EMAIL MARKETING:

FROM MESSAGE FILTERS TO AR FILTERS

by

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Bachelor of Design, Ryerson University, 2016

A Major Research Project

presented to Ryerson University

in partial fulfillment of the

requirements for the degree of

Master of Digital Media

in the Program of

Digital Media

Toronto, Ontario, Canada, 2019

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Author's Declaration

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Abstract

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The major research project explores augmented reality (AR) marketing for the retail industry in the advent of AR support in web browsers. In spite of advancements in mobile technologies, mobile AR research is limited and consumer acceptance is low, with a sense of uselessness ranking highly amongst consumer concerns. Three marketing emails, including a promotional, cart abandonment, and a seasonal campaign, are prototyped to demonstrate how mobile web-based AR can be integrated into email marketing strategies of the retail industry to increase levels of perceived usefulness. By satisfying the aim of the project within the technology acceptance model (TAM), AR can begin to shift from frivolous novelty to valuable commodity. The project deepens the field of AR application research, fills the gap in mobile studies, and the knowledge gained serves retail marketers as they develop the digital marketing strategies of tomorrow.

Acknowledgments

I wish to extend my sincere gratitude and appreciation to my supervisor, Assistant Professor Dr. Naimul Khan, for sharing his expertise. His teachings have allowed me to grow tremendously as a programmer. I would also like to thank my second reader, Assistant Professor Dr. Cheryl Thompson, for her mentorship and constant willingness to help. I have truly enjoyed my experience working by her side. Last but not least, I am forever grateful to my parents for encouraging my pursuits. This achievement would not have been possible without their unwavering love and support.

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Introduction

Significant research efforts in augmented reality (AR) have been documented in the last twenty years, with the emergence of entire conferences dedicated to presenting field advancements. During the 2008 International Symposium on Mixed and Augmented Reality (ISMAR), the leading academic conference on AR, Zhou, Duh, and Billinghurst categorized the prior decade of research. Building on this effort, Kim, Billinghurst, Duh and Welsh (2018) examined the ten subsequent years of research. The purpose of these two ten-year summaries was to analyze trends, to determine research limitations, and to recommend avenues for future work. A series of interconnected trends in the topics of mobile AR, AR applications, and AR evaluations were identified from the above summaries and have informed this major research project.

Kim et al. (2018) noted that although mobile devices came to be ubiquitous in the last decade, studies in mobile AR were limited. AR application research, in contrast, was among the most studied topics in both time periods examined. However, Kim et al. (2018) asserted that a need for greater depth across the application spectrum persisted. It was equally observed that the focus of AR applications shifted from largely targeting professionals to also including everyday consumers. As the technology diffused from industry to consumer, the quantity of AR evaluation studies spiked, revealing low acceptance levels stemming from a sense of perceived uselessness in everyday life. As per the technology acceptance model (TAM), noteworthy advancements in AR will continue to be rejected by consumers unless a useful purpose is also established. Nevertheless, recent research and development mostly focused on improving computations efficiencies and overall ease of use.

The major research project aims to develop a use case for mobile web-based AR grounded within TAM to deepen AR application research, fill the gap in mobile AR investigations, and help boost consumer acceptance. More specifically, the research project questions how mobile web-based AR can be integrated into various email marketing strategies of the retail industry to increase levels of perceived usefulness. By focusing on usefulness throughout the development process of email marketing materials, consumer perspectives of AR can be reframed from frivolous novelty to valuable commodity. Conclusions from the project will be beneficial to retail marketers as they work to create the digital marketing strategies of tomorrow.

This paper begins with a review of literature that introduces relevant background information and explores how AR marketing materials can be developed to maximize a sense of perceived usefulness. Perceived usefulness is studied with respect to the information search process, consumer empowerment, consumer-brand relationships, and habitual behaviours. The succeeding section of the paper reviews the methodological approach undertaken throughout the development of the research project. It also details the prototyping process for the marketing emails, including a promotional, cart abandonment, and seasonal email campaign. An evaluation is then conducted to assess if the project deliverable satisfied the objectives defined in regards to use value creation. Concluding remarks are subsequently coupled with a review of limitations and opportunities for further explorations.

Literature Review

Background

Augmented Reality Research

AR is defined as any technological system that merges the real with the virtual, supports real-time interactivity, and is registered in 3D (Azuma, 1997). Unlike virtual reality which blocks out the physical world for a fully immersive experience, AR enhances the real-world environment by superimposing virtual elements. Since the inception of AR in the late 1960s, the technology has garnered attention from both industry players and academic researchers (Qiao et al., 2019). Research efforts have culminated in a promising array of potential use cases for the technology, among which are education, medicine, military, manufacturing, entertainment, and advertising. Various types of AR hardware have also been introduced, including both mobile and non-mobile systems. Although the breadth of AR application research is substantial, particularly in North America and in Europe, there is a need for greater depth and understanding across the application spectrum as well as in mobile AR technologies.

Mobile Augmented Reality

Mobile AR is easily carried on one's person and can be used while on the go or occupied with another task (Craig, 2013). The paper utilizes the term mobile AR in accordance to Craig's (2013) distinction between mobile and portable. Under this judgement, hardware larger than a smartphone or tablet, such as a laptop, is considered portable, not mobile.

Currently, predominant platforms for mobile AR applications are hardware-based and app-based. Though these platforms have progressed immensely in recent years, certain limitations persist. For example, hardware-based applications such as smart glasses or head

mounted displays are costly (Qiao et al., 2019). They also face various challenges in regard to social acceptance, fashion conformance, and outdoor use (Bhutta, Umm-e-Hani, & Tariq, 2015). On the other hand, app-based applications require downloading and face cross-platform deployment obstacles (Qiao et al., 2019). Mobile web-based carries the potential to overcome many of the above constraints. However due to the infancy of the technology, research by Qiao et al. (2019) was among the only published works in this area and the authors called for AR developers to apply the theories in practice.

Mobile Web-Based Augmented Reality

Mobile web-based AR is an emerging area of web development that utilizes the same underlying technologies as websites, making it fully compatible with and accessible via standard web browsers. Though mobile web-based AR appears promising on many fronts, it also faces its own set of technical limitations. For example, the computational and energy efficiency of mobile smart devices as well as the mobile networks on which they run are all significant challenges that must be addressed (Qiao et al., 2019). However, as developers explore mobile web-based AR, it will be necessary to look beyond the code and examine consumer adoption of technological innovations.

The Technology Acceptance Model

TAM is applied to the research to provide a theoretical framework under which to execute the project. Established by Davis (1989), TAM proposes that the adoption of any technology is contingent on levels of perceived usefulness and perceived ease of use. The term perceived usefulness refers to the extent to which a technological system enhances job performance (Davis, 1989). In other words, perceived usefulness is the effectiveness of a

technology. Perceived ease of use, in contrast, measures the grade of difficulty associated with using a technological system (Davis, 1989). This can be understood as the overall efficiency of a technology. Although TAM was initially founded within the context of the workplace, it has since been applied to various technological scenarios, including the smart technologies of the retail industry. Through the investigation of evaluation studies and consumer adoption behaviours, it is possible to formulate an application for mobile AR that is welcomed by consumers.

Perceived Usefulness and Technology Acceptance

Davis (1989) concluded that usage intentions were more strongly linked to perceived usefulness than perceived ease of use. As long as technological systems were beneficial, participants were able to overlook friction in the user experience. However, no amount of ease of use was able to compensate for a technology without a useful purpose. This aligned with the results of Ha and Stoel (2009) who established that usefulness was the most accurate factor in predicting attitude towards online shopping and intent to purchase. Spreer and Kallweit (2014) also found no direct influence from perceived ease of use on AR acceptance within the retail industry. The authors attributed this to the intuitiveness of AR and the fact that customers were already familiar with smartphone devices. In view of this, the research project focuses primarily on developing use value rather than improving the user experience. Though mobile web-based AR has the potential to overcome the numerous ease of use concerns associated with mobile AR platforms, it is expected that user acceptance will not be captured unless a valuable purpose is established.

The Perceived Usefulness of Augmented Reality

In spite of substantial advancements in AR research, consumer applications for AR have not crossed the threshold from frivolous novelty to valuable commodity. Using an online survey with both qualitative and quantitative probes, Olsson and Salo (2011) investigated consumer acceptance of publicly released AR applications. The data collected from ninety participants revealed that positive user evaluations of AR were, for the large majority, shrouded by feelings of perceived uselessness in everyday life. Similar findings were obtained by Bhutta et al. (2015) who advocated that the overall success of AR was stippled by user acceptance levels of several issues including perceived usefulness. However, Bhutta et al. (2015) observed that with the arrival of mobile web-based AR, acceptance levels gained momentum. The mobile AR browsers studied in Olsson and Salo's (2011) survey were not only viewed as more innovative, but were also deemed more useful for everyday life in comparison to other mobile AR platforms. Given this, the research project asserts that mobile web-based AR is the appropriate type of AR in which to formulate a useful application of the technology.

Marketing and Augmented Reality

The core process of marketing consists of identifying the needs of consumers and clearly communicating how these can be satisfied (Lee, 2013). AR marketing, in particular, is a strategy adopted by marketers across various sectors that is designed to capitalize on the immense capabilities of mobile devices. Through AR, consumers can experience products, services, and brands in novel ways (Yaoyuneyong, Foster, Johnson, & Johnson, 2016). For example, the static characters on a poster for an upcoming movie can come to life when viewed through a mobile device. Since mobile capabilities are intrinsic to AR marketing and the field itself is heavily

focused on need satisfaction, this research project proposes that marketing is appropriate for the exploration of a useful application of mobile web-based AR.

Email Marketing

Email marketing is successful because it communicates with the individual, converts browsers into shoppers, holds high returns on investment, is incredibly measurable, and most significantly, reaches a mobile audience. Email is among the most utilized app and continues to be the most common mobile activity ahead of web browsing, social media, and games. Equally noteworthy, emails today are opened more frequently on mobile devices. In fact, 66% of all Gmail messages are opened on mobile devices (Hannah, Smith, & Swain, 2016). Furthermore, 72% of consumers claimed email as their preferred method of communication with brands, despite receiving an average of 416 commercial emails on a monthly basis (Hannah et al., 2016). Furthermore, emails are coded using standard web development languages. For these reasons, the research project proposes that email marketing is a suitable entry point for mobile web-based AR to reach a mobile audience. Overall, the project aims to deepen AR application research, address the gap in mobile AR investigations, and to bolster consumer acceptance levels by developing an exemplary use case for mobile web-based AR that is grounded in TAM. Therefore, the following research question is raised.

RQ: How can mobile web-based AR, when embedded within email marketing strategies used by the retail industry, lead to increased levels of perceived consumer usefulness?

Developing Useful Augmented Reality Marketing Materials

A study by Yaoyuneyong et al. (2016) compared traditional print advertisements to those with embedded AR content. Participants of the study, consisting of seventy-seven technically

savvy male and female college students, rated AR advertisements as superior to traditional print media in all independent variables measured such as novelty, entertainment, and informativeness. Nevertheless, when asked to select their preference overall, traditional print advertisements reigned supreme. Yaoyuneyong et al. (2016) concluded that AR content should be layered overtop traditional marketing materials to maintain a degree of familiarity and to conveniently communicate the marketing message. Overall, when AR marketing was successfully implemented, it held the power of putting the product into the hands of consumers (Yaoyuneyong et al., 2016). This research project proposes that, if thoughtfully embedded, AR will not intensely alter the standard email format and marketing effectiveness will be preserved and consumers will be more receptive to the AR capabilities.

Improving the Information Search Process with Augmented Reality

Rese, Baier, Geyer-Schulz, and Schreiber (2017) explored consumer acceptance of four mobile AR retail apps. Participants described the two apps accompanying catalogues with embedded AR markers as unnecessary because the AR experience merely offered extra traditional materials such as videos, sounds, and pictures. On the other hand, however, the two markerless virtual mirror applications reviewed were classified as helpful due to the ability to try on products, confirming that AR can serve a utilitarian function for everyday consumers. If AR within a marketing email provides useful data that cannot be easily conveyed using traditional mediums, particularly in relevance to the consumer's physical self or environment, it is expected that the information search process will be enhanced.

In the same way, Spreer and Kallweit (2014) presented mobile AR as beneficial within a physical retail store because the technology facilitated the consumer's search for information at the point of purchase. It is interesting to note, however, that participants claimed usage intention

would increase further if flyers promoting AR functionalities were displayed, particularly during the introductory phase. This research project claims that email is an appropriate substitute for flyers in the online world of retail. By promoting mobile web-based AR in email campaigns, value from an improved information search will be awarded to recipients and subsequent usage intentions are expected to elevate.

Empowering Consumers with Augmented Reality

Research by Hartemo (2016) observed the presence of filtering software combatting spam messaging and stated that it signaled lessening consumer acceptance levels of email marketing materials. According to Hartemo (2016), consumer empowerment will be key in maintaining high acceptance levels of email marketing into the future.

Consumer empowerment refers to the knowledge increase in consumers enabled by the internet that pushes marketers to alter their traditional marketing strategies (Hartemo, 2016). Consumers today have access to more information than ever before and are free to share their opinions with others through various channels. At the same time, however, marketers can better listen to consumer feedback and adapt as necessary. Hartemo (2016) argued that although social media affords one of the greatest opportunities for empowerment, email carried similar potential. For example, email permitted active, interactive, and personalized communication. However, Hartemo (2016) explained that psychological ownership played a role in feelings of empowerment and questioned if this could be generated through email.

Consumers naturally process information through touch and, as a result, research has explored how sensory experiences can be reproduced online (Hilken, de Ruyter, Chylinski, Mahr, & Keeling, 2017). Based on their research, Hilken et al. (2017) proposed that AR can

assist with the visualization of products, thereby bridging the gap between online and offline shopping. AR was proven to be particularly beneficial for material goods and experiential offerings of the retail sector. It was equally presumed that via AR, consumers could gain physical control of products within the online setting. A study by Brengman, Willems and Kerrebroeck (2018) concluded that due to perceived touchability, AR created a sense of ownership. The theory of perceived touchability argues that a physical touch is not needed for a sense of ownership, but that its simulation is sufficient to generate possession. Overall, Brengman et al. (2018) stated that feelings of ownership contributed positively to purchase intentions, user engagement levels, brand recall, and purchase confidence. This research project argues that by embedding mobile web-based AR into email communications, such sense of ownership can be instilled in recipients.

Lowering Risks by Forming Consumer-Brand Relationships with Augmented Reality

Scholz and Duffy (2018) emphasized the potential for AR marketing to forge deep relationships between consumers and brands. AR marketing was designed to capitalize on the capabilities of mobile devices and, as noted by Scholz and Duffy (2018), the home was among the top three locations where mobile devices were utilized. In other words, brands were entering the private realm of consumers. However, unlike the transactional stored-based AR applications, brands were able to melt into the background of AR marketing materials. Under these circumstances, the sense of self moved to the forefront and a seemingly more authentic experience was created and consumer-brand relationships were formed. This was found by Scholz and Duffy (2018) to be particularly beneficial in combatting the intrusive reputation that is often associated with marketing efforts.

Using TAM as a framework, Hubert, Blut, Brock, and Backhus (2017) assessed the influence of various types of risk on the adoption of mobile shopping apps. Apps with seemingly low financial risks reported higher levels of perceived usefulness. The research project proposes that by embedding mobile web-based AR into email marketing communications in a manner which considers the user's home environment, consumer-brand relationships may form. With relationships solidified, email marketing campaigns may appear relational rather than transactional. In turn, consumer fears of frivolous spending may be reduced and feelings of perceived usefulness may intensify.

By the same token, Hubert et al. (2017) uncovered that security risk influenced levels of perceived usefulness with regard to location sensitivity. Location sensitivity refers to the degree to which an app's content is relevant to the user's spatial context. Location sensitive mobile shopping apps were viewed as more useful, despite the fact that secure geographical information was shared with the app. Since email is frequently opened on mobile devices in the home, this project proposes that mobile web-based AR content will appear more localized and subsequently more useful. For example, viewing an advertised product in the email recipient's own home in lieu of a staged advertisement may be more spatially relevant. Overall, such emails may be more effective because it removes the mental load of imagining a product, brand, or service in one's own space.

Using Emails to Develop Habitual Behaviours

Hannah et al. (2016) claimed that since email is used several times per day, it is the most pervasive communication tool. Venkatesh, Thong, and Xu (2012) affirmed that an extended period of repeated actions can form a habitual behaviour triggered upon a particular context or environment. For example, if one reads a book every day during a break from work, one will

come to associate breaks with reading. Hubert et al. (2017) stated that habits were positively related to the levels of perceived usefulness of a technology. Given that email is used with such high frequently, it is expected that viewing embedded AR within email communications may become habitual and reach greater acceptance levels due to the sense of usefulness stemming from routine.

Methodology

Design Science Research Methodology

To fulfill the aim of the project, development adhered to the design science research methodology (DSRM). First proposed by Peffers, Tuunanen, Rothenberger, and Chatterjee (2007), DSRM frames the creation of successful information systems. The field of design science, guided by the core values of design and proof of usefulness, seeks to resolve problems by creating innovative technology solutions (Hevner & Chatterjee, 2010). This research project followed the six activities of DSRM, including (1) problem identification and motivation, (2) definition of the objectives for a solution, (3) design and development, (4) demonstration, (5) evaluation, and (6) communication. It is important to note that DSRM is structured nominally, therefore, the activities defined are not required to be conducted sequentially. In fact, the first four activities are all possible points of entry into the methodological process (Peffers et al., 2007).

The research project entered DSRM by means of a design and development centered approach (activity 3). A design and development centered approach results from using an existing technological system to solve a problem other than the one for which it was created (Peffers et al., 2007). As previously stated, the research project aimed to demonstrate how

mobile web-based AR (an existing technological system) could be embedded within the email marketing strategies of the retail industry to increase levels of perceived usefulness for consumers (new problem resolution). The graphical representation of DSRM as provided by Peffers et al. (2007) has been adapted to illustrate the process of the research project and is presented in Appendix A. Activities one through four are also detailed below, with the fifth activity to be presented and discussed in the next section of the paper. It is important to note that activity six is not explicitly addressed, but is instead represented by the totality of this paper.

Activity 1: Problem Identification and Motivation

In spite of substantial advancements in AR research, consumer applications for AR in the retail sector have not crossed the threshold from frivolous novelty to valuable commodity. For this reason, there was a need to assess the shortcomings of AR. A review of literature revealed that perceived usefulness was amongst the primary sources of criticism voiced by consumers, however, AR research and development has largely focused on improving computational capabilities as well as perceived ease of use. Studies also tended to be too broad in scope, naming entire sectors as possible benefiters of AR without examining the development of individual use cases in greater depth. Furthermore, studies reviewed publicly released applications, failing to consider usefulness throughout the design and development of applications. Noteworthy advancements in AR technologies and resulting consumer applications will continue to be overlooked by consumers unless a useful purpose is also established. Focusing on usefulness throughout the development process of a mobile web-based AR use case could deepen the fields of AR application and mobile AR research and bolster consumer acceptance of the technology. It could equally benefit retail marketers as they work to develop the digital marketing strategies of tomorrow.

Activity 2: Definition of Objectives for a Solution

The aim of this project was to demonstrate how mobile web-based AR could be integrated into email marketing strategies to increase levels of perceived usefulness. Therefore, various types of emails frequently used by the retail industry were to be created to host valuable web-based AR experiences. Useful AR content to be developed was expected to (1) simplify the information search process for advertised products, services and brands; (2) empower recipients by generating a sense of ownership towards the advertised products, services and brands; (3) form consumer-brand relationships to reduce both financial and security risks; and (4) establish habitual behaviours to increase activity and reduce the cognitive load required for use.

Activity 3: Design and Development

The design and development phase of the project deliverable, spanning approximately sixty days total, consisted of two phases of rapid prototyping and one period of refinements into a minimum viable product. As per the iterative nature of DSRM, activities two through five were briefly reviewed between each phase of the third activity. Ancillary information in regards to the technologies used is available in Appendix B.

Activity 3.1: Phase One (Prototype 1)

Phase One served to confirm the viability of embedding mobile web-based AR experiences within email marketing materials. An initial prototype was developed to establish basic AR functionality within a standard HTML email template. To produce the template, a rudimentary layout was sketched during a wireframing session (See Appendix C, Figure C-1). The wireframe was then coded in Visual Studio using HTML5 and CSS. Due to the objective of purely establishing feasibility, a precise type of email was not envisioned. Instead, the look and

feel of an email was simulated using greyscale colour-blocking and placeholder images and text (See Appendix C, Figure C-2). It is important to note that despite the simulation, usefulness remained core to the development process. At this stage, however, the usefulness stemmed from the placement of AR within the email and not the content itself.

The mobile web-based AR experience was realized by integrating 8th Wall Web into the Babylon.JS framework. In this framework, the AR content must be embedded on an HTML canvas, a standard web element. Thus, the canvas was easily positioned and resized within the email template using CSS. In a similar fashion to the above placeholder assets, predefined 3D shapes were added to the canvas for the purpose of testing. JavaScript code was also introduced to the template to add functionality to various HTML elements and to control the AR content. The final step of Phase One consisted of running the mobile web-based AR application on an Android smartphone device. For the purpose of confirming feasibility of concept, Prototype 1 was served locally from a Windows computer and not a web server (See Appendix C, Figure C-3). Once the mobile web-based AR ran successfully, viability was affirmed and work on Phase Two began.

Activity 3.2: Phase Two (Prototype 2A, 2B, and 2C)

In Phase Two, a mock email campaign was designed to explicitly explore how mobile web-based AR content could be embedded to generate a sense of usefulness. Materials for the marketing email were informed by retail trend forecast reports for Autumn/Winter 2019/2020 to ensure applicability to the time period in which the research was conducted. From the industry reports, a mock brand, product and service was defined to heighten the realism of the marketing emails. The email was then planned in accordance to the anatomy established by Hannah et al. (2016). In Hannah et al.'s (2016) model, successful marketing emails consist of seven elements

including send date and time, header, subject line, primary message, body, call to action, and the footer (Hannah et al., 2016). Following the definition of the outline elements by means of storyboarding, the development of Prototype 2 commenced.

The first step in the execution process was to construct the elements using a series of Adobe Creative Cloud programs. A blank 3D model was sourced from the Adobe Dimension CC stock library and used to form the 3D content for the AR experience (See Appendix C, Figure C-4). Textures for the model were fabricated using Adobe Illustrator CC and Adobe Photoshop CC to digitize hand-drawn motifs inspired by the print and graphic forecast reports (See Appendix C, Figures C-5 & C-6). The finalized model was exported from Adobe Dimension CC to .glb, a file format compatible with 8th Wall Web and Babylon.JS. A 3D scene was also built to stage the model within a lifelike setting (See Appendix C, Figure C-7). A photorealistic image of the scene was rendered to serve as the pictured advertisement accompanying the AR elements in the body of the email (See Appendix C, Figure C-8).

Prototype 2A was largely built on the code written during the first phase of the design and development process. The initial email template was adjusted based on the type of email envisioned and the placeholder assets were replaced with body copy, imagery, and the custom 3D model. The prototype was subsequently tested on the same Android smartphone device by serving the mobile web-based AR application locally from a Windows computer.

The core research question of this project sought to explore how usefulness could be generated within various email marketing strategies of the retail industry. Therefore, Phase Two was repeated twice more, resulting in a total of three unique marketing emails, each serving a different marketing goal (Prototype 2A, 2B, and 2C) (See Appendix C, Figures C-9 to C-14).

Activity 4: Demonstration

Activity 4.1 (Minimum Viable Product)

The design and development process resulted in a set of three unique email marketing campaigns that mimicked strategies frequently utilized in the retail industry. The types of emails explored consisted of a standard promotional campaign, a cart abandonment campaign, and a seasonal campaign. The finalized email marketing campaigns were hosted on a single web server and linked together to form a minimum viable product (See Appendix C, Figure C-15). This also facilitated the demonstration and evaluation of perceived usefulness for each campaign developed. Perceived usefulness was measured based on the extent to which each email satisfied the objectives defined for the solution. Results from the evaluation process are elaborated upon in the next section of the support paper.

Evaluation

As presented in the literature review, AR marketing strategies are more successful when layered overtop traditional advertisements than when used as substitutes because of an ensuing sense of familiarity (Yaoyuneyong et al., 2016). The placement of the AR canvas was, therefore, carefully considered throughout the design and development process. Two HTML canvases were defined and layered on top of one another using CSS. The top canvas was filled with an image (standard advertisement) while the canvas below contained the AR experience (supplementary content) (See Appendix D, Figures D-1 & D-2). Using JavaScript, functionality was added to an HTML button to enable toggling between the two canvases. In the default view, the image was visible to both resemble and function as a traditional marketing email. In the supplementary view, however, the image was hidden to give way to a useful AR experience. The structure of the

code itself successfully intensified usefulness because it embedded mobile web-based AR content in a manner which offered superior functionality without replacing or significantly altering the current format of marketing emails.

Alongside the placement of the AR canvas, the content and functionality brought forth via mobile web-based AR must be evaluated for usefulness. This evaluation was conducted using TAM. Within TAM, perceived usefulness refers to the extent to which a technological system enhances job performance, or to put differently, its overall effectiveness (Davis, 1989). This definition can thus be applied to email marketing as the degree to which embedded AR content facilitates effective email checking. As defined in the objectives for the solution, AR content was to be considered most useful only if it (1) simplified the information search process for advertised products, services and brands; (2) empowered recipients by generating a sense of ownership towards the advertised products, services and brands; (3) formed consumer-brand relationships to reduce both financial and security risks; and (4) established habitual behaviours to increase activity and reduce the cognitive load required for use. The remainder of this section reviews whether these criteria were successfully realized throughout the creation of the exemplary marketing application for mobile web-based augmented reality.

Perceived Usefulness from a Simplified Information Process

As put forward by Spreer and Kallweit (2014), AR held the power to facilitate the search for information at the point of sales, however, shoppers called for increased awareness of AR, particularly during the introductory period. Despite the resemblance to a standard marketing email, the presence of AR functionality was made evident through careful design of key email elements, such as in the subject line, body copy, and call to action. In doing so, the presence of the AR experience and the beneficial reasons for its inclusion were well communicated. For

example, in the abandoned cart email the subject line ("Still deciding? See our lamps in your home first!), the primary message ("Need help deciding? This Floral Ceramic Table Lamp might be the perfect accent piece for your room! Tap the button below and see exactly how it looks in your home before completing your purchase."), and the button text ("View in Room") worked together to reinforce the usefulness of the AR content. The purpose of the email was no longer a mere reminder to complete a purchase, it served to remove the mental burden of visualizing a product in one's own space and supported an informed purchase.

In standard marketing emails, advertised products, brands, and services are often presented in a static image or in an animated GIF that swiftly loops through a series of images. Consequently, consumers must follow a link to the sender's website to acquire more visual information. The AR experience afforded the opportunity to view the product in their own environment from all angles and distances within the email itself, bringing the missing visual information directly to the consumer (See Appendix D, Figure D-3). For these reasons, the embedded web-based AR content successfully improved the information search process within the email marketing campaigns, thereby increasing levels of perceived usefulness.

Perceived Usefulness from Consumer Empowerment

This research project suggested that embedding mobile web-based AR into email communications would empower consumers by instilling a sense of psychological ownership over the marketing materials. Touch interaction with the AR content was rather limited, however, the 3D models were visible from all angles and could be re-centered within the field of view by tapping the screen. In the promotional campaign, for instance, a free gift with purchase was offered. Rather than simply displaying a static image of the promotional item, the item was pictured wrapped in a gift box, to be unwrapped by launching the AR experience within the

email (See Appendix D, Figures D-4 & D-5). The act of opening a present is an experience that most can relate to, therefore, the simulation of touch in the AR experience remained strong. However, such feelings may have been heightened even further if the AR content included animations of the present being unwrapped based on user touch. Due to perceived touchability, the mobile web-based AR experience remained successful in generating the missing sense of ownership required for true consumer empowerment. Under these circumstances, feelings of perceived usefulness were strengthened.

Consumer empowerment, facilitated by greater consumer access to information via the Internet, drives change in marketing (Hartemo, 2016). By generating the missing sense of ownership required for true empowerment, the selling approach of the marketing emails was also transformed. Generally, standard marketing emails do not allow for interactions with products, brands, or services beyond a transactional selling nature. Moreover, the interactions that they do afford do not take place within the emails themselves. When an email recipient acts upon a call to action, the recipient is automatically redirected to the sender's website. As a result, the recipient's control over the experience is low and feelings of solicitation are high. The added toggle functionality allowed for full control over the AR experience. Thus, the supplementary content could be interacted with only as needed and within the email environment, an opportunity that was more relational than transactional.

Perceived Usefulness from Consumer-Brand Relationships

This research project proposed that consumer-brand relationships could form so long as embedded mobile web-based AR took the email recipient's environment into consideration. Given that the AR content appeared tied to the physical space in which it was viewed, it can be concluded that the marketing materials felt more spatially relevant than a traditional email. As

per the literature reviewed, the ensuing effects of consumer-brand relationships were twofold: first, financial and security risks decreased; and secondly, perceived usefulness increased. To illustrate, the abandoned cart campaign encouraged email recipients to view a product left in their virtual shopping cart in their own environment prior to making a purchase decision. The marketing email did not serve solely as a purchase reminder, it facilitated an informed purchase decision (financial risk) in a location sensitive manner (security risk) (See Appendix D, Figure D-6). In doing so, the communication effort appeared more genuine, as if sent from a companion and not a company.

It is important to note, however, that consumer-brand relationships may have been strengthened further if certain AR functionalities were improved. Though the AR content appears grounded in the surrounding space and can be re-centered within the field of view by tapping the screen, the 3D models cannot be dragged and dropped into position. In order for an email recipient to view a product on, for example, their own table, they must physically position themselves in front of their table. With drag and drop functionality, the product could be placed more accurately and from further distances. Nonetheless, the mental load of imagining a product, brand, or service in one's own space was significantly reduced, therefore, perceived usefulness increased.

Perceived Usefulness from Habitual Behaviours

Owing to the large majority of consumers who check their email multiple times per day, it was expected that the use of mobile web-based AR could become habitual through this medium. The unobtrusive manner in which the AR content was embedded within the email marketing campaigns successfully helped trigger repeated behaviours. As an illustration, seasonal email campaigns are sent with a high degree of regularity. As such, consumers would

experience and interact with AR consistently and would become acclimated rapidly. At the same time, consumers would begin to associate checking their email with AR content. The seasonal email type alone provides numerous opportunities for consumers to interact with new products, brands, and services. However, the project deliverable equally confirmed that AR could be easily implemented into the various types of email marketing strategies used by the retail industry. Ultimately, the effect of such repeated actions improves perceptions of usefulness and results in greater acceptance levels of mobile web-based AR.

Conclusion

Implications for Future Research

This research project brings forth many opportunities for future work. First, future studies should be developed to validate the perceived usefulness of the embedded AR elements through an online questionnaire posing both qualitative and quantitative questions. Likert scales and open-ended questions may be particularly beneficial in measuring the ensuing degree of usefulness. It is also recommended for various generational cohorts to be surveyed. For example, research supports that a greater percentage of Millennials prefer reading their emails on mobile devices than other age groups (WGSN Forecast Team, 2016a). However, Generation Z seeks out information and authenticity in branding more so than others (WGSN Forecast Team, 2016b). It would be interesting to see if perceived usefulness varied based on such generational breakdowns.

Along the same vein, Hannah et al. (2016) reviewed the many personalities of email users, including deleters, filers, and pilers. Deleters are email users who easily and rapidly delete emails deemed irrelevant. Filers are those that maintain an organized inbox by classifying

emails. Pilers, on the other hand, hoard all emails in an unorganized manner. Future studies should explore if, and how, perceived usefulness varies by personality type. For example, stronger levels of perceived usefulness could be experienced by pilers because feelings of ownership created by AR may build the confidence or necessary information to more effectively process email marketing materials.

In addition to validating usefulness, research should also assess the effectiveness and impact of mobile web-based AR in email marketing materials. Email marketing is highly quantifiable, with various trackable values such as open and click through rates (Hannah et al., 2016). An email marketing campaign with embedded AR content should be launched and key metrics should be analyzed. Quantitative results should then be compared to those of a traditional email campaign. Furthermore, email marketing spans many industries and serves many purposes beyond the three created in this research project, therefore, further types of emails and business sectors should be studied in such testing. It is probable that consumers may perceive usefulness differently across business sectors. Placing a lamp on your table via AR may be more useful than, for instance, placing a character from an upcoming movie. Within such context, the AR content may appear as more of a novelty than a practical application.

Finally, given that traditional emails usually consist of several images, it is recommended that marketers also explore how multiple AR canvases could be integrated into their marketing materials. Enhancing the visual realism of the 3D models may also be beneficial in creating use value for consumers. AR experiences should also be enhanced to include other functionalities, such as virtual try-on capabilities.

Implications for Practice and Recommendations

Due to high customer acquisition costs, companies seek marketing strategies that combat churn rates and increase customer retention levels (Chang & Zhang, 2016). Chang and Zhang (2016) argued that retention efforts should be focused on preventing customers from becoming inactive while also re-activating those who have become inactive. Offline channels were defined as most effective in reviving customers since physical environments were more immersive, offered educational opportunities, served as memory aids, and established consumer-brand relationships. Online channels, on the other hand, were viewed as more effective in maintaining active consumer relationships due to their convenient nature. This research project proposed a method of embedding web-based AR into marketing emails that not only maintains their convenient nature suitable for maintaining active consumers, but that also assists in their revival process.

Overall, this research project equips marketers with a new approach to email marketing, an advertising method within the retail industry that has remained relatively unchanged. Given the elevated quantity of marketing emails received by consumers each month, marketers will benefit greatly from an ability to stand out from the efforts of other retailers. Although marketing emails are highly successful, consumers are beginning to show signs of refusal, as signified by the ever-growing presence of filtering software combatting spam messaging (Hartemo, 2016). By increasing the sense of perceived usefulness via the implementation of AR, marketers can reverse the diminishment in acceptance levels.

Limitations

Primary data was not collected due to time constraints. Consequently, this research project relied on the conclusions of pre-existing studies. However, mobile web-based AR is in its infancy and published works are not yet supported by additional research efforts. It was, therefore, necessary to also extrapolate conclusions from other forms of consumer AR technologies adopted by the retail industry. The inability to control the research environment equally imposed limitations on the research project. In view of rapid technological advancements, the landscape of AR is ever changing and even recently completed research studies may already be inapplicable. This pertained not only to the literature reviewed, but also to the AR platform used. At the time of this project, 8th Wall Web was launched less than one year prior; therefore, updates and new functionalities are released regularly. In fact, during the four short months in which the project ran, developers of 8th Wall Web pushed fourteen code revisions and launched an entire new version of the platform (Release 12). Under this fast-paced environment, it was necessary to continuously re-assess how usefulness could be created.

Summary

The overarching aim of this project was to deepen the field of AR application research, fill the gap in mobile AR investigations, and to bolster consumer adoption levels by developing an exemplary use case for mobile web-based AR grounded in TAM. More specifically, the research project called into question how mobile web-based AR could be embedded within the email marketing strategies of the retail industry to heighten levels of perceived usefulness for consumers. It was found that the sense of usefulness could be heightened due to an enhanced information search process, the generation of ownership needed for consumer empowerment, enabling the formation of consumer-brand relationships, and the facilitation of habitual

behaviours. At its core, this project was intended to inspire retail marketers as they work to develop the marketing strategies of tomorrow. By focusing on the creation of usefulness throughout the design and development of AR marketing strategies, marketers will experience better conversion from their efforts that stems from greater acceptance of AR technologies. At the same time, consumers will find their inboxes filled with marketing materials that serve a more useful purpose than putting their filtering systems to use. Overall, the integration of web-based AR will not only help shift consumer perspectives of AR from frivolous novelty to valuable commodity, but it will also do the same to email marketing materials.

Appendix A – DSRM Process Model

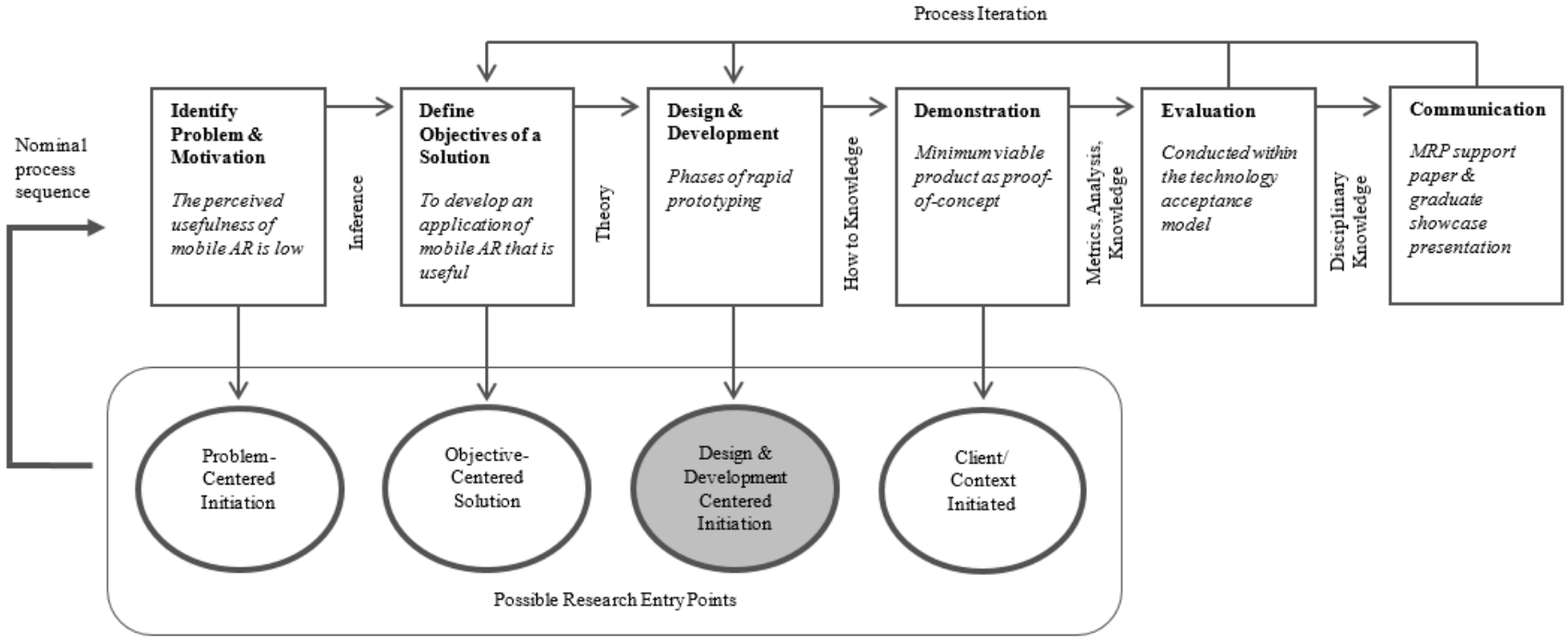

Figure A-1. DSRM Process Model. This chart depicts the research entry point and the methodological process undertaken throughout the research project. Adapted from the DSRM Process Model by Peffers et al. (2007).

Appendix B – Description of Technologies Used

Description of Technologies Used Throughout the Development Process		
Technology Category	**Technology**	**Description**
Programs	Visual Studio	An integrated development environment (IDE) from Microsoft
	Adobe Dimension CC	A 3D rendering and design software
	Adobe Illustrator CC	A software for creating vector graphics
	Adobe Photoshop CC	An imaging and graphic design software
Web Development	Hypertext Markup Language (HTML)	Defines the structure of a web page
	HTML5	The fifth and most recent version of HTML
	HTML Canvas Element	A container for drawing graphics on a website. Graphics are drawn using JavaScript.
	Cascading Style Sheet (CSS)	Defines the presentation of a web page
	JavaScript	A programming language for the web
Augmented Reality Development	8th Wall Web	An augmented reality platform for the mobile web.
	Babylon.JS	A JavaScript framework for displaying 3D graphics on the web using WebGL (JavaScript API) and the HTML5 canvas element.
Graphics	.glb	A file format for 3D assets.

Appendix C – The Design and Development Process

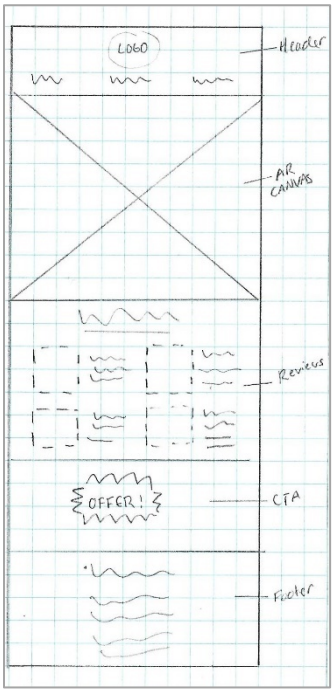

Figure C-1. Hand drawn email wireframe. This figure exemplifies the rudimentary layouts created throughout the initial wireframing sessions.

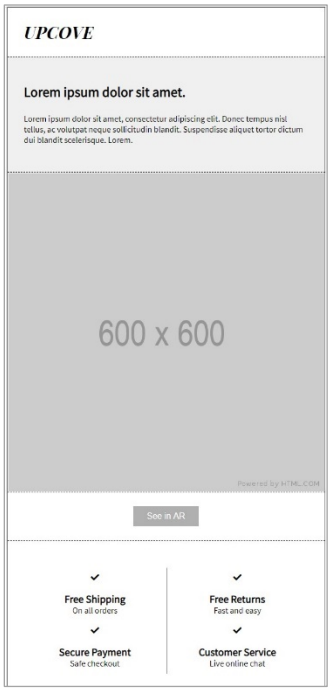

Figure C-2. Coded email wireframe. This figure shows the early transformation from sketch to code using placeholder images and a greyscale colour palette.

Figure C-3. QR code for local serving. This figure showcases a QR code generated in the Command Prompt that was used to test the web application locally.

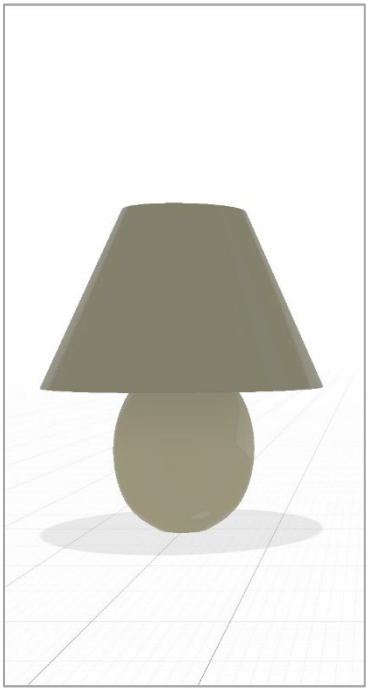

Figure C-4. Blank 3D asset. This figure demonstrates a blank 3D model as sourced in the Adobe Stock Library.

Figure C-5. Hand drawn motifs. This sketch demonstrates the elements used to create a material for the 3D model.

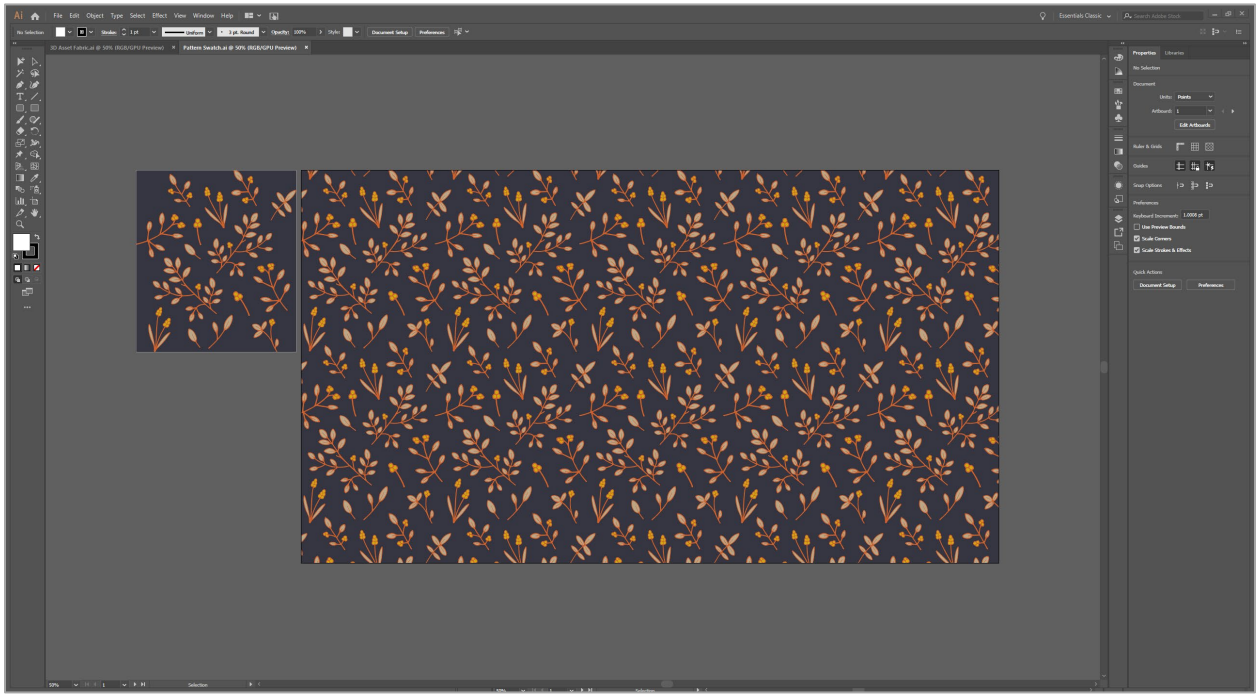

Figure C-6. Pattern design process. This figure illustrates a block motif created in Adobe Illustrator CC and its resulting pattern when repeated.

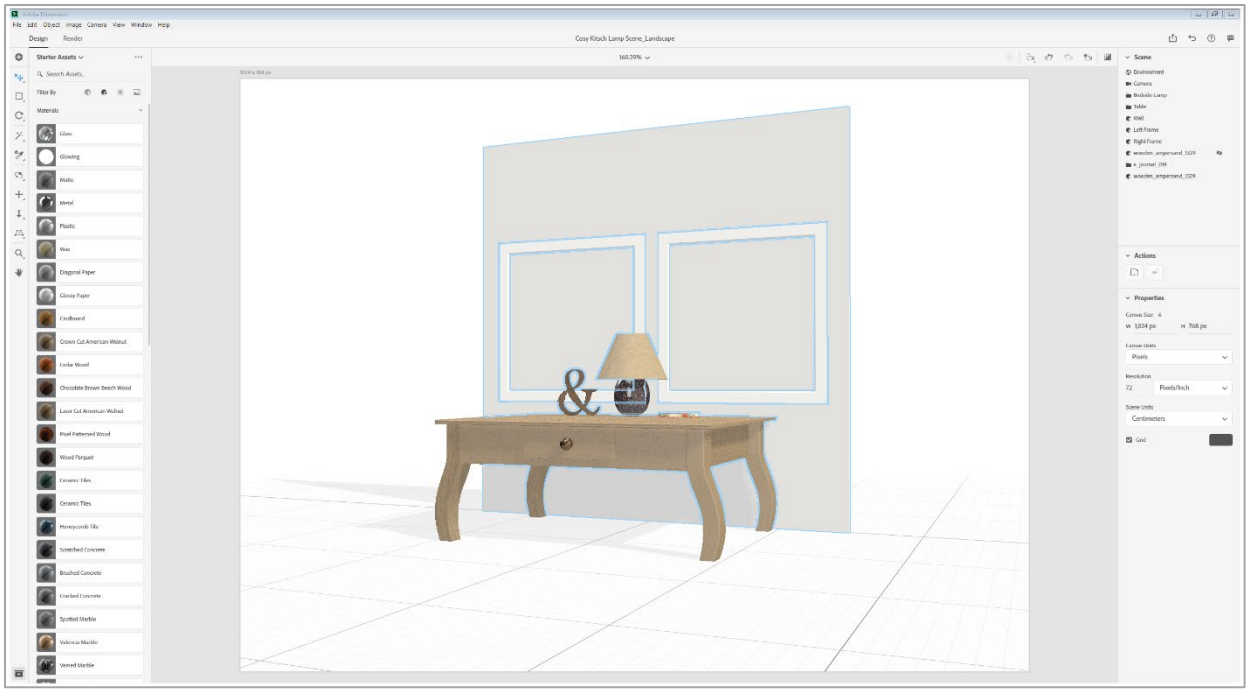

Figure C-7. 3D scene creation. This figure demonstrates how the 3D assets were staged in a scene to create the marketing materials.

Figure C-8. Rendered 3D scene. This figure showcases a 3D scene that has been rendered photo realistically.

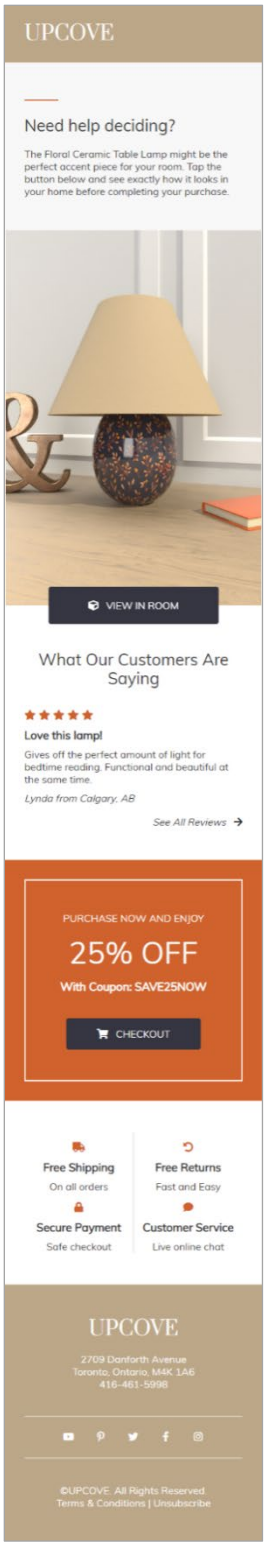

Figure C-9. Prototype 2A. This figure demonstrates the layout of the cart abandonment email campaign.

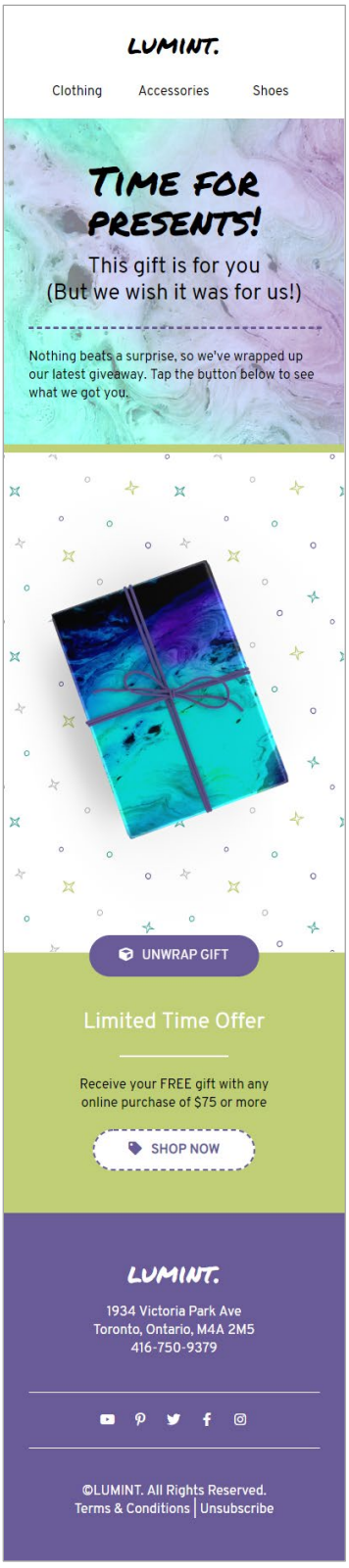

Figure C-10. Prototype 2B. This figure demonstrated the layout of the standard promotional email campaign.

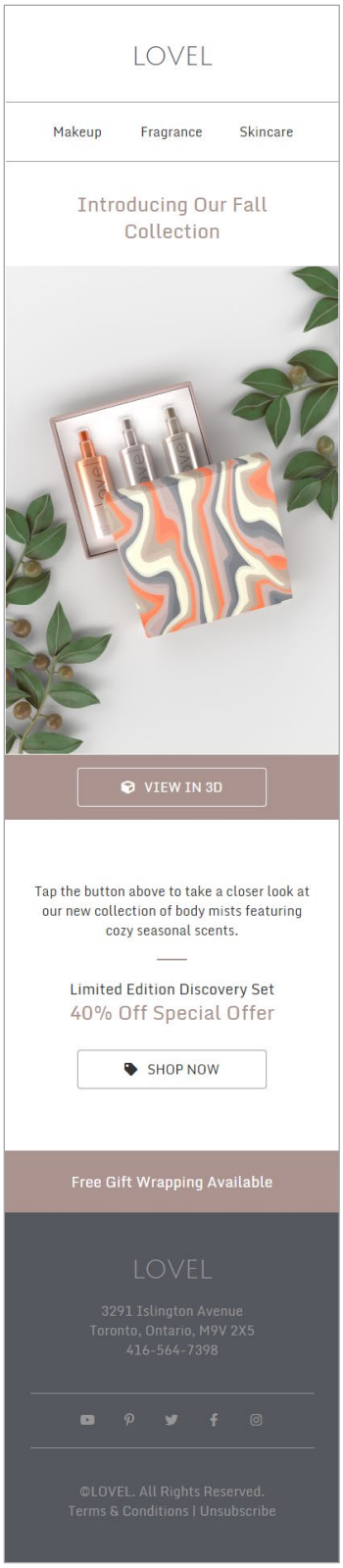

Figure C-11. Prototype 2C. This figure illustrates the layout of the seasonal email campaign.

Figure C-12. Model for Prototype 2A. This figure illustrates a 3D model of a lamp with textures applied.

Figure C-13. Model for Prototype 2B. This figure illustrates a 3D model of a pouch with textures applied.

Figure C-14. Model for Prototype 2C. This figure illustrates a 3D model of a bottle with textures applied.

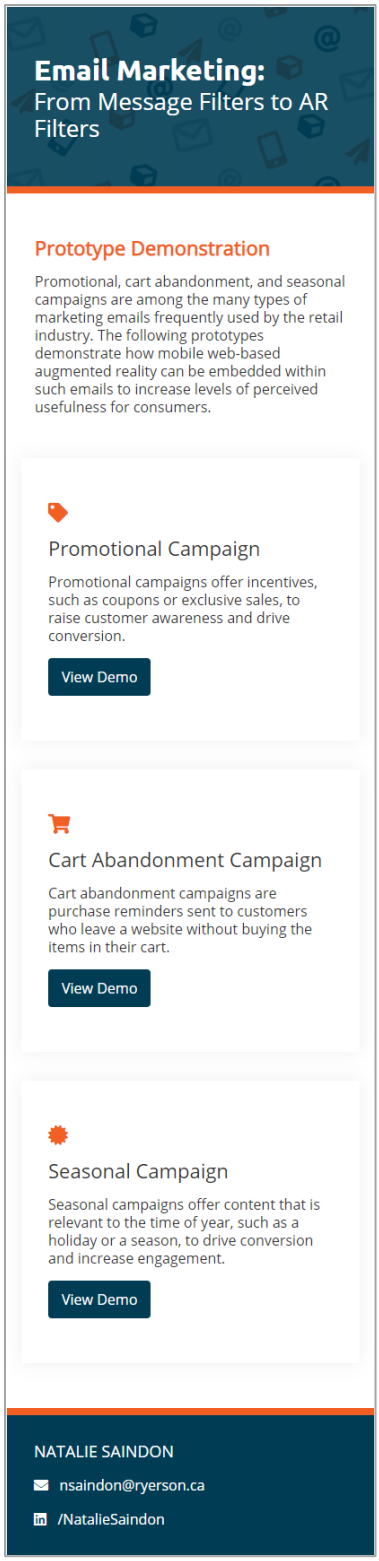

Figure C-15. Minimum viable product. This figure illustrates the demonstration page for the finalized email marketing campaigns.

Appendix D – Supporting Visuals for Project Evaluation

Figure D-1. Default view of cart abandonment email. This figure shows the top canvas filled with an image to resemble a traditional marketing email (the bottom canvas is hidden in this state).

Figure D-2. Supplementary view of cart abandonment email. This figure shows the bottom canvas containing the AR experience as viewed on launch (the top canvas is hidden in this state).

Figure D-3. Close-up of 3D model advertised in seasonal email. This figure shows how email recipients may view the product up-close and from all angles.

Figure D-4. Default view of promotional email. This figure illustrates the promotional item wrapped in a gift box.

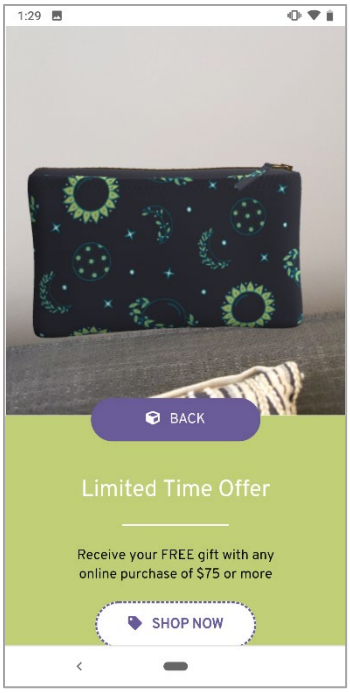

Figure D-5. Supplementary view of promotional email. This figure shows the promotional item once digitally unwrapped by the email recipient.

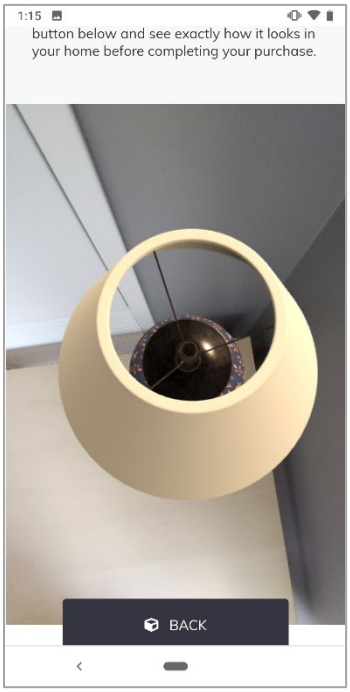

Figure D-6. Top view of 3D model of advertised product in cart abandonment email. This figure shows how the user may view the product from all angles and on their own furniture.

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