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Title of thesis Designing for Trust in News Media: Encouraging Digital Literacy Through Product Design

Department Department of Media

Degree programme New Media Design & Production

Year 2019   **Number of pages** 90   **Language** English

Abstract

Fake news, or false information in the media, is likely as old as legitimate news, but gained newfound attention in the months before and after the 2016 United States presidential election. The prominence of widespread false content in the media has converged with existing critiques of the media industry related to biased and misleading content, in an environment marked by the notable decline of trust in the industry. This represents a shift in media industry dynamics which negatively impact media consumers, who rely on information in the media to form and adapt their individual worldview.

Due to advances in technology, consumption of news media is rapidly shifting to mobile device-based experiences, which are primarily the domain of digital product designers. These designers are responsible for the user experience (UX) on mobile devices. Thus, they are tasked with ensuring consumers are able to access reliable news media content and build a better understanding of this media content through improved media and digital literacy. To do so, digital product designers need resources and framing to support them to this end.

Through the lens of design inquiry, this research-based thesis explores themes related to media industry dynamics, critical thinking, and the future of false information. This enables the creation of a research base and development of a preliminary set of product design guidance to support designers in building better media consumption experiences for people.

A literature review is conducted to understand the media industry trends that have led to the current situation. Models and visual schemas are constructed to aid designers in comprehension of this situation. These models show how false information and digital product design affect consumers' ability to form an accurate worldview. The projected evolution of false information and its impact are assessed. To understand different methods of addressing the trend of false information from a product design perspective, existing implementations developed by technology platforms are reviewed.

The culmination of this research is future-oriented product design guidance which emphasizes presenting consumers with accessible, effective contextual information and encouraging critical thinking capabilities while consuming media content. The guidance provides practical, adaptable recommendations for designers along with the research foundations, and should serve as an effective resource for digital product designers to enhance and augment the user's experience consuming media.

Keywords Product design, news media, information disorder, user experience, design guidance

Designing for Trust in News Media

Encouraging Digital Literacy Through Product Design

Master's Thesis
William Turner

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Acknowledgements

To Alexandra, whose encouragement and love have been incredible, and whose embrace of adventure made this whole thing possible to begin with;

To my parents, whose support and wisdom have meant the world, and to my family;

To Teemu and Jarno, whose careful guidance has been indispensable;

To Maya, Timi, Caleb, & Sourya, who are all smarter and more talented than I, for feedback and motivation;

To Ben, for inspiring this topic;

To Nordkapp for being the brightest, challenging minds;

And to The Proclaimers, without whose music this thesis would have never been finished. *It's over and done with.*

1. Introduction

The memetic phrase *fake news*, referring to false or misleading information in the media became a major topic of interest in 2016 in the aftermath of the U.S. presidential election. Only after the election occurred did the public recognize false information had spread broadly through online news media and across social media, and concern originally focused on the source, breadth, and intent of those publishing false information (Lazer et al., 2018). What later became clear is that, by diverting consumer interest away from high-quality media sources, and helping to confirm consumers' existing biases, widespread false information disrupted the public's access to reliable information (Allcott & Gentzkow, 2018).

This thesis will argue that an informed public is crucial to democracy, and a functioning and trusted media industry is crucial to the intact power of the people. The methods and sources by which people consume news media information has a significant impact on their worldview and the level to which they trust the media industry. In turn, this affects the methods and sources they choose to consume further media content, continuing to exacerbate the problem. These methods are shifting to digital formats, especially to mobile devices, and the experience of using a mobile device is largely the domain of digital product designers. In order to ensure a trusted media industry and an informed public that can form their worldview on the basis of accurate information, designers of digital products and services need reliable guidance to improve the experience of consuming news media for people.

In their seminal design text, The Design Way, Harold G. Nelson and Erik Stolterman (2012) call design "a natural and ancient human ability—the first tradition among many traditions of human inquiry

and action" (p. 1). It is from this tradition that I borrow a design inquiry approach to research this complex situation. Nelson and Stolterman note that a design inquiry approach is a well-adapted tool for making sense of complicated circumstances with many unpredictable factors. This is a fitting description of the current situation in the media industry, because of distrust in the media and widespread false information and its effect on consumers. The research in this thesis leverages and adapts a general structure described by Nelson and Stolterman (2012) to explore this topic in depth.

In 2016, the false information in the media emerged and spread largely via decentralized social media platforms. These platforms are excellent hubs for users to share information directly with one another but can be insufficient at providing context to its users. Therefore, it proved difficult for media consumers as well as those studying this issue to understand whether the creators and people who shared the false content over social media understood that the content was in fact misleading, biased, or false. Furthermore, it was not clear whether there existed malicious intent behind the creation and dissemination of the false content.

With so many distorted signals, it is difficult to determine if false media content was created to merely generate revenue for its publishers, or if it was disseminated in order to sow discord and disrupt the public's access to information. Regardless, research into the situation has shown that this kind of false media content was more effective in attracting attention and viewers via social media than legitimate media content ahead of the election, disrupting access to information for the public (Silverman, 2016; Vosoughi, Roy & Aral, 2018). Allegations emerged of a concerted and significant effort by Russian agents to disrupt American society conducted primarily by spreading false information via media publishers, advertising, and over social media from Russia (Shane & Goel, 2017). Government-led investigations spanning years uncovered notable evidence supporting the allegations (Shane & Goel, 2017).

In short, these events showed that contemporary technology creates an environment in which media content can be convincingly faked and seamlessly shared, sometimes without ill intent, influencing human

thought and behavior. Later in this thesis in section 2.4, a model and schema of this situation is established. Not only is the widespread false information phenomenon a current problem for society, it will continue to present difficult problems in the future as false content evolves ("Gartner reveals top predictions," 2017).

Before the next quadrennial U.S. presidential election begin, it is worthy and insightful to examine how the recent few years of the American public's experience with the media, politics, and society has unfolded. The lessons learned from the 2016 campaigns and the tremendous ripple effects still emanating from those events will prove extremely valuable as the 2020 campaign begins.

Increasingly, American media consumers receive and interact with news content via a mobile device, replacing other digital consumption methods such as browsing from laptops and desktops (Fedeli & Matsa, 2018; Newman, Fletcher, Kalogeropoulos, Levy & Nielsen, 2018, p. 27). In modern product development processes, crafting the user experience on mobile devices is the responsibility of product designers, who devise the way devices and experiences should operate.

This thesis will explore themes related to media consumption, the future of false information, distrust in the media as an institution, human thought and product design. Based on the information explored, strategies for how to improve the news media consumption experience for users via design will be proposed.

Because some concern exists among researchers about the memetic use of the phrase fake news as a critique on traditional media, this thesis commonly uses more specific terms such as *false information in the media* to refer to any intentional or unintentional content that is false, biased or misleading in a significant way. Other important terms used to identify this trend include *misinformation*, to identify false news information shared with the belief that it is true, and *disinformation* for false news information that is shared with the intention to mislead. More reasoning for these particular terms is contained in section 2.7, Key terms.

1.1 Research goals

The main intentions of this thesis is to explore the societal circumstances related to media industry dynamics and widespread false information, and evaluate how a design-led contribution could positively support media consumers. This thesis focuses on the value of designing media-centric digital products that better enable access to reliable and relevant news information for users in a future in which such reliable information will become increasingly difficult to find and trust. As noted in the introduction, this thesis will draw from a design inquiry approach, a method described by Nelson and Stolterman (2012) for comprehending complexity.

Broad contributing factors to this future situation include the current state of news, including an explosive variety in news sources, trust-damaging information disorder, and an advertising-supported media business model which does not value quality news. In addition, technological advancement has made it easier than ever before to unintentionally distribute misleading content with an incredibly broad network, as well as create and distribute intentionally misleading or altogether fabricated content.

As a product designer, my goal in writing this thesis is to provide preliminary design guidance for designers of media-centric products to improve product users' ability to navigate the risks of growing false and misleading information in the news. This is accomplished by establishing learnings based on exploratory research. This thesis then seeks to determine how the design of the media consumption experience itself can impact users' trust in the media, their ability to form an accurate worldview, and their informed participation in democracy.

The media consumption experience includes the type and availability of information, the way information is presented to the user, and the context and state of mind in which the user receives news information. By relying on guidance to improve the media consumption experience to the user's benefit, product designers working with news information can make better choices

about incorporating methods which encourage user behavior that reinforces self-directed reliance on quality media sources. Achieving this would lead to better-informed users who can better form an accurate worldview and successfully navigate a future including increasingly convincing false information.

In summary, two main questions will guide the development of this work:

- How can the experience of consuming news media in a digital environment be improved to help consumers form a worldview based on accurate news information, and permit consumers to take actions consistent with this worldview?
- How can digital product design, the major methodology through which the experience of consuming digital news media is shaped, positively impact this experience for consumers, and what guidance would be valuable to support designers in these efforts?

These context and answers to these questions will be explored and documented over the course of this thesis.

1.2 Motivation

My personal motivation dates back to my childhood, as the son of two journalists, and more practically to my initial interest and pursuit of a career in journalism, working as a designer during my bachelor's studies for a university newspaper in the United States. I have long been a believer in the power of free press to lay bare the inner workings of metaphorical machinery, or give a voice to the quieter or overlooked members of society. The power of journalism to fan the flames of justice and equality, all by diligent and relentless pursuit of the truth appealed to me. By sticking to an honest, objective viewpoint journalists can bring light to darkness.

After leaving my native United States to live and study abroad in 2016, I watched the last few months before the November presidential election as news began to emerge about fake news. I saw the incredible rift that it exposed among Americans and their beliefs.

It became clear to me that this rift was exacerbated by filter bubbles, and as a society, this caused a societal lack of perspective which journalism usually would provide. While the in-depth origins, current state, and potential futures of this situation will be traced later in this thesis, the recent past dating back a decade or two had included the loss of relevance to consumers regarding many news organizations and outlets in an increasingly saturated media environment. This loss of relevance of course contributed to the ongoing decline in trust in traditional news organizations. More significant was the void created by the lack of reliance on these news organizations, which, together with misplaced reliance in social media, created a hotbed in which false information could thrive.

This thesis began to take shape in the wake of this situation, as it unfolded and was further investigated, revealing how wide this societal rift really was. Parallel to these societal developments, as part of a course within Aalto University's Media Lab, a small group of fellow media design students and I explored solutions to address the false information phenomenon. One approach examined whether we could devise an algorithmic news accuracy system. We suggested it could work by aggregating all daily published news stories and determine which information was the most valid, publishing a story that could satisfy people's stated desire for completely objective news. We embarked on the project with the full understanding that we would not find much success, but it was nonetheless a worthwhile exploration. We relied on many assumptions we succeeded in challenging, and as a result the project led to several wide-ranging, research-based discussions about the state of the media industry during the spring of 2017.

I held many conversations with friends and former colleagues who are based in the United States about their news-reading experiences and thoughts, and these discussions formed the base of what would develop into this thesis. One journalist friend with whom I did my undergraduate studies with had built a career in journalism focusing on media dynamics and reporting. As we discussed further, he pointed to trust in media organizations as one of the chief issues facing the journalism industry in the wake of the revelation

of widespread false information, and challenged me to think about what a media organization might look like if designed from the ground up with trust in mind (B. Mullin, personal communication, January 22, 2017). Our discussion ranged from providing to the user transparency, context, and critical thinking. We considered new formats of news media articles that would function as a single repository for a story, similar to an entry in an encyclopedia. That conversation has helped to frame the entire exploration in this thesis.

I began to notice and explore ways that designers of media consumption products could provide tools to help users learn about and make sense of the news they were reading. As I developed this thesis further, it became clear that I could make a worthwhile contribution through design-led theoretical research. This design exploration would address both the current false information phenomenon and a future containing widespread, convincingly falsified information in traditionally trustworthy formats, such as images and video content, would could disrupt consumers' reality in even more significant ways.

Product design solutions addressing the phenomenon in the immediate aftermath, such as efforts by large platforms like YouTube, Facebook, and Google, largely failed to adequately consider the media consumer beyond their role as a hub for information. These platforms began to modify their proprietary news feed algorithm which controls how information is ranked and the order it is presented to consumers. As this thesis will examine in greater detail, the problem with these approaches is that it obscures from the consumer the larger issue at hand. Platform-level strategies do not completely inoculate media consumers from false information, as consumers still leave the 'walled gardens' of online platforms and would conceivably encounter false content elsewhere. Even if done well, these solutions additionally held false promises that media consumers could return to browsing news like they had previously, in which they read quality news stories backed up by facts and reported on by journalists, or clearly labeled opinion pieces. However, these assumption are flawed because of how much the dynamics of the media industry have shifted.

Design plays a significant role in trust, media and digital literacy, and credibility by displaying the right information to consumers on which they base their decisions (Ladd, 2012). How could the design of modern media consumption products, like newspaper websites and media-centric digital applications impact or foster trust? How could product designers understand how their design decisions impact the user's sense of trust and media literacy?

Designers have long been the user's advocate in development processes for products and services, and have found more recent success bringing a design-led, human-centered approach to increasingly broader segments of business. Since the mid-2000s, this has earned design a proverbial 'seat at the table,' putting designers in decision-making positions from a business perspective. Business consulting organization McKinsey & Company established a proprietary index, the McKinsey Design Index, to track the value that the design profession brings to business, finding a very strong correlation between design-led product development and business success (Sheppard & Sarrazin, 2018). This combination of a human-centric approach and a focus on business outcomes makes the design discipline an ideal origin point for transforming the media industry.

One part of this area is the products and services people use on a daily basis. With 58% of Americans by late 2017 often consuming news on a mobile device, up from 21% in 2013, the media landscape from the consumer's perspective is changing quickly (Fedeli & Matsa, 2018). Additionally, Newman et al. (2018) finds that this is a worldwide trend and "shows no sign of slowing down" (p. 27). Digital product designers play an increasingly major role in shaping the way people learn about current events through the design of mobile device experiences. Combined with this increasing move to mobile devices for news consumption, designers have never had so much control and responsibility for consumers' experiences. As detailed further in this thesis, the media consumption experience, and thus trust in the media, is paramount to a properly functioning democracy.

The role of design

Entire disciplines and methods are named to include the user in the designer's title including user experience design, user interface design, user-centered design, and user research, among others. Design's realm retains a significant amount of control over how a tool a user will interact with will feel, look and respond. Designers seek to shape the user's entire experience while using a product. With so much influence over the user's experience, designers have an obligation to create products and services that are useful, transparent, and empowering to the user.

These responsibilities that designers have to the people they create products and services for have commonalities to various codes of ethics around the world that professional journalists follow, one leading example of which is that of the Society of Professional Journalists ("SPJ Code of Ethics," 2014). At the heart of this code lies commitments to truth-seeking, transparency, and accountability and obligations to minimize harm to both consumers and subjects of news media.

From this perspective, one interesting comparison from the field of design are dark patterns, which represent deliberately-designed experiences that encourage users to take an action that is not in their best interest, often without fully understanding the consequences beforehand (Brignull, n.d.). These are commonly encountered in the digital field, with notable dark patterns encouraging users to buy insurance they don't need or subscribing to newsletters they do not want, all through tricky design of digital experiences (Brignull, n.d.) Often these patterns are discovered and singled out on social media to warn and call attention to others who may be unaware. These dark patterns are collected and shared as examples to discourage this type of dishonest behavior among designers.

In applying this concept of dark patterns to the emerging media environment, it is clear to see parallels that offer valuable insight. News information that is written to be misleading, or wielded as a tool to be deceitful represents a media dark pattern. Fraudulent image and video content is misrepresented to trick consumers into

believing in events, movements, and biases to advance the financial or political gains of others. In the aftermath of the 2016 election, comparisons were drawn in the media between the actions of then-president-elect Donald Trump and dark patterns:

> Most of us would assume a candidate for public office would operate based on some basic ethical standards including not directly lying to the public, the same way most of us would assume a company wouldn't directly trick us with its UX. Both assumptions turned out to be wrong. (Campbell-Dollaghan, 2016)

As I explore in further detail, these dark patterns in the media exist for many of the same primary reasons they exist in other cases: higher revenues and greater influence. But these particular dark patterns come with dangerous side effects of disrupting the public's access to accurate information and further strengthening possibly misguided prior beliefs (Allcott & Gentzkow, 2017).

In response, I wondered if readers could be educated to identify and thereby inoculate themselves against these media practices, in a way similar to how dark patterns are identified in design.

1.3 Design-led research inquiry

As noted earlier, the structure and aims of this thesis draw general inspiration from the design inquiry approach set forth by Nelson and Stolterman (2012). Specifically, the authors note that "[d]esign wisdom has the ability to shift from an analog experience of life, to a digital or analytic perspective of the world and *back again*" (Nelson & Stolterman, 2012, p. 18–19). Broadly, this thesis adopts this structure by beginning with an overview of the current news media industry, then analyzing how the media consumption experience could be improved, before providing practical guidance for product designers which is intended to affect regular consumers.

Nelson and Stolterman (2012) continue and explain that a design process is carried out "initially with a complex, undifferentiated

situation, [...] ultimately terminat[ing] with the integration of innovative designs into a desired seamless reality" (p. 19). Complexity is an apt description of the current uncertain circumstances of false, misleading, and biased information in the media. In these circumstances, the media consumption experience is a critical point of interaction for consumers, and is increasingly shifting to mobile device-based formats, which are largely the domain of product designers. Through exploratory research into this complex phenomenon of falsified media content, as well as careful historical examination of the themes that have created media distrust, this thesis seeks to create a set of guiding principles and actionable direction for designers. In the words of Nelson and Stolterman (2012), this guidance should allow for "integration of innovative designs into a desired seamless reality" when designers build digital products and services with media content (p. 19).

This set of guidance, available in section 4.4, draws from interpretative research conducted over the course of this thesis into media consumption and industry dynamics in the internet age, technology, user-centric product design, and critical thinking. Through exploration of existing research, ongoing media trends, and practice in the professional design field, I construct a body of research specific to the themes covered in this thesis. From this, learnings have been generated which support the development of guidance aimed at designers to create media-centric products and services that better support users. Advocacy for people as users and their holistic well-being is a key underpinning of the entire design profession. This guidance seeks to support designers in their approach to this goal.

As noted earlier, to gather this research, I adopt a design inquiry approach and establish some criteria and rely on several sources to ensure a comprehensive spectrum of ideas, separated into two main efforts. One, I establish context through examination of themes in the media industry that have led to the current circumstances surrounding false information and media distrust. Two, as a foundation for a contribution via product design, I explore the modern media consumption experience, especially focusing on themes and contemporary research into the impact of design and how the human mind is affected by these methods.

1.4 Structure of this thesis

In the second chapter, I build an understanding of both the historical context surrounding false information, and the decades-long change in public perception toward the press. I start with the current circumstances and work backward to the last period of relative stability for the American media industry, following the end of the second World War up until the mid-1970s. Limiting my research to that stage of American media dynamics allows for focus on the specific trends that are unique the industry and society since the mid-1970s. As detailed in the section 2.2, these trends include declining trust, broadening source availability, increased economic competition, and increased party polarization.

In section 2.3, I review landmark research into human thought and critical thinking to understand how the brain responds to different kinds of information. Accurate, confirmatory, false, and memetic information all affect human thought and information consumption differently. Proper guidance for product designers in this area must take into consideration the dynamics of information and human thought, and ensure that future implementations consider the user's holistic well-being, as noted earlier in section 1.3.

I construct a model and visual schema of the consumer-centric media model in section 2.4. This model and schema account for the impact of false, misleading, and biased information and how it takes advantage of inadequacies of the designed experience. This is of chief importance to this thesis. Especially in the new era of media consumption, which differs from traditional eras in that now the public has relatively equal ability to interact with and publish information independently, it is valuable to consider how media content consumption has changed via the internet and via mobile devices.

As the historical context approaches recent events, section 2.5 reviews valuable research regarding recent media industry dynamics, especially significant influence of social media and how the systems meet the surface-level needs of users but do not take responsibility for longer term effects. False, biased, and misleading information and

how technology will affect its predicted future course are examined in section 2.6.

An important factor to this section of research is the advancement of technology. Introduction of new technologies is a recurring theme in media history, as detailed throughout the second chapter, often leading to disruption which challenges the edict of the press (Knight Commission, 2018). New technology has principally reshaped the media environment in three broad ways. The internet, and technology built upon it, such as social media, has changed the way media information is disseminated and the way consumers interact with it. Advanced technical solutions for manipulating visual and audio content have paved the way for convincing and false information, disrupting consumers' trust in media content. Consumer-targeted technology, such as mobile devices, has evolved into a viable and in many cases primary method for content consumption (Fedeli & Matsa, 2018). As the point of interaction between the media and consumers shifts to mobile devices, the media industry and experience design begin to converge.

To understand this landscape of contemporary media consumption experiences, the third chapter examines implementations that both do and do not feature the user as a central part of the system. I review proposals that operate and fundamentally on diverse scales from a user's perspective. Implementations addressing false information which are explored and introduced by major internet platforms, for example Facebook and Google, differ in their aims and executions significantly than implementations undertaken by small startups or media organizations.

In the fourth chapter, a second model and schema are established in section 4.2 which describes the media consumption experience in detail. It is related to the earlier consumer-centric media model, and created as a foundation for comprehending the impact of the proposed product design guidance. Next, in section 4.4 the particular findings of this exploratory research via a design inquiry approach are presented. By developing product design guidance so that product designers can manage false information in the media, I focus primarily on the point of media consumption for users. The fifth chapter discusses these findings, their place among other implementations and guidance, and the overall procedures adopted in this thesis.

2. The decline of trust in the media

2.1 Overview

To make sense of the phenomenon of widespread false information in the media, it is important to consider the broad historical context of the relationship between the media industry and society, especially related to trust and democracy, as well as the future trajectory of the relationship. Doing so aids in creating comprehension of the environment that enabled false information to spread, and sets the stage for comprehending how a product design-led approach could have consequence.

By understanding the signals that allowed disinformation to flourish and spread amongst media consumers ahead of the 2016 election cycle, product design strategies can be developed to address the foundations of disinformation from a user-centric perspective. Following the election. Allcott and Gentzkow (2017) conducted research into the contemporary phenomenon of false information and identified four primary reasons false information has thrived (p. 214–215):

1. Declining trust in the media, which remains near an all-time low, although it has rebounded a small fraction (Swift, 2016; Jones, 2018). In addition, historical polls have indicated a long decline in trust since the 1970s, correlating with shifts in the media industry (Swift, 2016; Ladd, 2012).

2. Continued polarization between political parties leads to increasing attacks on the press, reducing the public's trust in the institution (Ladd, 2012; Allcott & Gentzkow, 2017).

3. The existing media model makes it easy and virtually without cost for disinformation publishers to establish a publishing platform via the internet and a successful business model via advertising (Allcott & Gentzkow, 2017, p. 214).

4. The speed and ease at which information spreads over social media, along with a continually growing base of users means disinformation can have a near immediate reach by utilizing social platforms. Ahead of the 2016 election, whereas social media referrals accounted for roughly ten percent of traffic to the top 690 news websites in the U.S., social media referrals to 65 fake news websites researched accounted for more than forty percent of traffic to those sites (Allcott & Gentzkow, 2017, p. 214–215).

Taken generally, these themes of declining trust in traditional sources, rising political polarization, lower barriers to market entry, and an abundance of accessible information, can be interpreted as interrelated causes and effects of a growing trend of information disorders driven by the internet and technological advancement. These themes serve as a guide for the following sections.

Covering the first and second points, this thesis briefly reviews the reasons societal trust in the media has declined broadly since the mid-1970s up until the 2010s. It is a result of increased economic competition and divergent political environments. The changing media landscape was brought on by these themes along with technological advancement. Next, a model is established of the modern media industry that accounts for trust, false information, and product design, and how those dynamics become actual political or societal results. Finally, information disorder is explored more deeply to understand its success and the major role social media platforms have.

The media consumer's role as a part of this system is an important aspect and is considered throughout. Additionally considered are the emergent ample opportunities for product design solutions to address accuracy and trust in the media. This contextual section finishes by observing how the disinformation phenomenon will continue to evolve as it becomes easier to create and more valuable to those who wield it effectively.

2.2 Trust and media: A half-century of turbulence

The spread of false information in the media is a direct result of the changing role and reputation of journalism in global society today, combined with technological advancements enabling new ways of sharing information. Researcher Ethan Zuckerman, the director of the Center for Civic Media at MIT, refers to the situation journalism is in now as an ongoing crisis (Zuckerman, 2018), which can be traced back to the advent of cable television news in the 1980s, and the beginning of the 24-hour news cycle (Knight Commission, 2018; Ladd 2012). In that era, television stations dedicated to news began mixing in commentary with daily news to fill airtime, "blurring of the line between factual reporting and interpretive commentary" (Knight Commission, 2018). This is detrimental to the consumers' experience as they face a larger quantity of information, of which a smaller portion is reliable media content.

A body of research into the American public's relationship with the media by media professor Jonathan M. Ladd corresponds with this assessment. Ladd (2012) points to the late-1970s as the last time the American media industry existed as a trusted, stable institution, and argues that the media's trusted role before the late-1970s was a "historical anomaly" instead of the norm (p. 6). The public trusted the media, and relied on its guidance to make it through an American postwar era marked by relative economic prosperity, civil rights issues, and military conflicts abroad.

Though not new, this phenomenon of widespread false information and false sources is tremendously amplified by the internet and technologies augmented by it, especially social media (Lazer et al., 2018; Allcott & Gentzkow, 2017). Researchers investigating false information in the media state that social media platforms operate as publishing platforms for fake news as well as "offer[...] tools to actively promote dissemination" of it (Lazer at al., 2018, p. 1096). Convincingly false information in the format of text, audio, images, video and more will increase and intensify in the next several years

(Gartner, 2017). This will make it progressively more difficult for media consumers to tell fact from fiction, and will further cast doubt upon and reduce consumers' access to reliable information.

It is apt and relevant to review how the media industry and the public's attitude toward it have differed significantly over the last half-century. In 1972 an opinion poll resulted in naming then-CBS television news anchor Walter Cronkite the most trusted man in America. The same year, a poll conducted by global analytics firm Gallup (n.d.) found 68% of Americans had a "great deal" or a "fair amount" of trust in the media. 43 years later, in 2016, Gallup conducted another poll ahead of the presidential election, finding that Americans reached an all-time low in trust in mass media, with 32% reporting any amount of trust (Swift, 2016). Though this has rebounded in the two years since 2016, the decline is still significant (Jones, 2018).

In summarizing his research, Ladd (2012) points to two essential purposes news media has in a functioning democracy. Media information helps to establish and further political organizations, which "structure political conflict," enabling a smoother democratic process (p. 203). Additionally, media outlets are a source of information for the public, which "enable retrospective voting" (Ladd, 2012, p. 203). This indicates that consumers are able to follow newsworthy events to draw their own conclusions about the performance about political initiatives and elected officials and ensure their voice is heard in the democratic voting process. Understanding how and why public trust is in decline for the institution which provides the public with information and context about what is happening in their communities is critical to understanding how to improve the media consumption experience. It is critical that there exists access to accurate media information which keeps the public informed now and in the future.

Ladd notes that in addition to the opinion poll naming Walter Cronkite the most trusted man in America, journalists were also lauded in popular culture, citing the 1976 release of the film *All the President's Men*, which painted *The Washington Post* reporters who uncovered the Watergate Scandal in a glowing, heroic light (Ladd, 2012, p. 1).

Journalists had the favor of the public and government, and as Ladd (2012) writes, the "media achieved a historically unique position as a respected, powerful, independent force," adding that the industry "had become their own political institution" in mid-century America (p. 52).

However, Ladd argues that the "conventional wisdom" that the mid-century environment for the media industry represented the norm is a misguided narrative (Ladd, 2012, p. 6). Instead he provides evidence that the "unusual characteristics" of the postwar media industry were the result of "low levels of economic competition" and a "lack of party polarization" (Ladd, 2012, p. 6). This resulted in relatively high levels of enforced, professional conduct among journalists, establishing a "professional norm of 'objectivity'" and fewer attacks on the press from politicians (Ladd, 2012, p. 6).

Ladd (2012) states that the public's decline in trust in the media following this era is a direct result of the inverse of these societal reasons that created the unusual, trustworthy media environment in the first place (p. 6) Polling data in the 1950s indicate a highly trusted press, a trend that evidently continued until the early 1970s before beginning "a steady reversion to historical norms, eventually arriving at its current meager level" of trust, a result of rising competition and increased political polarization (Ladd, 2012, p. 194). In the next sections, the specific causes and effects for rising economic competition and partisanship and its effects on media trust are examined.

Rising competition

The technological constraints that resulted in three national television channels before the 1970s ended as cable television enabled alternative sources to enter the market, significantly increasing choices for media consumers and thus increasing competition for journalists. As the previously uniform media market began to fragment with the entrance of new media outlets, existing institutional media groups altered their coverage to include "more 'soft' news" (Ladd, 2012, p. 65). Ladd (2012) notes that though most consumers condemn soft news, such as entertainment reporting

or tabloid journalism, "[m]ost people enjoy soft news," despite the fact that it causes consumers to "lose respect for the media" (p. 196–197). Even when provided with opportunities to consume more traditional informative news, consumers reject or ignore this content, and Ladd points out that consumers prefer news styles which actually create media distrust. However, consumer interest in soft news means media outlets can achieve profit by producing less informational news compared with relatively more expensive informational content. This conclusion is supported by a model of the media proposed by researchers and detailed later in this chapter, in section 2.4 (Allcott & Gentzkow, 2017, p. 217–219).

Historically, even over the last few hundred years, the introduction of new technologies has upset the content and delivery paradigms of the news industry, bringing "critiques of the excesses of the press and efforts to ensure the 'responsibility' of the press" (Knight Commission, 2018). Whereas prior media landscapes even in the 20th Century have provided media consumers decades without technological disruption, increasing technological advances means disruption now occurs more rapidly. This leaves people with less time to grow accustomed to the new system, resulting in consumers feeling alienated and without the necessary context to understand current events.

As an example, the years between the introduction of news radio to news television left consumers with a stable, comprehensible media environment for a period of years. When television news was eventually introduced and became widespread, consumers could better understand how the introduction of a new technology would affect the media environment as they understood it. However, with the advent of the internet, fundamental additions and changes in the methods by which people consume news have begun to occur more rapidly. These changes, utilizing technology such as the internet, mobile devices and artificial intelligence, continually disrupt the media environment, hindering the same kind of access consumers had to a stable media environment previously.

Rising partisanship

Around the same time as the media industry began to fragment, political polarization began a long trend of "increasingly diverge[nt]" congressional voting patterns (Ladd, 2012, p. 66). Ladd reports that "in the last 50 years… the main way the historic tension between politicians and independent news media has reasserted itself [is] through political attacks on the institutional media's accuracy and fairness." (Ladd, 2012, p. 65). These attacks have manifested in a situation with an increasingly polarized party system and populace. Whereas in the 1970s, liberals and conservatives counted themselves more equally members of the Republican and Democratic parties, by the mid 2000s, "the two American political parties have increasingly represented divergent interests and ideologies" (Ladd, 2012, p. 66).

To compete for attention, *CNN* and subsequent cable television news channels focused less on the pure objectivity that mid-century television news built upon, forcing all news networks to adapt to the "competitive pressure from alternative news sources," reports Ladd (2012, p. 71). Consumer demand increased for content which provides confirmation of consumers' prior beliefs (Allcott & Gentzkow, 2017, p. 218). The increased bandwidth provided by technological changes which allowed for more news television channels made this possible, resulting in further market fragmentation.

These new alternative news outlets, which emerged in the 1980s and continued to expand in the internet era, found increasingly niche audiences affected by political polarization to which to appeal. As a result, sources began to tailor content to fit niche audience interests. In their supply-and-demand media model, detailed in the next section, researchers Allcott & Gentzkow (2017) show that tailoring media content to fit consumers' prior beliefs enables media sources to provide more utility to news consumers. Because consumers make choices about which outlets to follow based on the utility received from these outlets, content tailored to fit prior beliefs indirectly furthers competitive and political divergence among outlets, consumers, and political organizations.

Ladd (2012) summarizes these shifting media dynamics succinctly:

> In this way, from the 1970s to the 2000s, the ideological polarization of the major American political parties was accompanied by a greater availability of alternative news outlets more compatible with the increasingly divergent worldviews of liberal Democrats and conservative Republicans. Unsurprisingly, relations between political leaders and the institutional news media changed considerably when leaders were more polarized and knew competing news outlets were available to provide information more consistent with their divergent worldviews. (p. 73)

The stability of the media industry during the middle of the 20th century dissolved as economic competition and political polarization increased. In turn, this negatively affected industry stability further as consumers were exposed to more biased reporting and trust in the media declined further as a result. Ladd (2012) documents that "[o]pinionanted cable [news show] hosts have attracted polarized audiences," citing that in 2007, cable news shows found distinctly different politically-minded audiences, with more Republican viewers of *Fox News*, and more Democratic viewers of channels like *CNN* and *MSNBC* (Ladd, 2012, p. 69). Furthermore, Lazer et al. (2018) summarizes existing research that people "view information consistent with their preexisting beliefs more persuasive," than information that challenges their beliefs (p. 1095). Similarly, Ladd (2012) studied the effects media distrust and found that distrusting individuals "vote more based on their party identification," while ignoring more practical information, for instance, about the national economy (p. 9). Together, these indicate that information provided via the media plays a crucial role in driving party polarization and produces external effects on consumers' voting actions. These trends continue to present day, with a notable increase in polarization among media consumers following the 2016 election (Newman et al., 2018, p. 17).

Fact checking journalism rose to prominence in 2009, when PolitiFact.org won the Pulitzer Prize (Mantzarlis, 2016). Since 2015, the Poynter Institute maintains the International Fact-Checking

Network (The Poynter Institute, 2015). The emergence of fact-checking as a separate media service online is interesting from a design perspective. The introduction of the internet provided an enhancement to this consumers' capability to independently verify news information. Independent fact-checking organizations like Snopes and PolitiFact provide verification information to media consumers. Research into how professional fact-checkers operate indicates that providing this type of curated information could improve the efficiency and accuracy of the online media consumption experience (Wineburg & McGrew, 2017).

The Pulitzer Prize was awarded to PolitiFact for the organization's coverage of the 2008 presidential election (Adair 2009). This election saw early signs of one of the first popular pieces of false information in the media in the past decade: the claim that Barack Obama was born outside of the U.S., which would make him ineligible for the presidency (Maheshwari, 2017). This story briefly dominated headlines in 2008 before the election and again in 2011, when then-reality television star Donald Trump embraced the story, making Trump's challenge of then-president Obama a cornerstone of Trump's own political aspirations. Trump focused media and public attention on the issue of Obama's birthplace, which *The New York Times* called "long debunked, and [...] confined to right-wing conspiracy theorists" (Parker & Eder, 2016). This had a tremendous effect on Trump's trajectory, as he rose "to a virtual tie for first [...] in the early polls of the 2012 Republican field" (Parker & Eder, 2016). Trump's strategic use of disinformation during his brief interest in the Republican nomination in 2012 proved to be a prototype of his successful bid in 2016.

2.3 Modern media content and critical thinking

Not only is Trump's broadcasting of this false information problematic, but so is the environment in which the public received it. This blind acceptance of information when users are unchallenged has been studied extensively, notably by cognitive scientist Daniel

Kahneman (2011). In his model of human thought, Kahneman (2011) distinguishes between two distinctly different modes which have a significant effect on the speed an accuracy with which we understand incoming information. Quick, intuitive, less intensive thinking, or System 1, relies more on emotion and instinct, whereas System 2 engages the mind in a higher-effort, analytical way (Kahneman, 2011).

Much of people's time is generally spent in System 1, which runs automatically and near subconsciously, providing surface-level information to System 2, which engages when necessary to solve problems that require critical thinking, like crossing a busy street or "monitoring [one's] own behavior" (Kahneman, 2011, p. 24). However, System 2 is lazy, and reluctant "to invest more effort than is strictly necessary," resulting in a model in which many of the conclusions System 2 arrives at are those supplied by System 1 (p. 31). This is a necessary habit developed evolutionarily, so that humans do not expend energy paying attention to non-critical tasks.

However, false information in the media takes advantage of this mental laziness. When consuming news, people are generally not engaging in comprehensive critical thinking, as reading and watching media content are nearly subconscious tasks. In examining fact checking, Lazer et al. (2018) note that people generally do not "question the credibility of information unless it violates their preconceptions," and that "[o]therwise, they may accept information uncritically" (p. 1095). This poses a challenge for media consumption experiences to overcome.

How can product designers negate this lack of critical thinking by media consumers? One method for inducing higher levels of critical thinking is to induce cognitive strain. This is achievable through a number of methods which run counterintuitive to standard design practices, such as decreasing legibility or increasing friction in the consumer experience. The end result is better cognitive performance because the mind must engage at a more intense level in order to process the information it receives.

While the specific presentation of it matters, it can be inferred that fact-checking induces cognitive strain by supplying additional information which verifies or contradicts information consumers are exposed to. When media consumers rely on fact checking information, it may be easier for them to recognize and consciously discard biased, misleading, or false information because of cognitive strain. In this way, supplying fact checking can combat false information in the media.

Kahneman (2011) notes that this cognitive strain can operates in an opposite fashion as well. It is understood that media consumers receive utility from media publishers both by receiving accurate information about the true state of the world, and by receiving information that confirms prior beliefs (Allcott & Gentzkow, 2017, p. 218). Kahneman (2011) states that consuming this type of confirmatory information, which does not challenge the prior beliefs people hold, produces "cognitive ease," in which consumers do not adequately question the veracity of the information out of mental laziness (p. 62).

Together, this means that context matters significantly to the media content which is consumed. The method and environment in which people consume media content can modify both the effectiveness of the message and the degree to which consumers question the message. This provides ample support for better-designed media consumption experiences which consider the user and their willingness to accept or challenge the received media information. Spurring the mind into action via an increase in cognitive strain can avoid mental laziness and result in consumers working to verify content they encounter online. How this can be achieved in the design of the media consumption experience is detailed in section 4.4.

2.4 Consumer-centric media model

To make sense of how trust, information disorder, bias and other media dynamics affect the public's relationship with the media, it is befitting to rely on a model by which these can be examined and understood. Allcott and Gentzkow (2017) outline a useful "supply

and demand for news" model, which I employ here (p. 217–219). Additionally, research by Ladd (2012), among others, support the model. I examine this model through the lens of digital product design, observing how the products and services consumers use to consume media information shape how these media dynamics affect consumers.

Additionally, using the methodology of a *schema* as defined by Harold G. Nelson and Erik Stolterman (2012), I devise a visual schema to model this system. Schemas are called "the primary means for representing holistic concepts, ideas, and fundamental knowledge in visual form" (Nelson & Stolterman, 2012, x). This schema visualizes the described dynamics of the media industry as a cycle, creating a comprehensive account for how media consumers select and filter media content, and form beliefs based on that content.

Allcott and Gentzkow (2017) posit that the key question media organizations attempt to answer in order to provide utility to media consumers is what is the true state of the world? (p. 218) Media organizations that can gather and report accurate information about the true state of the world produce more utility for consumers. This consumer-centric media model is reflected in the schema in Figure 1. In this simplified model, the two states of the world are reflected by whether a left-leaning or right-leaning candidate will perform better in office. If media organizations produce more utility by reporting accurate information which is confirmed by performance in office by a candidate, the media organizations gain more consumers and a better reputation, which result in higher revenues via advertising.

However, consumers enter this model with existing prior beliefs, and also experience utility from media organizations by having those prior beliefs confirmed by news information (Allcott & Gentzkow, 2017, p. 218). Media consumers make choices about which organizations to follow "in order to maximize their own expected utility" (Allcott & Gentzkow, 2017, p. 218). Because consumers experience utility both via accurate information and via confirmatory information, media organizations have an additional route to providing utility and gaining
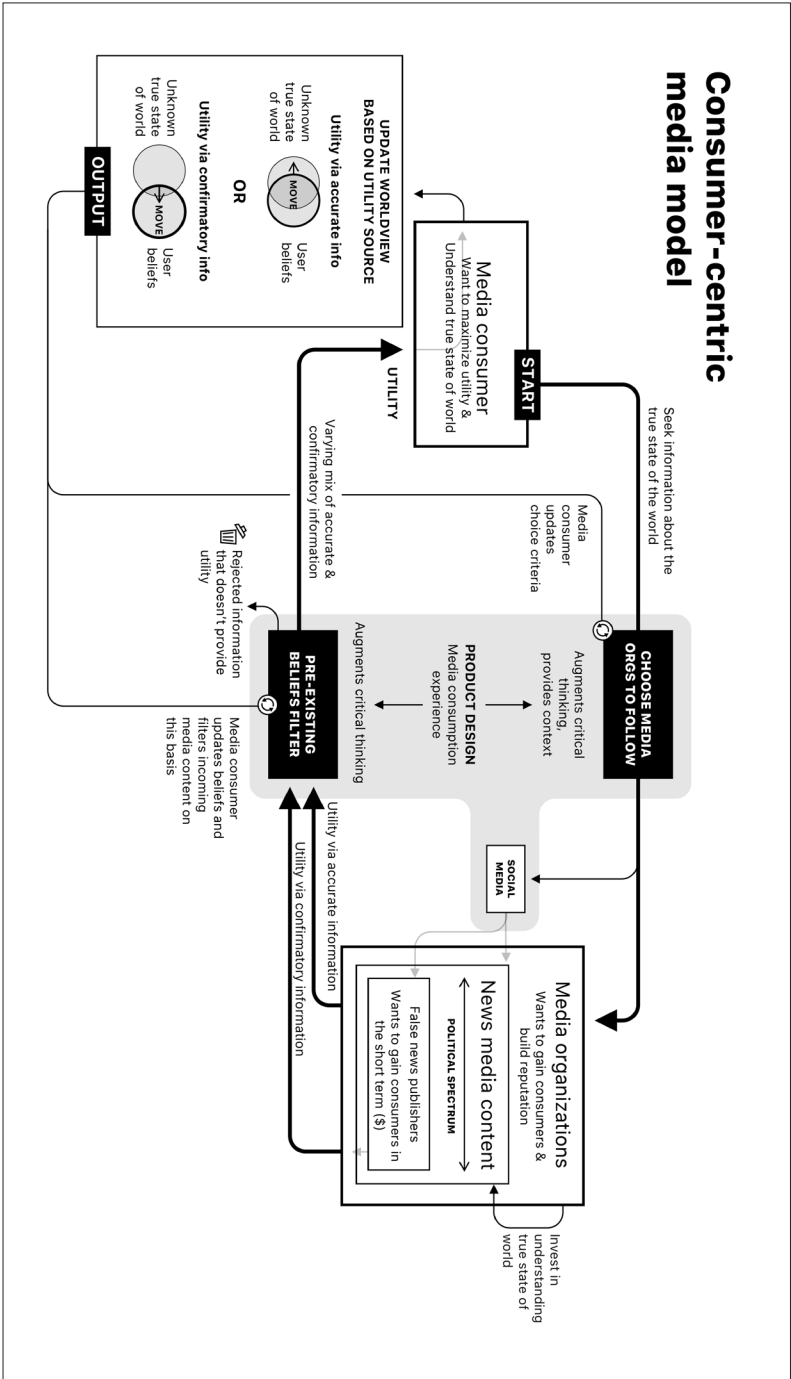
Consumer-centric media model

Figure 1. *Schema representing the consumer-centric media model. The schema and model approximately reflect the conclusions drawn in this section.*

consumers via publishing confirmatory information. This means media organizations can instead use this approach to gain more revenue via advertising that does not require the "costly investment" needed "to increase the accuracy" of reporting (Allcott & Gentzkow, 2017, p. 218).

Research by Ladd (2012) indicates that because consumers experience utility from media outlets via confirmatory news information, the availability of "more sensationalist and partisan sources for consumers" gave consumers sources "to turn to when [the consumers] lost faith in the institutional news media" (p. 202). This embrace of partisan sources has historically driven a positive feedback loop resulting in increased political polarization and "self-reinforcing" distrust in the media, also modeled in the schema in figure 1 (Ladd, 2012, p. 202). Ladd (2012) notes "consumption of alternative news" reduces trust in institutional media, which leads to even greater levels of alternative news consumption and further distrust (p. 202).

As consumers continue to make choices about which organizations to follow, and "as these sources often send very different messages," the choice in media organizations which consumers make "can increasingly determine the facts a person receives about the political world" (Ladd, 2012, p. 73). Due to these shifting media dynamics, media organizations and websites can attract more consumers and thus advertising revenue by publishing confirmatory news content regardless of the veracity of said information. By doing so, these organizations can at least theoretically establish a business model for false information.

Signal distortion

Within the model, Allcott and Gentzkow (2017) note two cases that encourage media organizations to report misleading or even false information to appeal to consumers' prior beliefs. First, when it is difficult to determine the true state of the world, "consumers will judge a firm to be higher quality" when the firm's reporting is closer to consumers' prior beliefs (Allcott & Gentzkow, 2017, p. 218). Secondly, when consumers actually prefer confirmatory

information over accurate information, media organizations benefit from publishing said confirmatory information. Additionally, because limited information about the true state of the world exists, organizations in these cases face less risk in being proved wrong about their reporting, further strengthening these organizations reputations in accordance with the model.

This reporting, whether accurate information about the true state of the world, or confirmatory information aligning with consumers' prior beliefs, has a measurable effect on political systems and society via consumer exposure to the media. Ladd (2012) records as an example that "in 1992, those who reported high levels of news exposure had more negative perceptions of the economy, and those perceptions were associated with a much lower probability of voting to reelect President George H. W. Bush" (p. 142). These types of results indicate the value that accurate reporting provides to media consumers, enabling them to participate in the democratic process with information.

Misleading and false information fits into this model as publishers take advantage of the advertising-supported business model and the ease of distributing content online to seek a profit. Compared to mainstream media publishers, publishers of false information are not interested in establishing a "reputation for quality" and therefore are not interested in any relationship with media consumers beyond these consumers generating revenue by accessing their online content (Allcott & Gentzkow, 2017, p. 221). Additionally, these publishers "lack the news media's editorial norms and processes for ensuring the accuracy and credibility of information" (Lazer et al., 2018, p. 1094). However, publishing confirmatory information still provides a utility to users, and "the format of social media — thin slices of information viewed on phones or news feed windows — can make it difficult to judge an article's veracity" (Allcott & Gentzkow, 2017, p. 221). The researchers posit that these false media publishers succeed in the model because media consumers "cannot distinguish them from higher-quality outlets" when browsing via modern media consumption experiences, thus earning more attention and revenue for these false media publishers without significant effort. As stated

in the introduction, dissemination of false information for profit introduces noise into the media consumption experience and can divert consumer interest.

The lens of product design

A product design-centric understanding can provide value in this situation. Modern media consumption experiences combine the gamut of publishers in integrated news feeds. Publishers shown together have with vastly different levels of political influence, vastly different pedigrees histories and focuses, and vastly different reputations for publishing quality. These news feeds exist as a central interaction point for users of a number of modern digital products, such as Facebook, Reddit, and Google. These organizations employ a common approach in interface design which is to normalize content from all media organizations in a similar design, utilizing the same text treatment and information hierarchy to display content equally in news feeds. This interface normalization makes it easier for media consumers to find media content in news feeds, as consumers can scan these interfaces for common design patterns.

However, by reducing the appearance of all pieces of media information in the general design approach of these news feed experiences can amplify consumers' access to confirmatory information, one type of utility that Allcott and Gentzkow (2017) highlight in their model (p. 218). This occurs because confirmatory news information is easier to recognize than accurate news information about the true state of the world, the other type of utility media organizations provide to consumers. By merely reading media headlines in a news feed interface, consumers could instinctively recognize whether it confirms their prior beliefs, thus fulfilling consumers' need for utility in their news sources. In Kahneman's model of human thought, providing this detail-less segment of content can have the effect of not inducing the user's capability for critical thinking, bypassing the brain's reason-based System 2 and appealing directly to the intuitive System 1 (Kahneman, 2011, p. 64). This has the effect of reducing consumers' needs for utility via accurate information about the true state of the world, which helps

media consumers make informed societal decisions with the utility of confirming prior beliefs.

These modern news consumption experiences could be designed to better support media consumers' need for information about the true state of the world, instead of confirmatory media information. This could be achieved, for example, by creating experiences that help people understand when signals received through the media are distorted to meet their prior beliefs, or providing additional guidance to help people place information they receive in a greater context. These types of consumption experiences could reduce the existing noise in the current media model produced by misleading information, bias, soft news, and confirmatory information, making it easier for people to access information about the true state of the world. These themes and ideas will be explored in depth in the fourth chapter.

2.5 The false information era

Misinformation and disinformation in the form of fake news played a complicated role in the 2016 American campaigns and election. Research by Allcott and Gentzkow (2017) examine the political and societal effects of false information in the media and, as detailed in the previous section, construct a media model for how media publishers operate, including how this false content takes advantage of this model for various reasons.

The researchers also frame "several potential social costs" of false information in the media (Allcott & Gentzkow, 2017, p. 219). These costs originate with media consumers, who the researchers find suffer significantly because of false information:

> First, consumers who mistake a fake outlet for a legitimate one have less-accurate beliefs and are worse off for that reason. Second, these less-accurate beliefs may reduce positive social externalities, undermining the ability of the democratic process to select high-quality candidates. Third, consumers may also become more skeptical of legitimate news producers, to the extent that they become hard to distinguish from fake

news producers. Fourth, these effects may be reinforced in equilibrium by supply-side responses: a reduced demand for high-precision, low-bias reporting will reduce the incentives to invest in accurate reporting and truthfully report signals. These negative effects trade off against any welfare gain that arises from consumers who enjoy reading fake news reports that are consistent with their priors. (Allcott & Gentzkow, 2017, p. 219)

From this it can be inferred that the effects of false information are significant deviations from the norm, and place an undue burden on media consumers to correctly distinguish between legitimate and illegitimate news producers in order to find trustworthy news. Especially significant, as expressed earlier by Ladd (2012), is that false information harms the democratic process by impairing voters' ability to be sufficiently informed. Additionally, as Allcott and Gentzkow (2017) note, the system is self-perpetuating, and the resulting decline in demand for high quality news will exacerbate the situation (p. 219).

The inferences drawn by Allcott and Gentzkow (2017) echo Ladd's (2012) conclusion that "the effects of media distrust on learning carry over into the electoral realm," affecting media consumers' ability to be informed and participate in the democratic process (p. 176) Furthermore, Ladd (2012) states that media consumers' lack of trust "alter how citizens hold politicians electorally accountable," indicating that the feedback loop of representative government is not functioning properly (p. 176). Following the media model established in the previous section, we can see that voting citizens rely on media information, among other factors, to decide what political actions they will make, for example, voting for a candidate (Ladd, 2012). When those candidates take office, their performance is reported again by the media to the citizen media consumers, and consumers in turn make choices about the candidates in office and the media outlets reporting on the situation. However, as Allcott and Gentzkow (2017) argue, false information furthers media distrust and disrupts this feedback loop, resulting in a stunted democratic process as media consumers receive insufficient or inaccurate information.

Technology also has an important impact. Understanding the specific effects of technology on media consumers via research is especially valuable to informing the product design process, as modern media consumption experiences must reckon with the emerging impact of technology. Zuckerman (2018) notes that widespread use of the internet, mobile devices, and social media has greatly affected the content creation and delivery channels for news. This changing model "creat[ed] a novel set of problems about authenticity and quality of news", thus contributing to the public's further mistrust in the media (Knight Commission, 2018). This loss of authenticity is alarming, and creates a significant void where the public has long relied on the news media for accurate and objective information.

Social media's significant role

The introduction of the internet and social media means news consumers now have many more choices of action in response to news. Lazer et al. (2018) call social media "the most important enablers and primary conduits of fake news" (p. 1095). Readers can boost content they agree with, or produce and distribute their own content, giving them "vastly more influence over the media agenda than our earlier model" (Zuckerman, 2018). Social media users create their own networks and serve as content producers, distributors, and audiences. While this has normalized publication and consumption of media content in many ways, making it easier for users to seek and publish their own information, the model has also enabled widespread sharing of disinformation on the platform.

Allcott and Gentzkow (2017) summarize that individuals with "no track record or reputation can in some cases reach as many readers as *Fox News*, *CNN*, or *the New York Times*" over social media (p. 211) One prolific producer of false information in the media had his stories shared broadly by Trump campaign officials on Twitter, and presented to users via Google search results (Gunaratna, 2016; Daro, 2016).

Social media creates difficult-to-fix problems for trust in the media and democracy. The inherent design of these platforms, which have been refined over many years to be addictive, make it hard for users to distinguish between reputable news and biased or false

information (Zuckerman, 2018). Additionally, Vosoughi et al. (2018) found that fake news spread faster than some real news over Twitter, in part because "it's easier to be novel and surprising when you're not bound by reality," according to a researcher with the study (Greenemeier, 2018). And an analysis conducted by BuzzFeed News after the election found that the top 20 illegitimate pieces of media content earned more engagement by platform users on Facebook than the top 20 legitimate news stories ahead of the election, resulting in a further reach and thus higher revenue for misleading or fabricated information (Silverman, 2016).

Additionally, Allcott and Gentzkow (2017) found that social media accounted for much higher proportions of traffic to websites publishing misleading or false information than traffic to established news websites (p. 222–223). The researchers analyzed the spread of disinformation via social media in the months leading up to the 2016 election, finding that social media accounted for much larger percentages of referrals to false information websites than to legitimate media organization websites. More findings indicate "social media have become an important but not dominant sources of political news and information" (Allcott & Gentzkow, 2017, p. 223). Together, this establishes solid reasoning for a design-led contribution which focuses on mobile device experiences.

Another important point is that users of social media have difficulties in accessing reliable information from legitimate sources because of the volume of false information spread (Allcott & Gentzkow, 2017). Partially this is caused by the interface and algorithm design of these experiences, which contribute to consumers' inability to select reliable news from unreliable news. Along with reports about the spread of false information, the sheer volume of false content reduces the public's overall trust in the news media, a phenomenon sometimes called "trust compression" (Caulfield, 2018). Trust compression occurs as media consumers learn that some media publishers are biased or false to some degree, and by extension assume that all publishers must be untrustworthy as well (Caulfield, 2018). This has deep implications for the future of the media consumption experience. (Allcott & Gentzkow, 2017; Caulfield, 2018).

The polarization present on social media platforms, notes Zuckerman (2018) "turns out to be a great business model," drawing attention and, thus, advertising revenue from large numbers of users, who are able to interact with the media content they encounter on the platforms. Platforms like Facebook, Twitter, YouTube and others are reluctant to resolve these problems as they are not problems for the businesses, but rather what Zuckerman (2018) refers to as "bugs for democracy." While profitable, social media companies are reluctant to drastically alter their carefully-honed algorithms, which control what content is shown to users, even if the content creates noise which makes it harder for consumers to find reliable news.

Certainly, the design of the products also play a major role. One reason disinformation thrives via social media is that the design of the platforms and the way media content is handled normalizes and strips away context that would be valuable. This "makes it difficult to judge an article's veracity" (Allcott & Gentzkow, 2017, p. 221). To understand how product design has contributed to the thriving nature of disinformation on Facebook ahead of the 2016 election, we can examine how the organization has modified the design of its products in response, and how this fits into the media model established earlier.

Facebook uses a proprietary algorithm to score and present content to users, which is adjusted regularly. The algorithm generally favors relevant, favorable content to users (Mosseri, 2018). This content is likely to earn more views and interactions, which means more traffic to the content's source and thus more advertising revenue. Similarly structured algorithms deliver relevant content to users on other platforms, like YouTube. Many media publishers manipulate the algorithm to some degree to ensure more visitors find their content. This system results in competition among media publishers and other content creators to craft and share higher-scoring content.

Fitting into the media model established earlier, in section 2.4, media publishers sometimes compete by publishing false, biased misleading, or exaggerated media stories, which as noted earlier in this section spread faster than real news (Vosoughi et al., 2018). This draws parallels to the rise in competition in the media industry

brought about by the advent of cable television beginning in the 1980s, forcing outlets to begin to produce more soft news.

2.6 The future of false information

The current disinformation phenomenon is problematic for consumers and for a functioning democracy, though research into the long-term "impact on political behavior [because] of exposure to fake news [...] are essentially nonexistent in the literature" (Lazer at al., 2018, p. 1095). Regarding false information generally, research firm Gartner predicts that by 2022, "most people in mature economies will consume more false information than true information" ("Gartner reveals top predictions," 2017). This section explores the next evolutionary stage of false and misleading news media content, especially focusing on content manipulation techniques and dissemination of information.

Referring back to the media model established in section 2.4, the future of widespread false information plays a significant role in disrupting news media consumption for people by taking advantage of the current digital news media business model. Active, targeted disinformation relying on advanced technology can better attract consumers' attention and clicks. Additionally, as detailed in the consumer-centric media model and schema in section 2.4, even more convincing and aggressive false information could continue to drive media polarization and limit consumers' ability to ascertain the true state of the world.

Just as technology disrupted the media industry at the end of the 1970s via cable television, and again from the 1990s onward with the introduction of the internet and social media, further technological disruption lies ahead. The technology that will next disrupt the media industry is already appearing, and it is becoming accessible. As techniques for creating, manipulating and disseminating both legitimate news information and disinformation advance, media consumption experiences need to evolve as well in order to preserve media consumers' access to important, reliable content.

Manipulation of reliable content formats

Image and video manipulation techniques are becoming both more sophisticated and more accessible. Software such as the widely available Adobe Photoshop contains features which allow users to quickly remove unwanted objects, artifacts, or people from images (Adobe Communications Team, 2018). While not as easy to use, researcher-developed machine learning techniques such as *generative adversarial networks* (GANs) are able to synthesize video content in a convincing manner. Often, examples of this technology show manipulated videos showing someone, such as a head of state, speaking words they did not actually say.

Though manipulated video and image information has existed before, for instance in the realm of Hollywood films, it has never been so easy to obtain nor to produce convincing content. Video manipulation technology has also entered the fringes of popular culture, as manipulated videos known as *deepfakes* have emerged online in which celebrities' faces are inserted into pornographic films (Schellmann & Bellini, 2018). People have generally relied on images and videos to provide a true account or evidence of an event, and these kind of widespread manipulation techniques depend on media consumers' proclivity toward images and videos as strictly accurate content.

With this type of media being so convincing, the implications for its use are significant. Dr. Hany Farid, a researcher in media content manipulation states, "If you can change digital images, you can change history," in an interview with The Wall Street Journal, citing the historical reputation image and video content have for accuracy (Schellmann & Bellini, 2018).

Since the 2016 election, fears have emerged that GAN-powered video manipulation could be used in more damaging ways. Farid has posed a hypothetical scenario in which a manipulated video of U.S. President Donald Trump is widely circulated via social media in which Trump states he has launched a nuclear weapon targeted at North Korea, but before the video can be debunked, North Korea retaliates to the faked content by launching its own nuclear weapon (Schellmann & Bellini, 2018). This bleak and frightening scenario is drastic, and to succeed,

the effort would rely on many dependencies, though the technology already exists for this kind of disinformation.

However, to have a measurable effect, faked content does not need to be as drastic as the nuclear weapons scenario Farid employs. A high-profile real-world example occurred near the end of 2018 following an incident during a press briefing session with Donald Trump at the White House, in which a White House intern tried to take a microphone from the hands of *CNN* reporter Jim Acosta while he spoke into it while questioning President Trump. The incident was captured on camera during regular filming of presidential press briefings at the White House, and it included footage of contact between the arms of the reporter and the intern (Aratani, 2018).

In what was regarded as a political move, the White House revoked Acosta's access to press briefings (Aratani, 2018). In citing the revocation via social media, U.S. press secretary Sarah Sanders implied that the reason the press pass had been revoked was that Acosta had acted inappropriately toward the intern, and included a video clip of the exchange between the two (Sanders, 2018) in which Acosta appears to emphatically strike the arm of the intern as she attempts to take the microphone.

The footage shared by the press secretary via Twitter was originally posted by an editor of the fake news media outlet *Infowars*, and differs from the original footage broadcast on public access television channel C-SPAN (Harwell, 2018). Whereas the original broadcast footage shows incidental and mild contact as the intern extends her arm to grab the microphone held by the reporter, the footage shared by the press secretary appears to show more intentional and forceful contact. Comparative analysis of the original and new footage showed that the footage shared by Sarah Sanders is different than, and "included repeated frames that did not appear in" the C-SPAN broadcast footage (Harwell, 2018). The result of these missing frames is lower quality footage, meaning "the video appears jumpier. Acosta's arm seems to move faster. Everything accelerates" (Warzel, 2018).

Consumer choice in media source and their ability to filter information based on pre-existing beliefs have significant roles in the

consumer-centric media model and schema in section 2.4. The type of information disorder presented in this episode demonstrates how valuable context is to consumers in this model. In addition to being of downgraded quality, the footage shared by the press secretary is just a few seconds long, removing the preceding and following footage capturing the entire exchange between the reporter, President Donald Trump, and the intern. Additionally, though the modified footage shared by the press secretary originated with an editor of *Infowars*, a dubious media publisher which often publishes disinformation content (Aratani, 2018; Harwell, 2018), followers exposed to only the press secretary's post on Twitter do not have any information providing that context. Allcott and Gentzkow (2017) note this significant issue with social media, stating that the design of these platforms strip away important information valuable to users for "judg[ing] an article's veracity" (p. 221).

Following the incident, Jonathan Albright, the research director for Columbia University's Tow Center for Digital Journalism stated that these incidents featuring modified versions of original footage are more insidious than completely fabricated content, calling it "something that's real but has been literally stretched" (Harwell, 2018). Sanders' Twitter post including modified content from Infowars represents what Albright calls "weaponized evidence" (Harwell, 2018). Without context, media consumers have no way of determining the credibility of the footage.

In summary, Buzzfeed called the entire episode "a handy example of the coming video manipulation dystopia" (Warzel, 2018). It shows how insidious manipulated video content can be, especially when shared by an influential entity like the administration of the U.S. President. This clip in particular had original footage to compare it with, and a high enough national profile that prominent disinformation specialists, experts and journalists joined the conversation to provide crucial context, but that may not be the case with modified footage in the future. The implications for this kind of manipulation could be even greater as technology advances and people increasingly consume media without the necessary information to place the information they receive in a greater context.

Additionally, existence of this technology also allows people to claim this content manipulation was executed when it is not. In 2017, Donald Trump suggested that a damaging sound clip which surfaced before the 2016 election, in which he spoke vulgarly, in a way considered unprecedentedly detrimental to his campaign, might have been manipulated (Victor 2017). The ability of politicians to claim their words are being manipulated is enabled by new content manipulation techniques and creates yet another hazard for consumers trying to build an accurate worldview.

This glimpse into the future of false information highlights the critical need for the development of better tools and resources to support understanding for everyday media consumers. Tools could help consumers recognize that information they have encountered online as false. Resources could help educate consumers about the intentions of public figures and media organizations of varying qualities, and indicate when information they publish is not objective. As an overall goal of this thesis is to support product designers in creating tools to better support media consumers. Consumers need easier paths to make sense of and learn about media content in order to better form accurate worldviews based on accurate media information. Methods of achieving this through product design are reviewed in section 4.4.

2.7 Key terms

To help build a better contextual understanding of themes in this thesis, especially given the emergent nature of much of this content, it is useful to review several terms related to media and design which shed light onto the overall context, conclusion, and discussion presented in this thesis.

Product design

Broadly speaking, *product design* refers to the arrangement of the structural elements of a product, both digital and physical products alike. In this thesis, the term product design is used to refer

specifically to the design of digital products, and often the word "digital" is included in the full term as *digital product design*. Product design is used to define the development of experiences which serve a particular need or desire for users. Digital products in this space are sometimes indistinguishable from the organizations that create them, but often they can and should be cognitively separated. For this reason products are usually smaller in scale than, for example, platforms such as Facebook or Google. Some examples of prominent digital products include Google Search and Spotify's streaming music applications. A product is not platform specific, and many prominent digital products exist on many platforms or formats at once.

The framing of a product necessitates the inclusion of the product user. The user interacts with the product, and the design of these digital products often centers on crafting an exceptional experience for users. Digital product design as a field is relatively new, and its borders are not very well-defined. It is similar to other fields within design, such as user experience and user interface design (UI/UX) service design, and interaction design (IxD). In the case of this thesis, product design is used to denote the explicit design of the interface, experience, and interactions for digital products.

User, consumer, person, and people

As a product designer myself, the terms user(s), consumer(s), person(s) and people are used in this thesis to define varying degrees of specificity of humans who read, watch, interact with, or are affected by news media information. Different terms are used for the sake of clarity.

As design has become more prominent and a wider variety of people have started to practice it as a profession, there has been a movement among designers recently to reduce the usage of terms like user and consumer when referring to people who interact with a product or service (Lefton, 2019). This, argues designer Adam Lefton, is detrimental to the ethos of designers as it is reductive by nature, largely ignoring the person a user is beyond their role in interacting with a product or service (Lefton, 2019). When applicable, I strive to use the terms person and people in this thesis, but for the sake of

clarity, still refer to people who interact with a product or service, or experience news media content as users or consumers.

Users define a general end user of a product or service. In the case of digital news media consumption, users of a product or service are often a broader term that includes consumers. It is a broad enough term that provides clarity about what specific segment of people are included in a reference. As a term, user has found its way into the general vocabulary of design and, as noted elsewhere in this thesis, entire factions of the design profession are named for the proximity of the work to the user, including user experience design and user research among other commonly used terms.

Consumers read, watch, listen to, or otherwise take in news media content, independent of format or device. This term is used more broadly to refer to consumers of news media in a historical context. News consumers are a large group, and the term consumer broadly define people who take an interest in or are exposed to news media content.

User experience design (UX)

When designers develop solutions that fully consider the needs and participation of all the users of the solution, they are following principles of user experience design. Human users of a designed system may include the primary user, or users, who directly interacts with the system, and secondary users who do not interact with the system directly but are affected by its use. In a product development environment, designers often advocate for the user by considering their experience when using the planned system. User experience designers must account for broad categories such as the context in which the system will be used and the mental and physical state of the system's users.

Products, services and other designed systems do not exist in a vacuum, and are always part of an interconnected web of other systems users interact with. Therefore, user experience designers must conduct research with users to understand the context of use. They work to understand how use of the system they are creating will

affect, and will be affected by, these other systems in a user's environment.

Finally, and most fundamentally, user experience designers must ensure the system they are designing matches the users' intentions. Seminal user experience designers Don Norman and Jakob Nielsen explain that "the first requirement for an exemplary user experience is to meet the exact needs of the customer, without fuss or bother" (Norman & Nielsen, n.d.). User experience designers conduct research to understand exactly how the developing system can best meet the users' goals, and represents an improvement compared to previous solutions for achieving these goals.

When designers consider the users' experience as part of the development process, they are contributing significantly and directly to the success of a system. Designing systems that effortlessly meet the users' needs produces a superior end result.

Media consumption experience

A term used significantly throughout this thesis is *media consumption experience*, sometimes appended as *digital news media consumption experience*. This term refers to the specific act of a person reading, watching, listening to or otherwise taking in media. By context it refers to different forms of this experience, and the term is platform and format agnostic. A central contextual theme of this thesis is to track how the media consumption experience has changed and impacted users as trust in the media has fallen.

The design of the media consumption experience refers to the specific ways in which an interface, product, or service can be shaped by designers and informed by consumer input. Often in the context of thesis, the media consumption experience exists on mobile devices and defines both the passive actions of reading text, watching image or video content, and listening to audio content as well as the active actions of interacting with media content, such as on a social media platform.

The media consumption experience can be detailed, for example, it determines how the type is set in a specific newspaper or magazine

or in a news application on a mobile device. It can also be very broad, and define the actions involved in consuming any media on a mobile device, be it news-related or not.

Terms related to information disorder: misinformation, disinformation, false information, fake news, digital and computational propaganda

Generally speaking, the term *information disorder* is a broader term and framework that encompasses the recent spread of false information in the media (Wardle & Derakhshan, 2017; Wardle, 2018). The creation and definition of this group of terms is used to bring clarity to this phenomenon and to avoid reliance on the politically-charged and ill-defined term *fake news*.

This section defines several closely related and thus confusing terms used in these circumstances. These terms include:

- *False information in the media* is used to broadly group all of these terms. This term is related to but distinct from biased or misleading information.

- *Misinformation* is false content which is shared by people who do not realize it is false.

- *Disinformation* is false content "deliberately created or disseminated with the express purpose to cause harm" (Wardle, 2018, p. 4).

- *Propaganda* is not necessarily true or false, and "often has a political connotation" (Wardle, 2018, p. 6). Since the beginning of widespread false information in the media, more specific terms such as *digital propaganda* have emerged in order to classify a new kind of propaganda that spreads via contemporary digital systems and technologies such as social media (Bjola, 2017).

Commonly, false information in the media has been referred to as fake news. Some researchers have maintained the use of fake news for its "political salience" (Lazer et al., 2018, p. 1094), although several prominent educators, journalists, and researchers have called

the term misleading and politicized (Caplan, Hanson, & Donovan, 2018; Zuckerman, 2017).

The term is not precise enough to be used in this context because of its vague and dual nature.

Research institute Data & Society distinguishes between two uses: (1) meaning "problematic content", and (2) as a critique of the media. This definition of "problematic content" is closest to what I refer to as false information in the media, such as misleading information online masquerading as real news, or propaganda altogether (Caplan et al., 2018, p. 6). The second use of fake news is often used to degrade the public's trust in these sources. Typically this is used by critics of mainstream media, particularly alt-right publications and conservative leaders (Caplan et al., 2018, p. 7–8).

Because of this conflicted definition, I avoid the term fake news, and instead refer to the phenomenon as false information in the media throughout this thesis, occasionally using other terms such as misinformation and disinformation where specifically applicable.

Dark patterns

As noted in the introduction to this thesis *dark patterns* are designed experiences which, broadly speaking, use deceitful practices to fool users (Brignull, n.d.). These are often wielded by digital experiences that add additional charges to online purchases. These experiences give users the illusion they are in control by using common design patterns which are often used in situations with mutual trust, such as standard digital experiences without dark patterns. From the perspective of Kahneman's (2011) research, these dark patterns work by inducing cognitive ease, tricking consumers into not engaging their ability to think critically.

Dark patterns are a valuable comparison between the field of design and the contemporary media environment. Dark patterns are to design what disinformation is to media dynamics. Both take advantage of users' pre-existing trust, in both standard design patterns and in reliable media content, to achieve ulterior goals.

Credibility cues

Credibility cues refer to concise but important pieces of information which indicate how credible a media publisher, writer, or piece of media content is from the user's perspective. In modern digital interfaces, these pieces of information are a type of shorthand consumers use to gauge whether the content they are consuming fits what they consider to be a reliable source. Commonly in media content accessed online, and especially on social media platforms, these are visual cues and include the logo or brand of a media publisher or platform, the name of the source, and particular pieces of image, video or text content (Newman et al., 2018, p. 35).

These cues or indicators are a part of the model and schema established in section 2.4 and aid the consumer in choosing which media sources to follow. Some false news publishers have also used these cues to mimic well-known news media brands to deceive users into accessing their false content for their own goals. This can be viewed as an example of a media dark pattern as detailed previously in this section and in section 1.2. Because this type of information is valuable to consumers drawing a conclusion about the reliability of news content, the media consumption experience should make credibility cues easy to access. As examined in section 3.4, the product development team responsible for addressing widespread false content on the platform at Facebook has made it a priority to present these credibility cues to users (Smith, Leavitt, & Jackson, 2017).

Media, news and digital literacy

Media literacy, along the closely related term news literacy, is a term used to measure media consumers' overall understanding of media dynamics, including how and why media content is created, who creates, funds, and publishes it, and how media content is used by different groups (Newman et al., 2018, p. 33). Digital literacy is likewise used to measure how comfortable one is with the digital environment. This includes their understanding of contemporary technology and the dynamics that shape content found on the internet. Though these three terms are related, especially in the modern media environment, media and news literacy are distinct from digital literacy.

According to the Reuters Institute Digital News Report 2018, media consumers "with high news literacy are better able to use credibility cues to identify untrustworthy news on search and social" (Newman et al., 2018, p. 36). This is a crucial point and indicates that high levels of media literacy can provide input to the media model established in section 2.4. Media, news, and digital literacy can aid consumers in seeking more reliable and accurate sources of media content on which to form and adapt their worldview. Importantly, news literacy does not directly correlate to higher levels of trust in the media, indicating that, for the public, the ability to participate in democracy in an informed way may be the ultimate goal of a better media consumption experience, instead of merely restoring trust. In this thesis, literacy is an output of a better functioning media consumption experience and enables consumers to better form an accurate worldview.

3. Existing Implementations

Of primary interest to the goals of this thesis is to understand how product design can positively impact the media consumption experience. As this thesis aims to develop a preliminary set of product design guidance as a directional resource, it is valuable and appropriate to review a representative selection of implementations that have interpreted and approached the phenomenon of widespread false information in the media. Understanding the history of these applications and the intentions of their creators helps to define the scope and stage for a contribution in this environment.

In particular the phenomenon surrounding the recognition of widespread misinformation in the media during the 2016 election spurred media organizations, technology platforms, and agile startups to investigate, design, implement and test a variety of initiatives to address concerns about false information in the media.

This section will examine some of these implementations, which vary in their aims, problem definition, and scope. For example, media organizations and some startups have developed novel technology-driven media delivery approaches which engage readers in a fundamentally different experience than traditional online media. Other startups are experimenting with the development of new tools for readers to use as they consume media online. The tools generally focus on helping readers separate more trustworthy media content from lower quality content. Some implementations come from large technology platforms focusing on both improving the quality of the content available on the platform itself, and giving users better tools to make sense of the content.

In this space of digital news media products, development often moves and changes quickly as product development teams within

organizations respond to emerging information. As a result, these implementations, both by large platforms and smaller startups who are still evolving the foundation of their approach, are sometimes less well-documented and have more opaque boundaries than more traditional digital products. This is especially true in this case of widespread false information.

For instance, Factmata, an organization working on a content-scoring system with reliance on artificial intelligence, has not released a commercial product yet, but have proposed a few promising novel solutions, which merit inclusion. On the platform side, Facebook has introduced a myriad of quick product pilots and solutions to address the problem of misinformation on the platform since the 2016 U.S. presidential election, only some of which have persisted beyond a testing phase.

As a result, it is worthwhile to consider some of the impactful initiatives which complex platforms with many users, such as Facebook and Google, have introduced in the years since the false information phenomenon began. In order to understand the current and projected future crisis false information in the media poses, it is valuable to seek, explore, and evaluate different applications addressing the problem.

3.1 Selection Criteria

In deciding which implementations merit inclusion in this section, I created a set of criteria. With so many new suggested and implemented solutions developed in response this situation, it is important to portray a representative range of notable examples. As new complications have emerged surrounding online content in this situation, these implementations have taken innovative approaches which are agile in their response to still-emerging context and ultimately result in novel experiences for users. These implementations focus on a successful or pleasing experience for people using each.

The selected implementations are separated generally into categories related to their perspective and goals within media consumption:

- **Innovation directly targeting false information**

- **Innovation in digital news delivery**

- **Platforms features focusing on context to target false information**

Organizations developing tools to address false media content and misleading publishing tactics would be included as an innovation directly targeting false information. These selected implementations represent a fundamental addition to the media consumption experience, as the approaches detailed in this section are all positioned as middle layers between media content and the consumer, and focus on providing readers with more context to allow them to draw their own conclusions.

New and existing media publishers experimenting with different and sometimes radical ways to present news stories to readers is categorized as an innovation in digital news delivery. These innovations are often encapsulated products with relatively smaller user bases, resulting in more exploratory product or service development, compared to larger organizations like Facebook and Google, who in recent years have recognized a need to ensure the trustworthiness of media content on their platforms (Constine, 2018).

These platforms serve significantly large user bases, and as a result are a common referral source for all types of content online, including false information. These platforms have invested heavily into addressing false information in the media and the related decline in trust in the media with innovative features which primarily focus on context. Platforms like Facebook and Google seek to present consistently high-quality media content to users without intervening in to moderate exactly which content or publishers can use the platform. With such large user bases, the actions these platforms take to manage false information in the media is significant and relevant to shaping future contributions to this space.

3.2 Innovations directly targeting false information

Innovations directly targeting false information are represented by new initiatives and startups who have taken different approaches to addressing misinformation in online content. The approaches vary. More more technologically-reliant solutions, like image analysis automation browser plug-ins Reality Defender and SurfSafe, to service-oriented solutions such as Factmata and the journalism-centric NewsGuard, all directly target the user's experience when encountering false content.

NewsGuard

One of the more innovative news media products created in the wake of the 2016 U.S. presidential election and the revelation of widespread misinformation is NewsGuard. It is designed to provide readers accessing news online with more context about a news publisher in the form of an at-a-glance cue about a publisher's trustworthiness. It conveys these trust ratings to users through a browser plug-in when a user is visiting a particular publisher's website, and bases that rating on a number of different metrics about the credibility of information on the site and overall transparency, as assessed by a team of professional journalists (Wang, 2018; Oremus, 2019).

NewsGuard provides detailed information about these publishers written by the journalists, and first presents to users a green or red rating indicating whether or not a website is considered trustworthy. Additional ratings exist that indicate whether a news site has not yet been assessed by the NewsGuard team of journalists, or whether the information on the site may vary significantly, in the case of social media sites like blogging platform Medium or user-generated video platform YouTube.

The key value in a product like NewsGuard is the availability of contextual information, which can help users make sense of which media they can trust in an increasingly fragmented media environment. When visiting a publisher's website, users can immediately understand

the general consensus about the publisher. Additionally, users have access to a number of different standardized metrics they can use to both evaluate the current publisher's site they are reading, as well as compare publishers against one another to understand how they differ. However, consumers must trust NewsGuard to some degree for the service to be effective.

Widespread use of NewsGuard's product would certainly direct an increasing number of users to trusted news publishers and away from distrusted ones. Problematically, NewsGuard relies almost entirely on desktop web browser plug-ins to convey publisher ratings to users, despite a majority of news consumers using mobile devices to access the news (Fedeli & Matsa, 2018; Newman et al., 2018, p. 27). That began to change in early 2019, and the product is now integrated by default in the mobile version of Microsoft's Edge browser, though the browser currently has a "minuscule market share" (Oremus, 2019).

However, NewsGuard's direct approach to providing users with a 'nutritional label' about news organizations will inevitably displease news organizations given an untrustworthy label, as widespread use of NewsGuard's product could lead to decreased traffic and reach for the publisher. News organizations, instead of choosing to modify their approach to fit NewsGuard's rating scheme, may choose to eschew the product altogether. Furthermore, regular readers of news organizations receiving an untrustworthy label may discredit the NewsGuard product entirely, and disregard its ratings for any news organization.

SurfSafe and Reality Defender plug-ins

SurfSafe & Reality Defender are both browser-based software plug-ins handling the way users perceive images online, and drawing their attention to false images shared online. Though both work slightly differently, the two technology-led solutions exist in a web browser, like NewsGuard, and thus are available on any site users visit using the browser. The products function by visually indicating which images online match commonly manipulated or fabricated images. The apparent goal of these types of implementations is to improve users' digital literacy (Lapowsky, 2018).

The solutions share a similar genesis, beginning as a response to the revelation of widespread false information in the media, and especially digital media. After recognizing the credibility and reliability problems present in online digital imagery, the creators of SurfSafe wanted to build a software layer solution that helps consumers comprehend what images were false (Lapowsky, 2018).

By examining the media model established in section 2.4, SurfSafe and RealityDefender represent product design solutions that aid the consumer in choosing what news media content is worth trusting. However, solutions like these feature sophisticated technology but largely ignore the context surrounding the media consumption experience. For example, people with low levels of media or digital literacy would benefit the most from this type of technology, as it could aid in building understanding about how doctored images appear. But many of these implementations, including SurfSafe, RealityDefender and NewsGuard are available only via a browser plug-in. Installing a browser plug in is likely not familiar to consumers with low media or digital literacy levels, thus the relevant reach for these types of implementations is low. (Lapowsky, 2018).

RealityDefender has not been released publicly yet, but the two experiences appear similar from a user's perspective. First-hand experience with the SurfSafe plug-in shows that the software has not achieved its potential yet (Vincent, 2018). Images that are cropped or reversed still pass through SurfSafe's filters, and doctored content may appear as marked true by the plug-in. These deficiencies will impact how the plug-ins are trusted and in turn used. Expanding into usage on commonly used, image-centric social media platforms such as Instagram and Facebook would be a valuable move for this technology.

Factmata

Securing initial seed funding in 2016, notably from Google's Digital News Initiative, Factmata is a startup promising to address the false information phenomenon directly using artificial intelligence algorithms powered by human subject-matter experts feeding their understanding into the system. The company is developing patent-pending technology that they state on their website will "provide a real time

quality, safety and credibility score" to content online
(Factmata, n.d. a).

The startup claims to have developed algorithms that can quantifiably determine themes in online content like hyper-partisanship, controversiality, and bias (Factmata, n.d. b). Previously, these themes have been very difficult to score and measure because of the subjectivity and diversity of language and intent. Factmata does this by relying on experts who review and annotate cross-sections of online content. Their assessments, as well as individual experts' biases, are entered into the algorithm.

Users span from individual media consumers, to journalists, publishers, and platforms. These users may eventually make use of Factmata's artificial intelligence-powered service to obtain a clear understanding of the accuracy and inherent biases in content they consume online, to the scale of individual sentences.

Factmata aims to build a content scoring system that is understandable to users like individual media consumers and journalists. The goal of this system is to "allow [users] to critically evaluate content critically by highlighting its source, meaning, and framing" (Factmata, n.d. c). This indicates that the organization has recognized the value of allowing users to draw their own conclusions about online content while providing them with an exceptional level of accessible context. This type of approach is well-aligned with research studying how professional fact-checkers operate (Wineburg & McGrew, 2017).

In order to meet the organization's stated goal of eliminating the effects of disinformation, the organization has important objectives to achieve. First, Factmata must prove that their technology can work as claimed and reliably provide a content score that is valuable to its users, which has already proven difficult for other organizations like NewsGuard. If the startup can achieve that, they must secondly maintain objectivity in order to gain and preserve users' trust, which has proven difficult for less sophisticated initiatives, such as NewsGuard. Meeting these two goals would be a monumental achievement.

3.3 Innovations in news delivery

Conversational news

Launched in 2016, the first mobile application released by media organization Quartz represented a new method to quickly disseminate relevant news information to users in a chat-based interface (Lichterman, 2016). The experience uses the interface to breakdown a dense news story into more understandable segments. Rather than relaying an entire existing news story in this way, the application summarizes the content, which is written less like traditional news content and in a more conversational style.

A crucial difference is the inclusion of specific user interactions in the experience. When users receive a short story summary in the application, they can ask for more context or to move on to another story. For this reason, the application represents an innovative approach to news delivery. Creating a mild personality and tone of voice to deliver the news content, as Quartz has done, is a good way to build rapport with users. It is an innovative approach to delivering news in an increasingly fragmented media environment. The app utilizes a simple user interface, reducing distracting elements, and delivers valuable news content in an efficient manner.

However, the interface does put the user in a media environment controlled by Quartz, and it may be difficult for consumers to perform additional research and gather context about the content presented in the application. Because this is an application on mobile devices, consumers must make an intentional choice to download the application, thus some trust of Quartz as an organization can be assumed. Additionally, both the simplicity of the interface and the conversational delivery of the media content may not induce the user to think critically about the content they consume. If potentially false or misleading content were presented via the app, it could be fairly easy for users to accept it as truth without providing much opportunity for users to verify the information.

Single-topic news media platforms

The internet enables a huge proliferation of news publishers, and social media and other internet platforms provide users with access to similar content about the same newsworthy events from several different publishers. One innovative response to this is the type of approach which publishers News Deeply and Sift have taken. Rather than focus on a wide breadth of news, both services have taken a more vertical approach.

NewsDeeply concentrates its resources to build entire news reporting projects focusing on a single issue in depth. The organization took shape first around the Syrian Civil War with Syria Deeply, a single-focus reporting project started in 2012 with a mission to "highlight Syrian voices and perspectives through independent journalism that made sense of Syria's complex and brutal conflict" (Syria Deeply, 2018). NewsDeeply has continued to cover single subjects in depth, with a total of 8 news platforms spanning from the refugee crisis to environmental issues.

Sift, an smartphone news media application launched in 2018, likewise explores just a single topic in depth, beginning with immigration in the U.S. Through a compelling user-centered design, Sift provides users a media-consumption experience that differs significantly from the norm, allowing users to focus on understanding the economic and societal impacts of immigration without distraction by other subjects, stories, or content.

Furnishing more context, every single piece of information in Sift is linked directly to the original source, and users have a chance to dive deeper into subjects that provide better context for the focus subject. Additionally, Sift users have the opportunity to directly provide feedback individually for every piece of content in the application, giving users a better connection to the journalists behind the project (Sift, 2018). While Sift provides context via links to original research, the design of the experience does not encourage users to obtain more information from other sources.

Sift is a slight departure from a traditional news media consumption experience, as users are presented with information such as text,

interactive news quizzes, graphs, and images in short, digestible segments, whereas NewsDeeply follows a more mainstream approach albeit with a singular subject focus. Building single-focus news media experiences is an interesting and differentiated approach that could contribute to building trust with readers. While both Sift and NewsDeeply are fundamentally different experiences, the two services share in creating an insulated environment for the reader to explore a single issue in enough depth to potentially come away with a significantly improved understanding of the subject.

Newsvoice, AllSides

AllSides, launched in 2012, and Newsvoice, launched in 2018, are both news media aggregators, collecting stories on a particular subject and presenting groups of different viewpoints from news publishers on the subject. AllSides and Newsvoice, though originating in different eras and political climates, share a similar path. Both were developed in response to the largest criticisms facing the media during the services' respective formations.

The political and public opinion of journalism shaped both services motivation and output. AllSides developed in the midst of the 2012 U.S. presidential election, while there was increasing concern about bias in the media (Farhi, 2012). The organization formed to help combat inherent news publisher bias and resulting filter bubbles by presenting readers with stories on the same subject from news sources aligned with left, right, and center viewpoints.

Newsvoice started in response to the 2016 U.S. presidential election as more information about the breadth of misinformation in the media was uncovered (Newsvoice, 2017). The service launched with the intent to present more perspectives on news subjects, similar to AllSides, but additionally to involve a community of readers in shaping the news. Newsvoice does not rely on the same strict left, right, center structure to which AllSides adheres, but does present a variety of categorized sources via its service, and allows the community to comment on this grouping of articles. Understanding the differences between these two similar services, and how each have found success or experienced problems is key to informing future contributions in this space.

In the aftermath of the misinformation phenomenon, AllSides and Newsvoice present much different levels of credibility to readers. AllSides' transparency, pedigree, because of several seasoned journalists on its staff, and seven years of experience make the straightforward curation on the website of news seem trustworthy. Their objective approach which collects and presents the major themes from different perspectives of a news story can help readers place the news in context. AllSides provides only a brief summary in the staff's own words, before presenting links to other media sources, limiting commentary from the organization to just the few objective facts.

On the other hand, Newsvoice lacks the same objectivity that AllSides is able to provide, resulting in an apparent lack of credibility. Instead of a staff of journalists, Newsvoice allows users to submit content and write summaries, and curation is handled by the community, who vote for or against articles. Newsvoice uses these votes to rank content it presents, and a central piece of the service allows users to comment on grouped stories, shaping the narrative themselves.

Though services with a similar community-driven curation and context approach exist, such as Reddit, Newsvoice is novel for combining a news-focused service, categorized article groupings, and a community-focused approach. However, despite a tagline of "unbiased news" (Newsvoice, 2017), this approach allows users to craft their own narratives, possibly introducing their personal biases in the process.

Both services hold merit for media consumers interested in understanding the broader context of a story. AllSides' reliance on credibility cues is able to attract readers interested in comparing different media narratives about newsworthy events. While new, NewsVoice has a model that could aid in facilitating understanding among news readers, but will only find success if they can establish better trust with users and avoid including users' personal biases in the available content.

3.4 Platforms features targeting false information

Technology companies like Facebook and Google, among others, serve several thousands of users every day, and have recognized that false information in the media spreads, in part, through users of their platforms (Zuckerberg, 2016). Because of their large user bases, how these technology companies address this situation is important and informative for future contributions in this space. This section reviews how two of these major platforms, Google and Facebook, have addressed the spread of false information in the media. Other major platforms, like YouTube, have also introduced features that address the issue of false information (Farokmanesh, 2018; Lewis, 2019). However, findings from the Reuters Institute Digital News Report 2018 state that "an overwhelming preference toward reading rather than watching" when consuming media content (Newman et al., 2018, p. 28). Implementations by Facebook and Google directly address the act of reading news, and understanding the breadth of how these two platforms have responded is especially valuable.

Implementations by Facebook

The social media site Facebook served as a connection hub for over 2.3 billion monthly users in December 2018, roughly thirty percent of the world's population (Facebook, 2019). Users regularly share and interact with news articles on the service, posted by both media publishers and users. The platform, along with other social networks, has altered the media landscape significantly due to its role as a vector for many news publishers and content consumers.

Since the 2016 election cycle, Facebook has come under increased scrutiny for its handling of false or misleading information in the media on its platform. As a result, the organization has introduced several initiatives and features aimed at users and designed to inhibit spreading false information while providing users with more context about the news they consume. The implementations Facebook has launched to address false information have been various and

numerous, however, this section will focus primarily on a few key product features, primarily part of the interface, which have been designed for users to interact with as they use the site. While other activities such as reducing advertising-based economic incentives for spreading false content (Mosseri, 2017) and establishing the Facebook Journalism Project certainly are effective actions for Facebook in handling false information on the platform, this thesis focuses on product design implementations that can affect users' understanding of media content.

As detailed in the context section, Facebook's algorithm scores and presents content to users, and media publishers online often earn money via advertising by driving traffic to their webpages, and as a result, media publishers manipulate the algorithm to some degree to ensure this traffic and therefore advertising revenue. Furthermore, any credibility cues provided by a media organization's website are stripped away on Facebook, reducing all publishers and content creators to a similar-looking profile (Allcott & Gentzkow, 2017, p. 221). While the algorithm is designed to personalize content feeds for users and reward high quality content, media publishers have found some success in manipulating the system for profit by publishing disinformation, as false content spreads faster on social media than some true stories (Silverman, 2016; Vosoughi et al., 2018).

As a result of this, Facebook developed user-centered product features intended to provide flags about false media information, better credibility cues about publishers, and broad context about the media content users consumed:

1. **Disputed Tag** Facebook first launched a feature to flag links found on the platform as "false news" in 2015 (Owens & Weinsberg, 2015). The company later responded to the revelation of false information on the platform ahead of the 2016 U.S. presidential election with expanded development and testing of a new false information flagging and display system (Mosseri, 2016). The feature set enabled users to report a link discovered on the platform as fake news, and flagged to users links that had been disputed by reputable third-party fact-checkers, and enabled additional actions on that link. More

prominent flags were displayed when users acted to share a disputed link. This feature was removed from the platform after a year of use, as it could have unintended adverse effects, such as making non-flagged content appear undisputed when it was not the case, and making it more difficult for users to find valuable contextual information (Smith et al., 2017).

2. **Related Articles** As an improvement on the discontinued Disputed Tags feature, Facebook explored and released features that would present users with additional media content related to a news article in the user's feed. The feature could display articles from different publishers about the same subject or articles about different subjects from the same publisher. This feature represented the first large-scale effort from Facebook to show additional context to users about media content they encounter.

3. **Publisher Context** Along with the Related Articles feature, Facebook explored and launched another user-facing feature designed to help users determine the credibility of media publishers on the platform (Smith et al., 2017). This application provided users with a preview of the publisher's Wikipedia article as a source of additional context about a link users read. At the time of release, the product design team launching the feature said including Wikipedia gave users "a way of getting quick consensus or history on a publisher," and that the lack of a Wikipedia page for a publisher "was an important credibility cue for users" (Smith et al., 2017).

These moves by Facebook carry weight because of the enormous number of users on the platform. It is more difficult for users on social media platforms to verify the reputation of a media publisher than it is on traditional online media websites. This is partially responsible for the speed at which false information in the media spreads on social media. Furthermore, users' inability to verify media publishers combined with Facebook's ranking algorithm which rewards polarizing content, created an environment before the 2016 election in which bad actors could easily insert false information in the media into regular users' news feeds (Zuckerman, 2018).

By developing better information for users about the media content users consume on the platform, Facebook's objective is ultimately to improve the quality of the user's experience when using the platform. The organization's move to include context about information in the media for users is an important point as many other efforts have launched initiatives to evaluate how providing context helps overall understanding of the media. If effective, these types of features could help users consume higher-quality, more trustworthy media content in a more informed manner, building user trust in the respective platforms, proving worthwhile from a business perspective.

Google App news features

Google's various approach to media content have a long history and it is difficult to draw many specific conclusions from the breadth of the organization's work, similar to the range of initiatives Facebook has launched. The company has long supported journalists and in 2018, launched the Google News Initiative to collect their various efforts in one place (Schindler, 2018). This section focuses especially on Google's approach to news content on mobile devices through Google's proprietary mobile device application, as this is a specific focus of this thesis.

Google has long been the market leader in delivering search content, and has learned along the way from its users how relevant pieces of information are to one another. As a result, the organization's news content delivery through the Google app is especially personalized to fit the needs of the individual consumer. Though functionally similar to the numerous news applications currently available for mobile devices, in that content is presented in a single vertically-oriented scrolling view, Google's approach could be a valuable way to bring deeper context to media consumers.

Upon launch, the application interface presents essential information for the user about their location, including weather information and access to search, as well as the beginning of relevant news content. As the user scrolls, they are presented with main news content, which takes up a significantly large portion

of the user interface, and is sometimes followed by groupings of secondary contextual news information that by comparison takes up less space. One example of these content pairings is a main news story about a sports-related event, followed by contextual, separated secondary information containing scores for the sports games in reference in the original main story.

Additionally, the application presents informative tags showing the category to which the news item belongs. These tags are interactive, and with a single tap users are able to launch a Google search for the category title. This presents immediate context for users. Furthermore, consumers have great control in this service over the news that arrives in the feed. Not only can users set overall rules for the news discovery feature, but directly from individual news items in interface, users are able to choose to follow a news category, or even adjust the frequency at which this item and category appears in their feed.

This particular contribution from Google is an encapsulated solution that achieves a lot of success for its users. People who use Google's app to consume media are able to keep some context about what they read, and can perform search functions to read further about a subject. The design of this product in particular stands out among many other implementations of media consumption experiences.

The implementations reviewed in this section constitute a representative sample of how media organizations, inspired startups, and platforms responsible for the experience of millions of users have addressed the false information and media distrust situation. This selection provides valuable context for understanding the placement of the product design guidance among other implementations.

4. Guidance for product designers

4.1 Overview

My contribution addresses the themes examined in this thesis through the lens of product design to establish a foundational set of research and design guidance for designers working with news media content in the complex, contemporary media environment. As a result of this research, I propose a practical set of guidance for designers working with news media content. I develop a visual schema for comprehending this research in the tradition of Nelson and Stolterman (2012), and then present the product design guidance.

To build a media industry-centric backdrop to this contribution, I examined research into the historical course of the industry, and analysis about how the public's attitude and thinking toward the press institution as a whole has evolved over time, especially focusing on matters of trust. I explored the recent and still-developing phenomenon of false information in the media in connection with the industry's historical context. I studied research into this phenomenon to understand the actual impact of it and the conceivable trajectory of its evolution in the future.

A design inquiry-led contribution begins with an examination of the media consumption experience. I explored the evolution of technology for media content creation, distribution, and consumption experiences. To build an understanding of how media consumers perceive information, I reviewed research into critical thinking

and human thought, with special focus into how product design strategies could be developed to use this research to the advantage of the consumer. I then explored implementations of product design since the beginning of the widespread phenomena of false information to understand how other product designers in the field have addressed the circumstances.

By considering the media model detailed in section 2.4, it is clear that the chief objective of a modern media consumption experience should be in assisting consumers to base the formation of their worldview on accurate news. The experience should also aid consumers in rejecting worldview formation on the basis of news that merely confirms their pre-existing beliefs. This is complicated by the fact that consumers are fulfilled in their need for utility from news media by both accurate and confirmatory content. The role of product design in this model augments consumers' capabilities to recognize the difference between accurate and confirmatory information. Product design should also promote critical thinking processes which enable consumers to form a more accurate worldview and rebuild some trust in the media.

As established by Nelson and Stolterman (2012) and summarized in section 1.3, the crucial ability of design is its capacity to begin with a complex situation in the world, assess it from "a digital or analytic perspective," and turn that "outcome [...] back into the analog" (p. 19) Based on the research in this thesis exploring the complex circumstances of the media industry, the establishment in section 4.4 of preliminary product design guidance is an effort at transforming the findings back to a state that has comprehensible relevance to the world.

I endeavor to improve and augment the ability of consumers to form an accurate worldview. The forthcoming product design guidance addresses the current and future circumstances in which media information is progressively more difficult to trust and verify. As noted, product design has a recognizable impact on the news media consumption experience. With so many media consumers in recent years shifting from consuming media content through many disparate formats, to consuming media content on a shared single

format on mobile devices (Fedeli & Matsa, 2018), a design-led approach can have significant impact on media consumers.

In this chapter overall, I trace the output of the theoretical research, and outline of a set of new product design guidance developed as a resource and a tool for designers creating modern media consumption experiences. The structure of this chapter begins with a description of the media consumption experience model in section 4.2 in order to make sense of the content which follows. This describes the specific way consumers use mobile devices to seek and read media content. Then, the format, criteria and boundaries of the proposed product design guidance are reviewed in section 4.3. Finally, a draft set of guidance targeted at design professionals is presented in section 4.4.

This is separated in two portions. The first portion focuses on better, responsive information delivery throughout the media consumption experience. The second challenges designers to think again about the holistic impact of the media consumption experience on people, and how the experience could better support users' capabilities to make sense of and contribute to society.

4.2 Media consumption experience model

To make sense of this complexity, I establish a second model, the media consumption experience model, which ties together the themes of this thesis, along with the potential positive effect product design can have. It is related to, but operates at a more detailed scale than the consumer-centric media model detailed in section 2.4. This media consumption experience model specifically deals with the act of consumption via modern technology. Additionally, I create a schema to better represent this complex situation. The schema incorporates the role of product design guidance in this system.
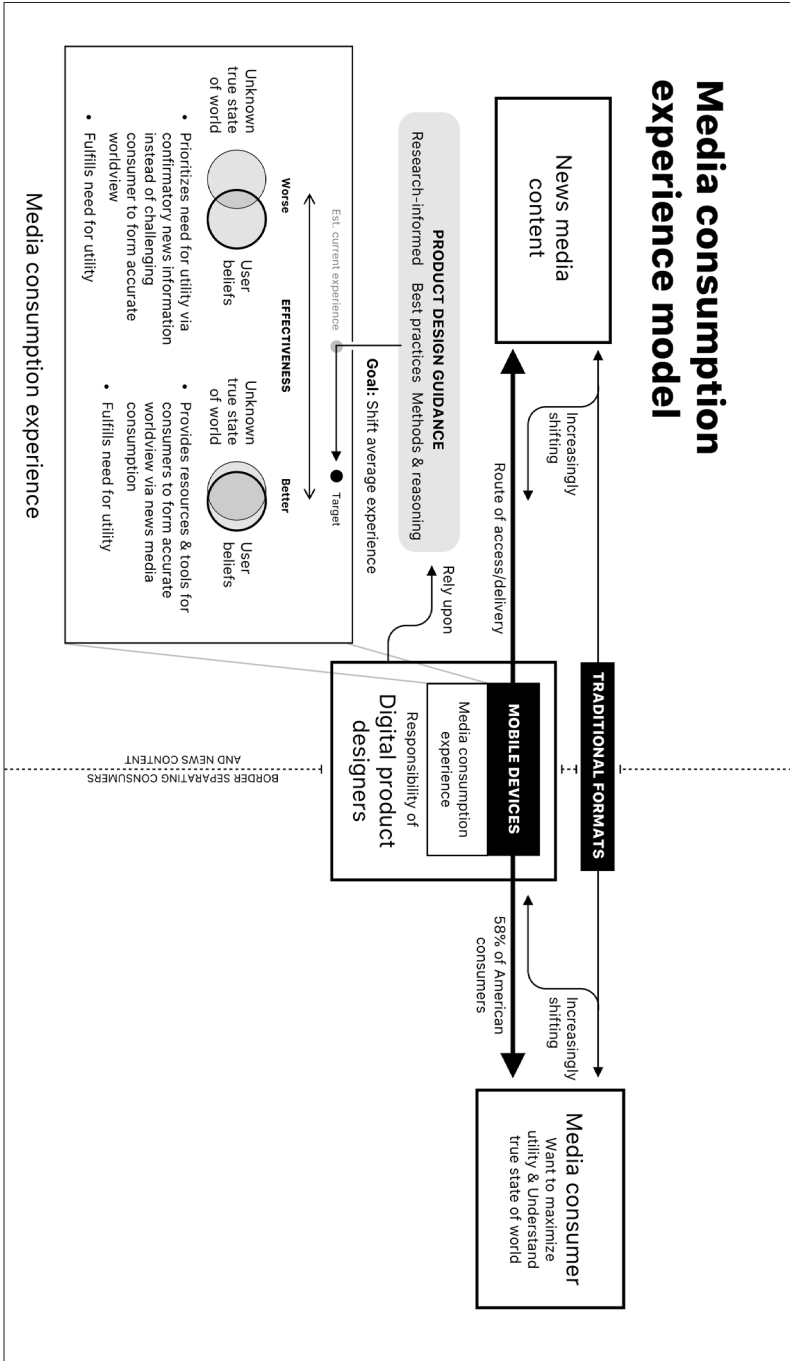
Figure 2. Schema representing the media consumption experience model. The schema reflects the description of the model in this section, depicting how product design and product design guidance can affect the media consumption experience.

A definable border exists between news and consumers. Increasingly, the location and format of that border is converging on mobile devices (Fedeli & Matsa, 2018), and will continue to grow (Newman et al., 2018, p. 27) as experiences on mobile devices continue improving. The mobile device as a foundation for a centralized media consumption experiences standardizes much of the content, presenting headlines, content, imagery, and video as of equal weight (Allcott & Gentzkow, 2018, p. 221). Social media platforms especially equalize this content. Experiences with the mobile device operating system and encapsulated consumption experiences via device applications, or apps, are the domain of product designers.

As noted in the introduction in section 1.3, implementations which introduce novel media consumption experiences that do not account for the user's role are insufficient. This is because media content has the most effect on the individual consumer. As researchers have found, and demonstrated in sections 2.3–4, media content affects the way consumers think, approach societal issues, and form a worldview. Exposure to media content greatly affects how consumers choose news sources to follow, therefore creating a feedback loop, as depicted in the consumer-centric media model schema in section 2.4. Broadly speaking, media distrust can lead to further media distrust. This makes the digital media consumption experience important, as it is a growing access point through the border for people to consume media content.

As false, biased, and misleading information mixes in among other legitimate content online, and with projections of this content to get worse and harder to detect, media consumers need enhanced tools and resources for dealing with these phenomena. The media consumption experience needs to evolve alongside with the sophistication of the information presented through it. These tools and resources can be delivered by modernizing and updating the media consumption experience to better suit the needs of today.

Relying on the consumer-centric media model established in section 2.4, it is clear that false and misleading information in the media prevents consumers from obtaining an accurate sense of the true state of the world, and is self-reinforcing, driving consumers to

consume media from organizations that further inhibit consumers' ability to understand the world's true state. However, with better tools, consumers may be able to better handle the effects of these information disorders and regain an informed status that allows them to accurately and effectively participate in democracy.

Product designers have a responsibility for shaping and controlling experiences on mobile devices, and the media consumption experience is no different. Product designers need guidance to follow to build these principles into their products at an intrinsic level. If designers have well-reasoned, practical, researched resources to follow, users will receive the support they need in the new media model.

Fundamental changes in the methods by which people consume news have begun to occur more rapidly than ever before, as detailed in the second chapter. These fundamental changes necessitate fundamentally different processes to ensure a continuously valuable experience for media consumers. User-centered product design methods comprise a suitable, adaptable approach to continually address future media consumption experiences.

4.3 Guidance format

Sets of product design guidance in the format detailed in this section are quite common and a valuable recurring trend in today's design profession. As noted in the introduction to this thesis, design is of increasing importance in business, and is relied upon in many areas of industry. Designers are included more often in making broader business decisions, and notably have an impact on company success (Sheppard & Sarrazin, 2018).

Design-led organizations and individuals commonly develop and publish design guidance for different approaches. This type of guidance usually takes the form of both theoretical and practical resources which help designers use repeatable methods, shape thinking about a problem, and apply reasoning and ideas from other industries or implementations to a new area. They take on names,

such as frameworks, models, toolkits, and style guides. For the sake of clarity, this thesis uses guidance as a general term. Many of these serve as pragmatic resources for designers, providing them tools to inject their work with fresh thinking and recommendations.

This guidance is directed specifically at designers creating experiences for mobile devices and exploratory activities for media consumers. However, it is designed to be platform agnostic. As media content consumption shifts more and more to mobile devices, designers working with media content should focus their attention on this area. Currently, news readers using a mobile device encounter a high *research barrier*, a term used in this thesis to indicate the relative difficulty of researching information about content consumed on a mobile device compared to a desktop browsing experience.

Consumers are prevented from accessing relevant and valuable context because of the design of the experience. As detailed in the next section, 4.4, consumers face risks in loss of focus or distraction when exiting mobile device-based reading environments to access another site or service to explore additional information about a news story they are actively reading. In other words, the research barrier is a measure of how difficult it is for users to conduct their own research to verify the accuracy of the media content they are consuming. The developed product design guidance should support designers in creating experiences for users to overcome this barrier.

This guidance is widely applicable in the context of mobile devices because much text-based news media content is served in a similar format, a modern form of an ancient format of information, the scroll. By connecting subsequent segments of narrative by stacking them on top of one another, the presenter is able to ensure continuity and has knowledge of what the audience has already read. It is also an intuitive reading experience, as readers learn to begin at the top of the column and follow a clear direction until the end. In standard mobile device-based news consumption experiences, the design and normal use of supports consumption of news in this vertical manner. However, these contemporary column-based consumption experiences do not prioritize methods for accessing additional context.

The guidance focuses broadly on the media consumption experience. This begins when a consumer encounters or seeks out any sort of digital news media content, and concerns the holistic experience of finding that content, viewing a preview, actively consuming the content, and interacting with that content. It can be broadened to include parts of the media model and schema presented in section 2.4. As part of the media consumption experience, consumers choose media organizations to follow, and filter the content they receive, seeking utility in their news media selection. Then, consumers modify their worldview based on this information. The media consumption experience can have a significant impact on consumers and society in this way.

Sources for the foundation of this content come from the major themes outlined in this thesis. Specifically, research into human thought and critical thinking, fact-checking strategies, media distrust, and false and misleading media content are all chief sources for the guidance. All of the learnings from this exploratory research are focused through a design outlook, making it clear to designers how the direct impact of these learnings on users can be understood.

4.4 Product design guidance

Conclusions drawn from this research, especially from the consumer-centric media model in section 2.4, suggest that what media consumers need is not constant access to news content, but contextual information that empowers them to gain a more holistic understanding of the true state of the world. As explored in the second chapter, the modern delivery mechanisms for news content remain grounded in outdated assumptions about the interaction between media organizations, news content, and people. These systems do little to account for the effects on the user.

The media consumption experience can be redesigned to allow for more user empowerment in an era of widespread false information. As noted in the media consumption experience model and schema at the beginning of this chapter in section 4.2, the experience of consuming news media is increasingly the responsibility of product

designers as people use these devices more for consuming media content. In order to improve the media consumption experience in an era with so much complexity, this thesis argues that product designers working in this area need better research-anchored guidance.

The exploratory research in this thesis can be relied upon as a foundational resource for product designers to help maintain their focus on crafting news media consumption experiences that result in increased media literacy, enhanced ability to form an accurate worldview, and increased contextual understanding of media content.

This section describes several different strategies and methods designers can follow to improve the media consumption experience for consumers. As stated earlier, these strategies and methods are derived from research conducted and documented in this thesis. This section lays out support for various approaches that are succinctly streamlined and detailed in the following fifth chapter.

The contextual reasoning and research, different influences, and best practices are presented for each section of the product design guidance. Based on exploratory learnings from the research, the guidance is predominantly classified into two sections. The *accessible context* section refers to a set of strategies or methods which predominantly examine the value in presenting users with additional relevant information in a graspable, context-building way. *Empower critical thinking* contains digital product design patterns for encouraging slower, critical thinking while people consume news media content.

Accessible Context

The current media consumption experience on mobile devices strips away much context and cues for credibility that traditional media models inherently contained. And, as detailed in section 2.2, the number of available sources for news media content has increased rapidly since the beginning of cable television news at the end of the 1970s and again with the internet. Media consumers have a great deal of news content to constantly process.

The lack of effortless access to objective sources of information about related subjects contributes significantly to the aforementioned research barrier for mobile device media consumers. Many services, such as news and internet browsing apps available on contemporary mobile device operating systems require users to exit the context of the story they are currently reading to do additional reading or research. A partial cause is the physical design of these devices, which prioritize a smaller screen to ease portability and increase convenience, which results in less area on the screen.

However, the responsibility for these issues users face on mobile devices within the media consumption experience lies with designers. Designers lead and contribute to the digital products and services used on mobile devices, and this is potentially representative of a failure in the design process to adequately consider the holistic experience of users. Further research is needed. It is important that the mobile media consumption experience should be reconsidered from a more user-centric view, with nearly 60% of Americans consuming news "often" on their mobile devices (Fedeli & Matsa, 2018).

Design contextual experiences. Media content does not exist in a vacuum, but digital media products occasionally treat media content like it does. For example, Facebook responded to concerns that the experience of reading news on its platform lacked context by introducing features like Related Articles which provided consumers with additional information about the news event of focus. Factmata and NewsGuard are both implementations attempting to provide impartial context in different ways. Whereas Quartz Brief, a mobile device application which presents news in a chat-like interface, does little to serve additional context to consumers outside of the chat interface. Consumers do often suffer from a context deficit with media content, partially because media consumption experiences are over-designed to improve and focus the act of actually reading or watching content.

Media consumers do not have the kind of information resources they need to assess the media content they consume. Consumers need understanding of where a piece of content fits in among ongoing media narratives. Designers can look to traditional news models for

evidence of the impact of context. Consumers previously relied on television news anchors, radio hosts, and newspaper columnists among others to comprehend news media in context. In the era of digital news media and widespread false information in the media, consumers must often navigate this vast environment without the same contextual information.

The media consumption experience could be designed to provide better access to tools and resources consumers could use to gather their own context. For instance, Facebook and Google now surface articles similar to a topic consumers are reading, though the relevance of these other articles is not optimized. Additionally, Facebook and Youtube have explored delivering links to Wikipedia entries about content consumers are accessing (Farokmanesh, 2018; Smith et al., 2018). which has become a defacto source of objectivity, though this objectivity could be considered relative.

Provide ways to overcome the research barrier. As detailed in the criteria for this guidance in section 4.3, users of mobile devices consuming news media content face a higher research barrier compared to desktop users. There are a variety of factors users may weigh when deciding a research barrier is relatively too high for them while consuming media content. This includes their perceived understanding of the content they are considering, the relevance of the content to the story their worldview, how long the research task will take, and the risk of losing their place in the content. A relatively high research barrier potentially reduces the likelihood that users will choose to assess the credibility of the information they read on a mobile device. Research which examines and measures how humans weigh the costs of making decisions supports this (Kool, McGuire, Rosen & Botvinick, 2010; McGuire & Botvinick, 2010).

Two distinct possibilities emerge when media consumers are presented with a research barrier when reading. If consumers decide the barrier is too high, they will continue reading the story and exit when it no longer interests them. If consumers decide to research the content, they must often exit the reading experience and switch context, creating a gap in their content consumption. These gaps become hazards where users can become distracted and lose focus in the original consumption experience.

It is important that users are able to obtain extra contextual information and information about the veracity of information they read online without risking distraction or derailment from their primary consumption experience. Users should not face a high research barrier when consuming media via a digital product. Product designers should find ways to reduce or mitigate this research barrier, making it easier for users to gain valuable objective information about the news they are reading.

Encourage lateral reading. One way of overcoming this research barrier is to design overt tools that allow consumers to gain context. Researchers at Stanford studied and compared the different media content verification techniques employed by undergraduate students, doctoral students, and professional fact-checkers and uncovered a method called lateral reading. Fact checkers employ this method when assessing the veracity of stories or sources (Wineburg & McGrew, 2017). As discussed earlier, compared to the usual content consumption practice of reading from top to bottom, staying on a single website or news story to assess its credibility, what one might deem reading vertically, fact checkers read laterally and open new web browsing windows to read more objective information about the website from other sources. This has similarities to approaches which present more context to consumers.

Professional fact checkers proved to be significantly faster and more thorough at this research than students or Ph.D historians because of their use of lateral reading. (Wineburg & McGrew, 2017). Encouraging actions that improve the user's contextual understanding of media content they consume, such as lateral reading, is a core method designers of digital products can employ to improve media literacy and media trust for consumers.

Empower critical thinking

Media consumers often lack the required tools and methods for assessing media information. Biased, misleading and false media content thrives via bypassing the slower, critical thinking function of the mind and appealing to the intuitive brain which relies on snap judgments. As Kahneman (2011) notes in section 2.3, the

logical, critical thinking System 2 of human thought "is normally in a comfortable low-effort mode" (p. 24) In this more idle state, misleading, false, or biased media information that merely continues to induce cognitive ease can pass unnoticed, entering human thought. "A reliable way to make people believe in falsehoods is frequent repetition, because familiarity is not easily distinguished from truth," states Kahneman (2011, p. 62). This is significant and valuable point which supports challenging consumers' sense of cognitive ease.

The huge amount of available news content also exacerbates this situation. This overwhelming amount of information can make the consumer spend less time on any single piece, letting the intuitive System 1 make decisions. The digital products consumers use to access news content should be supportive and empowering in this situation. The media consumption experience should be a vehicle for users to think more critically about the news, and in turn, draw their own conclusions about current events. This body of research aims to supply product designers with a resource to design the future media consumption experience to account for this.

Induce cognitive strain. One method for encouraging critical thinking and understanding of media content is to induce cognitive strain in users. As noted in section 2.3, the reverse of cognitive strain, cognitive ease, could allow System 1 to receive false, misleading, or biased information at face value and form beliefs based on it. Conversely, cognitive strain challenges the human mind by compelling its cognitive abilities into action to solve a problem. Inducing cognitive strain can significantly improve people's ability to understand a concept.

As an example, Kahneman (2011) notes a study which found that even poorly printed test material, utilizing "a small font in washed-out gray print," induced enough cognitive strain to significantly reduce the number of mistakes test subjects made (p. 65). However, modern experiences are designed to reduce cognitive strain as much as possible. Reducing the legibility of a typeface in a digital media consumption experience, as in Kahneman's (2011) example, may seem counterintuitive to designers, and it was difficult to

find any existing implementations which expressly tried to induce cognitive strain in this way. However, designers of media consumption experiences should seek out and implement other ways to trigger cognitive strain in users.

Reconsider entirely frictionless experiences. One method of inducing cognitive strain may be through introducing intentional friction into an experience. Proposing this could be perceived as counterintuitive to the general trend of designed digital experiences. Designers are often perceived as champions of making things easy for users. Eliminating obstacles and distractions are generally hallmarks of successful user experience design. However, this extreme focus on eliminating all friction has stopped designers from recognizing the value of slowing the user down (Weaver, 2019).

Friction can be an incredibly valuable feature for users. One example is a relatively new trend in authentication online, called two-factor authentication. This system by sending a message with a code to an already registered device or browser when a user uses a password to sign in to a platform on a new device or browser. Despite the slight friction, this provides a much higher level of security for users, as in order for a bad actor to gain access to the user's data, the bad actor would need access to two disparate pieces of information.

However, friction does not exist only for making it harder for thieves to access user data. Slowing down consumers and empowering critical thinking activities is a trend beginning to be embraced more within the design community (Yablonski, 2019). As noted by Kahneman (2011), cognitive strain induces critical thinking. One resource for introducing intentional friction into designed experiences in order to create a better, more holistic experience for consumers is the website Humane by design (Yablonski, 2019). This resource presents repeatable design patterns with curated collections of writing which serve as valuable context for product designers.

4.5 Guidance summary

The preliminary guidance presented here is the result of a design inquiry and exploration into the subject matter within this thesis. The guidance is framed from the contemporary perspective of user-centered product design, and directly utilizes the research to draw conclusions about actions designers can take in order to positively impact the digital media consumption experience for users.

This guidance should serve as a starting point for designers working with news media content and digital products. By following the themes contained within, designers should be able to create media consumption experiences that improve consumers' ability to form an accurate worldview based on accurate news content, and by doing so, improve media trust in reliable content.

Context and critical thinking are not new concepts to the design of products, but strengthening this type of information in media environments is crucial to building trustworthy media organizations and experiences. Doing so can aid media consumers in forming more accurate worldviews and enabling informed participation in democratic actions.

5. Discussion

As detailed in the introduction, my main objective in writing this exploratory research-based thesis was to establish foundational research into the complexities of the contemporary media industry and, as a product designer, understand how a design-led contribution to these circumstances could positively impact media consumers.

To structure this work, I established key questions to drive the work forward:

- In today's current complex and evolving media environment, how could the digital news media consumption experience itself better support consumers' ability to comprehend the news and enable consumers to take appropriate actions which support their worldview?

- How can product design have a tangible effect on the news media consumption experience, and how could product design guidance be developed to support designers work in creating consumer-centric media experiences?

First, a literature review was conducted to establish a historical context and recent developments in the media industry, primarily the decline of trust. This review surveyed the reasons behind the dynamics that have caused major shifts in the industry in the last half-century. It also established an interpretive research-based model which connected themes in this thesis related to product design and human thought with how consumers modify their beliefs based on from media information. Next, groundbreaking research about widespread false information in the media was reviewed. A sensible trajectory for the future of false information based on research and recent newsworthy events is established.

A review of existing implementations indicates that a few approaches of enhancing the media consumption experience have been explored. However, it is abundantly clear there is much space for growth here, and many different ways the experience could be crafted to better support users. Many solutions focus on limiting exposure to false information, for instance, but only a few reviewed implementations are designed to support providing additional context to consumers. Though it is more difficult to assess intentionality, no implementations reviewed appear to support critical thinking as a chief aspect of the consumption experience.

The interpretation of the exploratory research and preliminary product design guidance based on the research follows. A model of the media consumption experience, which accounts for the increasing importance of product design, is established. This model helps to interpret the research output, and enables a discussion about the preliminary product design guidance. The guidance is then presented and detailed in two primary sections. The guidance draws from the body of research within the thesis and reasoning is presented to support its efficacy.

The outcomes of this research conclude that there are actionable routes in which the media consumption experience can be improved. Within the confines of the consumer-centric media model established in section 2.4 of this thesis, these improvements to the experience would enhance the capabilities of consumers to form their worldviews based on accurate signals received from the media. Doing so would reduce the effects of media content that provides utility to consumers through information that only confirms existing biases.

As demonstrated in guidance overview, research conducted over the course of this thesis indicates that future media consumption experiences should advocate for providing thorough context and empowering critical thinking. Given the current circumstances of the media industry, especially the overall decline in trust and widespread false information and other information disorders, and given how these situations are projected to evolve, it is clear how

supporting context and critical thinking will help media consumers form an accurate worldview.

A foundational step in providing better media consumption experiences for people is through establishing product design guidance for professional designers. It is common for designers to rely on theoretical and practical resources and tools to inform and shape the work they do. This set of guidance provides a theoretical and practical understanding of designing media consumption experiences. As noted within this thesis, digital product designers will increasingly gain more authorship over media consumption experiences as the user base for mobile device technology grows. Designers can first use this research to build an understanding of the media industry dynamics and historical context. This preliminary set of product design guidance is a resource and a tool for designers approaching creation of media consumption experiences.

In general, I am pleased with the findings represented in this research. The focused exploration of the themes related to media distrust and the role of product design has resulted in an effective set of interpretive research. Additionally, it is valuable to extract and apply the learnings from this research to a set of practical guidance for designers.

Given my personal experience and background, this thesis primarily covers the news media experience in the United States and largely does not mention news media experiences in other markets. This is partially because media experiences differ vastly from country to country, making it more effective to assess the market I understand best. Additionally, the media environment in the United States has remained relatively volatile for several years, and as a result American consumers are likely to benefit the most from a contribution to improving the media consumption experience.

My initial assumption of this overall project did not account for the incredible scale of the implications of media distrust and the phenomenon surrounding disinformation. The resulting changes to the structure and focus of this thesis while developing it have occurred because the circumstances are much more complex

than initially thought. Because of this, it became important to first establish a representative set of research into these themes. Via deeper research, these themes broadened from general media distrust to include a historical perspective, a broader and more strategic product design point of view, and an understanding of human thought and reasoning.

From this research, it became possible to establish a preliminary set of product design guidance for a target audience of designers building media-centric products. Whereas earlier plans for this thesis included the design and testing of prototypical media consumption experiences, it became clear over the course of this thesis that a more strategic product design approach would allow for this thesis more deeply explore both the themes and the future role of product design for media consumption. My evaluation is that this results in a more broadly communicative set of guidance that is reliable for designers in different fields, instead of a prescriptive execution that would ignore the diverse contexts designers face.

Overall, this research serves as a foundational basis for further work in this area. There exist clear paths forward for further development based on this thesis. Developing the guidance into more practical formats in support of professional designers is a valuable next step. Additionally, more research into specific approaches for supporting media consumers through product design should be conducted. Finally, given how the dynamics of the media industry have affected this complex situation, more attention and research into the future evolution of the media industry is needed.

In the future, further developing this practical guidance would involve several efforts. Since the work is primarily targeted toward professional designers, one interesting way to advance these design recommendations is to review them alongside these designers who rely on a variety of design guidance on a regular basis. Understanding how to make this content practical and reliable would be valuable achievement.

Based on this exploratory research and preliminary guidance, it would be especially prudent to evaluate the effectiveness of

these techniques with media consumers themselves. How well do methods that provide additional context help consumers better form a more accurate worldview? How can interfaces be designed to induce cognitive strain and thus engage critical thinking, while still maintaining high standards for interface design and accessibility? These are interesting starting points for additional design-led research, and represents a gap in understanding in this field.

While this thesis establishes a comprehensive set of existing implementations, collecting a more expansive library of both existing and conceptual executions of this guidance would provide a good basis for evaluating effectiveness as described in the previous paragraph. Including these exemplar implementations would provide great context for designers working with future versions of this type of guidance.

Additionally, continuing to evaluate the dynamics of the media industry as technology continues to affect it is a broad and important area of research. Continuing to research false information in the media and likely future situations in which even more media content is easily fabricated and disseminated is invaluable. The guidance in this thesis is developed in response to the current circumstances ongoing in the media industry, so that consumers have resources to rely on in a future filled with convincing and misleading information. In the near future, it is predicted that half the media content consumers in developed markets will encounter online will be false ("Gartner reveals top predictions," 2017). Continuing research into how content is fabricated and how consumers cope with it will be enlightening to content creators, media publishers, and designers working with media content.

While false information in the media and its future evolution are important considerations in this environment, other information disorders impact consumers' ability to understand contemporary issues and form an accurate worldview. In turn, this impacts how well consumers participate in society. As trust in the media continues to be unpredictable, consumers' inability to gain valuable context and comprehension can worsen. Establishing an understanding of how design can be used to affect trust in the context of news media is by

definition a complex topic. This thesis seeks to begin to interpret this complexity, and sets forth some models for better comprehending the role of product design among the modern media environment. This work will certainly inform future iterations of this guidance and creates a basis for future work in the context of design for media consumption experiences.

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