Mitigating Distrust in Digital News Media: A Qualitative Research-Creation Study of a Proposed Fact-Checking Decentralized Application

Emily Follett-Campbell

A Research-Creation Thesis

in

The Department of Journalism

Presented in Partial Fulfillment of the Requirements

for the Degree of Master of Arts (Digital Innovation in Journalism Studies) at

Concordia University

Montreal, Quebec, Canada

October 2022

CONCORDIA UNIVERSITY

School of Graduate Studies

This is to certify that the thesis prepared

By: Emily Follett-Campbell

Entitled: *Mitigating Distrust in Digital News Media: A Qualitative Research-Creation Study of a Proposed Fact-Checking Decentralized Application*

and submitted in partial fulfillment of the requirements for the degree of

Master of Arts (Digital Innovation in Journalism Studies)

complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the final Examining Committee:

_____ Chair/Graduate Program Director

Dr. Andrea Hunter

_____ Supervisor

Dr. David Secko

Approved by _____

Chair of Department or Graduate Program Director

_____ 2022 _____

Pascale Sicotte

Dean, Faculty of Arts and Science

ABSTRACT

Mitigating Distrust in Digital News Media: A Qualitative Research-Creation Study of a Proposed Fact-Checking Decentralized Application

Emily Follett-Campbell

As mis- and disinformation is created and shared with greater ease and speed, trust in online news media is declining. While the "infodemic" resulting from the COVID-19 pandemic is the most obvious recent example of this (Garneau & Zossou, 2021), the spread of mis- and disinformation is woven into conflicts around the globe, from the Russian invasion of Ukraine (Price, 2022; O'Neill, 2022), to divisive domestic tensions, like climate denial (Meyer, 2021). Reuters puts Canadians' trust in "news overall" at 42 per cent (Newman et al., 2022, p. 119). While other studies provide a more optimistic overview (Bricker, 2021; Edelman Canada 2021), they still show that trust is an issue of concern. This paper will explain how a fact-checking decentralized application (dApp) could provide a democratic process for recording and verifying claim reviews, and through crowdsourcing verification and fostering transparency and digital media literacy, potentially help bolster public trust in news media. This paper is one component of a Research-Creation Thesis Project, which also consists of: (a) a website, checkmarker.org, that explores key problems negatively impacting trust and how a fact-checking dApp might work; (b) interviews with professionals with expertise relevant to trust in news media and/or blockchain; and (c) a short survey to gather preliminary feedback about the concept and the topic

of trust in journalism. In the future, this project could lead to the development of a prototype of a fact-checking dApp, as well as be used to make a case for or against the use of blockchain in journalism.

Acknowledgements

I am deeply indebted to my Academic Supervisor, Dr. David Secko, for his constructive feedback and patience throughout this process. I would also like to express my appreciation to Chair and Committee Member, Dr. Andrea Hunter, and MA Program Director, Dr. Magda Konieczna for examining this thesis project. This endeavor would not have been possible without the eight interviewees who generously shared their insights: Sally Lehrman, Jeremy Clark, Elyse Amend, Rosanna Schropp, Juliette De Maeyer, Patrick White, Steve Faguy, and Roberto Rocha.

As this Research-Creation Thesis Project was created at Concordia University in Montreal, I would like to acknowledge that it was made on the unceded territory of the Kanien'kehá:ka nation.

Before starting this master's program, I worked at a small magazine, where I wrote an article on Indigenous inclusion in the workplace. I was told about the mass graves at residential schools. At the time, I assumed it must be old news and had no understanding of its significance. Later, this got me thinking. Accidentally breaking news or getting others to break news in a non-hard news environment can be a tactic for suppressing information and intimidating people, especially women, into soft news and other types of content creation. While I may have been more comfortable writing a mommy blog or publishing fan fiction (as has at times been suggested), to assume that important information cannot surface in these areas is arrogant. With so much user-generated content, the likelihood of this happening online is high. For planting the seeds of ideas like that (as well as helpful business advice) I would also like to extend my sincere thanks to Vera Asanin and James Mior. Thanks should also go to the countless others who I worked with or interviewed or whose paths crossed mine before and during the creation of this

project. For instance, I am also grateful for the solid foundation I got in digital marketing and inspirational people I had the privilege to work with in the postgraduate certificate IMC program at St. Lawrence College.

Many thanks to the engineering students and Concordia's Centre for Engineering in Society for showing me how to learn and teach at the same time (whether they knew it or not, it was extremely helpful). Thanks to Grad Pro Skills for useful workshops in thesis prep, Zotero, and the like, and Jonathan Jarry, for allowing me to interview him. For being sources of inspiration, thanks to Civil, the work of Manoush Zomorodi and the *ZigZag* podcast, Sasha Costanza-Chock, and Data & Society and CAJ programs and events. A million years ago, I went to theatre school at Concordia. The pandemic was isolating and spending it researching everything that can go wrong with digital communications was a bit disheartening. Thanks to the ghosts of theatre school past for reminding me what I believe about that eternal human drive to say shit you're not supposed to; and thanks to the many well-wishers/trolls who helped me hone that ability into something acceptable (hopefully) for academic publication.

I would be remiss in not mentioning my 7-year-old son, Gavin, who is, and will always be, my main inspiration. I never had the ambition to make anything that might outlast me before he was born. Lastly, I'd like to recognize my friends, late night muses, and family, especially those who let me crash/work at their places (mom, Tam), for their support.

Table of Contents

List of Figures

List of Tables

Introduction: Research Questions and Objectives

As mis- and disinformation is created and shared with greater ease and speed, trust in online news media is declining. This Research-Creation Thesis Project addressed the question of whether a fact-checking decentralized application (dApp) could help improve public trust in journalism. A fact-checking dApp shows potential for research in this area due to its decentralized and inclusive nature and capacity to provide a means of self-regulation (further discussed on pages 43 and 47). There is a large amount of unverified user-generated content (UGC) online. A fact-checking dApp could enable news organizations and content producers to give credit where credit is due (or secure the identities of sources where it is unwanted), as well as expediate verification and protect people from harassment by shuffling information quickly to the news organizations best equipped to handle it, while still including small, independent content producers and engaging news audiences to participate in the process.

Eight interviewees with expertise in the intersection of journalism and technology and/or blockchain were interviewed for 30-45 minutes each via Zoom to create content for the website checkmarker.org (Appendix A1-A15), which also explored issues impacting trust in news media and provided an explanation of how a fact-checking dApp might work (Appendix A1). Interviewees and people navigating the website were invited to read a sample fake news article (Appendix A2) and accompanying claim review article (Appendix A4), and then take an eight-question survey (Appendix B) to gather feedback and gauge interest in the idea. As participants navigated the website, the goal was that they would gain knowledge of some of the problems faced by news media (e.g., audience polarization, media manipulation, ad revenue lost to digital platforms) and see how these problems impact trust and how a fact-checking dApp might help mitigate them.

This approach was designed to explore the following research questions:

RQ1: What improves public trust in news media?

RQ2: Would a fact-checking dApp improve public trust in news media?

This paper covers the literature in the area, methodology of the work, and discussion of the interviewees' insights. While the sample from the online survey opened to the public was not large enough to be included, the interviews provided robust responses, which are a sounding board for how future research might engage wider audiences.

Both the literature and interviews revealed three commonly proposed solutions to declining trust in news media:

- Greater transparency on the part of news organizations.
- Better education and digital media literacy.
- Interventions to reduce the influence of mis- and disinformation on the public.

A fact-checking dApp could potentially help facilitate all three of these solutions, and five of the eight interviewees affirmed they would be more likely to trust online news that uses this process. By providing an immutable record of claim reviews that would alert both people and search engines and recommender systems that disputed content has been verified, a fact-checking dApp could help promote media literacy and potentially engage news audiences in the verification process, creating a shared resource that would be accessible to small, independent news outlets.

Literature Review

The participatory nature of digital news media, sheer volume of information available, and technological innovations in producing digital content has led to a proliferation of mis- and disinformation. For example, one *Buzzfeed* analysis conducted during the 2016 U.S. presidential election found that in the months leading up to the election, fake news stories generated more engagement on Facebook than legitimate news stories from major news outlets (Silverman, 2016). Culloty and Suiter argue that the internet and social media platforms facilitate and "incentivize low-quality content in many ways"; but "disinformation only becomes a problem when it finds a receptive audience" willing to "believe, endorse or share it" (2021, p. 4).

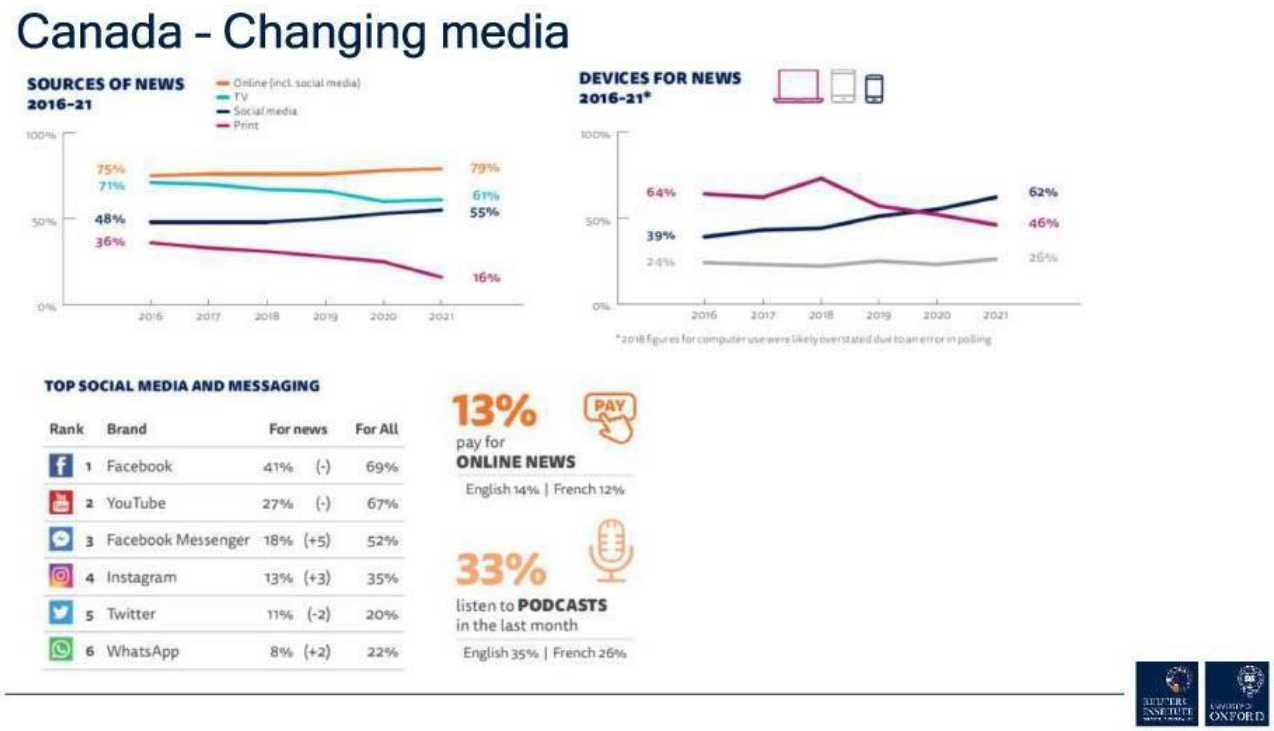
The rise in mis- and disinformation has been accompanied by a rise in fact-checking and verification initiatives (Appendix A7). The fact-checking dApp proposed in this thesis project could provide a means for audiences to easily identify content that has undergone a democratic fact-checking process and enable them to participate in verification. It would be democratic and participatory because in addition to being a shared data structure, blockchain (pg. 43) can also function as a voting mechanism. This literature review will examine some of the challenges that makes online verification necessary.

The Decline of Public Trust in News Media

The digital shift has led to a decline of trust in journalism. In the context of journalism, trust can be viewed as public perception of the media's ability to report the news "fully, accurately and fairly" (Gallup & Knight Foundation, 2020). As shown in Figure 2, most Canadians (79% in 2021; and 77% in 2022) get their news from online sources, including social media (Newman et al., 2021, p. 119; Newman et al., 2022, p. 119).

Figure 1

Canada – Changing media: Sources of news



Note. From *Reuters Institute Digital News Report 2021*, by N. Newman et. al, 2021, p. 119 (https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2021-06/Digital_News_Report_2021_FINAL.pdf). CC BY-NC.

However, while Canadians increasingly consume news digitally, this digital shift has coincided with a decline in trust (Appendix A6). In 2021, the *Reuters Institute Digital News*

Report 2021 pegged trust in news overall in Canada at 45 per cent (Newman et al., 2021, p. 119). Since then, trust has fallen three percentage points to 42 per cent, "its lowest score yet," according to the 2022 report (Newman et. al, 2022, p. 119).

Trust statistics vary, as different organizations measure trust in media differently, for example by making a distinction between audience type, degrees of trust, or between traditional and online media. For instance, the *2021 Edelman Trust Barometer*, which measures trust around the world in NGOs, business, government, and media, provides a more positive outlook. Edelman Canada puts Canadians' trust in media at 64 per cent for the "informed public" and 53 per cent for the "mass population" (2021, p. 6). For the informed public category, respondents had to be college-educated, with a household income in the top 25 per cent and have "significant engagement in public policy and business news" (Edelman Canada, 2021, p. 2). The mass population category encompassed all other respondents (83%) (Edelman Canada, 2021, p. 2). The report found media trust in Canada was up three points from the year before and generally stable compared to other countries, with Australia seeing the greatest increase in trust (+12) and China experiencing a record year-over-year decline (-10) (Edelman Canada, 2021, p. 4).

Other organizations, such as the Radio Television Digital News Association of Canada (RTDNA Canada), report similar findings. RTDNA found overall trust in traditional news media in Canada is down from previous years (Table 1), and has also become more polarized, with more Canadians swinging more towards extremes, as evidenced in its *Trust in News* report findings shown in Table 1 (Bricker, 2021, p. 2-4).

Table 1

Trust in traditional news media in Canada

	A Great Deal	A Fair Amount	Not Very Much	None At All	Trust Great/Fair
2021	15%	51%	27%	7%	66%
2008	8%	61%	27%	4%	69%

Note. Adapted from *RTDNA Trust in News*, by D.J. Bricker, 2021, p. 4. https://www.ipsos.com/sites/default/files/ct/news/documents/2021-06/RTDNA_Trust_in_News-Report-2021-06-03-v1_0.pdf. Copyright 2021 by Ipsos.

Trust levels were also widely divergent based on the type of source, with traditional news media trusted more than online. For example, trust in broadcast TV news (54%) and print newspapers (49%) was higher than trust in online-only news publications (29%) and social media (12%) (Bricker, 2021, p. 5). It is worth noting that while trust in broadcast news and print newspapers was comparatively high, consumption of these sources was lower than in previous years (Table 2) (Bricker, 2021, p. 7, p. 9).

Table 2

Trust and consumption

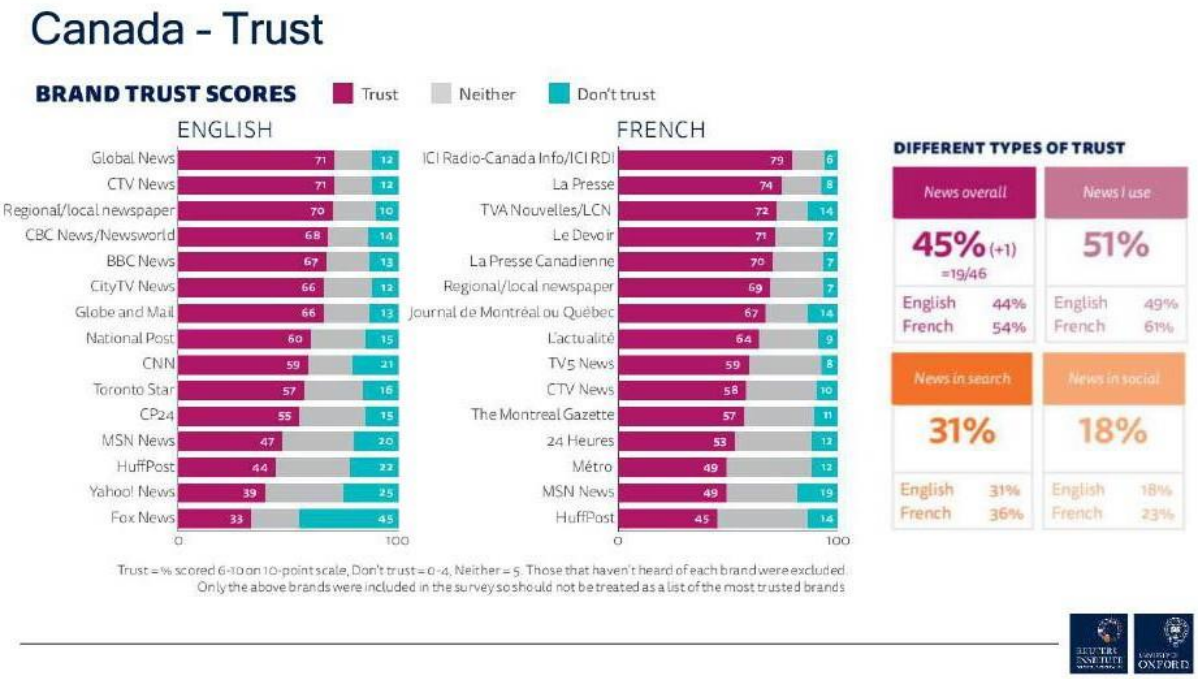
	Trust – 2021	Consumption - 2021	Trust - 2017	Consumption - 2017
Broadcast TV news	54%	48%	62%	58%
Print newspapers	49%	24%	58%	42%

Note. Adapted from *RTDNA Trust in News*, by D.J. Bricker, 2021, p. 5 & p. 7 https://www.ipsos.com/sites/default/files/ct/news/documents/2021-06/RTDNA_Trust_in_News-Report-2021-06-03-v1_0.pdf. Copyright 2021 by Ipsos.

Trust levels are also greatly impacted by news brand and delivery mechanism, with public confidence in trusted brands being much higher than overall trust (Figure 2) (Newman et al., 2021, p. 119).

Figure 2

Canada – Trust: Brand Trust Scores



Note. From *Reuters Institute Digital News Report 2021*, by N. Newman et. al, 2021, p. 119 (https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2021-06/Digital_News_Report_2021_FINAL.pdf). CC BY-NC.

The COVID-19 pandemic has highlighted the role mis- and disinformation plays in trust in news media, and public institutions in general. A Statistics Canada survey found that 90 per cent of Canadians surveyed used online sources to find COVID-19-related information; however, 96 per cent saw information "they suspected was misleading, false or inaccurate" (Garneau & Sossou, 2021). Vaccine mis- and disinformation also predates the pandemic. For instance, a 2019 survey of 2,500 Americans conducted during a measles outbreak found that consumers of traditional media were less likely to be misinformed about vaccines than those who got their information from social media (Stecula et. al, 2020). The survey showed a relatively high number of adults were misinformed; with, for example, 15 per cent of respondents believing that vaccines contain toxins (Stecula et. al, 2020). While the percentage of misinformed people may not seem that high, it is high enough to "undercut community immunity," which for measles, "requires vaccination rates in excess of 90 per cent" (Stecula et. al, 2020). The study showed that "vaccine misinformation proved resilient over time," and 81 per cent of the sample were "as informed or misinformed" in a second round of surveying five months after the first round (Stecula et. al, 2020). However, the 19 per cent who changed their views, represent enough of an impact to influence "herd immunity," thus demonstrating how interventions to counter mis- and disinformation can be consequential to events that affect all of us (Stecula et. al, 2020).

Another U.S. study compared vaccine-relevant messages of Twitter bots to average users (Broniatowski et. al, 2018). Data was gathered from July 2014 to September 2017; and the activity of Russian trolls, sophisticated bots (bots designed to closely mimic human behaviour), "content polluters" ("accounts that disseminate malware and unsolicited content"), and accounts that contained the #VaccinateUS hashtag were analyzed (Broniatowski et. al, 2018). The study

found vaccine-hesitant parents were more likely to turn to the internet for information and less likely to trust health practitioners; and antivaccine advocates have a significant social media presence, with upwards of 50 per cent of tweets containing antivaccine sentiment (Broniatowski et. al, 2018). The researchers state that the U.S. Defense Advanced Research Project's (DARPA's) 2015 Bot Challenge teams identified "bot networks designed to spread vaccine misinformation, but the public health community largely overlooked the implications of these findings" (Broniatowski et. al, 2018). The ramifications of public institutions ignoring mis- and disinformation are evident in the proliferation of false news about COVID-19. In 2020, the Director-General of the World Health Organization (WHO), Tedros Adhanom Ghebreyesus, said: "We're not just fighting an epidemic; we're fighting an infodemic" (WHO, 2020).

The COVID-19 pandemic has also made clear the consequences of stark polarization on the public's receptiveness to information. For instance, during Canada's "Freedom Convoy," ideologically right-leaning convoys of truckers set up blockades and organized protests, originally in opposition to the government's COVID-19 vaccine mandates (Aiello, 2022). Reports of journalists being harassed at these events led the Canadian Association of Journalists (CAJ) to release a statement urging newsrooms to take precautions to protect the safety of reporters (Docto, 2022). Journalists' complaints of harassment ranged from receiving threatening messages on social media to being spat on by protesters (Docto, 2022). Whether that conflict could be prevented by creating a more trusting relationship is unknown, but such conflict creates obvious barriers to journalists' ability to effectively cover the situation.

In terms of causes of mistrust, it is also worth noting that Canadian newsrooms do tend to be demographically homogeneous. While the ability to report news should transcend any demographic differences or bias, lack of diversity and the ideological leanings of news outlets

are reasons for distrust in news media. According to a November 2021 press release from the Canadian Association of Journalists (CAJ), 74.9 per cent of journalists who disclosed their race identified as white, compared to 18.6 per cent who identified as a visible minority, and 6.4 per cent who identified as Indigenous (CAJ, 2021). The survey, which was conducted on 3,873 journalists from 209 news outlets across Canada, also revealed that "white journalists tend to hold more senior and stable jobs" (CAJ, 2021). In the RTDNA *Trust in News* report, 76 per cent of respondents agreed that it was "important for them to see and hear from diverse voices"; this number was higher amongst BIPOC and LGBTQ25+ respondents (87% and 76%, respectively) (Bricker, 2021, p. 11). However, fewer Canadians said "Canadian news media currently reflects the diversity of the Canadian population": 69% overall; 61% BIPOC; 57% LGBTQ25+ (Bricker, 2021, p. 11). Ideological bias, or perhaps more often, the perception of ideological bias, also impacts trust. According to *The Canadian Encyclopedia*, while newspapers have traditionally openly leaned politically to the left or right, today "openly biased reporting" is often found on left- or right-leaning websites, such as *Salon* or *Rebel News* (Tattrie, 2019). While fair and objective representation is a cornerstone of journalistic standards, bias should not be discounted, and addressing these issues directly and transparently might help improve trust.

While the pandemic created an initial spike in news consumption, over time the surge of information on the topic has led to reports of news fatigue (Savage, 2020), with one 2020 Pew Research Centre report finding that seven-in-10 respondents needed "to take breaks from COVID-19 news" (Mitchell et. al, 2020). This news fatigue may lead people to adopt a less critical mindset. During the pandemic, large numbers of Canadian newsrooms also closed (Appendix A13). Part of the Local News Research Project, which records the closure of local newsrooms, the COVID-19 Media Impact Map for Canada tracks the impact of COVID-19 on

the Canadian media industry (Local News Research Project, 2022). As of August 2022, the Local News Research Project reported 56 local Canadian news outlets have closed permanently since March 2020; and only 16 have reopened after temporarily closing (Local News Research Project, 2022). Of the 3,023 editorial and non-editorial jobs cut temporarily or permanently from March 13, 2020 to April 8, 2021, 1,281 were confirmed to be permanent and the status of the rest of the layoffs was unknown (Local News Research Project, 2022). The closure of news outlets and news fatigue indirectly impacts trust, in that it creates a climate conducive to the spread of mis- and disinformation (Appendix A6).

Overall, while trust numbers vary, all the surveys consulted for this paper showed that trust in news media in Canada is generally down, with respondents reporting particularly low levels of trust in news from social media. However, despite trusting online and social media less, consumers are increasingly getting their news from these sources.

What Makes News Trustworthy

In terms of why people trust news, The Trust Project identifies eight key trust indicators (2022). A non-profit, California organization with global reach, run by a geographically diverse group of journalists led by Sally Lehrman (one of the interviewees for this project), The Trust Project includes partners like *The Globe and Mail* and the *CBC* (2022).

The Trust Project's Eight Trust Indicators include:

1. Expertise of the journalist: reporting adheres to strict standards.
2. Clear labelling: to differentiate between different types of news, like opinion or sponsored content.
3. Providing references.

4. Local knowledge: reportage is conducted on the scene or by people familiar with the area (e.g., who are native speakers of the local language).
5. Reporting news from diverse perspectives.
6. Enabling feedback from the public.
7. Making the news process and methods more transparent.
8. Following shared standards and guidelines.

(The Trust Project, 2022)

Lehrman explained the trust indicators were identified through a user-centred design process through discussion around user needs and wants, such as what people value in news and how they decide whether to trust news. Trust and truth are subjective terms but having a commonly held understanding of what they mean in terms of journalism is necessary to a functioning civic sphere. While this is more challenging in an international context, The Trust Project has member organizations from around the world.

Problems Caused by the Digital Shift

The digital transformation of the past few decades has fundamentally changed the way news is disseminated to and received by the public. While there are positive aspects to the digital shift, it has also created problems for news outlets. When considering how a fact-checking dApp might work, it is important to understand the problems that make online verification important.

The Proliferation of Mis- and Disinformation

The participatory nature of digital news and sheer volume of information available online has made newsworthy information more accessible to the public; however, this has also been

accompanied by a rise in false news stories. The recent hype around "fake news" can make it seem like a new phenomenon, but it has existed as long as there has been news. In a *WIRED* article, Martínez writes that the idea of non-partisan, journalistic "objectivity" would have been completely foreign to American founding fathers like Ben Franklin or Samuel Adams, both of whom were newspapermen who wrote under pen names like Alice Addertongue and Vindex the Avenger (2019). Martínez writes that a "resurrected Franklin wouldn't have a news job inside *The Washington Post*; he'd have an anonymous Twitter account with a huge following that he'd use to routinely troll political opponents" (2019). An example of historical fake news is "The Great Moon Hoax," which appeared in the *New York Sun* in 1835, and depicted winged, bat-like humanoids on the surface of the moon (Zielinski, 2015) (Appendix A10). However, though fake news is historically common, each novel communication technology enables new ways to "manipulate and amplify" it, creating new challenges to be tackled (Kalsnes, 2018).

Before considering these challenges, it is important to make a distinction between misinformation and disinformation. The digital media landscape is not just cluttered with maliciously created fake news; it is also teaming with bad information that was created accidentally and/or with good intentions. Misinformation refers to incorrect information that is created and spread unintentionally. Many people do not pay attention to the news they share. For instance, Moravec et. al state that "more than half of the articles shared on Twitter are shared without the user ever reading them, let alone thinking critically about them" (2018, p. 1345). Disinformation, on the other hand, refers to lies and half-truths created and shared with the intent of misleading or deceiving the public.

Efforts to counter disinformation is also not new. At the turn of the 20th Century, Lippmann argued that protecting news from the taint of propaganda was a fundamental problem

of democracy, writing that "no modern society lacking the wherewithal to detect lies could call itself free" (Lippmann in Kalsnes, 2018). However, while disinformation is clearly problematic, the proliferation of apparently harmless misinformation can also be troublesome when it leads to a climate where people cease trusting the news, or even expert information in general, such as COVID-19-related public health recommendations.

There are several factors particular to digital media that make it conducive to the creation and sharing of mis- and disinformation. One is the participatory nature of digital media, and popularity of amateur blogging, vlogging, and podcasts, as well as citizen journalism. Though professional journalists can still be identified by common attributes like journalistic norms and values, working for professional news organizations, and accepting payment for work; as digitization makes participatory journalism faster, easier, cheaper, and more accessible, the lines between professional journalism, and news being made and disseminated by people not professionally employed in media, are becoming increasingly blurred (Engelke, 2019, p. 31). This has upsides and downsides.

Participation and inclusion can lead to a more informed and engaged public. For instance, in a study of user generated content (UGC), Johnson and Dade found media professionals generally viewed ethical audience participation in a positive light, with one respondent stating: "On digital, we do what we call 'social listening' to get UGC content that we can form into stories. This practice leads us to plenty of stories, both feature and hard news" (2019, p. 270).

Yet, there are also downsides to the participatory nature of digital media. Before the digital transformation, the communication of news was largely one-way. Occasionally, an audience member might write a strongly worded letter to an editor or call in to a news station, but this was not a daily, continuous exchange for most people. Now, through search engines and

social media, people regularly direct very personal queries to the online world at large. The answer often comes in the form of news, both real and fake. While people's day-to-day decision-making process was influenced by the news in the pre-digital era, for example by the local weather report, it was arguably less influenced by fake news. When anyone can disseminate information, the doors are opened to malicious agents, the traditional gatekeeper role of news media is diminished, and news outlets must compete for attention with clickbait, conspiracy theories and salacious rumours on platforms that were designed first for entertainment and socializing.

Additionally, the sheer volume of information available online can lead audiences to become overwhelmed, which can negatively impact their ability to absorb, or even consider, news items. A Gallup/Knight Foundation survey *American Views 2020: Trust, Media and Democracy* found that 60 per cent of Americans report finding it harder rather than easier to be well-informed due to the massive number of sources of information available to them (2020, p. 7).

Digitization has also negatively impacted news producers, especially economically. For instance, social media platforms have become integral to the distribution of news, but unpredictable changes, such as alterations to recommender algorithms, inhibit news publishers' ability to monetize content on platforms (Culloty & Suiter, 2021, p. 2). This, combined with competition from other online information sources, has contributed to financial strife. For example, News Media Canada states that in 2019, Google and Facebook absorbed 80 per cent of online advertising revenue in Canada (News Media Canada, 2021).

Technology also makes it easier to make high quality fakes. Though fake news is sometimes too outlandish to be believable, it can now often be indistinguishable from the real

thing. For instance, in the case of deepfakes, "it is now possible to generate entirely synthetic images of people and to mimic the facial expressions and speech of real people" (Culloty & Suiter, 2021, p. 18). A recent video project, "In Event of Moon Disaster," demonstrates deepfakes (Burgund & Burgund, 2020). The video, which presents a speech recorded by Nixon, in case the 1969 moon landing ended in disaster, challenges the audience to guess which aspects of the recording are real and which are computer generated (Burgund & Burgund, 2020). Cheap fakes and deepfakes can be made for little to no cost, with little to no skill, whereas previously, producing high-quality forgeries would have required engaging someone with considerable technical ability.

Media Manipulation Tactics

While not all false news is deliberate, some disinformation online serves a malicious agenda. When analysing disinformation, it is useful to know some of the common tactics used to deliberately manipulate the public, as they are a direct cause of polarization of the public discourse and eroding trust in news media, as well as institutions in general, and this eroding trust serves to benefit malicious agents (e.g., Russia's influence in the 2016 US presidential elections) (Appendix A11).

Using personal data that most of us freely exchange online for digital services like social media messaging, media manipulation targets specific, often vulnerable demographic groups, exploiting the social nature of public opinion formation to disseminate disinformation to achieve a specific goal (Shapiro & Martin, 2019). Another term for this is information influence, and according to Shapiro and Martin, anyone can become a target of information influence, including entire nations (2019) (Appendix A10). From the campaign to influence the 2016 U.S.

presidential election to the invasion of Ukraine, disinformation has played a key role in Russia's political strategies. In 2016, Russia had 20 information influence campaigns in 13 countries, including Canada, 40 per cent of which were on Facebook and 90 per cent on Twitter (Shapiro & Martin, 2019). Pamment et. al argues that "foreign information efforts (FIEs)," such as the Russian attack on the U.S. presidential election, should be counted among "techniques hostile actors employ to negatively impact democratic societies," stating that such activities "are used to manipulate public opinion, disturb elections, isolate vulnerable social groups, and destabilise entire regions and countries" (2018, p. 5).

Recently, NATO announced a "cyber rapid reaction force" to enhance civil and military cooperation (Segal, 2022). "In today's threat landscape, military adversaries and threat actors are combining cyber, information and kinetic attacks as a form of hybrid warfare that is highly effective when coordinated," Wasim Khaled, co-founder and CEO of Blackbird.AI, told *Forbes* in July (Segal, 2022). Such attacks that revolve around cyberspace are a part of modern warfare, and the ongoing conflict in Ukraine is an example. Whether cooperation with civilian organizations will enable the military to respond to such threats more quickly is unknown, and the increased involvement of tech platforms like Google and Facebook in state affairs is cause for concern for many. In an email quote from the article, crisis management expert Baruch Labunski, CEO of Rank Secure, said "the joint effort of civilian industry and the military can be commendable or dangerous. It depends on your point of view and how one looks at government overreach" (Segal, 2022).

When evaluating media manipulation tactics, one must consider who uses them and why. Culloty and Suiter define "bad actors" as "a generic term for those who intentionally create and propagate disinformation" (2021, p. 11). They identify four types of bad actors based on their

interests in creating and disseminating disinformation: state actors, bad actors with financial interests, those with ideological interests, and amplifiers (Culloty & Suiter, 2021). These categories are not mutually exclusive, as there can be overlap between the different types based on motivation.

While bad actors can be motivated by emotionally charged socio-political goals; as often as not, they are financially motivated and disconnected from the consequences of the fake news they produce. Ong and Cabañes interviewed producers of fake news before and after the 2016 national election in the Philippines, to understand how society is complicit in driving people to do this type of work (2019, p. 3). Ong and Cabañes argue that approaching disinformation as a culture of production encourages examination of the social conditions that make fake news production attractive and normalize it as a side gig (2019, p. 1). Additionally, financially motivated disinformation is sometimes interwoven with legitimate news. Culloty and Suiter state the difference between PR and disinformation "is often dubious" (2021, p. 14). They cite the tobacco industry as a classic example and argue that news media can be "complicit" in the financially motivated "obfuscation of scientific evidence"; for instance, in "orchestrating artificial debates between climate scientists and climate-change denialists" to the benefit of fossil fuel companies (Culloty & Suiter, 2021, p. 14).

Bad actors can also be driven by ideological interests. Often intersecting with political and financial interests, bad actors with ideological interests permeate online subcultures, such as the antifeminist men's movement (Culloty & Suiter, 2021). Finally, not all bad actors produce disinformation; some are amplifiers, increasing the spread of disinformation, like media pundits, celebrities, and online influencers (Culloty & Suiter, 2021). No matter how outlandish disinformation might be it often plays on very real emotions and powerful public sentiment,

creating a fallout that cannot be easily dismissed or ignored; and the most successful fake news is executed in such a way that makes it impossible for the media not to report on it. As the adage goes, 'there's no such thing as bad press.' From the perspective of bad actors, it doesn't matter if the media is only reporting on a story to debunk it; they just want the coverage (Culloty & Suiter, 2021).

Malicious agents exploit shortcuts in thinking called "heuristics" to learn about people from their data, targeting audiences based on psychological and socio-economic traits, nudging their thinking toward desired results, and gaining additional information about them based on which nudges work to shift their thinking (Pamment et. al, 2018, p. 6). In addition to spreading mis- and disinformation, some tactics commonly employed by bad actors are:

- Forged identities: Imitating legitimate news outlets, creating fake accounts, etc., the ease of which is facilitated by social media and private messaging apps. For example, Facebook removed 5.4 billion fake accounts in the first nine months of 2019 (Fung & Garcia in Culloty & Suiter, 2021, p. 16).
- Leaks: Illegitimate dissemination of legitimate information, including "tainted leaks," where real information is illegally gotten and released with false content mixed in (Pamment et. al, 2018, p.12).
- Maligning Rhetoric: Using hostile tactics like personal attacks to silence and undermine people (Pamment et. al, 2018, p.12).
- Flooding: Overwhelming discourse on a topic with useless, often contradictory, information to create confusion and polarize public opinion (Pamment et. al, 2018, p. 13).
- Information Laundering: Information shuffled through fake news and foreign language websites to obscure its origin, with the aim of it being picked up and spread by

increasingly large authentic social media accounts and legitimate news outlets (Pamment et. al, 2018, p.13).

- Hashtag Hijacking: This occurs when malicious actors "take over authentic hashtags to promote inauthentic behavior" (Kelly & Samuels, 2019).
- Humour and memes: Used to water down and encourage acceptance of problematic or extremist content. For instance, in *Tweeting the Jihad*, Klausen gives examples of the informal and familiar nature of some extremist social media content, such as the example in Figure 3, taken from an account that has since been suspended, which depicts how extremists use car batteries to charge their phones (2015).

Figure 3

Life-style Tweet from "Abu Fulan al-Muhajir" showing "Band of Brothers" spirit

Note. From Klausen, J. (2015). Tweeting the Jihad: Social Media Networks of Western Foreign Fighters in Syria and Iraq. *Studies in Conflict & Terrorism*, *38*(1), p. 5. https://doi.org/10.1080/1057610X.2014.974948. Copyright 2015 by Jytte Klausen.

- Symbolic acts: Real life events enacted in coordination with communication efforts, such as acts of terrorism, which are "often motivated by communicative logic" (Pamment et. al, 2018, p. 11).
- Cheap fakes and deepfakes.
- Using bots to replicate human online behaviour. For example, "an analysis of 200 million tweets about COVID-19 found that almost half had the characteristics of automated bots" (Young in Culloty & Suiter, 2021, p. 16).
- "Astroturfing": Creating "the false impression of grassroots debate" about topics like vaccination, through means such as semi-automated bots and cyborgs amplifying both sides of the debate to divide and provoke legitimate users (Broniatowski, 2018).
- Trolls (Appendix A10). According to Marwick and Lewis, "trolling the mainstream media to exploit its penchants for spectacle, novelty, and poignancy is not only a favored pastime for trolls but is often used as a justification for trolling behavior," enabling trolls "to maintain a quasi-moral argument that, by trolling, they are exposing the hypocrisy, ignorance, and stupidity of the mainstream media" (2017, p. 9).
- Additionally, bots and trolls frequently retweet or modify content from legitimate users, whose messages may be appropriated and have the unintended effect of "feeding the trolls" (Broniatowski, 2018).
- Bad actors also exploit AI and data voids (explained in more detail below).

Data Voids

Evolutionary biologist Professor Carl T. Bergstrom and data science professor Jevin West introduced a media literacy course called "Calling Bullshit in the Age of Big Data" at the

University of Washington (Rosenwald, 2017). In an example covered by *Columbia Journalism Review* they asked students to Google a fake news story: "Do vaccinations cause shaken baby syndrome?" (Rosenwald, 2017). A basic internet search turned up only fake news items; the claim was so ridiculous no articles existed to refute it (Rosenwald, 2017). This is an example of a data void, and in a Data & Society report, Golebiewski and boyd explain how such data voids are exploited by media manipulators in breaking news situations before legitimate content is generated (Golebiewski and boyd, 2019). When news is breaking, a rush of new content is produced, while at the same time, a spike in searches results in new search terms and hashtags. Journalistic content is ranked highly by search engines and recommender systems, which auto-suggest further search terms (Golebiewski and boyd, 2019). Auto-suggestions based on user behaviours can result in echo chambers (Appendix A11), in which users only see news items that align with their beliefs and biases.

Malicious agents also create and appropriate search terms to divert people to misinformation (Golebiewski and boyd, 2019). For example, during the Sandy Hook school shooting, conspiracy theorists argued that distraught survivors seen crying on TV were paid actors, popularizing the term "crisis actors" (Golebiewski and boyd, 2019). Prior to the conspiracy, the term referred to actors who played victims to help train first aid responders (Golebiewski and boyd, 2019). It wasn't a common search term, making it ideal for media manipulators to appropriate, and took on a life of its own amongst conspiracy theorists (Golebiewski and boyd, 2019). Recently, a Texas judge awarded the parents of a Sandy Hook victim $45.2 million in damages, when the host of Infowars radio show and webcast, Alex Jones, was found to have defamed them by spreading conspiracy theories about the massacre, although he may wind up only having to pay a fraction of that amount (Queen, 2022). Finally,

Golebiewski and boyd state that data voids are created by "problematic queries" (2019). Search queries often reveal intimate desires and fears, some of which are highly taboo. They explain that while there have been deliberate efforts to counter some taboo searches such as "Did the Holocaust happen?" many problematic query data voids are rife with misinformation (Golebiewski and boyd, 2019). Whether people believe those exploiting data voids or not, they waste time, allowing false information to spread before legitimate content is created.

Algorithms, AI, and Content Moderation

Traditionally, news outlets have played a gatekeeper role, controlling what information was given to the public and when it was released. On online and social media platforms, this gatekeeper duty is often filled by automated systems. Tech giants like Google and Facebook claim that it is their algorithms that are responsible for what content audiences see and the best any human employee can do to explain why a particular story appeared in a newsfeed or search results is to recreate the events that led to the algorithm displaying the news item. Culloty and Suiter argue that "social media platforms have become a major source of public information and debate, but they were never designed to function as a public sphere" (2021, p. 86). Platforms are in the business of acquiring audience attention and personal data, and then reselling that attention and data to advertisers (Wu in Culloty & Suiter, 2021, p. 34). Microtargeting allows bad actors to "target those whose personalities and behavioural characteristics make them more likely to consume, believe, and spread disinformation" (Kosinski et al. in Culloty & Suiter, 2021, p. 35). However, Culloty and Suiter also argue that it is important not to overstate the power of these practices; that "to a large extent, claims about the capabilities of microtargeting and user profiling are part of the platforms' own business hype" (2021, p. 35).

Platforms increasingly control not just the news that you see, but also the content you do not see. Content moderation can at times seem non-sensical. For example, the COVID-19 pandemic restricted the availability of human content moderators, and in March of 2020, "the platforms acknowledged that groundless content removals were likely to increase" (Stokel-Walker in Culloty & Suiter, 2021, p. 69). Twitter, for instance, "erroneously flagged tweets containing the words 'oxygen' and 'frequency' as conspiracy theories" (Serrano in Culloty & Suiter, 2021, p. 69).

Concern over problematic content on platforms has resulted in government interventions and a push for more stringent regulations. For example, in May 2019, New Zealand Prime Minister Jacinda Ardern and French President Emmanuel Macron enacted the "Christchurch Call to Action," a non-binding commitment to fight terrorism content online, signed by 18 countries (including Canada) and eight major tech firms (Culloty & Suiter, 2021, p. 39). At the same time, there is mounting concern about "overzealous moderation" and "erroneous classification of 'extremist' content" (Culloty & Suiter, 2021, p. 39). For instance, some countries have passed laws against disinformation, but in some cases, this has led to backsliding into authoritarianism, like Malaysia's Anti-Fake News Act, which "aided the censorship of government critics including investigative journalists" (Yeung in Culloty & Suiter, 2021, p. 74). Laws against fake news are also often enacted alongside internet shutdowns.

Media manipulation tactics put regulating bodies in a difficult position, where the reasoning behind regulations becomes an excuse for censorship; and censorship becomes an excuse for media manipulation tactics like trolling behaviours. However, there is indication that news leaders are becoming more receptive to regulation. For instance, Reuter's *Technology Trends and Predictions 2022* indicates digital news leaders are becoming more optimistic about

regulation and other interventions, with 41 per cent of respondents agreeing that "policy changes could help journalism," compared to only 18 per cent in 2020 (Newman, 2022, p. 33). However, still nearly a quarter of those surveyed (24%) worry interventions could make things worse rather than better (Newman, 2022, p. 33).

Whether media manipulation tactics are used with the intent of amplification, or financially, politically, or ideologically motivated, bad actors target news audiences by exploiting the social nature of public opinion formation to disseminate bad information online and encourage legitimate users to believe and share disinformation. Attempts to regulate against such behaviour is often perceived as censorship, and only exacerbates the situation. Tactics like astroturfing can create the illusion of debate on topics like the efficacy of vaccination or existence of climate change when there is in fact almost unanimous agreement amongst experts on these issues. Media manipulation casts doubt on news media, causing people to question information, like public health recommendations, which can negatively impact trust. It also causes people to lose confidence in their ability to discern disinformation from legitimate news and become afraid of sharing information altogether. Media manipulators polarize public discourse on important issues, negatively impacting our ability to trust each other, as well as eroding trust in journalism.

Online Verification and The Rise of Fact-Checking Initiatives

The proliferation and speed of online mis- and disinformation has led to a boom in fact-checking initiatives and platform interventions to counter false news. However, while some studies find that corrections do change people's views; others find they affect little change, in some circumstances even creating a "backfire effect," more deeply entrenching people's belief in

false information (Wood & Porter, 2018; Moravec et. al, 2018; Roozenbeek et. al, 2020; and Walter & Tukachinsky, 2019).

The first organizations to verify political facts online, which Graves and Cherubini state can "fairly be called a new democratic institution," emerged in the early 2000s (2016, p. 6). Online fact-checking has grown in recent years, and according to their 2016 report, of 113 fact-checking groups active at the time, 90% were in operation since 2010, and nearly half were in operation since 2014 (Graves & Cherubini, 2016, p. 6). Similarly, Allein and Moen state that the number of online fact-checking organizations rose from 44 in the U.S. and Europe in 2014, to around 210 in 68 countries in 2019 (2020, p. 12). The *State of the Fact-Checkers 2021* report from Poynter's International Fact-Checking Network (IFCN) found "341 active fact-checking projects, up 51 from the previous year, operating in 102 countries" (2021, p. 2).

There has also been a rise in advocacy organizations that promote better standards for online information, like Poynter's International Fact-Checking Network (IFCN) (IFCN, 2022), or *The Markup*'s Citizen Browser Project (*The Markup*, 2020). The Citizen Browser Project, which audits social media companies to see how data is amplified or suppressed, paid a panel of 1,200 people to install a custom web browser that shares real-time data of their Facebook and YouTube activity (with any personally identifying information removed) (*The Markup*, 2020). "Social media platforms are the broadcasting networks of the 21st century. They dictate what news the public consumes with black box algorithms designed to maximize profits at the expense of truth and transparency. The Citizen Browser Project is a powerful accountability check on that system that can puncture the filter bubble and point the public toward a more free and democratic discourse," states Julia Angwin, Editor-in-Chief of *The Markup* (*The Markup*, 2020).

Additionally, the big platforms have launched a variety of their own fact-checking initiatives, like Twitter's Birdwatch (Coleman, 2021) and Meta's third-party fact-checking program (Meta, 2021). Launched in 2016, the later asked the professional fact-checking community for help flagging and verifying false and misleading content on the Facebook platform (2018, Funke & Mantzarlis). All member organizations were required to be signatories of IFCN's Code of Principles (2018, Funke & Mantzarlis). In 2018, Poynter surveyed 19 of the 35 fact-checking partners involved; and while almost 60 per cent were satisfied (52.63%) or very satisfied (5.26%) with the partnership, they were less certain "about whether it has helped them reduce the reach of viral hoaxes" (2.9% certain on a five-point scale of degree of certainty) (2018, Funke & Mantzarlis). Still the program has expanded, and according to Meta, now includes "more than 90 organizations fact-checking in more than 60 languages globally" (2022, Meta).

Many established news organizations have also developed fact-checking arms, such as *Les Décodeurs* (Les Décodeurs, n.d.), a website vertical of the French daily newspaper *Le Monde*; CBC Radio-Canada's *Les Décrypteurs* (Radio-Canada, n.d.); or *The Washington Post's Fact Checker* (Kessler, n.d.). There are also around as many independent organizations, like *Snopes* (Snopes, n.d.) and *PolitiFact* (PolitiFact, n.d.).

Additionally, there have been various attempts to automate and innovate verification, like Hoaxy, a tool for visualizing the spread of information on Twitter, created by the Indiana University Observatory on Social Media (OSoMe) (Hoaxy, n.d.); and ClaimBuster, a comprehensive collection of automated live fact-checking projects from the Innovative Data Intelligence Research Laboratory (IDIR Labs) at The University of Texas at Arlington (ClaimBuster, 2022).

Mainly intended for use by journalists, the ClaimBuster API uses text analysis to enable automated fact-checking of claims (ClaimBuster, 2022). This thesis project used its Automated Live Fact-Checking tool as a neutral means to identify claims to check in the sample fake news article (Appendix A4). Fact-checkers and journalists strive to correct misinformation as quickly as possible, but this has become increasingly difficult to achieve due to the massive amount of information available. Computational models, like ClaimBuster, aim to improve the situation by automating the selection of checkworthy claims. The most recent ClaimBuster dataset is based on 23,533 sentences extracted from transcripts of televised U.S. presidential debates from 1960 to 2016 (Arslan, F. et. al, 2020). The data was categorized into non-factual sentences (NFS), unimportant factual sentences (UFS), and checkworthy factual sentences (CFS) (Allein & Moen, 2020, p. 14). The sentences were labelled by paid journalists and university students and professors, and the quality of the participants' labelling was measured (Allein & Moen, 2020, p. 14). Sentences labelled as NFS are subjective, such as opinions, beliefs, and questions, and the difference between UFS and CFS is checkworthiness (Allein & Moen, 2020).

However, Allein and Moen suggest that checkworthiness may be too ambiguous a concept to be conducive to automation, pointing out that the term is not even defined by major dictionaries (2020). They break the term down, defining "checking" as verification of a claim by a person or system, and "worthiness" as "the quality of deserving to be treated in a specified manner or deserving attention, on the one hand, and as worth, value and suitability" on the other (Allein & Moen, 2020, p. 13). Allein and Moen state that because there is little agreement among fact-checkers as to what constitutes checkworthiness, which is reflected in the "inconsistent and less reliable" datasets used for training, the "subjective concept of checkworthiness might not be

a suitable filter for claim detection" (2020, p. 12). A fact-checking dApp could be useful in this regard by enabling people to vote on checkworthiness.

In addition to organizations and initiatives dedicated to fact-checking, research has been done on other interventions to mitigate mis- and disinformation, such as content labelling and media literacy tools designed to lead people to adopt a more critical mindset when consuming news (Wood & Porter, 2018; Moravec et. al, 2018; Roozenbeek et. al, 2020; and Walter & Tukachinsky, 2019). In one study, Pennycook et. al used "the wisdom of crowds" to crowdsource "laypeople" to rate the reliability of news sources, rather than professional fact-checkers (2019). Individuals rated their familiarity and trust in 60 news sources, categorized as: "mainstream media outlets, hyperpartisan websites, and websites that produce blatantly false content ('fake news')" (Pennycook et. al, 2019). Despite "substantial partisan differences," laypeople generally rated the mainstream news sources as being more trustworthy (Pennycook et. al, 2019). In another study, Pennycook et. al investigated if these findings would translate to COVID-19 misinformation (2020). The "nudge treatment" in this study involved asking participants to rate the accuracy of a headline unrelated to COVID-19 before evaluating true and false COVID headlines (Pennycook et. al, 2020). They found the treatment increased "sharing discernment," and tripled the likelihood of participants sharing true headlines after (Pennycook et. al, 2020). The research demonstrated that "using crowdsourcing to estimate the reliability of news outlets shows promise in mitigating the spread of misinformation that is present on social media"; however, there are "various limitations" to this method, such as people's distrust of unfamiliar sites, resulting in "highly rigorous," but less well-known sites to receive undeservedly low ratings (Pennycook et. al, 2019). A fact-checking dApp could help mitigate this problem by allowing less-known news sites to partner with more well-known brands.

When it comes to how news is digested by audiences, confirmation bias is another well-known, but debateable, problem. Moravec et. al define confirmation bias as "a bias against information that challenges one's beliefs" (2018, p. 1346). Online mediums, such as social media, can compound confirmation bias by creating filter bubbles that reinforce people's pre-existing attitudes and belief in false information. Wood and Porter state that ideology can be used as a "group heuristic," employing "the ideological spectrum to arrange political figures and perceived groups into a continuum of allies and adversaries," enabling people to make snap judgements on news stories based on where their allegiances lie (2018, p. 141). In studies conducted between 2005 and 2006 of mock news articles on ideologically polarizing issues such as WMDs in Iraq, Nyhan and Reifler found that giving people facts to counter false information can "compound their ignorance," resulting in a "backfire effect" (Nyhan & Reifler in Wood & Porter, 2018, p. 135). In their research, "subjects presented with facts correcting misperceptions relevant to their ideology, doubled down on their misperceptions" (Nyhan & Reifler in Wood & Porter, 2018, p. 136). In fact, when Facebook discontinued its short-lived fake news warning in 2017 (a "disputed" signal on articles flagged by third-party fact-checkers), the company justified the decision by stating "research suggested the 'red flag' approach actually 'entrenched deeply held beliefs'" (BBC, 2017).

However, in conducting similar, but more in-depth research to Nyhan's & Reifler's, Wood and Porter "found no corrections capable of triggering backfire, despite testing precisely the kinds of polarizing issues where backfire should be expected" (2018, p. 135). In their research, they enrolled 10,100 subjects across five studies, covering 52 "commonly misconstrued policy areas" (Wood & Porter, 2018, p.137). Contrary to Nyhan & Reifler, they found that

exposure to corrections shifted the average subject's opinions closer toward the facts (Wood & Porter, 2018, p. 139).

Other studies have also returned mixed results. In a study that focused on news disseminated via social media platforms, Moravec et. al found that participants struggled to assess the veracity of news items, making correct assessments only 44% of the time, and that while a fake news flag did cause them to think more, rather than altering their misperceptions, it made them "more likely to believe news headlines they wanted to be true" (Moravec et. al, 2018, p. 1350-53). Their behavioural experiment extracted electroencephalography (EEG) data from 83 social media users and analyzed if they could detect fake news on social media and whether a fake news flag changed their cognition and judgement (Moravec et. al, 2018, p. 1343). They found that "the flag had no effect on judgements about truth" and that "confirmation bias is pervasive" (Moravec et. al, 2018, p. 1343).

Their research suggests that the medium by which news is delivered may influence people's receptivity to corrections. They identify three context-specific factors unique to social media news consumption:

1. A user's mindset is different on social media, and this impacts how information is processed. On social media, users adopt a "hedonic mindset," meaning they are not there to determine which information is true or false, but rather they are there for enjoyment, and so will avoid effort and "engage in articles that make them feel good" (Moravec et. al, 2018, p. 1345).
2. Unlike visiting a news website or reading the newspaper, where people choose the source before they read an article, on social media platforms, the source of information can often be ambiguous (Moravec et. al, 2018, p. 1345). While some news audiences may

subscribe to sources by following them on social media, often news stories in people's newsfeeds are chosen by algorithms, and investigating the source is too much effort for people in a hedonic mindset (Moravec et. al, 2018, p. 1345).

3. The volume of fake news on social platforms also makes it challenging to separate truth from mis- and disinformation (Silverman, 2016).

According to Moravec et. al, these factors combine to "create a context in which social media users do not think as critically as they should when presented with news" (2018, p. 1345).

Users' lack of critical thought regarding news items on social media suggests that confirmation bias is not necessarily deliberate, but rather a biproduct of inattention. However, Moravec et. al found that users tend to take "an opinion on contentious social media topics, rather than remaining neutral," regardless, and that those opinions are often an automatic rather than a considered response (2018, p. 1345). In their research, participants spent an average of 10.5 seconds (per headline) reading news headlines before answering questions about them (Moravec et. al, 2018, p. 1348-49). Moravec et. al found that the fake news flag increased respondents' cognition and caused them to consider the headline for longer but did not change their beliefs (2018). They state that "we can design technology to deliberately change user cognition," but that it "may be optimistic to believe that a simple 'disputed' flag might trigger the deep introspection needed to overcome confirmation bias and resolve cognitive dissonance," thus more research is required on "how to develop stronger signalling mechanisms for the results of fact-checking" (Moravec et. al, 2018, p. 1355).

Research by Walter and Tukachinsky explores how such corrective messaging can be made more effective (2019, p. 155). Aggregating the results of 32 studies, they found that individuals "may prefer to uphold a coherent, albeit incorrect mental model than be left with an

incomplete one," so corrections "should offer information that can successfully replace the refuted components of the mental model without compromising the coherence of all the existing elements of the story" (Walter & Tukachinsky, 2019, p. 158). Walter and Tukachinsky also found time-sensitivity, coherency, repetition, and source to be contributing factors (2019). They found that "real-time corrections are easier to integrate into the mental model," and that since people tend to discount information that challenges their beliefs, corrections are more effective if they affirm people's worldviews (Walter & Tukachinsky, 2019, p. 160). Additionally, the credibility of the source has a positive influence on the acceptance of corrections, and retractions are more readily accepted if they come from the same source responsible for the misinformation, which, for example, is why the Federal Trade Commission (FTC) requires corrective advertising to be made by the same brand responsible for spreading false advertising (Walter & Tukachinsky, 2019, p. 161).

Since corrective messaging produces mixed results, possibilities to pre-emptively counter mis- and disinformation have been explored, such as media literacy tools like *First Draft*'s "Online Verification Challenge" (n.d.) and the online newsgame *Bad News*, produced in collaboration by Cambridge University scientists and the DROG group (Van der Linden, 2020; DROG, n.d.). In their research, Roozenbeek et. al found that *Bad News* provides psychological inoculation against common misinformation tactics (2020, p. 1). They call this approach "prebunking," and state that, analogous to the process of medical immunization, "pre-emptively warning and exposing people to weakened doses of misinformation, can help cultivate 'mental antibodies' against fake news," and they suggest that social media companies, governments, and educational organizations consider this prebunking approach instead of attempting to debunk false information after the fact (Roozenbeek et. al, 2020, p. 1).

Their newsgame, which has reached 1 million people, presents a fictitious social media environment, in which players can "walk a mile in the shoes of a fake news creator" (Roozenbeek et. al, 2020, p. 2). In it, participants entering a simulated, politically and financially neutral, social media environment are presented with six common misinformation techniques:

- Impersonation, of individuals and organizations.
- Emotional language, designed to evoke fear and anger.
- Divisive language, used to polarize social media users.
- Spreading conspiracy theories.
- Discrediting opponents through gaslighting and red herrings.
- Baiting people into responding in an exaggerated manner (trolling).

(Roozenbeek et. al, 2020, p. 7).

Over a 15-minute period, in a process "meant to trigger the 'immune system' but not overwhelm it," players create a fake news site, gain followers and credibility by successfully identifying and employing the techniques, and earn six badges that correspond with the tactics (Roozenbeek et. al, 2020, p. 7-8). Roozenbeek et. al found that playing the game "significantly reduces participants' susceptibility to simulated fake Twitter posts" (2020, p. 4); regardless of political ideology, "highlighting how the intervention may not be hindered by confirmation bias" (Roozenbeek et. al, 2020, p. 6-7).

Up until the early 2000s fact-checking was an integral part of the news process and many young journalists got their start as fact-checkers; however, those jobs are nearly non-existent today (Tobias, 2018). Whether fact-checking sites, like Snopes; platforms interventions, like Facebook's third-party fact-checking; and digital media literacy initiatives, like the *Bad News* game adequately fill this gap is debatable, given the prevalence of mis- and disinformation.

Building off these existing fact-checking initiatives and disinformation interventions, this thesis project explores how blockchain might be utilized to crowdsource verification. As a means of democratic organization without the need for a central authority, blockchain might provide an attractive solution to facilitating a consortium of news organizations and individuals interested in countering online mis- and disinformation. It could also enable the public to participate in the verification process (for instance, by enabling voting on claims and claim reviews), as well as aid small, independent news outlets and content producers by creating an environment where they can collaborate with larger, more established brands. While cryptographic security may not seem necessary to the process of fact-checking, it could potentially be used to protect the identity of sources in instances where authoritarian forces seek to supress the truth and their safety is in jeopardy due to their involvement in debunking claims.

Blockchain and Journalism

In his book on blockchain as an architecture of trust, Werbach states that blockchain is based on a simple idea: to trust a system without necessarily trusting any of its components or participants (2018, p. 3). Blockchain transactions contain cryptographic proof that other parties can use to mathematically verify a transaction is valid, whereas previously, a central authority was required to verify the validity of online transactions. Blockchain has a capacity for data aggregation similar to the power of Google, but without the centralized control (Werbach, 2018, p. 55).

While we often think of a blockchain ledger in terms of cryptocurrency transactions; ledgers in general are not just for recording debits and credits. Other types of ledgers that could potentially benefit from blockchain include copyrights, land title registries, democratic vote

tallying (Werbach, 2018, p. 54), or any other type of unambiguous data that necessitates a high level of security but does not take up a lot of storage space, as data synchronization is slow and can consume a lot of energy. From a journalism perspective, "blockchains can serve as secure registries for important metadata, such as a story's time of publication, bylines, and tags" or rank and filter ad content, replacing "the auction mechanism of digital ad exchanges" (Ivancsics, 2019). (For more on how blockchain works, see Appendix A9).

Blockchain is designed to mitigate failing trust in centralized systems; as well as the problems that occur in a decentralized system where no one entity has control. Akin to how cryptocurrency addressed failing trust in financial systems, a fact-checking dApp might help address declining trust in news media. Systems such as blockchain networks, which merge cryptographic security with economic incentives, are referred to as "cryptoeconomics," and according to Werbach, cryptoeconomics will likely have some role to play in the media of the future (2018, p. 47). There have been several prominent blockchain-based journalism projects, such as The News Provenance Project. Created through a collaboration of the Research and Development group at *The New York Times* and IBM, it asked how readers could be helped to "discern what is credible" by using the information embedded in photo files (captions, time, place) and blockchain "to track metadata as it travels around the internet" (Saltz, 2019). (For case studies that demonstrate blockchain in action and more on The News Provenance Project, see Appendix A8.)

There are also negatives to decentralization. Werbach outlines several factors inhibiting the widespread adoption of blockchain (2018). One is the pervasive notion that it is better suited to illegal activities than legitimate businesses. This is understandable given cryptocurrency's shady start. For instance, during its three-year existence, Silk Road—which facilitated trade in all

manner of illegal products like drugs and guns—processed 9.5 of the 12 million bitcoin in circulation at the time (Werbach, 2018, p. 49). According to Werbach, hesitation to use blockchain is also rooted in anxiety that it is dangerous to invest in a trustless system (2018, p. 3). One common fear is that illegal activity on blockchains could result in them being shut down by governing bodies. Matzutt et. al argue that while blockchains are mainly used to enable a credible account of digital events, like financial transactions, they are also used to "irrevocably record arbitrary data" such as short messages and pictures, and that "arbitrary content" on blockchains, like pornography, could render them illegal (2018, p. 1). Their research revealed 1600 files on the Bitcoin blockchain containing mainly harmless text or images, but also some clearly objectionable content, such as links to child exploitation (Matzutt et. al, 2018, p. 1). Matzutt et. al raised concern about several types of objectionable content that could potentially be placed in transactions, including copyright violations, malware, privacy violations (e.g., sensitive personal data, like sexually explicit photos or videos), politically sensitive material (e.g., state secrets), and illegal or condemned content (2018, p. 13). However, their suggestion that illegal content could make "blockchain illegal to possess for all users" (Matzutt et. al, 2018, p. 15) has been disputed. In a *WIRED* article "Why Porn on the Blockchain Won't Doom Bitcoin," the authors dismiss Matzutt et. al's conclusions, stating that "blockchains won't make the law go away, and the law won't make blockchains go away" (Narayanan et. al, 2018).

Outside of outright illegal content, there are also other areas where content on blockchains could potentially conflict with the law. For example, the European Union's General Data Protection Regulation (GDPR) includes the "right to be forgotten" (GDPR.EU, 2022). This right allows individuals to request that their personal data be removed from databases, which is impossible to achieve in some blockchain networks (Werbach, 2018). Under the GDPR, "the

right to be forgotten" can be trumped if the data is being used "to exercise the right of freedom of expression and information," which could exempt journalistic content, but not all data is covered by this exemption (GDPR.EU, 2022).

As discussed above, with the digital shift in news media, the proliferation of mis- and disinformation, and the rise in fact-checking initiatives and platform interventions to counter fake news, the potential of online verification is one area where blockchain might intersect with journalism. While some studies find that mis- and disinformation corrections and interventions change people's views; others find they have little impact on people's belief in false information. However, even small attitudinal changes can have a significant impact on events. The important role of journalism in this area is clear, for instance, in the case of vaccine information, where a high rate of acceptance is necessary to achieve community immunity. The spread of fake news also impacts public trust in news media, and efforts to counter mis- and disinformation can help improve trust in journalism.

The Proposed dApp Concept

A blockchain is a distributed or decentralized data structure that optimally functions without the need for a central authority (Appendix A9). Applications created to run on blockchains, like Ethereum or EOS, are called decentralized applications (dApps). Unlike an Apple app, for instance, which runs on a system controlled by Apple, dApps are designed to run on networks that are not controlled by a central authority.

In the fact-checking process proposed in this thesis project (Appendix A1), news outlets would (in theory) join checkmarker to use the dApp, whose core community would also be open to independent journalists, editors, experts, and anyone else interested in actively verifying information. The checkmarker dApp would integrate with platforms that news stories are on.

Every story using checkmarker could have a digital watermark, identifying the content as being part of the organization. A visual indicator of trust that would make trustworthy digital news content more easily identifiable is not a new idea. News brands are identifiable by their logos, and many people base their trust in news coverage by brand association, with trust in legacy organizations like CTV News (62%) or La Presse (65%) being higher than the overall average (42%) (Newman et. al, 2022, p. 119). However, a fact-checking dApp is a new concept that could potentially help prevent the spread of fraudulent news posts, which often imitate the look and feel of established news outlets (Pamment et. al, 2018).

In addition to this visual marker, every story using checkmarker would also have a "Report" button. Anyone, including news audiences, would be able to report mis- and disinformation by clicking on the report button and filling out a form. Not all potential issues would be flagged for verification. Only claims that are important, verifiable, and that generated sufficient audience engagement and/or were put forward by checkmarker members themselves,

would be verified. Additionally, for a claim to be verified, someone would have to be willing to pay for the claim review: a brief article outlining the claim and its degree of veracity, with supporting evidence. What constitutes "important and verifiable" would be up for debate, with the expectation being that this discussion would be part of the draw, or one of the factors causing people to engage with the dApp.

Reported issues not followed up on would still be forwarded on to the organization who produced the piece, and they could use the feedback as desired. (The site in this thesis project used Gravity forms, which can be exported as spreadsheets.)

In the case of news stories flagged for checking, the story would remain flagged until resolved. Claim reviews would ideally be written by the news outlet or content producer who originally created the flagged item, or else by checkmarker members. Once verified, a claim would be given a rating using a five-point scale (indicating if it was true, mostly true, mostly false, or false). The headline, link to the claim review article, and this rating could be stored in the blockchain transaction that paid for it. For instance, a MultiSig bitcoin transaction could be used, requiring multiple members to approve the claim review before payment. Using the Schema type "Claim Review," searchable blockchain transaction information could be included in the structured data of the claim review, indicating that it was verified to search engines and recommender systems (algorithms that make suggestions based on patterns of user behavior, such as YouTube's recommendation system that predicts what video you will watch next) (Figure 4).

Figure 4

How transaction information could be placed in the structured data of claim reviews

```
<script type="application/ld+json">
{
        "@context": "https://schema.org/",
        "@type": "ClaimReview",
        "name": "Claim Review: Gentlemen, Ivermectin-Soaked Tampons Won't Cure Covid"
        },
        "reviewRating": {
        "@type": "ClaimReviewed",
        "ratingValue": 2,
        "worstRating": 1,
        "bestRating": 5,
        "reviewAspect": "Claim: ivermectin cures COVID-19"
        },
        "identifier": {
        "URL":
        "https://blockstream.info/tx/345c5afafdb710d9cc148bed7be9c356226df90c4eff37c452cc
2526541ad942"
        "contentReferenceTime": "2021-11-14 08:56:55"
        "author": {
                "@type": "person",
                "givenName": "Emily"
                "familyName": "Follett-Campbell"
                "birthdate": "1978-03-31"
        }
}
</script>
```

1. *Note.* From Follett-Campbell, E. (n.d.) About. *checkmarker*. https://checkmarker.org/
2. *Note.* I have listed myself as the author, but alternatively the author could be "Organization" type and "Checkmarker.org"

Verification would be expected to be performed within a three-day window to allow time for the claim review to be written and the transaction and any voting to take place while still ensuring the error would be corrected in a timely fashion. Potentially in urgent, breaking news situations, real-time updates could be posted. A time window of some sort is essential to provide corrections in time for the information to be useful to news audiences, as well as allow sufficient time for voting to take place if necessary. Additionally, research indicates that real-time interventions are more successful (Walter & Tukachinsky, 2019, p. 160). Disputes would be resolved by voting. If a particular news item had unresolved issues for too long, its checkmarker

digital marker/logo would be revoked and any previous claim reviews associated with it archived, since to maintain the integrity of such an organization all members would have to be fully committed to correcting mis- and disinformation.

The aim would be to create a shared database of claim reviews, maintained through a participatory process, by a collaborative, supportive community. While checkmarker would employ professional journalists, some information requiring highly specialized or technical knowledge might be verified by experts, and audiences might raise issues unnoticed by news outlets.

Potential Benefits

The aim of checkmarker would be to create not just a repository of claim reviews, but a community of journalists and experts able to verify information. So, for instance, in a breaking news situation during an internet shutdown, which have become "commonplace in Africa and Asia and are often justified on the pretext of countering disinformation" (Culloty & Suiter, 2021, p. 74), there would be an infrastructure in place to verify claims that would still be open and accessible to everyone. Although private messaging apps like WhatsApp, Telegram, or Signal can be used for this purpose, they are by nature private.

Outside of emergency crisis communication situations, checkmarker could help promote media literacy and be useful to news audiences on an everyday basis by making trustworthy news content more easily identifiable, both to humans, and to search engines and recommender systems, helping to alleviate some of the trust issues created by confirmation bias and filter bubbles (Appendix A5).

From the perspective of checkmarker members, like news outlets, a fact-checking dApp could be beneficial in creating a large pool of resources, the expense of which would be shared and thus minimized. This could be especially useful to small, independent outlets, who might struggle to find resources.

From the point of view of those verifying information, contributing could provide an opportunity for thought leadership marketing, novice editors could gain experience, and technical editors could showcase their highly specialized knowledge.

Scope of This Research-Creation Thesis Project

While a fact-checking dApp could potentially be a helpful tool, declining trust in news media and the problems currently causing it will not be solved solely by this concept. Therefore, the goals of this research project were as follows:

- The objective of the literature review was to explore problems faced by news media caused by the digital shift, the decline of trust in journalism, and explore solutions, including blockchain.
- The proof-of-concept website checkmarker.org (Appendix A1-A15) presented this research in an interactive form and illustrated how a fact-checking dApp might work.
- The interviews and web survey gathered feedback and gauged receptiveness to a fact-checking dApp. The interviews also provided insight into trust in news media in general.

Methodology

This Research-Creation thesis project raised the question of whether a fact-checking dApp could help improve public trust in journalism. Eight experts with expertise in news media,

journalism and technology, and blockchain were interviewed to create content for the website, checkmarker.org (Appendix A1-A15). The website included an explanation of how a fact-checking dApp might work (Appendix A1), a sample fake news article (Appendix A2) invited participants to see how many potentially checkable claims they could spot and inaccuracies they could report using the "Report" button (Appendix A3), and an accompanying claim review article (Appendix A4) identified the checkable claims and debunked false claims in the sample fake news article. Participants were invited to take an eight-question survey (Appendix B) to gather feedback. Interviewees were verbally asked the survey questions. A link from the website led to the survey, which was conducted using LimeSurvey and hosted on Concordia servers. The survey was not the main focus of the work but was included to explore future research directions. The results of the survey were not included in the final paper as the sample size was too small. As participants navigated the website, the goal was that they would gain knowledge of some of the problems faced by news media and see how these problems impact trust and how a fact-checking dApp might address them.

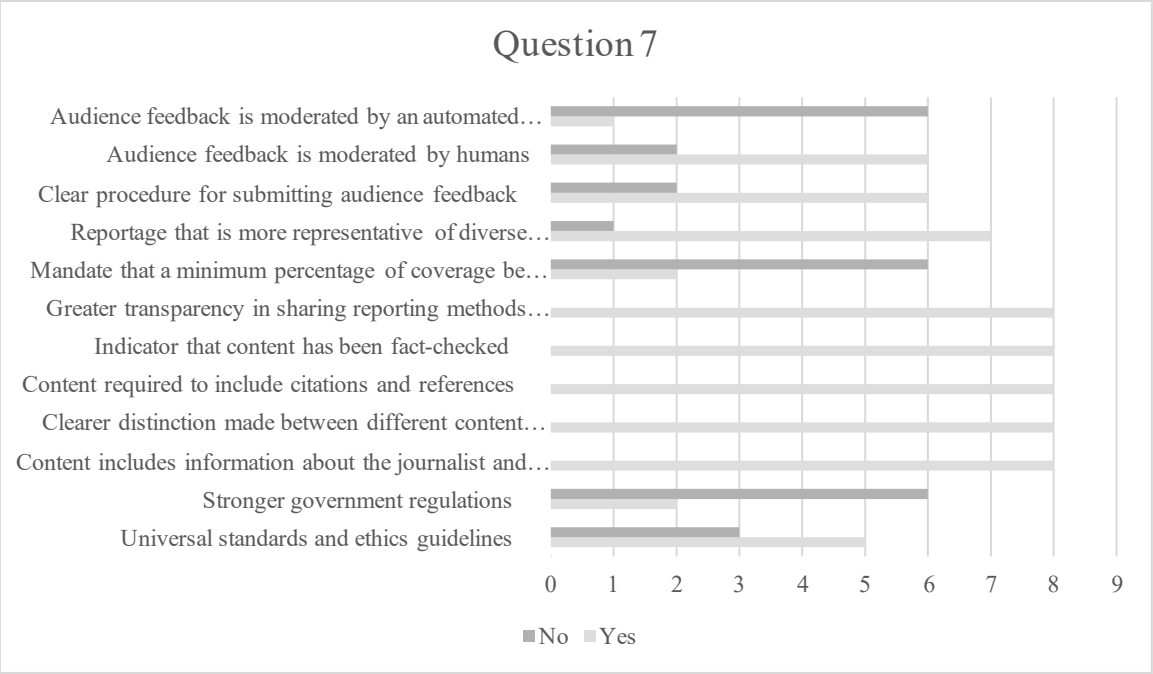
Results

The output of this project was the website checkmarker.org (Appendix A1-A15) and this paper, both of which were based on the research in the literature review and interviews (Appendix A15). The results from the online survey were omitted due to the small sample size; however, in addition to other questions, interviewees were asked the survey questions, verbally. Five individuals affirmed that they would trust online news more if it used the process described in this project; and three individuals said they would not (Appendix B, Question 6). When it came to other elements that they thought would improve trust in online news (Figure 5), they

unanimously agreed that greater transparency, a fact-checking indicator, citations and references, clearer distinctions between different types of content, and information about the journalist would improve trust.

Figure 5

Interviewee Reponses to Question 7: What would improve your trust in online news?



Note. From Appendix B.

The survey also collected other information about the respondents, including their news consumption and trust in news. Of the eight people surveyed, three were a student, faculty, staff, or alumni of Concordia University (Appendix B, Question 1); and four worked in media (Appendix B, Question 8). All believed that press freedom was important to a functioning democracy (Appendix B, Question 2). Five people consumed news delivered via traditional delivery mechanisms, like print newspapers, daily; two people, weekly; and one person, never (Appendix B, Question 3). All the people surveyed consumed online news daily (Appendix B, Question 4). Seven of the interviewees believed online news to be as trustworthy as traditional

news if it came from a reliable brand, and one person trusted it as much as traditional sources (Appendix B, Question 5). While five of the eight interviewees affirmed the proposed dApp would improve their trust, as this thesis was only a proof-of-concept and not a prototype, their survey responses are best viewed as speculative. The longform interviews (discussed below), were more fruitful and provided deeper insight into potential solutions to the problem of distrust in news media, as well as directions for future research. In line with the literature, transparency, education, interventions to combat mis- and disinformation, and engagement with the public were identified as being important.

Discussion

This discussion will focus on the eight interviewees with expertise in news media and blockchain, who were asked to share their opinions on trust in journalism and the possibility of a fact-checking dApp (See Appendix A15 for the full video interviews).

Table 3

Interviewees: Names, titles, and expertise

Name	Title	Expertise
Rosanna Schropp	PhD candidate, UQAM, Montreal	For her MA thesis at UQAM, Rosanna Schropp did a case study on Civil, perhaps the most prominent blockchain-based news endeavor so far. She conducted anonymized interviews in New York with individuals in the organization and journalists from several, U.S.-based Civil newsrooms.
Elyse Amend	Associate Professor, Journalism Department, Concordia University	A professor with data journalism research experience, Elyse Amend worked as a community journalist before falling in love with teaching and transitioning to an academic career. Her background gave her firsthand experience of the digital shift and waning local news industry.
Patrick White	Professor, School of	White has an extensive background in journalism, including runs as Editor-in-Chief at *Huffington Post Quebec* and

	Media, UQAM	*Canoe.ca.* He has worked as a reporter and editor at outlets like *CTV News*, *Reuters*, and *La Presse Canadienne*. Additionally, he is an expert in the digital shift.
Steve Faguy	Copy Editor, *Montreal Gazette*; freelance writer	A Concordia alumnus, Faguy studied computer science at Concordia before transferring to journalism. In addition to having a technical background, he also writes extensively about the Canadian media industry.
Juliette De Maeyer	Assistant Professor, University of Montreal	Originally from Brussels, Belgium, Juliette De Maeyer came to Canada to work at the University of Montreal. Her research touches on the journalism production process, the future of information, and the intersection of new technologies and journalism.
Roberto Rocha	Investigative Journalist, Investigative Journalism Foundation	An educator and former Investigative Data Journalist with CBC/Radio-Canada, Rocha specializes in using computational methods and data to report stories.
Jeremy Clark	Associate Professor, Concordia Institute for Information Systems Engineering	An expert and frequent speaker on blockchain technologies, Clark also holds the NSERC/Raymond Chabot Grant Thornton/Catallaxy Industrial Research Chair in Blockchain Technologies.
Sally Lehrman	Chief Executive Officer, The Trust Project; independent journalist	An award-winning journalist and digital innovator, and former Senior Director of the Journalism Program at the Markkula Centre for Applied Ethics at Santa Clara University, Lehrman founded The Trust Project, an international collaboration of news organizations dedicated to strengthening "public confidence in news through accountability and transparency," in 2014.

Interviews addressed the following research questions: What improves public trust in news media; Would a fact-checking dApp improve public trust in news media?

RQ1: What improves public trust in news media?

In the late 90s, Sally Lehrman brought together senior news executives in the Bay Area who were moving into the digital environment to talk about ethics in that space. Decades later,

when she wanted to revive that group to see how things had changed and search for solutions to the issue of trust in journalism, which had declined even further in the intervening years, she discovered that nothing had changed, and that people were still talking about the same problems. "As news had moved into the digital space, it was as if editors felt like they were captive to this space, and there was nothing they could do to uphold the best standards of journalism…the complaint was our standards are degrading, our ethics are degrading, and there's not a lot we can do about it because we're in competition with all this other information that looks like news," she said.

Lehrman didn't think that made sense. "Why are we letting this environment define journalism for us? As a result, trust is declining in journalism. Why can't we flip the picture and use this technology to surface or to highlight and support better journalism? So that was the start of The Trust Project."

The Trust Project aims to improve trust in journalism by having its partner organizations adhere to eight key trust indicators (pg. 14). In addition to being a tool for media literacy, the trust indicators enable news organizations to be more transparent.

"People are more aware that there is a lot of untrustworthy information out there, but they are not necessarily very good at discerning it and it makes them afraid of any kind of information," Lehrman said. "Part of this is because there has been this whole propaganda machine about so-called fake news. Some people think all journalism is somehow fake news, or you can choose what news is not fake or fake depending on your opinions, or they trust familiar brands but they're afraid they might accidentally believe something that's not true. It creates this whole atmosphere of uncertainty and fear, lack of confidence within people about their own ability to decide [if news is trustworthy]."

Patrick White also saw a lack of progress in the digital news space. Bilingual in Quebec City at a time when this was rare, White was hired at CTV News at the age of 19. Since the 80s when he began his career, he said we now have access to countless sources of information though the internet and social media, which is beneficial, but "the algorithms created by social media are creating extremes on both sides and polarization of the public discourse."

The RTDNA *Trust in News* report would indicate this is true: It found that Canadians' trust in news has shifted more towards both extremes, with participants responding they had either "a great deal" of trust, or "none at all," roughly doubling in comparison to 2008 (Bricker, 2021).

When asked why the public should trust news media, Roberto Rocha said: "It shouldn't. It should always keep them accountable and have a healthy dose of skepticism...Trust has to be earned, not just given by default." He stated that trust is an issue that media organizations need to talk about internally more, as well as "communicate with their audiences more about how they arrive at their conclusions and how they do their reporting."

The main inhibitor to achieving this is likely lack of time as news organizations' resources are already stretched thin (Appendix A13); so, this is one area where a fact-checking dApp might be useful as it could automate such transparency.

Rocha said that there is a perception that news media has a liberal bias and "stifles or minimizes conservative voices"; additionally, there have been issues in the past with the media "getting it wrong," for example, by believing information from the government or police they later discovered was a coverup or lie. He said there is also an issue with news media not representing the populations they serve or covering communities in an accurate way; and research, such as the CAJ diversity survey, which found that 74.9 per cent of journalists who

disclosed their race identified as white supports this statement (2021). Given that objectivity and fair representation are tenets of journalism, it should not be assumed that the demographic makeup of news organizations is necessarily a cause or predictor of accurate coverage; however, the homogenous nature of Canadian news organizations should not be dismissed as a factor in trust either.

In contrast, Steve Faguy believes people need to trust the news despite its imperfections. "Not all news media is perfectly altruistic," he said, "But generally speaking, journalists (those who have the passion for the craft, because it's not a good way of making money these days) they do it because they want to have an impact on the world. They want to educate people; they want to make a difference. It doesn't necessarily mean you have to trust all media, but you have to trust someone who doesn't have skin in the game, who…wants to get you the facts as much as possible." This point speaks to the importance of information in our daily lives and the challenges that misinformation raises to communities (see Appendix A6). For Lehrman this is important because, "from a democratic perspective, it is extremely dangerous if we can't share enough information to be able to vote on our leadership or vote on policies. It comes down to the very decisions we make about our lives…The pandemic was a really good example of that, but it's not always so dire." This need for shared information to have a functioning civic sphere can be as simple as which route to take, said Lehrman, or what information is needed to participate in community activism.

Rosanna Schropp agreed that trust is important because we must agree on information enough to be able to debate it, and the media can help enable that shared understanding. In a seminal article on democracy written a year after the First World War, Lippmann wrote: "No man has ever thought out an absolute or universal ideal in politics, for the simple reason that

nobody knows enough, or can know enough, to do it" (1919). We need, and have always sought, commonly accepted outside information sources to inform our collective decision making, and journalism continues to play a central role in democracy and liberty today.

Faguy said journalism "doesn't need to be the way things used to be, but at the same time, there needs to be an unbiased arbiter. You can't just be like, well, omnipotent and unaffected journalism is passé, so I'll just believe what some activist on the internet says…If you're not willing to do the effort yourself of looking into things, you need to be able to trust people who you know put the truth above whatever agenda they have."

While this is inherently subjective and there is no absolute way to know if anyone is putting the truth above an agenda, trusted news brands do tend to have a track record of doing this, and a fact-checking dApp could be helpful to start-ups, by allowing them to align with trusted legacy brands.

When asked if the issue of lack of trust in news media is as serious as it seems, Faguy said there is an argument to be made both ways. As someone who is active on social media, he sees people who believe that everything is a conspiracy, and he observed the same mistrust towards politicians, especially with regards to COVID-19; yet while everyone was talking about vaccine hesitancy [when vaccines were first made available], a majority of people still signed up to be vaccinated. Faguy said there is a significant portion of the population that "has had its mind poisoned" by concepts like conspiracy theories, and "it's going to continue to be a problem. So long as it is either financially or politically expedient or profitable to exploit that…and that's a serious problem." He said that if the current trend towards polarization goes on, people will continue to distrust media that isn't on their side.

In terms of what might help mitigate that trend, he said transparency, arming people with information, and engaging with them can help. However, in terms of regulation, he said that journalism works best if loosely regulated, giving the example of past attempts to license the profession, which he is strongly against; believing that journalism is not something you are, but rather something you do. "You can do journalism without necessarily being a journalist," he added. While research indicates news leaders are warming up to the idea of regulation; still, nearly a quarter (24%) worry interventions could make things worse rather than better (Newman, 2022, p. 33), and only two of the eight people interviewed thought stronger government regulations would help improve trust. A dApp might be more readily adopted by those concerned about regulation, as it could provide a means for self-regulation for news organizations, content producers, and platforms, without the need for centralized control or government intervention.

As a journalism professor, Elyse Amend stated she was surprised sometimes by the fallacies students encounter online and believe, and like Faguy, she also saw education as a potential solution. When asked if the issue of trust was overblown, she said that social media creates "feedback loops and silos of people yelling their opinions" about fake news at each other, which creates the illusion of mass agreement, while the "quiet, middle rational group" who make up the majority are unconcerned. However, she can relate to people's mistrust of news media, as news outlets have driven consumers to other channels like social media by dropping the ball on the turn to digital. She said that mainstream news media is in financial danger, and has been for a long time, which should be cause for concern, but distrust of news journalism should not be confused with distrust of mass media [such as social media influencers]. As opposed to previously, when people turned to their local paper or 6 o'clock news for information, now "you can get a million different versions of one story from a million different places, and at the end of

the day, figuring out what's true and what's not is difficult and overwhelming." She also wondered if trust is as much the issue as apathy triggered by information overload, where people "stop caring about what's true in favour of what's most entertaining."

Research does indicate that the "hedonic" mindset of social media users is not conducive to critical analysis of news; and Morevac et. al, for instance, found that users will avoid effort and "engage in articles that make them feel good" (Moravec et. al, 2018, p. 1345). Whether social media users should be expected to critically analyze content if they are in the space for fun is debateable. However, enabling users who do want to engage more critically with news and verification to do so is increasingly central to the strategies of news outlets (e.g., sharing datasets used in stories); platforms (e.g., Twitter's birdwatch); and governments (e.g., Heritage Canada's Digital Citizenship Initiative).

As someone who studies data journalism, Amend said that data journalism could potentially be useful to verification, "but the thing about using data to find and report on stories is that…you can do it with good intentions, but of course you can use data and manipulate data in ways that makes no sense and is very wrong, but it looks accurate, because you have done a bunch of percentages and you've correlated a bunch of things." Therefore, data literacy and numeracy to enable people to understand the basics could be more helpful in combatting mis- and disinformation.

Like many of the interviewees, Patrick White also stressed the importance of education. When it comes to disinformation, he said fact-checking is useful, but it is not enough to solve the problem of distrust in news. He stated compulsory civic and media education, "from grade one to university, nationwide, is needed to explain to kids and future adults the role of a news

organization, the process of news selection and news making, agenda-setting, social media, the challenge of fake news and misinformation, and the role of a journalist in a democratic society."

Civic and media education is in fact integral to Canada's plan to combat mis- and disinformation (Appendix A7). For example, the Canadian government has been financing and supporting digital citizenship initiatives for several years (Canadian Heritage, n.d. in Garneau & Zossou, 2021). It is also central to the government's response to the COVID-19 "infodemic." One 2020 Statistics Canada survey on this topic found 40 per cent of respondents reported believing information about COVID-19 they later found to be untrue and 53 per cent reported sharing unverified information (Garneau & Zossou, 2021). These results would suggest that better digital media literacy and education could be of benefit to Canadians.

However, while education is an important factor, too often lack of agreement is mistaken for lack of understanding. We can believe in the existence of verifiable facts, and also acknowledge that there may be holes in the information reported by news organizations, or that certain groups or communities may be underrepresented. The Organization for Economic Co-operation and Development (OECD) identified "three pillars in combating misinformation": greater transparency of communications of public institutions, online platforms reducing the spread of false claims, and education (OECD, 2020 in Garneau & Zossou, 2021).

"I have a reputation of credibility and I only publish facts, and not opinions," White stated, "but there is a huge distrust in journalists in Canada right now. If you look at demonstrations about safe sanitary regulations about COVID-19…people are spitting on journalists, they are insulting journalists publicly and on social media. This level of hate, I've never seen that before 2018 in Quebec…It's very worrying." Lehrman shared this view. She said, "every journalist who really is a journalist is out there seeking the truth, and they are under

assault at every turn." She said women journalists are especially vulnerable to attacks on social media, and even physical threats, and that while lots of fields have encountered that volatility, journalism in particular is a target.

The situation led to an Ipsos poll on harassment of media workers, the first of its kind in Canada, which found that more than 70 per cent of media workers reported having been harassed (Bundale, 2021). The level of harassment is such that it can be used as a deterrent, for instance to steer women away from "hard news" towards "soft news" (e.g., lifestyle, fashion, etc.) or other types of content creation. A fact-checking dApp could be helpful in this regard as it could provide a simple, objective way to respond to harassers by redirecting them to participate in the verification process if they take issue with the way stories are being covered.

When asked why the public should trust news media, Juliette De Maeyer said, "because they are the only professionals whose job it is to actually do that; to account for the world around them." She stated that journalists' account of the truth is not perfect; but it's the best we have.

While the interviewees expressed varying degrees of concern over declining trust in journalism, all identified trust as an important factor; and in line with academic and government research on the topic (e.g., OECD, 2020 in Garneau & Zossou, 2021), there was a consensus that trust in news media could be strengthened through education, transparency, and engagement.

RQ2: Would a fact-checking dApp improve public trust in news media?

When trying to think of a MA thesis topic, Rosanna Schropp settled on journalism, as she had a strong interest in the field. "I just typed into Google: 'blockchain and journalism,' and the first thing I saw was Civil…" she said. She saw that the Civil newsroom platform (Appendix A8), which aimed to create a collaborative distribution process, marketplace, and verification

mechanism through open governance, cryptoeconomics, and blockchain technologies, demonstrated that there was a strong case for blockchain and journalism. However, she said the journalists she spoke with had a different perspective from the organization representatives: that democratic participation was a great vision, but prohibitively time-consuming. Though the Civil project was shuttered in 2020, Schropp still believed it was successful as an experiment in alternative solutions to the crisis in journalism though, and she stated that the hundred plus member organizations from around the world who were interested in joining demonstrated that there is an interest in it as a solution.

A stumbling block she thought checkmarker might encounter if it was implemented is people's general mistrust of experts. Schropp said the pandemic highlighted controversy over whether people want to hear more from experts in the media, or if they want to give voice to people we do not hear from as often. She wondered if trust and credibility would be improved by expert voices, or if people would dismiss it as more of the same and be less inclined to trust it for this reason. She also stated that lack of trust in media may just be symptomatic of a larger mistrust in political, social, and financial institutions in general.

"Are these people that are already against the media and against the elite, are they willing to…check that…something has been fact-checked by somebody? I think it will be the people who are already interested in good information…that might be the problem, that the people that you want to reach, you cannot reach them because they already have no trust in the media and no trust in the experts."

While the impact of corrections and influence of confirmation bias has been debated, it is safe to state that corrections are not always well received (Moravec et. al, 2018; Wood & Porter, 2018). Schropp shared her belief that criticizing people for their distrust is the wrong approach

and only creates more polarization, and that rather we should try to understand why people do not trust media. Optimally, a potential fact-checking dApp should reach people who believe mis- and disinformation. The pandemic has highlighted the need for this; since, in the case of correcting vaccine-related falsehoods, changing only a small percentage of the public's views can mean the difference between achieving "community immunity" and failing to achieve it (Stecula et. al, 2020).

"Trust is a feeling," Juliette De Maeyer said. "It's something that we deeply feel sometimes in our gut, so it's definitely something that we must account for, but it doesn't mean that trust or truth is something that is entirely subjective. Sometimes that's the leap that people make when they say that: If trust is a feeling, then it's only a question of feeling, and I can trust anything, but it's not entirely subjective because when we trust someone, we rely on objective things that exist in the world." She said the problem is that people tend to think of trust and truth in binary terms (e.g., "this is true, this is not true," or "this is a fact, this is not a fact") but there are limitations in such an approach, and it might be more relevant to think in terms of "degrees on a scale." Most fact-checking sites do this; for instance, *The Washington Post* gives claims more Pinocchios based on how far from the truth they are (Kessler, n.d.).

De Maeyer stated that she might not be the best audience for fact-checking sites. "I find it tedious to read, and a bit depressing. This is really personal, and I'm happy they exist, but I find it a bit depressing to see how everyone is wrong all the time," she said. She stated that she did not understand how blockchain could be useful or think that there is necessarily a need for new tools to identify mis- and disinformation but would like to see more original ways to show uncertainty in news articles. A demonstrated tolerance of uncertainty that both acknowledges and leverages the public's greater awareness of mis- and disinformation might help improve trust.

The dApp proposed in this project would address uncertainty by rating claim reviews on a five-point scale of accuracy. Additionally, the data could be compiled into maps or visualizations of mis- and disinformation on certain topics to create an overall picture of what is known and unknown, similar to Hoaxy (n.d.), but users could directly use the visualization to fill in gaps in knowledge.

When it comes to technology and journalism, Faguy said, "Is a computer going to be able to decide what is newsworthy? Is a computer going to be able to decide what is interesting in a story? I don't know that is something that is in the near term...Journalism, like a lot of things, is an art. It's something that requires that higher level of reasoning, that we're not really seeing from computers yet." Faguy was skeptical that blockchain could be useful to journalism, and said, "I don't think the data not being secure is the problem." He said the trust issue is a very human one and doubtful that technology could improve it directly.

Research suggests that people's lack of trust in news is in part rooted in their distrust of technologies, as evidenced, for instance, in social media news trust scores that are much lower than the overall average (e.g., 12% for social media, compared to 66% overall) (Bricker, 2021); however, as trust is an emotion, it is undoubtedly, a human problem.

Jeremy Clark said people sometimes overestimate the potential of blockchain to solve such problems. He explained that while people sometimes talk about blockchain as if it can exist outside of the internet, this is not really the case, and that the definition of a blockchain is "probably a definition of 'internet' itself." Clark described blockchain as a technology overlaid on the internet, and that if you think of the internet as "something that gets computers to talk to each other," technologies like email or blockchain are "something that internet-enabled computers might talk about." To put it another way, blockchain is like the intranet, or private

network, that you might find at a large company; except, in the case of public blockchains, anyone can join. Clark said that a dApp would make sense for fact-checking as it would be undesirable for one entity to oversee it; however, people would still have to interpret the data. He stated that people tend to mistakenly assume too much from a blockchain system, but it cannot interpret truth.

The dApp proposed in this project could help ensure humans remain in the verification process because the synchronization required for a blockchain system (i.e., all nodes updating the ledger simultaneously without the need for a central authority) is slow enough to be conducive to voting. Additionally, it is impossible to alter data without all nodes being aware of it. It is not a technology for enforcing trust, but rather consensus. This was challenging to illustrate, and this thesis project made clear that an understanding of the dApp proposed might be more effectively conveyed through comparing a fully functional prototype to traditional verification methods.

In line with the views Faguy shared, Amend stated that automating the identification of potential issues could be helpful, enabling journalists to avoid mundane work, "when the human journalist element is to contextualize [information], make it interesting, and tell a story." However, in terms of blockchain and journalism, she said she does not understand it well enough to say if it could be useful. This is a commonly held view and this lack of understanding is one of the main barriers to adoption of blockchain in general. White stated that blockchain is not well known or understood. "People think it's directly related to cryptocurrencies, which are quite unstable and destabilizing financial markets right now. It's just bad publicity around cryptocurrency and a lot of fraud in the financial markets and misunderstanding of what is blockchain all about…It's going to take 25 years for people to understand it, unfortunately." It is important that news outlets and audiences have a chance to fully understand how blockchain

might be useful to journalism before dismissing it as a bad idea, and this thesis project took a step towards facilitating that understanding, which future projects could build on.

Another positive aspect of this thesis project identified by Lehrman is that it could help address the fear people have of sharing misinformation and accidentally becoming part of the problem. She said there are many fact-checking organizations, but initiatives that are based on bringing the public into the process is a good development. She said checkmarker is not strictly speaking just a fact-checking site, but designed more broadly, which intrigued her, because that's the kind of feedback The Trust Project got: that there was concern over issues beyond just truth, such as whether a story is one-sided. However, she saw two potential risks in involving the public. One is the challenge of attracting people to a space and keeping them there (see Strengths and Limits below for more on this). In her experience, she has seen that such sites can only maintain a population if it's students whose participation is compulsory. The other risk she identified is people deliberately trying to manipulate the system; in other words, how to protect against trolls.

Another barrier to adoption identified by interviewees is journalists' resistance to technology. Rocha taught himself to code to be able to create interactive pieces and realized he could tell "powerful stories visually through data analysis and data visualization." He said data is not always a perfect reflection of the world; that it can be biased or incomplete, but it provides a "statistical bolster to get us as close to the facts as possible." As someone who is very comfortable using technology in reporting, he doesn't understand the resistance on the part of journalists to adopt new technologies and tools. He identified that as the greatest threat technology poses to journalism; that journalism tends to be "resistant to change until the last possible moment, until it becomes impossible to ignore," and that "getting left behind" is the

biggest threat, rather than any particular technology. He said more technologically skilled reporters could help improve that resistance to change.

Schropp hoped that independent news outlets adopt and develop technologies like blockchain to create a counterbalance to the dominance of big players in the market, because "if the big media take control of blockchain, then we have centralized platforms again, and this would be the same as today, just with another technology." Though her view of technologies like blockchain was positive overall, she was less optimistic that they will solve the crisis in journalism. Like Rocha, she was also surprised by how resistant journalists seemed to be to new technologies.

White stated that "there is a lack of understanding from [news] media organizations about the business models of the future." He said the model right now could include any combination of technology, philanthropy, paywalls, great content, and government funding. "But it has to be a global, 360 approach to the whole thing," adhering to an overarching vision, as opposed to one-off experiments. He does not think smaller news organizations have a grasp of that.

In terms of potential dangers blockchain might pose to journalism, Clark stated that it could disrupt the industry from an economic perspective. White saw such potential economic disruption as a positive and said so far blockchain and journalism has been a failure, however, "myself, I believe in it because of micropayments, which could be a way to monetize content for news organizations." Given the difficulty news organizations have had in monetizing online content; with, for instance, Google and Facebook absorbing 80 per cent of online advertising revenue in Canada (News Media Canada, 2021), any new mechanism for monetizing news is worth consideration.

White also said blockchain "could be a great tool for fact-checking," and added that "you could also prioritize credible news organizations." In general, interviewees who were more familiar with blockchain displayed more enthusiasm towards the idea of a fact-checking dApp. However, there was a consensus that trust in news media could be strengthened through better education, transparency, and engagement.

Strengths and Limits

As Lehrman pointed out, one of the main challenges of verification initiatives is lack of public interest in verification. One limitation encountered in executing this project was lack of survey results, and as there was not a robust enough sample, they were not included. Since the interviewees represented a great deal of information, and information was gathered in a qualitative manner to support the research-creation efforts, the proof-of-concept evolved into a website about mis- and disinformation and trust and an explanation of how a dApp might work. This may have made the site too detailed for a general audience of survey takers to absorb and/or be interested in. However, since the concept was new and unfamiliar to most people, explaining it became a necessary first step and is ultimately a strength of the project.

Another limitation encountered with this project is that it is difficult to obtain quantitative data on perceptions of truth or checkworthiness because these topics are inherently subjective. However, an exploration of these subjective concepts was still valuable and resulted in decisions such as rating claims on a five-point scale. A visual marker to identify content as being part of checkmarker was not explored in detail and the effectiveness of such an identifier would require more research. The problem with such a marker is that it might be used as a filter to steer people away from good information into silos.

In general, studies on verification and mis- and disinformation interventions have returned mixed results, with some research revealing confirmation bias to be a powerful inhibitor to acceptance of interventions (Morevac et. al, 2019), and other studies finding corrections to successfully shift people's opinions towards the facts (Wood and Porter, 2018). Despite the limitations encountered in this project, interviewees' interest would indicate that the possibility of a fact-checking dApp warrants further investigation. The research in this project could serve as a useful launchpad for such research, and it is significant in that it could lead to the development of a full prototype or be used to make a case for or against blockchain-based journalism projects.

Future Research

Building off this project, future research could be executed in stages. First, further work on a fact-checking dApp could focus on simpler experiments. For example, survey respondents could be asked to consider news headlines only (instead of whole articles) (e.g., Pennycook et. al, 2020 and Pennycook et. al, 2019), which can be a more effective approach given our short attention spans, especially in an online environment. Future surveys could also be tailored towards a more specific audience. The hedonic mindset and general inattentiveness of social media users means that they are unlikely to engage in the kind of critical thought, or expend the energy needed to verify news (Moravec et. al, 2018). For this reason, a fact-checking dApp tailored to a niche audience might be more readily adopted than one aimed at a general audience. Future studies might determine if this is true by comparing interventions on common social media platforms with a fact-checking dApp, and/or by comparing average users with people with a strong interest in verification of news.

Walter and Tukachinsky found time-sensitivity to be a contributing factor to the effectiveness of interventions, with real-time corrections more easily integrated into people's mental models (2019, p. 158). This would suggest that future research should focus on real and current headlines. The research also indicated that people were more receptive to verification when in a headspace more conducive to it. Building on the work of Morevac et. al, Walter and Tukachinsky, and Saltz, a future study could ask participants to label headlines before sharing them. Such a study could include both legitimate news items and mis/disinformation and ask people to label how recent a news item is or whether it is news or opinion, before asking them to identify and rate claims and/or flag issues for verification.

Another area for future exploration might be the impact of trust on news audiences' willingness to pay for news. Future research might also compare media literacy initiatives with verification-specific labelling, for instance comparing a fake news flag with a prebunking initiative like the *Bad News* game.

Lastly, a/b testing could be conducted on a prototype. Since a prototype would likely be unfamiliar to most users, a more long-term approach could be taken, where respondents could be invited to interact with the prototype over a period of days or weeks and participate in a diary study to record their response to it over time.

Conclusion

The participatory nature of digital news media, sheer volume of information available, and technological innovations in producing digital content has led to a proliferation of mis- and disinformation. As mis- and disinformation is made and shared with greater ease and speed, trust in online news media is declining. While the "infodemic" resulting from the COVID-19

pandemic is the most obvious recent example of this (Garneau & Zossou, 2021), the spread of mis- and disinformation is woven into conflicts around the globe and media manipulators create, amplify, and exploit polarization, compounding distrust of news media, and public institutions in general. As a system where no one entity has control and decisions are made by consensus, blockchain could provide a means for automated self-regulation for tech platforms and news and fact-checking organizations. It could also help promote media literacy, facilitate greater transparency, and engage news audiences to participate in the verification process.

This project created and explored a fact-checking dApp, showing how it could provide a transparent, democratic process for verifying claims and claim reviews, while still allowing news outlets to maintain their gatekeeper role, unfettered by government intervention, a problem in areas of the world where freedom of the press is not upheld, and fake news used as an excuse for stifling opposition to authoritarian regimes. Five of the eight interviewees affirmed that the fact-checking dApp proposed could improve trust in journalism, and nearly all expressed strong sentiment that better education and digital media literacy are needed. This project could be valuable as a foundation for future research into a fact-checking dApp more focused on digital media literacy.

Bibliography

2019 Edelman Trust Barometer: Canada. (n.d.). Edelman Canada. Retrieved February 10, 2021, from https://www.edelman.ca/trust-barometer/trust-barometer-2019

2021 Edelman Trust Barometer: Canada. (n.d.). Edelman Canada. Retrieved November 1, 2021, from https://www.edelman.ca/trust-barometer/edelman-trust-barometer-2021

A People's Guide To Tech. (n.d.). Allied Media Projects. Retrieved September 7, 2022, from https://alliedmedia.org/resources/peoples-guide-to-ai

About - Storyful Storyful. (n.d.). Storyful. Retrieved October 5, 2021, from https://storyful.com/about/

Across Canada, headlines disappear. (2021, February 4). *News Media Canada*. https://nmc-mic.ca/2021/02/04/across-canada-headlines-disappear/

Affelt, A. (2019, April 30). Can Blockchain Combat Fake News? *The Tilt*. Retrieved September 21, 2022, from https://www.thetilt.com/content/commentary/blockchain-combat-fake-news

Aiello, R. (2022, January 28). What does the trucker convoy hope to accomplish? *CTV News*. https://www.ctvnews.ca/politics/what-does-the-trucker-convoy-hope-to-accomplish-1.5758489?&cid=ps:923&gclid=EAIaIQobChMI8dmCycGe-gIVnm1vBB29ngJMEAMYASAAEgJHzvD_BwE&gclsrc=aw.ds

Algorithmic Justice League. (2022). *About*. https://www.ajl.org/about

Allein, L., & Moens, M. F. (2020, October). Checkworthiness in automatic claim detection models: Definitions and analysis of datasets. In *Multidisciplinary International Symposium on Disinformation in open online media* (p. 1-17). Springer, Cham.

American Views 2020: Trust, Media and Democracy. (2020, August 4). Knight Foundation. https://knightfoundation.org/reports/american-views-2020-trust-media-and-democracy/

Amazon Mechanical Turk. (2020, July 20). Getting Started with Surveys on MTurk. *Medium*. https://blog.mturk.com/getting-started-with-surveys-on-mturk-e2eea524c73

Angwin, J., ProPublica, Grassegger, H., & ProPublica, special to. (2017, June 28). Facebook's Secret Censorship Rules Protect White Men From Hate Speech But Not Black Children. *ProPublica*. https://www.propublica.org/article/facebook-hate-speech-censorship-internal-documents-algorithms?token=Ci46J_nknyC9_Qajiwhk8PgNGJj_0VNN

AOL Community Leader Program. (2020). In *Wikipedia*. https://en.wikipedia.org/w/index.php?title=AOL_Community_Leader_Program&oldid=959746845

Arslan, F., Hassan, N., Li, C., & Tremayne, M. (2020). A Benchmark Dataset of Check-worthy Factual Claims. ArXiv:2004.14425 [Cs]. http://arxiv.org/abs/2004.14425

Ateniese, G., Magri, B., Venturi, D., & Andrade, E. (2017). Redactable Blockchain – or – Rewriting History in Bitcoin and Friends. *2017 IEEE European Symposium on Security and Privacy* (EuroS&P), 111–126. https://doi.org/10.1109/EuroSP.2017.37

attribution.news. (n.d.). *attribution.news*. Retrieved January 5, 2021, from https://attribution.news/

Australian Associated Press. (2021, September 30). *Ivermectin is not being given to COVID-19 patients in Australia*. AAP Factcheck. https://www.aap.com.au/factcheck/ivermectin-is-not-being-given-to-covid-19-patients-in-australia/

Author: A Schema.org Property. (2022, October 25). Schema.org. https://schema.org/author

Barthel, M., Mitchell, A., Asare-Marfo, D., Kennedy, C., & Worden, K. (2020, December 8). *Measuring News Consumption in a Digital Era*. Pew Research Centre. https://www.pewresearch.org/journalism/2020/12/08/measuring-news-consumption-in-a-digital-era/

BBC News. (2017, December 21). Facebook ditches fake news warning flag. https://www.bbc.com/news/technology-42438750

Beis, C., Harris, K., & Shreffler, S. (2021, August 13). The Internet Archive has been fighting for 25 years to keep what's on the web from disappearing – and you can help. *The Conversation*. http://theconversation.com/the-internet-archive-has-been-fighting-for-25-years-to-keep-whats-on-the-web-from-disappearing-and-you-can-help-163867

Bell, E. (n.d.) How tech platforms decide what counts as journalism. *Columbia Journalism Review: The Existential Issue: Chapter 1: Who*. https://existential.cjr.org/who/

Benton, J. (2020, April 14). The coronavirus traffic bump to news sites is pretty much over already. *Nieman Lab*. Retrieved October 5, 2021, from https://www.niemanlab.org/2020/04/the-coronavirus-traffic-bump-to-news-sites-is-pretty-much-over-already/

Binns, C. (2018). Journalism's Savior? *Stanford Social Innovation Review*, *16*(3), 8–9. https://lib-ezproxy.concordia.ca/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=129691235&site=eds-live

Bitcoin scalability problem. (2020, September 18). In *Wikipedia*. https://en.wikipedia.org/w/index.php?title=Bitcoin_scalability_problem&oldid=979117497

Blockstream (n.d.). *Blockstream Explorer*. Retrieved November 14, 2021, from https://blockstream.info/

Bliss, K. (2021, February 3). Canada's Bell Media Cuts Hundreds of Jobs, Including in Radio. *Billboard*. Retrieved April 30, 2021, from https://www.billboard.com/articles/news/international/9520619/canada-bell-media-layoffs-radio/

Bloyd-Peshkin, S & Currie Sivek, S. (2017, March 23). Magazines find there's little time to fact-check online. *Columbia Journalism Review*. https://www.cjr.org/b-roll/magazine-fact-checking-online.php

Blum, B. (2021, March 9). Closing of HuffPost Canada 'abrupt' and 'devastating,' editor says. *CBC*. https://www.cbc.ca/news/business/huffpost-canada-closing-1.5942533

Bond, S. (2021, August 21). Facebook's Most Viewed Article In Early 2021 Raised Doubt About COVID Vaccine. *NPR*. https://www.npr.org/2021/08/21/1030038616/facebooks-most-viewed-article-in-early-2021-raised-doubt-about-covid-vaccine

Borel, B. (2017, January 4). Fact-Checking Won't Save Us From Fake News. *FiveThirtyEight*. https://fivethirtyeight.com/features/fact-checking-wont-save-us-from-fake-news/

Bricker, D.J. (2021) *RTDNA Trust in News*. Ipsos. https://www.ipsos.com/sites/default/files/ct/news/documents/2021-06/RTDNA_Trust_in_News-Report-2021-06-03-v1_0.pdf

Brin, C. (n.d.). *Canada. Reuters Institute Digital News Report 2021*. Reuters Institute for the Study of Journalism. Retrieved September 4, 2021, from https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2021/canada

Broniatowski, D.A., Jamison, A.M., Qi, S., AlKulaib, L., Chen, T., Benton, A., Quinn, S.C., & Dredze, M. (2018). Weaponized Health Communication: Twitter Bots and Russian Trolls Amplify the Vaccine Debate. *American Journal of Public Health*, *108*, 378-1384. https://doi.org/10.2105/AJPH.2018.304567

Brown, S. & P. Johnston (2021, February 10). Vancouver's TSN 1040 pulled off air as Bell Canada continues with cuts. *The Province*. Retrieved April 30, 2021, from https://theprovince.com/sports/vancouvers-tsn-1040-pulled-off-air-as-bell-canada-continues-with-cuts

Bunce, M. (2019). Management and resistance in the digital newsroom. *Journalism*, *20*(7), 890–905. https://doi.org/10.1177/1464884916688963

Bundale, B. (2021, November 9). Canadian journalists grappling with epidemic of online bullying, harassment: Survey. *The Toronto Star*. https://www.thestar.com/business/2021/11/09/canadian-journalists-grappling-with-epidemic-of-online-bullying-harassment-survey.html

Burgess, M. (2018, October 17). We finally know the full extent of Russia's Twitter trolling campaign. *Wired UK*. https://www.wired.co.uk/article/twitter-troll-data-russia-ira-iran

Bustillos, M. (2018). Erasing history. *Columbia Journalism Review*. https://www.cjr.org/special_report/microfilm-newspapers-media-digital.php

Buterin, V. (n.d.). *Ethereum Whitepaper*. Ethereum.Org. Retrieved January 27, 2021, from https://ethereum.org

Butler, O. (2021, April 22). I'm an expert on internet deception but even I fell for this. *The Independent*. https://www.independent.co.uk/voices/catfish-uk-presenter-oobah-butler-b1834304.html

Canada, P. H. A. of. (2020, October 29). *Coronavirus disease (COVID-19): Canada's response* [Education and awareness]. https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/canadas-reponse.html

Canadian Heritage. (2021, August 3). *Engaging Canadians on Fair Revenue Sharing Between Digital Platforms and News Media*. https://www.newswire.ca/news-releases/engaging-canadians-on-fair-revenue-sharing-between-digital-platforms-and-news-media-819053863.html

Casini, L. (2018). Googling Democracy? New Technologies and the Law of Global Governance: Afterword to Eyal Benvenisti's Foreword. *European Journal of International Law*, *29*(4), 1071–1077. https://doi-org.lib-ezproxy.concordia.ca/10.1093/ejil/chy072

Casino, F., Dasaklis, T. K., & Patsakis, C. (2019). A systematic literature review of blockchain-based applications: Current status, classification and open issues. *Telematics and Informatics*, 36, 55–81. https://doi.org/10.1016/j.tele.2018.11.006

Castonguay, A. (2021, April 30). Attention web giants: 'Recess is over.' *Macleans*. https://www.macleans.ca/politics/ottawa/attention-web-giants-recess-is-over/

CBC. (n.d.). *Journalistic Standards and Practices*. Retrieved January 27, 2021, from https://cbc.radio-canada.ca/en/vision/governance/journalistic-standards-and-practices

CBC News. (2021, September 2). *When is ivermectin safe for humans and other questions about anti-parasitic drug not recommended for COVID-19*. https://www.cbc.ca/news/canada/calgary/ivermectin-covid-19-alberta-pandemic-1.6159985

CBC News. (2021, October 7). *Calls spike to Alberta poison hotline about ivermectin after anti-parasitic drug touted as COVID-19 treatment*. https://www.cbc.ca/news/canada/calgary/ivermectin-poison-hotline-covid-drug-alberta-1.6203269

CDC. (2020, February 11). *COVID-19 Vaccination*. Centers for Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/vaccines/effectiveness/work.html

Civil. (2021). *The Civil Cryptoeconomic Whitepaper*. (Original work published 2017). joincivil. https://github.com/joincivil/whitepaper

ClaimBuster: Automated Live Fact-checking. (n.d.). Retrieved September 22, 2021, from https://idir.uta.edu/claimbuster/

ClaimReview: A Schema.org Type. (2022, October 25). Schema.org. https://schema.org/ClaimReview

Coleman, K. (2021, January 25). Introducing Birdwatch, a community-based approach to misinformation. Retrieved February 12, 2021, from https://blog.twitter.com/en_us/topics/product/2021/introducing-birdwatch-a-community-based-approach-to-misinformation.html

Concordia University Library. (n.d.). *Archive & share data: Research data management guide*. Retrieved January 7, 2021, from https://library.concordia.ca/research/data/deposit-data.php

Conférence de presse de M. Christian Dubé, ministre de la Santé et des Services sociaux - National Assembly of Québec. (n.d.). Retrieved November 6, 2021, from http://www.assnat.qc.ca/en/actualites-salle-presse/conferences-points-presse/ConferencePointPresse-78241.html

COVID-19. (n.d.). Retrieved November 6, 2021, from https://www.infoentrepreneurs.org/en/news/

COVID-19 vaccination data. (n.d.). Retrieved November 6, 2021, from https://www.quebec.ca/en/health/health-issues/a-z/2019-coronavirus/situation-coronavirus-in-quebec/covid-19-vaccination-data

CP24. (2021, February 4). Legislation coming this year to force Google, Facebook to pay for news content. *CP24*. https://www.cp24.com/news/legislation-coming-this-year-to-force-google-facebook-to-pay-for-news-content-1.5296756

Credibility Coalition. (n.d.) *Our goal: to understand the veracity, quality and credibility of online information*. Retrieved October 5, 2021, from https://credibilitycoalition.org/

Crowther, C., Thibault, S., Salamon, E. & King, G. (2018). Introduction: Whose Crisis? Journalism Is Not Just for Journalists and Policy Is Not Just for Wonks. *Journalism in Crisis: Bridging Theory and Practice for Democratic Media Strategies in Canada* (pp. 3-24). Toronto: University of Toronto Press. https://doi.org/10.3138/9781442625198-004

Culloty, E. & Suiter, J. (2021). *Disinformation and Manipulation in Digital Media*. New York: Routledge.

DataJournalism.com. (n.d.). *Verification Handbook*. C. Silverman (Ed.). https://datajournalism.com/read/handbook/verification-1

DelViscio, J. (2020, July 20). A Nixon Deepfake, a "Moon Disaster" Speech and an Information Ecosystem at Risk. *Scientific American*. https://www.scientificamerican.com/article/a-nixon-deepfake-a-moon-disaster-speech-and-an-information-ecosystem-at-risk1/

Delgado, T. D. (2017, May 19). Mark Zuckerberg Hates Black People. *Medium*. https://medium.com/@thedididelgado/mark-zuckerberg-hates-black-people-ae65426e3d2a

De Maeyer, J. (2017, May 24). Podcasting Is the New Talk-Radio. *The Atlantic*. https://www.theatlantic.com/technology/archive/2017/05/how-podcasting-is-shaping-democracy/524028/

Design Justice Network. (n.d.). *Design Justice Network*. Retrieved July 31, 2020, from https://designjustice.org

Digital Rights Foundation | About. (n.d.). Retrieved November 1, 2021, from https://digitalrightsfoundation.pk/about/

Docto, I. (2022, January 28). Canadian reporters warned of harassment, racist threats, violence at "Freedom Convoy." *Daily Hive*. https://dailyhive.com/vancouver/canadian-association-journalists-freedom-convoy-violence

Données sur la COVID-19 au Québec. (n.d.). Retrieved November 6, 2021, from https://www.quebec.ca/sante/problemes-de-sante/a-z/coronavirus-2019/situation-coronavirus-quebec/

DROG. (n.d.). *DROG group*. Retrieved September 24, 2022, from https://drog.group/

Dubberly, S. (2019, December 6). *The Digital Verification Corps: Amnesty International's Volunteers for the Age of Social Media*. Amnesty International Citizen Evidence Lab. https://citizenevidence.org/2019/12/06/the-digital-verification-corps-amnesty-internationals-volunteers-for-the-age-of-social-media/

Edmonds, R. (2020, June 2). R.I.P. Civil — Lessons from a failed startup. *Poynter*. https://www.poynter.org/business-work/2020/r-i-p-civil-lessons-from-a-failed-startup/

Emergent. (n.d.). Retrieved August 3, 2020, from http://www.emergent.info/

Engelke, K. M. (2019). Online Participatory Journalism: A Systematic Literature Review. *Media and Communication*, *7*(4), 31. https://doi.org/10.17645/mac.v7i4.2250

European Commission. (n.d.) *The Digital Services Act package: Shaping Europe's digital future*. Retrieved February 15, 2022, from https://digital-strategy.ec.europa.eu/en/policies/digital-services-act-package

Facebook, Social Media Privacy, and the Use and Abuse of Data: United States Senate Committee on the Judiciary. (n.d.). Retrieved August 5, 2020, from

https://www.judiciary.senate.gov/meetings/facebook-social-media-privacy-and-the-use-and-abuse-of-data

FactCheck.org (2022). *FactCheck.org*. Retrieved September 14, 2022, from https://www.factcheck.org/

Fairyington, S. (2018, February 23). In the era of fake news, where have all the fact-checkers gone? *Columbia Journalism Review*. Retrieved March 16, 2021, from https://www.cjr.org/business_of_news/fact-checking.php

Fazio, L. (2020). Pausing to consider why a headline is true or false can help reduce the sharing of false news. *Harvard Kennedy School Misinformation Review*, *1*(2). https://doi.org/10.37016/mr-2020-009

Fink, K. (2019). The biggest challenge facing journalism: A lack of trust. *Journalism*, *20*(1), 40–43. https://doi.org/10.1177/1464884918807069

Finley, K. & Barber, G. (2019, July 9). The WIRED Guide to Blockchain. *WIRED*. https://www.wired.com/story/guide-blockchain/

First Draft. (n.d.). *Online Verification Challenge*. Retrieved January 5, 2021, from https://ftp.firstdraftnews.org/articulate/temp/ovcR/story_html5.html

Frankenfield, J. (n.d.). *Decentralized Applications – dApps*. Investopedia. Retrieved January 15, 2021, from https://www.investopedia.com/terms/d/decentralized-applications-dapps.asp

Funke, D. (2018, October 25). How Facebook deals with misinformation, in one graphic. *Poynter*. https://www.poynter.org/fact-checking/2018/how-facebook-deals-with-misinformation-in-one-graphic/

Funke, D. (2021, August 13). Fact check: Ivermectin is not a proven treatment for COVID-19. *USA Today*. https://www.usatoday.com/story/news/factcheck/2021/08/13/fact-check-ivermectin-not-proven-covid-19-treatment/5566216001/

Funke, D. & Mantzarlis, A. (2018, December 14). We asked 19 fact-checkers what they think of their partnership with Facebook. Here's what they told us. *Poynter*. https://www.poynter.org/fact-checking/2018/we-asked-19-fact-checkers-what-they-think-of-their-partnership-with-facebook-heres-what-they-told-us/

Gallup & Knight Foundation (2020). *American Views 2020: Trust, Media and Democracy*. Gallup/Knight Foundation. https://knightfoundation.org/wp-content/uploads/2020/08/American-Views-2020-Trust-Media-and-Democracy.pdf

Garneau, K., & Zossou, C. (2021, February 2). *Misinformation during the COVID-19 pandemic*. Statistics Canada. https://www150.statcan.gc.ca/n1/pub/45-28-0001/2021001/article/00003-eng.htm

GDPR.EU (2022). *Everything you need to know about the "Right to be forgotten"*. Retrieved September 14, 2022 from https://gdpr.eu/right-to-be-forgotten

Getting Started - schema.org. (n.d.). Retrieved November 14, 2021 from https://schema.org/docs/gs.html

Gendall, P. & Healey, B. (2008, May 1). Forum – Asking the Age Question in Mail and Online Surveys. *International Journal of Market Research*. *50*(3). https://journals.sagepub.com/doi/10.1177/147078530805000303

Gilmore, R. (2021, February 4). A world without news: Papers publish blank front pages to highlight industry struggles – National. *Global News*. Retrieved September 16, 2021, from https://globalnews.ca/news/7617779/canada-news-industry-newspapers-blank-struggles-journalism/

Golebiewski and boyd. (2019, October 29). *Data voids: Where missing data can easily be exploited*. Data & Society. https://datasociety.net/wp-content/uploads/2019/11/Data-Voids-2.0-Final.p

Google News Initiative Impact Report. (n.d.). Retrieved November 14, 2021, from https://newsinitiative.withgoogle.com/impact/

Goop. (2021, February 25). *Can I Drink Coffee While Fasting? Intuitive Fasting & Coffee*. https://goop.com/ca-en/wellness/detox/can-i-drink-coffee-while-fasting/

Government of Canada, Healthy Canadians. (2021, August 31). Ivermectin not authorized to prevent or treat COVID-19; may cause serious health problems. https://healthycanadians.gc.ca/recall-alert-rappel-avis/hc-sc/2021/76365a-eng.php#media-medias

Graves, L. & Cherubini, F. (2016). *The Rise of Fact-Checking Sites in Europe*. The Reuters Institute for the Study of Journalism. https://reutersinstitute.politics.ox.ac.uk/sites/default/files/research/files/The%2520Rise%2520of%2520Fact-Checking%2520Sites%2520in%2520Europe.pdf

Grigg, I. (2004). *The Ricardian contract*. Proceedings. First IEEE International Workshop on Electronic Contracting. [Conference paper]. DOI: 10.1109/WEC.2004.1319505.

Hao, K. (2021, November 20). *How Facebook and Google fund global misinformation*. MIT Technology Review. Retrieved December 17, 2021, from https://www.technologyreview.com/2021/11/20/1039076/facebook-google-disinformation-clickbait/

Harrison, C. (2007, November 17). Harvard University Program on Survey Research: Tip Sheet on Question Wording. https://psr.iq.harvard.edu/files/psr/files/PSRQuestionnaireTipSheet_0.pdf

Healing, D. (2021, February 2). Union says Bell Media cuts hit 210 employees in Toronto, half from newsrooms. *CTVNews*. https://www.ctvnews.ca/business/union-says-bell-media-cuts-hit-210-employees-in-toronto-half-from-newsrooms-1.5292819

Heathers, J. (2021, October 23). The Real Scandal About Ivermectin. *The Atlantic*. https://www.theatlantic.com/science/archive/2021/10/ivermectin-research-problems/620473/

Heer, T., Heath, C., Girling, K., & Bugg, E. (2021). *Misinformation in Canada: Research and Policy Options*. Evidence for Democracy. https://evidencefordemocracy.ca/sites/default/files/reports/misinformation-in-canada-evidence-for-democracy-report_.pdf

Heritage Canada. (2022, September 7). Digital Citizen Contribution Program. *Heritage Canada*. https://www.canada.ca/en/canadian-heritage/services/online-disinformation/digital-citizen-contribution-program.html

Hoaxy: How claims spread online. (n.d.). Retrieved September 11, 2022, from https://hoaxy.osome.iu.edu/

Hobbs, A. (2020, May 12). How Civil Didn't Save Journalism. *Study Hall on Patreon*. Retrieved September 9, 2021, from https://www.patreon.com/posts/how-civil-didnt-37037075

Holan, A.D. (2020, October 27). *The Principles of the Truth-O-Meter: PolitiFact's methodology for independent fact-checking*. PolitiFact. Retrieved March 30, 2022 from https://www.politifact.com/article/2018/feb/12/principles-truth-o-meter-politifacts-methodology-i/

HuffPost Canada Union [@HuffpostCAUnion]. (2021, April 8). *It's been more than four weeks since our entire newsroom was laid off by Buzzfeed*. [Image attached] [Tweet] Twitter. https://twitter.com/HuffpostCAUnion/status/1380190768413831174?cxt=HHwWjMCjmZ-MtqcmAAAA

Hunt, E. (2016, March 24). Tay, Microsoft's AI chatbot, gets a crash course in racism from Twitter. *The Guardian*. https://www.theguardian.com/technology/2016/mar/24/tay-microsofts-ai-chatbot-gets-a-crash-course-in-racism-from-twitter

Ireton, C., Posetti, J., & UNESCO. (2018). *Journalism, "fake news" & disinformation: handbook for journalism education and training*. UNESCO UNESDOC Digital Library. http://unesdoc.unesco.org/images/0026/002655/265552E.pdf

IFCN Code of Principles. (2022) *About.* International Fact-Checking Network (IFCN). https://ifcncodeofprinciples.poynter.org/know-more

IFCN@Pointer (2021). *State of the Fact-Checkers 2021*. https://www.poynter.org/wp-content/uploads/2022/01/IFCN_2022_StateFactChecking2021_v06.pdf

Illes, Matthew (2020). *Ending the Civil journey*. Retrieved September 9, 2021, from https://civil.co/

Inc, G. (2021, July 14). *Americans' Confidence in Major U.S. Institutions Dips*. Gallup.Com. https://news.gallup.com/poll/352316/americans-confidence-major-institutions-dips.aspx

Ipsos. (2008, May 29). *Seven in Ten (69%) Canadians Have `Trust and Confidence' in Traditional News Media*. Ipsos. https://www.ipsos.com/en-ca/news-polls/seven-ten-69-canadians-have-trust-and-confidence-traditional-news-media

Ivancsics, B. (2019, January 25). Blockchain in journalism. *Columbia Journalism Review*. https://www.cjr.org/tow_center_reports/blockchain-in-journalism.php

Jackson, G. (2020, January 27). The Geocities Archive is bringing the early internet to life. *VICE*. https://www.vice.com/en/article/n7jzgm/the-geocities-archive-is-bringing-the-early-internet-to-life

Jarry, J. (2021, October 30). The Ivermectin train cannot stop. *McGill Office for Science and Society*. Retrieved November 6, 2021, from https://www.mcgill.ca/oss/article/covid-19/ivermectin-train-cannot-stop

Johnson, B. & Dade, C. (2019). Local broadcast journalism, user-generated content and boundary work. *Media Practice and Education*, *20*(3), 260-276. https://doi.org/10.1080/25741136.2018.1464742

Jolly, B. (2021, April 8). Disappearing Headlines: Print newspaper advertising works. *News Media Canada*. https://nmc-mic.ca/2021/04/07/disappearing-headlines-print-newspaper-advertising-works/

Journals No. 22 - February 2, 2022 (44-1) - House of Commons of Canada. (n.d.). Retrieved February 7, 2022, from https://www.ourcommons.ca/DocumentViewer/en/44-1/house/sitting-22/journals

Journalists, C. A. of. (n.d.). *CAJ releases national Canadian Newsroom Diversity Survey results*. Retrieved September 10, 2022, from https://www.newswire.ca/news-releases/caj-releases-national-canadian-newsroom-diversity-survey-results-865613417.html

J-source [@jsource]. (2021, February 23). *HuffPost Canada staff file for union certification*. [Image attached] [Tweet] Twitter. Retrieved September 4, 2021, from https://twitter.com/jsource/status/1364235842072510466

Justin Bieber to Lead Peace Summit with China in Space. (n.d.). Retrieved November 1, 2021, from https://www.worldgreynews.com/177948/justin-bieber-to-lead-peace-summit-with-china-in-space

Kalsnes, B. (2018, September 26). Fake News. *Oxford Research Encyclopedia of Communication*. https://doi.org/10.1093/acrefore/9780190228613.013.809

Kelly, M., & Samuels, E. (2019, November 18). How Russia weaponized social media, got caught and escaped consequences. *Washington Post*. https://www.washingtonpost.com/politics/2019/11/18/how-russia-weaponized-social-media-got-caught-escaped-consequences/

Kertscher, T. (2021, August 10). No evidence yet concluding that ivermectin is an effective COVID-19 treatment. *PolitiFact*. https://www.politifact.com/factchecks/2021/aug/10/viral-image/no-evidence-yet-concluding-ivermectin-effective-co/

Kessler, G. (n.d.) *Fact Checker*. Washington Post. https://www.washingtonpost.com/news/fact-checker/

Khandelwal, R. (2019, December 28). Word Embeddings for NLP. *Medium*. https://towardsdatascience.com/word-embeddings-for-nlp-5b72991e01d4

Kille, L. W. (2015, October 9). The growing problem of Internet "link rot" and best practices for media and online publishers. *The Journalist's Resource*. https://journalistsresource.org/media/website-linking-best-practices-media-online-publishers/

Klausen, J. (2015). Tweeting the Jihad : Social Media Networks of Western Foreign Fighters in Syria and Iraq. *Studies in Conflict & Terrorism*, 38(1), 1–22. https://doi.org/10.1080/1057610X.2014.974948

Kriskoart. (2015, October 2). *LEARN PREMIERE PRO IN 20 MINUTES !: Tutorial For Beginners* [Video]. YouTube. Retrieved October 5, 2021, from https://www.youtube.com/watch?v=Hls3Tp7JS8E

Lehrman, S. (2017, May 25). What people really want from news organizations. *The Atlantic*. https://www.theatlantic.com/technology/archive/2017/05/what-people-really-want-from-news-organizations/526902/

Les décodeurs (n.d.) *Actualités, vidéos et infos en direct*. Le Monde.fr. https://www.lemonde.fr/les-decodeurs/

Lewis, S. C. (2019). Lack of trust in the news media, institutional weakness, and relational journalism as a potential way forward. *Journalism*, *20*(1), 44–47. https://doi.org/10.1177/1464884918808134

Lippmann, W. (1919, November 1). The Basic Problem of Democracy. *The Atlantic*. https://www.theatlantic.com/magazine/archive/1919/11/the-basic-problem-of-democracy/569095/

Local News Research Project (2022, August 12). *COVID-19 Media Impact Map for Canada*

Fact Sheet Summary of data for March 11, 2020 to August 12, 2022. Retrieved September 12, 2022, from https://s35582.pcdn.co/wp-content/uploads/2022/08/COVID-19-Media-Impact-Map-for-Canada-Fact-Sheet-Aug-12-2022.pdf

Local News Research Project (2021, March 11). *COVID-19 Media Impact Map for Canada Fact Sheet Summary of data for March 11, 2020 to March 11, 2021*. Retrieved September 12, 2022, from https://s35582.pcdn.co/wp-content/uploads/2021/03/COVID-19-Media-Impact-Map-for-Canada-Fact-Sheet-Mar-11-2021.pdf

Follett-Campbell, E. (n.d.) *checkmarker*. https://checkmarker.org/

Local News Research Project (2021, March 11). *COVID-19 Media Impact Map for Canada data March 11, 2021.* [Data set]. Retrieved September 12, 2022, from https://s35582.pcdn.co/wp-content/uploads/2021/02/COVID-19-Media-Impact-Map-for-Canada-Fact-Sheet-Feb-17-2021.pdf

Local News Research Project (2022). *Local News Research Project.* https://localnewsresearchproject.ca/

Loeppky, J. (2021, July 23). How HuffPost Canada's digital impact and untimely demise changed Canadian news media. *Poynter*. https://www.poynter.org/business-work/2021/how-huffpost-canadas-digital-impact-and-untimely-demise-changed-canadian-news-media/

Lofaro, J. (2021, November 5). Vaccinated people in hospital a sign of Quebec's 'community failure,' not vaccine failure: expert. *CTV News*. https://montreal.ctvnews.ca/vaccinated-people-in-hospital-a-sign-of-quebec-s-community-failure-not-vaccine-failure-expert-1.5653943

Lorenz, T. (2021, December 9). Birds Aren't Real, or Are They? Inside a Gen Z Conspiracy Theory. *The New York Times.* https://www.nytimes.com/2021/12/09/technology/birds-arent-real-gen-z-misinformation.html

Lucero, J.M. and M. Nahorniak. (2021) "Workshop: Going beyond advanced search: Google tools for journalists." 22nd International Symposium on Online Journalism.

Lunar animals and other objects Discovered by Sir John Herschel in his observatory at the Cape of Good Hope and copied from sketches in the Edinburgh Journal of Science. (n.d.). [Image]. Library of Congress, Washington, D.C. 20540 USA. Retrieved October 27, 2021, from https://www.loc.gov/resource/pga.02667/

Lutostanski, E. (2020, October 6). How Torstar launched 10 hyperlocal news brands in less than a year. (2020, October 6). *Local Media Association*. https://www.localmedia.org/how-torstar-launched-10-hyperlocal-news-brands-in-less-than-a-year/

Macaluso, N. (2021, November 4). Japan Continues to Use Vaccines, Not Ivermectin, to Fight COVID-19. *FactCheck.Org*. https://www.factcheck.org/2021/11/scicheck-japan-continues-to-use-vaccines-not-ivermectin-to-fight-covid-19/

Mantas, H. (2020, June 22). With the help of platforms, grants and donations, more fact-checking organizations are now for-profit. *Poynter*.7h7ttps://www.poynter.org/fact-

checking/2020/with-the-help-of-platforms-grants-and-donations-more-fact-checking-organizations-are-now-for-profit/

Martin, D. A., Shapiro, J. N., & Nedashkovskaya, M. (2019). Recent Trends in Online Foreign Influence Efforts. *Journal of Information Warfare*, *18*(3), 15–48. https://www.jstor.org/stable/26894680

Martínez, A.G. (2019, February 10). Journalism Isn't Dying. It's Returning to Its Roots. *WIRED*. https://www.wired.com/story/journalism-isnt-dying-its-returning-its-roots/

Marwick, A. & Lewis, R. (2017, May 15). *Media manipulation and disinformation online*. Data & Society. https://datasociety.net/wp-content/uploads/2017/05/DataAndSociety_MediaManipulationAndDisinformationOnline-1.pdf

Matzutt, R., Hiller, J., Henze, M., Ziegeldorf, J. H., Müllmann, D., Hohlfeld, O., & Wehrle, K. (2018). A Quantitative Analysis of the Impact of Arbitrary Blockchain Content on Bitcoin. In S. Meiklejohn & K. Sako (Eds.), *Financial Cryptography and Data Security* (Vol. 10957, pp. 420–438). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-662-58387-6_23

Max Bell School of Public Policy. (n.d.) *Digital Democracy Project.* Retrieved January 11, 2021, from https://www.mcgill.ca/maxbellschool/research/digital-democracy-project

McCann, C. (2021, January 23). As a matter of fact: Fact-checker extraordinaire Daniel Dale reflects on the Trump era. *CBC*. https://www.cbc.ca/news/canada/newfoundland-labrador/daniel-dale-trump-era-1.5884246

McCullagh, D. (2019). The End of the Free Internet Is Near. *Reason*. https://reason.com/2019/07/12/the-end-of-the-free-internet-is-near/

Memmott, M. (2013, October 30). 75 Years Ago, "War Of The Worlds" Started A Panic. Or Did It? NPR. https://www.npr.org/sections/thetwo-way/2013/10/30/241797346/75-years-ago-war-of-the-worlds-started-a-panic-or-did-it

Meta. (2022) *Meta's third-party fact-checking program*. Meta for Media. Retrieved (September 14, 2022), from https://www.facebook.com/formedia/mjp/programs/third-party-fact-checking

Meta. (n.d.) *Hate Speech.* Transparency Center. Retrieved September 22, 2021, from https://transparency.fb.com/policies/community-standards/hate-speech/

Meyer, K. (2021, January 5). Climate denial mixing with other disinformation, analysis shows. *Canada's National Observer*. https://www.nationalobserver.com/2021/01/05/news/climate-denial-other-disinformation-analysis

Mitchell, A., Oliphant, J. B., & Shearer, E. (2020, April 29). About Seven-in-Ten U.S. Adults Say They Need to Take Breaks From COVID-19 News. *Pew Research Center's Journalism*

Project. https://www.pewresearch.org/journalism/2020/04/29/about-seven-in-ten-u-s-adults-say-they-need-to-take-breaks-from-covid-19-news/

Moravec, P., Minas, R., & Dennis, A. (2018). Fake news on social media: people believe what they want to believe when it makes no sense at all. *SSRN Electronic Journal*. 10.2139/ssrn.3269541.

Muñez, E.L., F. Haffajee, G. Pérez de Acha, J. Posetti, E. Stapley. (2021). "Online violence against women journalists: How to combat this global scourge?" 22nd International Symposium on Online Journalism.

Museum of Hoaxes. (n.d.) *The Great Moon Hoax*. Retrieved August 27, 2021, from http://hoaxes.org/archive/permalink/the_great_moon_hoax

Nakamoto, S. (n.d.). Bitcoin: A Peer-to-Peer Electronic Cash System. https://bitcoin.org/bitcoin.pdf

Narayanan, A., & Werbach, K. (2018, March 29). Why Porn on the Blockchain Won't Doom Bitcoin. *WIRED*. https://www.wired.com/story/why-porn-on-the-blockchain-wont-doom-bitcoin/

Newman, N. with Fletcher, R., Robertson, C.T., Eddy, K., and Nielsen, R.K. (2022). *Reuters Institute Digital News Report 2022*. Reuters Institute for the Study of Journalism. https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2022-06/Digital_News-Report_2022.pdf

Newman, N., Fletcher, R., Schulz, A., Andi, S., Robertson, C.T., & Nielsen, R.K. (2021). *Reuters Institute Digital News Report 2021*. Reuters Institute for the Study of Journalism. https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2021-06/Digital_News_Report_2021_FINAL.pdf

Newman, N. (2020). *Journalism, Media, and Technology Trends and Predictions 2020*. Reuters Institute for the Study of Journalism. https://www.digitalnewsreport.org/publications/2020/journalism-media-and-technology-trends-and-predictions-2020/

NewsDiffs. (2012). *Tracking Online News Articles Over Time*. Retrieved July 14, 2020, from http://newsdiffs.org/

News Media Canada. (2021, February 3). *An urgent letter to all Members of Parliament*. https://nmc-mic.ca/2021/02/03/an-urgent-letter-to-all-members-of-parliament/

News Media Canada. (2021, February 4). *Across Canada, headlines disappear*. https://nmc-mic.ca/2021/02/04/across-canada-headlines-disappear/

News Media Canada. (2021, March 30). *Google and Facebook control the internet advertising market in Canada*. https://nmc-mic.ca/2021/03/30/google-and-facebook-control-the-internet-advertising-market-in-canada/

Nyhan, B. & Reifler, J. When Corrections Fail: The Persistence of Political Misperceptions. *Political Behavior*, *32*, 303–330 (2010). https://doi.org/10.1007/s11109-010-9112-2

O'Neill, P.H. (2022, February 21). The US is unmasking Russian hackers faster than ever. *MIT Technology Review*. https://www.technologyreview.com/2022/02/21/1046087/russian-hackers-ukraine/

Ong, J.C., & Cabañes, J.V. (2019). When Disinformation Studies Meets Production Studies: Social Identities and Moral Justifications in the Political Trolling Industry. *International Journal of Communication*, (13)20.

Pamment, J. et. al (2018). *The role of communicators in countering the malicious use of social media.* The Central and Eastern European Online Library (CEEOL). Retrieved July 16, 2020, from https://www.ceeol.com/search/book-detail?id=775090

Panetta, F., & Burgund, H. (2020). *In Event of Moon Disaster - Home*. In Event of Moon Disaster. https://moondisaster.org/

Pearl, M. (2017, November 11). No, the Sutherland Springs shooter wasn't Antifa. *VICE*. https://www.vice.com/en/article/pa3vq8/all-the-fake-news-spread-about-the-sutherland-springs-shooter

Pennycook, G. & Rand, D.G. (2019). Fighting misinformation on social media using crowdsourced judgments of news source quality. *Proceedings of the National Academy of Sciences of the United States of America*, *116*(7), 2521–2526. https://doi.org/10.1073/pnas.1806781116

Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., & Rand, D. G. (2020). Fighting COVID-19 Misinformation on Social Media: Experimental Evidence for a Scalable Accuracy-Nudge Intervention. *Psychological Science*, *31*(7), 770–780. https://doi.org/10.1177/0956797620939054

Peterson, J., Krug, J., Zoltu, M., Williams, A.K., Alexander, S. (2020, December 2). Augur: a decentralized oracle and prediction market platform (v2.0). Forecast Foundation. https://arxiv.org/abs/1501.01042

Pew Research Centre. (n.d.) *Writing Survey Questions*. https://www.pewresearch.org/our-methods/u-s-surveys/writing-survey-questions/

PolitiFact. (n.d.). *PolitiFact*. Retrieved September 11, 2022, from https://www.politifact.com/

Powers, B. (2020, June 25). How Decentralized Fact-Checking Might Work. *CoinDesk*. https://www.coindesk.com/jack-dorsey-has-floated-decentralized-fact-checking-at-twitter-heres-what-that-could-look-like

Price, N. (2022, March 9). The Kremlin's Allegations of Chemical and Biological Weapons Laboratories in Ukraine. *United States Department of State*. Retrieved March 14, 2022 from https://www.state.gov/the-kremlins-allegations-of-chemical-and-biological-weapons-laboratories-in-ukraine/

PremiumBeat by Shutterstock. (2020, June 11). *Remove Unwanted Noise in Your Audio Using Premiere Pro* [Video]. YouTube. https://www.youtube.com/watch?v=Jw7unvK0KY4

Pröllochs, N. (2021). Community-Based Fact-Checking on Twitter's Birdwatch Platform. ArXiv:2104.07175 [Cs]. http://arxiv.org/abs/2104.07175

Quandt, T. (2018). Dark Participation. *Media and Communication*, 6(4), 36-48. https://doi.org/10.17645/mac.v6i4.1519

Radio-Canada.ca (n.d.). *Décrypteurs*. ICI Radio-Canada.ca. Radio-Canada. Retrieved September 9, 2022 from https://ici.radio-canada.ca/decrypteurs

Richter, A. (2018). Fake news and freedom of the media. *Journal of International Media & Entertainment Law*, *8*(2), 1-33. https://www.swlaw.edu/sites/default/files/2019-03/Fake%20News%20and%20Freedom%20of%20the%20Media%20-%20Richter.pdf

Rieger, S. (2021, September 1). Amazon Canada adds health disclaimer to searches for ivermectin. *CBC News*. https://www.cbc.ca/news/canada/calgary/amazon-ivermectin-disclaimer-1.6161875

Roberts, J. J. (2019, May 26). Facebook Could Fix the News Industry With Micropayments—Unless Kik Does It First. *Fortune*. https://fortune.com/2019/05/26/kik-facebook-news-micropayments/

Roberts, P. W. (2004). *A war against truth: an intimate account of the invasion of Iraq*. Raincoast Books.

Roozenbeek, J., van der Linden, S., & Nygren, T. (2020). Prebunking interventions based on inoculation theory can reduce susceptibility to misinformation across cultures. *The Harvard Kennedy School Misinformation Review*, *1*(2). https://misinforeview.hks.harvard.edu/article/global-vaccination-badnews/

Rosenwald, M. (2017, Fall). Making media literacy great again. *Columbia Journalism Review*. https://www.cjr.org/special_report/media-literacy-trump-fake-news.php

Rowe, D.J. (2020, June 6). Le Voir magazine ceases operations after over three decades covering the arts. *CTV News*. https://montreal.ctvnews.ca/le-voir-magazine-ceases-operations-after-over-three-decades-covering-the-arts-1.4972480?cache=vlsazdwnr%3FclipId%3D89531

Sasha Costanza-Chock, Maya Wagoner, Berhan Taye, Caroline Rivas, Chris Schweidler, Georgia Bullen, & the T4SJ Project, 2018. #MoreThanCode: Practitioners reimagine the landscape of technology for justice and equity. Research Action Design & Open Technology Institute. Available online at https://morethancode.cc.

Saltz, E. (2020, January 22). What if every news photo on social media showed contextual information? *Medium*. https://open.nytimes.com/what-if-every-news-photo-on-social-media-showed-contextual-information-8936cf4e8c45

Saltz, E. (2020, January 27). How do people decide whether to trust a photo on social media? *Medium*. https://open.nytimes.com/how-do-people-decide-whether-to-trust-a-photo-on-social-media-e0016b6080ae

Savage, M. (2020, May 6). Coronavirus: How much news is too much? *BBC*. https://www.bbc.com/worklife/article/20200505-coronavirus-how-much-news-is-too-much

Schema Markup Validator. (n.d.). Retrieved November 14, 2021, from https://validator.schema.org/

Schema Markup Testing Tool | Google Search Central. (n.d.). Google Developers. Retrieved November 14, 2021, from https://developers.google.com/search/docs/advanced/structured-data

Schneider, N. (2019). Decentralization: an incomplete ambition. *Journal of Cultural Economy*, *12*(4), 265–285. https://doi.org/10.1080/17530350.2019.1589553

Scientific American. (2020, July 20). *To Make a Deepfake* [Video]. YouTube. https://www.youtube.com/watch?v=7nD3zrMN47E

Scocca, T. (2016, August 22). Gawker Was Murdered by Gaslight. *Gawker*. Retrieved July 14, 2020, from http://gawker.com/gawker-was-murdered-by-gaslight-1785456581

Segal, E. (n.d.). *What Business Leaders Need To Know About NATO's New Cyber Initiative. Forbes*. Retrieved September 10, 2022, from https://www.forbes.com/sites/edwardsegal/2022/07/01/what-business-leaders-need-to-know-about-natos-new-cyber-initiative/

Semple, J. (2019, September 13). Canadian academics, scientists fight back against online election disinformation. *Global News*. https://globalnews.ca/news/5901707/canadian-academics-scientists-election-disinformation/

Shane, T., Saltz, E., & Leibowicz, C. (2021, May 12). From deepfakes to TikTok filters: How do you label AI content? *First Draft*. https://firstdraftnews.org/long-form-article/from-deepfakes-to-tiktok-filters-how-do-you-label-ai-content/

Shearer, E., & Matsa, K. E. (2018, September 10). News Use Across Social Media Platforms 2018. *Pew Research Center's Journalism Project*. https://www.journalism.org/2018/09/10/news-use-across-social-media-platforms-2018/

Silverman, C. (2016, November 16). This analysis shows how viral fake election news stories outperformed real news on Facebook. *BuzzFeed*.

https://www.buzzfeednews.com/article/craigsilverman/viral-fake-election-news-outperformed-real-news-on-facebook

Skowronski, D. M. et. al. (2021). Two-dose SARS-CoV-2 vaccine effectiveness with mixed schedules and extended dosing intervals: test-negative design studies from British Columbia and Quebec, Canada (p. 2021.10.26.21265397). *medRxiv*. https://doi.org/10.1101/2021.10.26.21265397https://www.medrxiv.org/content/10.1101/2021.10.26.21265397v1

Society of Professional Journalists (SPJ). (2014, September 6). *SPJ Code of Ethics*. Retrieved January 27, 2021, from https://www.spj.org/ethicscode.asp

Solon, O. (2017, May 25). Underpaid and overburdened: the life of a Facebook moderator. *The Guardian*. https://www.theguardian.com/news/2017/may/25/facebook-moderator-underpaid-overburdened-extreme-content

SMA Marketing. (n.d.). Can I Add Multiple Schema Types to One Page? (Spoiler Alert) YEP! Here's how! https://www.youtube.com/watch?v=xtkChJGlI0M

Smith, S. H. (2004). *The fact checker's bible: a guide to getting it right*. Anchor Books.

Snopes (2022). *The definitive fact-checking site and reference source for urban legends, folklore, myths, rumors, and misinformation*. Snopes.com. https://www.snopes.com/

Society of Professional Journalists (2014, September 6). SPJ Code of Ethics. SPJ. https://www.spj.org/ethicscode.asp

Spithoven, A. (2019). Theory and Reality of Cryptocurrency Governance. *Journal of Economic Issues*, *53*(2), 385–393. https://doi.org/10.1080/00213624.2019.1594518

Stanford University (n.d.). *Internet Observatory*. Internet Observatory Cyber Policy Center. Retrieved January 27, 2021, from https://cyber.fsi.stanford.edu/io/io

Stecula, D.A., Kuru, O., Jamieson, K.H. (2020, January 14). How trust in experts and media use affect acceptance of common anti-vaccination claims. *Harvard Kennedy School Misinformation Review*. https://misinforeview.hks.harvard.edu/article/users-of-social-media-more-likely-to-be-misinformed-about-vaccines/

StopFake. (2022). *StopFake*. https://www.stopfake.org/en/main/

StoryMap JS. (n.d.). Retrieved May 1, 2021, from https://storymap.knightlab.com/select/

Strong-Boag, V. (2018, March 29). Fake News Canada 1922: Designed to Diminish and Deceive. *Active History*. http://activehistory.ca/2018/03/fake-news-canada-1922-designed-to-diminish-and-deceive/

Subramanian, S. (2017, February 15). The Macedonian Teens Who Mastered Fake News. *Wired*. https://www.wired.com/2017/02/veles-macedonia-fake-news/

Tattrie, J. (2019, October 23). Media bias in Canada. *The Canadian Encyclopedia*. https://www.thecanadianencyclopedia.ca/en/article/media-bias-in-canada

TechCrunch. (2017, September 18). *Decentralizing Everything with Ethereum's Vitalik Buterin: Disrupt SF 2017* [Video]. YouTube https://www.youtube.com/watch?v=WSN5BaCzsbo&feature=youtu.be

Tiwari, U., & Ben-Avie, J. (n.d.). Mozilla's analysis: Brazil's fake news law harms privacy, security, and free expression. Open Policy & Advocacy. Retrieved February 15, 2022, from https://blog.mozilla.org/netpolicy/2020/06/29/brazils-fake-news-law-harms-privacy-security-and-free-expression

Tobias, C. (2018, November 14). Fact checking 101. *Magazines Canada*. https://magazinescanada.ca/hotsheet-fact-checking-101-by-conan-tobias/

The Associated Press. (2022, February 11). NOT REAL NEWS: A look at what didn't happen this week. *AP News*. https://apnews.com/article/coronavirus-pandemic-technology-business-health-ottawa-9697f25eb1c9da59eba837cfb4ad5564

The Confessions of a She-Politician. (1922, June 1) *Maclean's: The Complete Archive*. Retrieved September 3, 2021, from http://archive.macleans.ca/article/1922/06/01/the-confessions-of-a-she-politician

The Geocities Gallery. (n.d.). Retrieved November 1, 2021, from https://geocities.restorativland.org/

The Markup. (2020, October 16). *The Citizen Browser Project—Auditing the Algorithms of Disinformation*. https://themarkup.org/citizen-browser

The News Provenance Project. (2020). *The News Provenance Project*. Retrieved December 17, 2021, from https://www.newsprovenanceproject.com

The Trust Project. (2022) *About*. The Trust Project. https://thetrustproject.org/about/

The Trust Project. (2022). *Trust Indicators*. The Trust Project. https://thetrustproject.org/trust-indicators/

The US is unmasking Russian hackers faster than ever. (n.d.). MIT Technology Review. Retrieved February 22, 2022, from https://www.technologyreview.com/2022/02/21/1046087/russian-hackers-ukraine/

Tobias, C. (2018, November 14). Fact Checking 101 by Conan Tobias. *Magazines Canada*. https://magazinescanada.ca/hotsheet-fact-checking-101-by-conan-tobias/

Tow Center, Columbia Journalism School. (2018, October 19). *Blockchain in Journalism: Promise and Practice* [Video]. YouTube. https://www.youtube.com/watch?v=Y9MN8xwmWBo&feature=emb_logo

Twitter. (2022). Note ranking. *Birdwatch Guide*. https://twitter.github.io/birdwatch/ranking-notes/

Uberti, D (2016, December 15). The real history of fake news. *Columbia Journalism Review*. Retrieved January 28, 2021, from https://www.cjr.org/special_report/fake_news_history.php/

U.S. Food & Drug Administration. (n.d.) Why You Should Not Use Ivermectin to Treat or Prevent COVID-19. *FDA*. https://www.fda.gov/consumers/consumer-updates/why-you-should-not-use-ivermectin-treat-or-prevent-covid-19

Usher, N. (2020). Re-Thinking Trust in the News. In R. E. Gutsche & K. Hess (Eds.), *Reimagining Journalism and Social Order in a Fragmented Media World*. (p. 92–106). Routledge. https://doi.org/10.4324/9780429347245-7

Valverde, M. (2021, April 23). Fact-checking claim about the use of ivermectin to treat COVID-19. *PolitiFact*. https://www.politifact.com/factchecks/2021/apr/23/instagram-posts/fact-checking-claim-about-use-ivermectin-treat-cov/

Van der Linden, S. (2020, July 28). *Bad News Game*. Cambridge Social Decision-Making Lab, University of Cambridge. https://www.sdmlab.psychol.cam.ac.uk/research/bad-news-game

Vlasits, A. (2017, July 1). By Facebook's Logic, Who Is Protected From Hate Speech? *Wired*. https://www.wired.com/story/facebook-hate-speech-moderation/

Voir. (2020, June 5). *Bye bye*. [Status update]. Facebook. https://www.facebook.com/voir/posts/pfbid02mSNYCTKzxyMzp34Gu2DycKMRHzcxrte791Fm6ZfKwncnX6jm2Ehi74DoKQvcRV3Ll

Walter, N., & Tukachinsky, R. (2020). A Meta-Analytic Examination of the Continued Influence of Misinformation in the Face of Correction: How Powerful Is It, Why Does It Happen, and How to Stop It? *Communication Research*, *47*(2), 155–177. https://doi.org/10.1177/0093650219854600

Werbach, K. (2018). The blockchain and the new architecture of trust. *MIT Press*.

Williams, R. (2021, February 9). TSN 1040 off the air as latest victim of Bell Media cuts. *The Daily Hive*. Retrieved May 1, 2021, from https://dailyhive.com/vancouver/tsn-1040-radio-off-air-bell-media

Winseck, Dwayne. (2020) *Media and Internet Concentration in Canada, 1984– 2019*. Canadian Media Concentration Research Project, Carleton University. https://doi.org/10.22215/cmcrp/2020.2

Wood, T. & Porter, E. The Elusive Backfire Effect: Mass Attitudes' Steadfast Factual Adherence. *Political Behavavior*, *41*, 135–163 (2019). https://doi.org/10.1007/s11109-018-9443-y

WordProof. (2022). *WordProof Timestamp – More trust, a safer internet*. https://wordproof.com/

World Health Organization (WHO). (2020, February 15). *Munich Security Conference*. https://www.who.int/director-general/speeches/detail/munich-security-conference

Zadrozny, B. & Collins, B. (2018, August 14). How three conspiracy theorists took 'Q' and sparked Qanon. *NBC News*. https://www.nbcnews.com/tech/tech-news/how-three-conspiracy-theorists-took-q-sparked-qanon-n900531

Zielinski, S. (2015, July 2). The great moon hoax was simply a sign of its time. *Smithsonian Magazine*. https://www.smithsonianmag.com/smithsonian-institution/great-moon-hoax-was-simply-sign-its-time-180955761/

Zomorodi, M. & Jen Poyant (Hosts). (2018). *The ZigZag Project*. (Season 2). https://zigzagpod.com/episodes?category=Season%20Two

Zuckerman, E. (Fall, 2019). Building a More Honest Internet. *Columbia Journalism Review*. Retrieved September 10, 2022, from https://www.cjr.org/special_report/building-honest-internet-public-interest.php/

Appendix A: checkmarker.org website links (Please note: when this website is taken down, archived content can also be found at: behance.net/emilyfollett)

Appendix A1: checkmarker

https://checkmarker.org/

Appendix A2: Take the Survey, "Gentlemen, Ivermectin-Soaked Tampons Won't Cure COVID" sample fake news article

https://checkmarker.org/take-survey-now/

Appendix A3: Report Button, "Report: Gentlemen, Ivermectin-Soaked Tampons Won't Cure COVID"

https://checkmarker.org/report-gentlemen-ivermectin-soaked-tampons-wont-cure-covid/

Appendix A4: Claim Review, "Claim Review: Gentlemen, Ivermectin-Soaked Tampons Won't Cure COVID"

https://checkmarker.org/2021/11/10/claim-review-gentlemen-ivermectin-soaked-tampons-wont-cure-covid/

Appendix A5: Blockchain and Trust in Journalism

https://checkmarker.org/blockchain-and-trust-in-journalism-2/

Appendix A6: Yes, It's Time to Worry About Trust in News Media

https://checkmarker.org/blockchain-and-trust-in-journalism-2/yes-its-time-to-worry-about-trust-in-news-media/

Appendix A7: The Infodemic and Rise of Online Fact-Checking

https://checkmarker.org/blockchain-and-trust-in-journalism-2/the-infodemic-and-rise-of-online-fact-checking/

Appendix A8: Three Case Studies in Blockchain

https://checkmarker.org/blockchain-and-trust-in-journalism-2/3-case-studies-in-blockchain/

Appendix A9: What is Blockchain?

https://checkmarker.org/blockchain-and-trust-in-journalism-2/what-is-blockchain/

Appendix A10: Media Manipulation 101: How to Capitalize on Friends and Influence People

https://checkmarker.org/blockchain-and-trust-in-journalism-2/media-manipulation-101-how-to-capitalize-on-friends-and-influence-people/

Appendix A11: Slider: Media Manipulation Stratagems (Note: this slider is a separate appendix in print only, on the website it's the same link as A10)

https://checkmarker.org/blockchain-and-trust-in-journalism-2/media-manipulation-101-how-to-capitalize-on-friends-and-influence-people/

Appendix A12: Who Wants to Pay for Journalism?

https://checkmarker.org/blockchain-and-trust-in-journalism-2/who-wants-to-pay-for-journalism/

Appendix A13: Local News Under Threat

https://checkmarker.org/blockchain-and-trust-in-journalism-2/local-news-under-threat/

Appendix A14: Local News Storymap

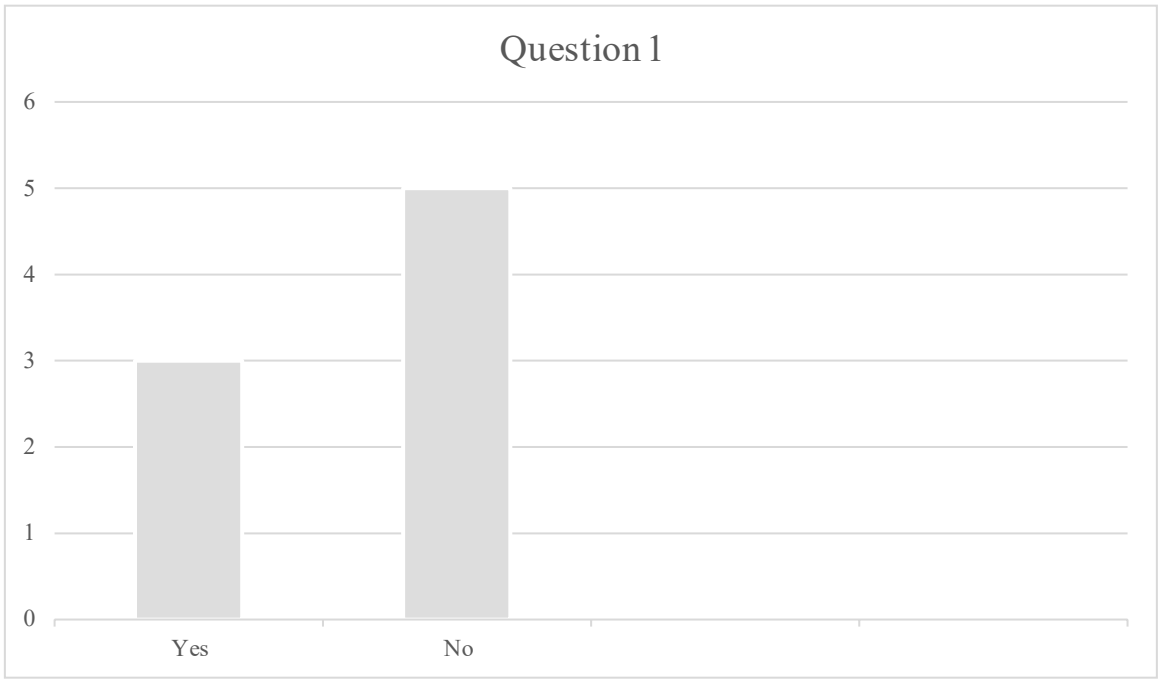
https://uploads.knightlab.com/storymapjs/2370406993b7899e3c3cb1700fb74704/local-news-shifts/index.html

Appendix A15: Interviews with Experts

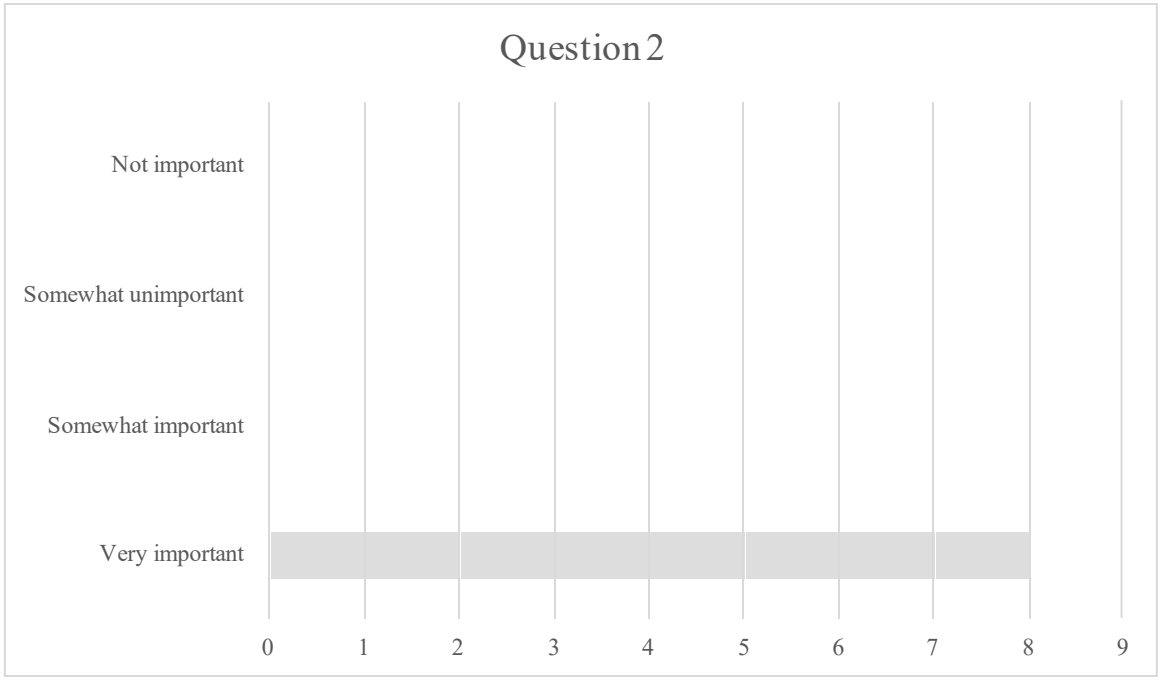
https://checkmarker.org/blockchain-and-trust-in-journalism-2/interviews-with-experts/

Appendix B: Survey Results: Interviewees

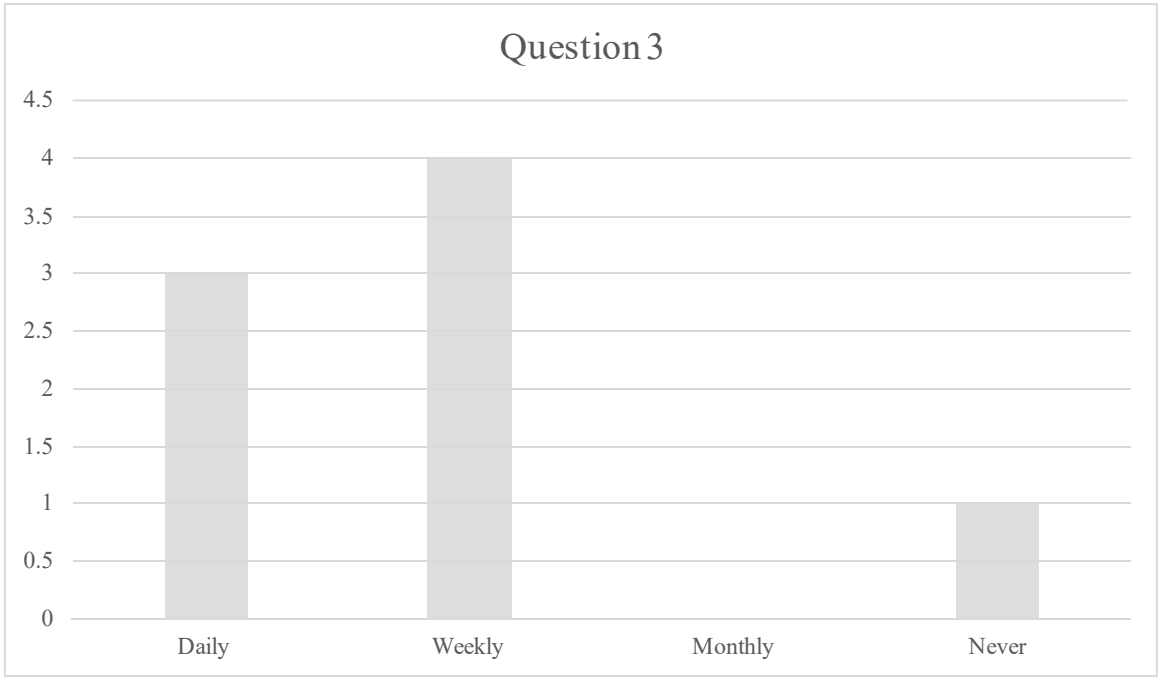
Are you a student, faculty, staff, or alumni of Montreal's Concordia University?



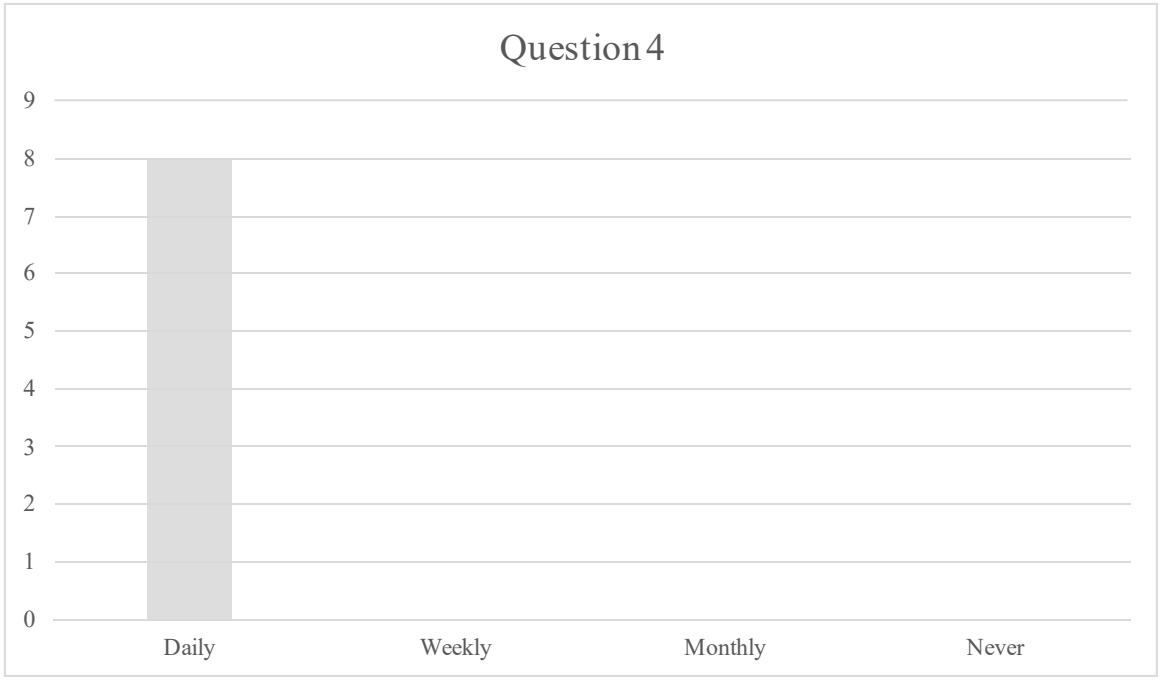
How important is press freedom to a functioning democracy?



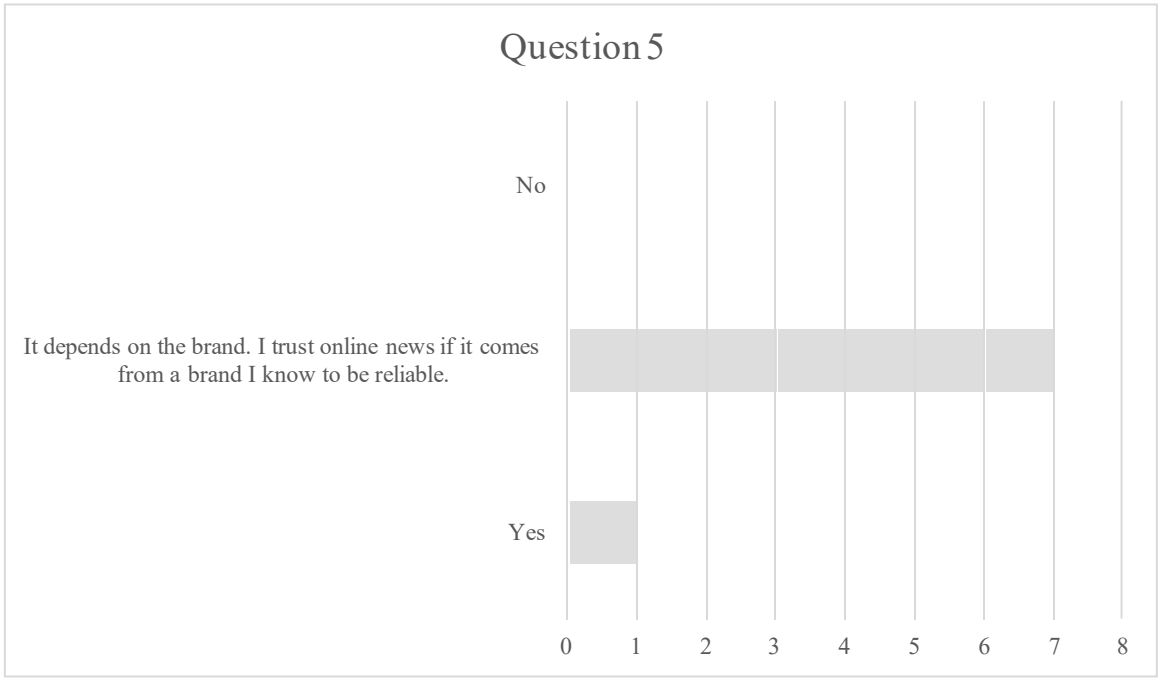
Thinking only of use for news, in the past year, how often did you get your news from traditional delivery mechanisms?



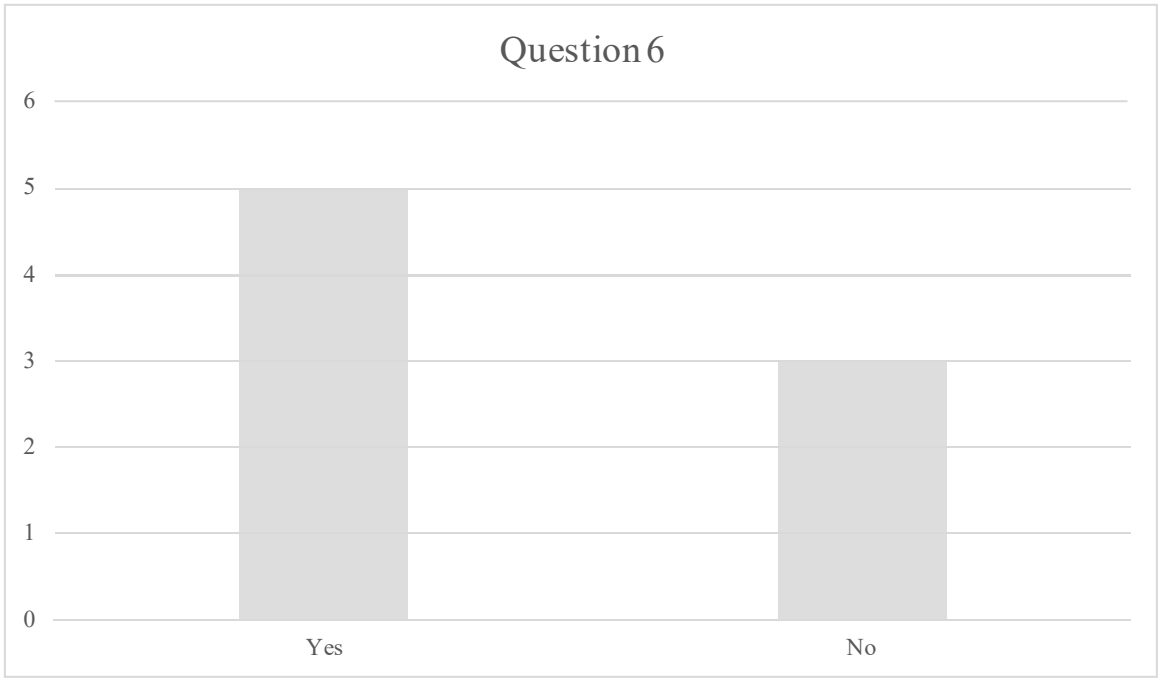
Thinking only of use for news, in the past year, how often did you get your news from online delivery mechanisms?



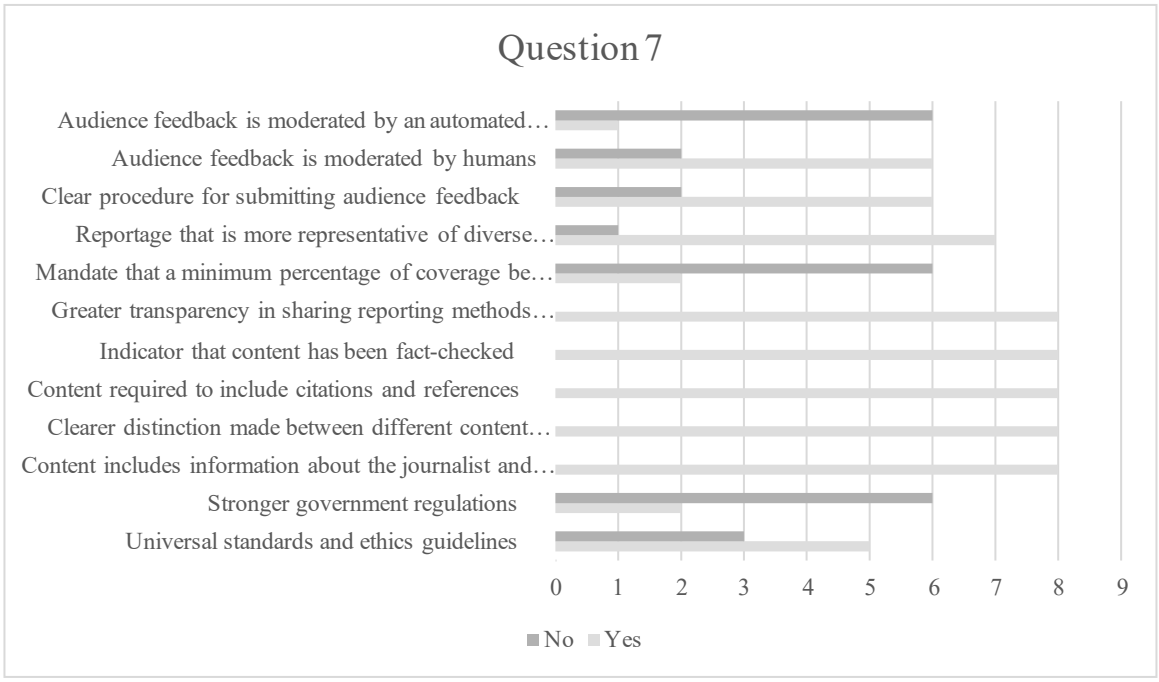
Are online news sources as trustworthy as non-online sources?



Would you be more likely to trust online news that uses this process?



What would improve your trust in online news?



Do you work in media?