Misinformation & Disinformation in Canadian Society

A system analysis & futures study

By Miriam Havelin

Abstract

Misinformation and disinformation online is one of the great problems of our time. The digital era has enabled new and increasingly complex communication systems to flourish. Information flows across vast distances instantly and people are more interconnected than ever before. This also means that information which is inaccurate, misleading or objectively false can also travel at unprecedented rates, and often travels faster and farther than objectively truthful content. This information contaminates the online landscape and impacts people's ability to discern accurate and truthful content. Misinformation and disinformation is often more sensationalized, which often leads to it being engaged with more often on platforms, this can in turn cause it to become favoured by algorithms. These algorithms tend to prioritize popular content to maintain users on platforms longer and exposes them to more advertisements, in order to gain advertising revenue.

This research used interviews, a survey and an extensive literature review to understand the spread of misinformation and disinformation in Canadian society today, and to map this using a systems approach. Following this, strategic foresight tools were used to generate potential future scenarios with the goal of making strategic recommendations for the current context.

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Introduction

We Shape our digital spaces and afterwards our digital spaces shape us...

On October 28, 1943, during a speech in a meeting to the House of Lords, Sir Winston Churchill famously said, "we shape our buildings and afterwards our buildings shape us". This was in reference to the Commons Chamber which had been bombed in 1941 during the Blitz (International Churchill Society, n.d.). The argument was whether to build the Commons Chamber back exactly as it had been, a large rectangle where opposing parties faced each other, or to build it in a new style and shape such as a semi-circle or horseshoe (UK parliament, n.d.).

Churchill was adamant that the vibrant party system, with heated debates on the left and right could only be sustained in the rectangular shaped room. Furthermore, the act of crossing the floor from one side to the other, symbolizing a change in political stance on an issue or a change in party altogether was so visible it required serious consideration serious consideration. Compared to Members of Parliament shuffling around a semi-circle.

I would offer a 21st century rendition of this historic quote as "we shape our digital spaces and afterwards our digital spaces shape us". A digital space, like physical architecture, is a built environment in which humans interact and communicate. They are ideated, designed and developed by humans through complex algorithms. And they are continually maintained and updated by teams of developers, designers and engineers.

Furthermore, once individuals engage in these online spaces, they help shape the culture and norms of these spaces. The interactions on these platforms can also shape the behaviour of others, either explicitly, through rules of engagement and user agreements, or implicitly through collective behaviours and tacit understanding of the platform.

This is distinct from the way, in which people have been able to come together in the past. For thousands of years humans interacted in relatively small groups that solved immediate problems in their lived environments with a focus on survival (Bak-Coleman et al., 2021). With the agricultural revolution and the advent of writing humans were able to live in larger groups forming civilizations. When printing was developed, first in China and later in Europe, humans were able to communicate and have influence across ever increasing distances and a growing number of people. The modern newspaper soon followed, and with it, humans began to communicate news, foreign affairs, and current events to one another across vast distances.

Information technology has only grown since then, and with every new technology: radio, telephone, television, computer, and internet, the connectivity and complexity of human communication systems also increases. This increased connectivity has allowed people access to a world online unimaginable to previous generations. Unprecedented amounts of information, content, and other people are instantly available to anyone with a connectible device. Creating and sharing information online has never been easier, and the nature of many online spaces has allowed people to create and share content with a huge global audience.

In the early days of internet technology, many people hypothesized that the internet would be a utopia of open information highways and civic discourse (Novak, 2017). While these ideas seem

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naïve now, they are part of the deep cultural narratives that helped shape the burgeoning technology industry and they still run deep in the identity of today's technology giants. The narrative of benevolent technology and the assumption that more technology and greater technical advancement is always "good" is not only a part of the technology industry culture today, but also a wider social bias in society.

Many modern technologies, especially related to information dissemination have cascading effects and unintended system-wide outcomes with major implications for individuals and society. One such outcome in the information technology ecosystem is the spread of problematic information in the form of misinformation, disinformation, malinformation and many other variants that, like information itself, have grown to unprecedented levels in recent decades.

What has followed is a crisis of information and epistemics. Information about scientific, political, ideological, and social issues are how people make sense of the world around them, and how decisions are made about interacting in that world. Misinformation and disinformation contaminate healthy information streams, affecting sensemaking capacity, and impacting the ability for people to make accurate decisions about the environments in which they interact (The Consilience Project, 2021; Policy Horizons, 2021).

There is very little debate about the negative effects of problematic information online; the issue has been gaining momentum among researchers and policy makers. Where competing viewpoints do exist, they are around what issues within the sphere are the most important to address in order to truly impact the spread of problematic online information,

and how to formulate solutions to these issues. The complexity and systemic nature of this issue means that individuals, who research specific aspects of misinformation, disinformation, or one of the other labels and interact with distinct stakeholder groups, may place a significant amount of importance on the specific issue under their purview and may miss important system-wide factors.

A lot of the research conducted in this field has focused on the immediate causes or consequences of problematic information online, generally with a narrow lens or theme such as political or ideological disinformation and COVID-19 related misinformation. Some research in this field focuses on analyzing the ways in which problematic information spreads or the algorithms behind it. While this research is crucial and indeed foundational to the understanding of this problem space, research which looks at the whole ecosystem of problematic information from a systems perspective is lacking. As is the analysis of the long-term future possibilities of problematic information and its possible impacts on society.

This work aims to look at problematic information online through the lens of systems thinking and strategic foresight: Systems thinking to outline the complexities of the landscape of problematic information in Canadian society and the linkages between stakeholders within the system; and strategic foresight methods as a structured framework to think about possible futures for problematic information in Canadian society in order to envision possible outcomes of present-day trends and system dynamics. This is done to "learn from the future," to be able to recommend intervention strategies or work toward desirable outcomes. Within this context this research aims at answering the following research questions:

What could the impacts of problematic information online look like in the future in Canada?

How might we build individual and collective resilience to problematic information online?

Terminology

There is a lack of universally accepted definitions for many of the terms used in discussing false or problematic information online. Currently, information is defined by different experts, using different metrics. Shifting cultural context and the colloquializing of terms means that many of the words in this space have multiple and overlapping definitions depending on the setting.

Problematic information can be categorized based on intent, degree of truthfulness, degree of harm, and type of information being looked at. In at least two instances, researchers have classified false information by combining multiple dimensions such as truthfulness and intent, to create a framework (Wardle et al., 2017; Edison et al., 2017).

It is worth noting that while some of these studies use the same qualifiers, they examine different words. In Wardle et al. for example, their framework leads to the categories of misinformation, disinformation and malinformation, which are further divided into fabricated content, manipulated content, impostor content, false context, misleading content, false connection, and satire or parody (Wardle, 2019). In Edson et al, this framework list news satire, news parody, news fabrication, photo

manipulation, advertising and public relations, and propaganda as types of "fake news" (Edson, 2017). Both studies use truthfulness and intent as the yardsticks for which to measure and classify these terms.

Defining and classifying these concepts is a challenge; they are sociocultural constructs and can vary based on the author, medium, and intended audience. As Caroline Jack explains "many of these familiar terms do not have mutually exclusive definitions. Rather, their meanings overlap, and word choice can be a matter of perspective. These factors can make attempts to describe problematic information imprecise, inconsistent, and subjective" (Jack, 2017). Furthermore, different researchers and academics define and classify problematic information in ways they feel make the most sense for the work at hand. This paper will not attempt to exhaustively define all the terms available in the literature. The following selection of terms are the most relevant to the research question and necessary for the understanding of this work.

Problematic Information

Caroline Jack coined the term in Lexicon of Lies and defines it as "information [which] is problematic: it is inaccurate, misleading, inappropriately attributed, or altogether fabricated" (Jack, 2017). It is an encompassing term which can adequately capture the multitude of terms discussed in the literature.

Misinformation

The crux of the definition of misinformation is that false or problematic information is unintentionally incorrect as a result of misrepresentation or misunderstanding (Jack, 2017; Marwick, 2018;

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Sharma et al., 2018). Vraga & Bode offer the definition that misinformation is "information considered incorrect based on the best available evidence from relevant experts at the time" (2020). They note that this definition can be challenging in practice when there is a lack of expert consensus, or the topic being debated is part of an emerging field of study with many unknowns.

Disinformation

Disinformation is information which is intentionally incorrect and meant to deceive, misinform, or mislead the audience (Jack, 2017; Marwick, 2018; Sharma et al., 2018). Intention implies motivation on behalf of the author, which motivation is often classified as being financial, ideological (or political), social, or psychological (Edson et al., 2017; Wardle & Derakhshan, 2017; Verstraete et al. 2017).

Malinformation

Malinformation is a term less frequently used in this field and has been defined as genuine information which is meant for certain contexts being shared with the deliberate intention of causing harm (Wardle & Derakhshan, 2017; Wardle 2019). Or as truthful content which has been "reconfigured" (Baines et al., 2020; Brennen et al., 2020). An example highlighted in a fact sheet published by the Reuters Institute at the University of Oxford, discusses a social media post with an image of a selection of vegan items on an otherwise empty shelf at a grocery store accompanied by the caption "Even with the Corona Virus [sic] panic buying, no one wants to eat Vegan food." The paper goes on to explain that the image was actually taken in Texas in 2017 before hurricane Harvey (Brennen et al., 2020).

Fake-News

The term "fake news" arose to describe websites which presented visual characteristics of   legitimate news sites but were publishing sensationalized stories to generate advertising revenue (Edson et al., 2017; Marwick, 2018). It has since become a "catch all" phrase used to describe all types of misleading or problematic online information. It has also become a term colloquially used by politicians and people to discredit traditional journalism or mainstream news which they disagree with (Edson et al., 2017; Marwick, 2018; Wardle, 2019; Verstraete, 2017). For these reasons the term is particularly hard to define out of context and has become both controversial and overly vague as a descriptor for problematic information.

Satire

Satire is content which is purposely created to deliver news or information in a humorous format which emulates traditional news. It is culturally relevant and uses humor, exaggeration, and irony to critique or ridicule the subject but does not have the intention of being deceitful (Edson et al., 2017; Jack, 2017, Verstraete, 2017).

- Parody – Edson et al. Define parody as a form of satire which contains false information delivered in the form of traditional news (2017). It has many of the same qualities of satire but can also be partially or entirely invented. Authors of parody expect that their audience understands the sociocultural cues to know that the content is false. However, for this reason parody can sometimes be confused for fact by groups or individuals who are not "in on the joke" and mistaken the false content for truth.

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Some definitions of Satire and parody do not make this distinction and use other characteristics to distinguish the two terms. Wardle has also noted that satire and parody have become increasingly weaponized and partisan to vilify people and entrench polarization (Wardle, 2019)

Hoax or Fabrication

A hoax or fabrication is false content which is created with the intention of deceiving the reader into believing it is true. It will mimic traditional media in order to convince audiences that the information presented is fact (Edson et al., 2017; Jack, 2017, Verstraete, 2017).

Propaganda

Propaganda is purposefully biased content which is intended to persuade the audience for a particular perspective (Jack, 2017, Verstraete, 2017). It is often associated with politics and political information. The term is regularly used to negatively characterize persuasive content that the author may not approve of.

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What causes individuals to create disinformation? What causes individuals to share information which they know is false or misleading? Why do people believe disinformation? Are some individuals more likely than others to believe disinformation, misinformation or hoaxes?

These are questions, which researchers in this space have been working to answer for decades; extensive studies have been conducted to answer these questions in order to offer tangible solutions that would have an impact on the proliferation of problematic information online.

This section will provide a brief overview of a few of the "human factors", which are important to the understanding of this ecosystem. This is not meant to be an exhaustive compilation of factors, rather a small selection based on their relevance to this study and/or overall importance in the field.

Human psychology and behaviour

The first set of human factors discussed focuses on human psychology and behaviour: how this impacts individual perceptions and actions offline, and furthermore what it looks like when these factors manifest in digital spaces.

Bias

A bias, broadly, is defined as an attitude that predisposes an individual to favour something (Merriam- Webster, n.d.). Humans have several cognitive biases, many of which are relevant to the study of problematic online information. This section will examine a selection of cognitive biases that apply to this study.

One of these is **confirmation bias**. It is the tendency to process, interpret, and filter information based on preconceived or existing beliefs (Casad, 2019; Kumar et al., 2018). Confirmation bias can mean individuals will unwittingly ignore information that does not support their predisposed viewpoint. An individual is especially likely to exhibit confirmation bias when an issue is highly important to them or self-relevant (Casad, 2019). Confirmation

Bias can lead to biased searches for information, biased reasoning, and biased recall (Casad, 2019; Noor, 2020).

The result of this in relation to misinformation and disinformation online is that individuals are more likely to interact with and share content that aligns with their biases regardless of the perceived truthfulness of said content (Kumar et al., 2018). People are also more likely to perceive objectively neutral and factual information as supportive of their bias by selectively filtering information they disagree with (Kumar et al., 2018; Noor, 2020). When an individual searches for information using biased statements, they are likely to get information that aligns with their point of view. Algorithms are designed to respond to search queries with information that is most relevant to the person making the inquiry; this means that a search conducted with biased or leading statements will likely result in information confirming that statement (Noor, 2020).

In general, algorithms on social platforms and in search engines are designed to provide users with more content that is relevant to them. This often

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means content, which is in line with what the user has expressed affinity for in the past. The effect of this is that increasingly digital online spaces insulate individuals from information and content, which they disagree with or do not engage with. This can further enforce a person's confirmation biases and distort their perception of reality.

The **illusory truth effect** is a type of cognitive bias where individuals are more likely to perceive repeated information as more truthful than new information (Hassan et al., 2021). "It is [...] thought to occur because repetition increases processing fluency, and as fluency and truth are frequently correlated in the real world, people learn to use processing fluency as a marker for truthfulness (Hassan et al., 2021).

This phenomenon is a powerful tool and has been used in advertising, politics, and indoctrination (Hassan, 2021). Research shows that "falsehood diffused significantly farther, faster, deeper, and more broadly than the truth in all categories of information" (Vosoughi, 2018). This rate of diffusion means that disinformation and misinformation could become more visible in online spaces and be seen more frequently than truthful content. Creating the illusion of truth through repetition and causing individuals to be more susceptible to believing problematic information simply from seeing it more often.

The illusory truth effect can be exploited by "bad actors" whose intention is to spread false or misleading content online. Targeted disinformation campaigns will often take the form of multiple fake accounts sharing the same piece of information in close succession to create the illusion of credibility (Allyn, 2020; Chen, 2015).

This repetition can cause a piece of content to become more visible on platforms and create the illusion of truth for users who see it repeatedly.

Naïve Realism
Naïve realism is the implicit assumption that one's perceptions provide "direct knowledge of external reality, unconditioned by one's perceptual apparatus or individual perspective" (APA dictionary, n.d.). Individuals exhibiting naïve realism will tend to assume that their perception of reality is accurate and free from bias and that opposing or differing opinions or viewpoints are a result of other people being irrational, biased, or uninformed (Calvert, 2017; Kumar et al., 2018).

This can mean that when interacting with individuals online, who share different opinions or viewpoints, individuals will discredit one another rather than disagree with each other's differing viewpoints (Calvert, 2017). This can lead to an increasing sense of hostility for individuals, who do not share the same perception of reality.

Tribalism
Tribalism is the feeling and perception of strong "in-group" loyalty (Merriam-Webster, n.d.). It can often lead to negative perceptions of individuals, who do not conform to the dynamics and worldview of the group, in a process called "othering". Where specific traits are associated with the in-group and other traits are associated with the out-group (Staszak, 2009). This is especially problematic when combined with naïve realism which can lead to the idea that members outside of the group are irrational or uniformed about reality.

A theory which correlates with tribalism is **normative influence theory** or **social normative theory**, which is exemplified by individuals

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expressing viewpoints and sharing content that is aligned with their peers to gain favour and social acceptance within their groups (Kumar et al., 2018; Sharma et al., 2019).
Taken together, cognitive biases such as the ones highlighted here are shown to be strong factors affecting the way people share and consume content online (Hassan, 2021; Kumar et al., 2018; Noor, 2020; Sharma et al., 2019). These factors unwittingly affect people's reasoning and objectivity and can change the types of information people seek out and share as well as who they choose to interact with.

When interacting in digital spaces these human factors combine with different aspects of technology resulting in several consequences that disrupt the information ecosystem.

For most of the human experience information only traveled quickly among individuals near one another. Digital technology allows individuals to interact with one another across vast distances. In the past, as the distance between people increased, so too did the time it took to transfer information; this meant that individuals were only able to communicate with and have influence over a small group of people, who were near them.

Today, digital platforms allow individuals to socialize with people from all over the world, and information between people travels instantly. This dynamic means that individuals, who were once forced to interact with the people they encountered in their immediate surroundings, are now able to interact with anyone who is online. The benefit is that members of marginalized groups can form networks and find solace and companionship in online spaces. However, this also means that fringe groups, who may have problematic viewpoints or

ideologies, can also find like-minded networks, in which to grow and deepen their opinions.

These human factors may also have the side effect of increasing polarization and partisanship. As Alice Marwick explains "partisanship is primarily driven not by any particular party position or platform, but by affinity for and similarity to one's fellow party members. [...] partisanship is identity-based: people identify with the party that they feel that most members of their social group belong to and will adjust their party preferences to match their family, friends, or neighborhoods" (2018).

When groups of like-minded individuals interact in online spaces, they form their own digital neighborhoods; where offline neighborhoods necessitate a certain level of physical proximity, digital neighborhoods are comprised of members based solely on identity and conformity to the group. This strengthens the need to conform to the collective viewpoints expressed within the group and to distance oneself from the character traits of non-members, which could manifest in the expression of opinions which are increasingly extreme.

These human factors taken together help to explain the fracture in the current collective epistemology of society (The Consilience project, 2021; Marwick, 2018). Individuals experience distinct information ecosystems depending on their ideologies, as well as their online behaviours and interactions. It follows that the perceptions people have of reality and the world are different depending on their information ecosystem.

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Social phenomena affecting susceptibility to problematic information

There are partisan asymmetries affecting the spread of problematic online information, with users, who are ideologically on the right, being more likely to consume and share information which is objectively false (Benkler et al., 2017; Conorver et al., 2012; Marwick, 2018). It is not necessarily true that people, who lean ideologically right, are simply more inclined to believe misinformation and disinformation. Rather, it is the epistemological reality of right winged media that it contains more misinformation and disinformation (Benkler et al., 2017). Part of this stems from a long-standing distrust of mainstream media that has slowly been replaced by increasingly partisan news sources (Benkler et al., 2017; Benkler, 2019).

Another social phenomenon, which affects an individual's susceptibility to problematic information, is economic and/or social crisis and uncertainty. Some researchers have hypothesized that the decline in trust in institutions faced by many western countries since the 70s correlates with the end of the "Golden Age of Capitalism," and its subsequent "replacement by neoliberalism, and the spread of broad-based economic insecurity that followed" (Benkler, 2019). Declining trust in institutions means that individuals find it difficult to know where to get information from and can turn to non-traditional sources for information.

An effect of this is that interested individuals can exploit times of crisis and public uncertainty to sew discord and division through targeted disinformation. By using content, which is alarmist, sensationalized, or emotionally charged to illicit engagement from users, these individuals can increase their own power and influence and further

leverage that influence over others.

The nature of modern digital information systems means that individuals can obtain information from any number of sources and will do so in ways which align with their predisposed beliefs and knowledge capacities, while also conforming with their social circle. In their 2020 report the Edelman Trust Barometer declared "information bankruptcy" and highlighted the need for media to work towards rebuilding public confidence in information (Edelman, 2021).

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System map

Figure 1: System dynamics map

Lawyers

speech,
& Defam-
Lawyers

Data &
Privacy
Lawyers

Advertisers

ring
sonal info.
pinions

Celebrities'
social media
accounts

Social media
"Influencers"

hate speech

purposefully
inflamatory
speech

Advertising &
Marketing
Companies

Companies
Using Social
Media for ads

izen
urnalists

Large User
Accounts

Trolls

Academics & Researchers

Users

False info.
Producing
Individuals

Bot
Accounts

Educators

Primary

Secondary

Post
Secondary

Financially
Motivated

Ideologically
Motivated

Socially
Motivated

**Advocacy and Social
Interest Groups**

n of

Stakeholder

Content type

Financial compensation

Sub-type

Data

Behaviour

Influence

Regulation
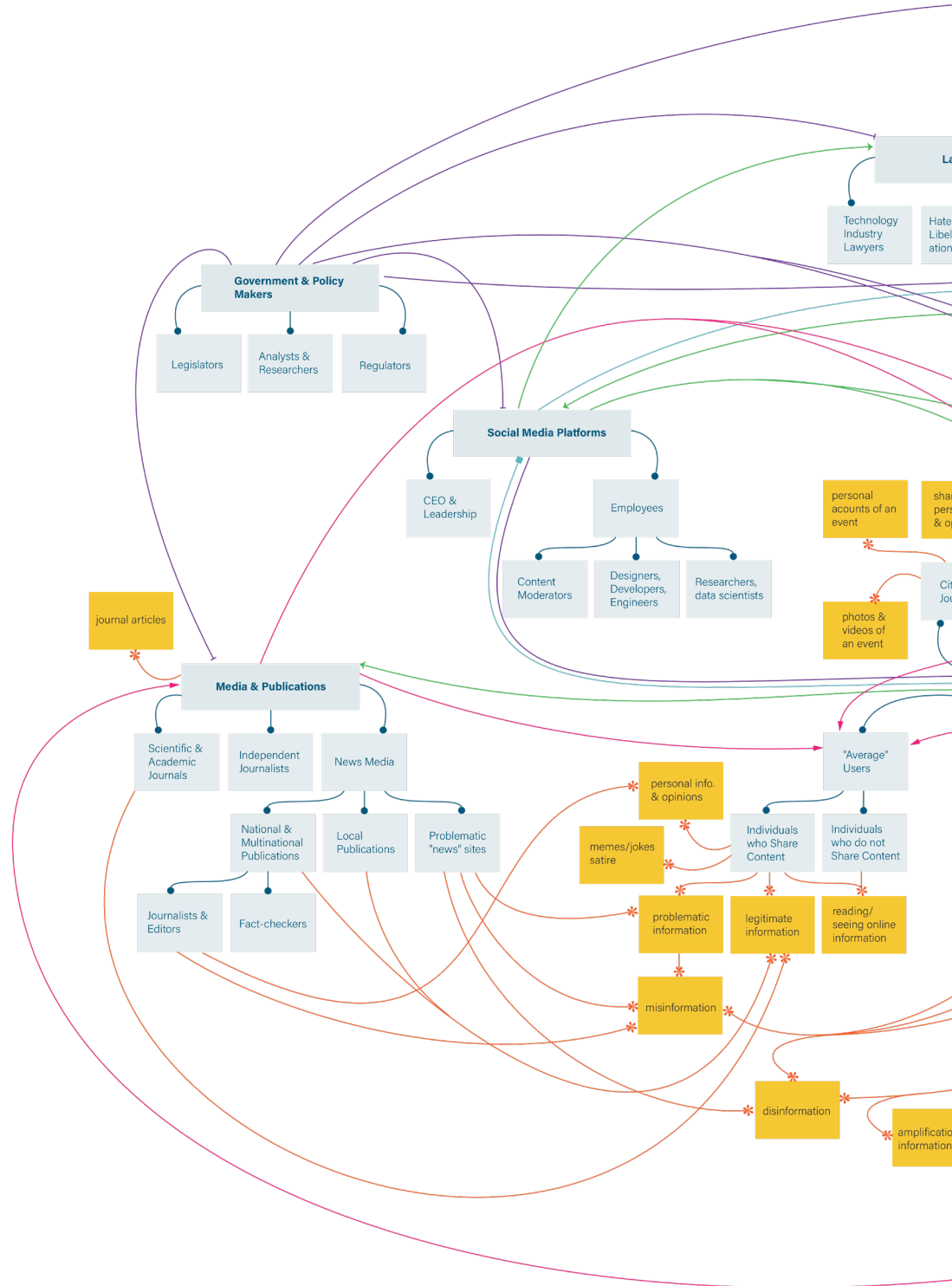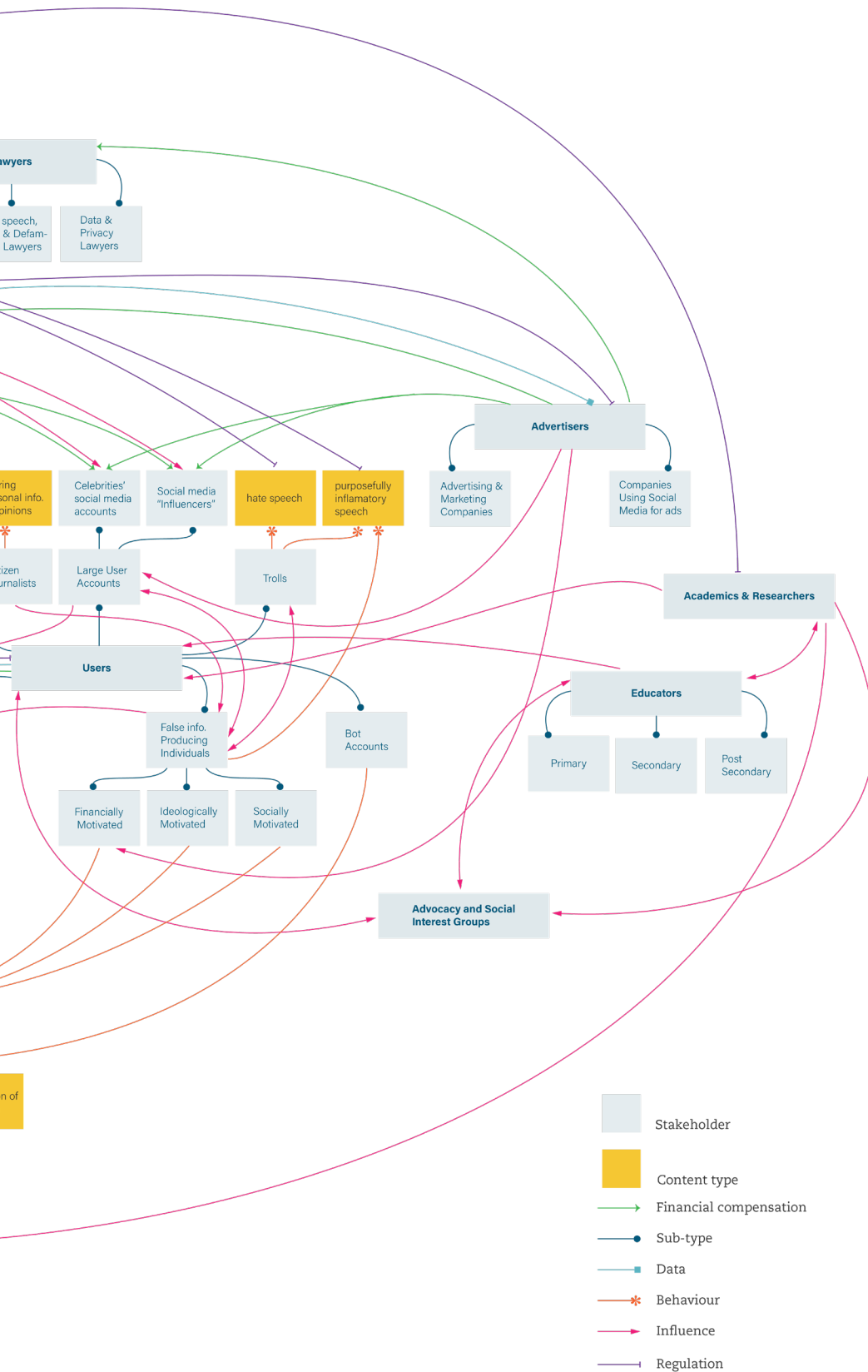
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This system consists of massive, borderless technology companies, as well as the users who frequent these sites, advertisers, traditional media and journalists, government and policy makers, academics and researchers, educators, and social advocacy groups. In interacting with each other the stakeholders create a complex web of issues that contribute to the spread of problematic information online.

This section will explore the various stakeholders which make up the system as well as their value exchanges and potential motivating factors.

Exploring the system

Actors & Stakeholders

Users are individuals who sign up to have accounts on social media platforms. On all social media platforms users interact with each other in some way; and in many cases, users can interact with people they know as well as people, who are strangers to them. Some users inspire numerous strangers to interact with them or their account, these users would be considered influential, and are often referred to as *influencers*.

User accounts are not always made up of just one individual. Companies, brands, and celebrities all have accounts on various social media platforms that are handled by teams of professionals and are intended to represent a brand or professional entity.

Users can be further sub categorized based on the type of user account they have, or the type of content they produce. In this system the users have been divided into six sub categories which are:

- Average users - This is meant to encompass individuals who are not famous or influential who make accounts on platforms. This sub category is further divided into individuals who share content and individuals who do not share content. Said distinction is relevant to the system as a whole.
- Citizen journalists - Specifically individuals who share news, opinions, stories, and/or photos and videos, but are not formally trained journalists.
- Large user accounts - Users who grew their accounts organically on a given platform by producing popular content, such as influencers. This sub category can also include celebrities or athletes who make social media accounts and have many followers due to their fame and popularity outside of the social media platform. Large user accounts can have outsized influence on social media platforms, and can be financially compensated by platforms, brands and advertisers.
- Fake news producing individuals - These are users who purposefully create problematic content. This sub category is further divided into financially motivated, ideologically motivated and socially motivated individuals.
- Trolls - These are users whose intent, generally, is to create heated debates and arguments online. They do so by commenting on posts or content by other users with inflammatory or incendiary remarks and opinions. These accounts often use pseudonyms and avatar photos to allow for personal anonymity.
- Bot accounts - Are accounts made by

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individuals or groups which are run by software. They are created with the capacity to resemble normal accounts by interacting with other user accounts and content. However, they are generally created to amplify content specific to a certain goal (Van der Kleut, 2020). These accounts can also be connected in large networks to amplify specific posts on a platform.

It is important to note that these user definitions are not mutually exclusive, in some cases multiple sub categories could apply to a given account or individual on a platform.
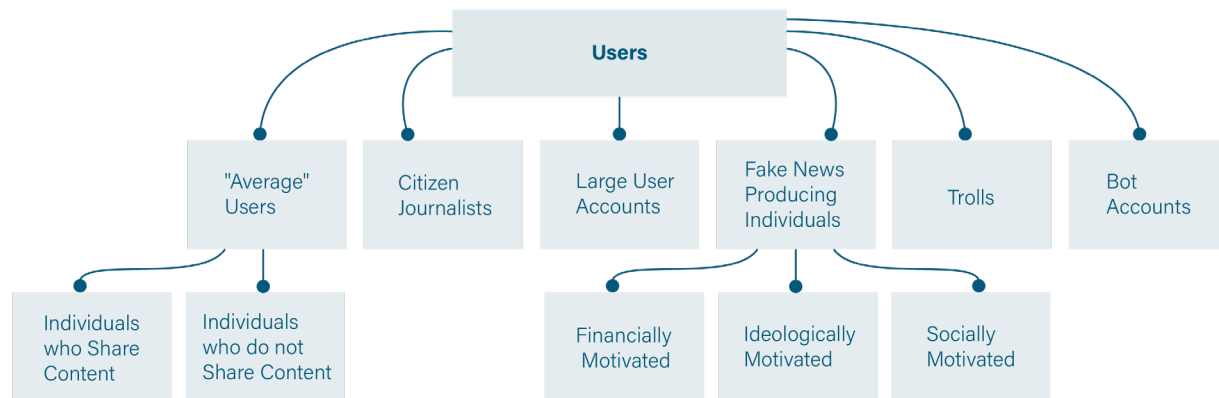
Figure 2: Stakeholder map: users

Social media platforms are large multi-national corporate entities that offer the service of social connection, communication and sharing or re-sharing of information, media, news, images, and/or videos on a digital platform.

Individuals sign up to these sites usually, without paying a fee, and can connect with one another; in doing so they form large networks of interconnected individuals.

The dynamics of social media platforms differ from one company to another, in terms of what is allowed on the platform and ways in which individual users can interact. There are also unwritten social rules for the type of content or interaction which happens on platforms which contribute to the overall culture of each platform and causes them to be distinct experiences for users.

In the system presented here the sub categories pertain to the individuals who work within these platforms and companies. The sub categories are:
▪ CEO & leadership - Specifically, individuals who make top level decisions about the company and platform.
▪ Employees - This refers to individuals who work below management level at a company. In this system they have been further divided into content moderators, designers, developers and engineers, and researchers and data scientists.

These subcategories are not an exhaustive study of the various potential roles within a social media

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platform, rather they are a general overview of roles which are of relevance to this system exploration.
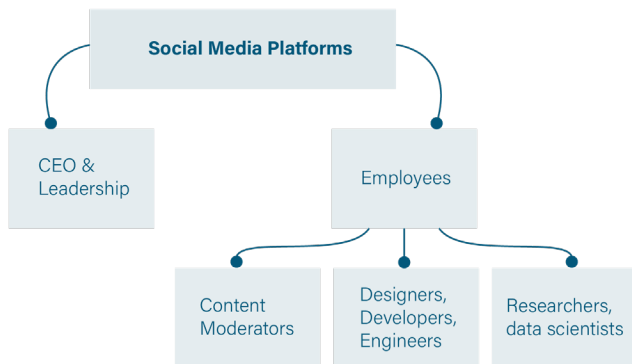
Figure 3: Stakeholder map: social media platforms

Government & policy makers are responsible for most of the laws which govern online spaces in Canada. In a later section this paper highlights the legislation which has an impact on this system. The sub categories identified for this stakeholder group are:

- Legislators - Very broadly, a legislator is Canada is someone who participates in federal, provincial, municipal or local legislative body. This also includes band council members. They can be elected or appointed (Government of Canada, 2021).
- Analysts and researchers - In government this refers to individuals whose role it is to gather, research, interpret, and assess information relevant to the branch they represent. They often provide insights to leadership from their research which allows leadership to make informed decisions.
- Regulators - Broadly, Canadian regulators interpret legislation and develop and enforce rules based on said legislation.

These governmental sub categories were included

in this system study based on their relevance in this system. They are not meant as an exhaustive exploration of the roles in government.

Figure 4: Stakeholder map: government & policy makers

Advertisers & brands provide social media companies with a vast majority of their revenue by paying for advertising space on their platforms. Platforms provide them with user data and information gathered about how users interact with their ads. Because platforms have access to so much information about their users they often target relevant advertisements to them, which can increase a user's chance of interacting with the ad or buying the product.

Some advertisers and brands will also pay specific users directly, generally influential ones, to advertise their products.
In this system advertisers and brands have been split into two sub categories:

- Advertising and marketing companies - This refers to companies which specialize in advertising and marketing, and have one or more clients.
- Companies using social media for ads - This refers to brands or companies which use the data and information provided by social media companies to advertise to users directly, without hiring advertising and marketing companies.

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Figure 5: Stakeholder map: advertisers & brands

Academics & researchers study various aspects of the misinformation and disinformation ecosystem. There are many academic inst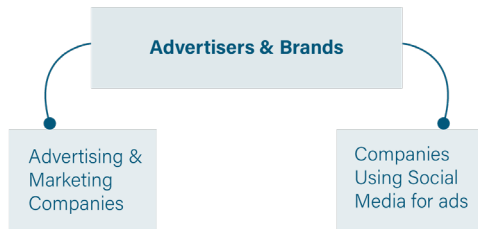itutions as well as think tanks in Canada that have centers dedicated to this type of research. There is also research conducted in other similar countries where the findings can be applied to a Canadian context.

In this system study no sub categories for researchers has been specifically named. However, the category is in reference to researchers and academics who study specific aspects, stakeholders, or relationships within this system.

Figure 6: Stakeholder map: academics & researchers

Media & publications interact on social media platforms in various ways. Many traditional news media use social media to spread their news, as well as to share articles and video clips. The companies will have their own account(s) to do so. Often traditional media will use social platforms to post content in order to attract readers.

It is worth noting that many traditional media and publications often require some form of payment

when accessing their content. Sometimes stories will be hidden behind a paywall, with just the first few paragraphs available for free. Other times a company will allow a user to read a certain number of articles for free before blocking access to articles unless the user pays for a subscription.

The sub categories identified for this stakeholder group are:
▪ Scientific & academic journals - This category includes journals which have scholarly articles and papers that have been peer reviewed. Some journals interact on social media platforms and have their own accounts on some of these platforms.
▪ Independent journalists - In many media companies journalists will also have personal accounts and use them to disseminate news stories, in addition to their own personal content and opinions.
▪ News media - This refers to media and publications which focus on delivering news to the general public or a targeted subset of the public. For the purpose of this system exploration this sub category has been further divided into national & multinational publications, local publications and problematic "news" sites.

There are some media sites and publications which endeavor to resemble accurate, responsible news and reporting, but are creating and/or sharing problematic information. These sites contribute to the misinformation and disinformation ecosystem directly by actively disseminating false or sensationalized stories.

In the media and information ecosystem of today, with a strong emphasis on speed and immediacy of information, traditional news media can also

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misreport or misrepresent information. These sites inadvertently contribute to the misinformation and disinformation ecosystem in this way, and can also increase the public distrust of media when these errors occur.

Increasingly, traditional media and publications will use platforms to gather information for stories and news, by reporting on interesting events or individuals on platforms, or by getting information and content (photos or videos) from user accounts on platforms.
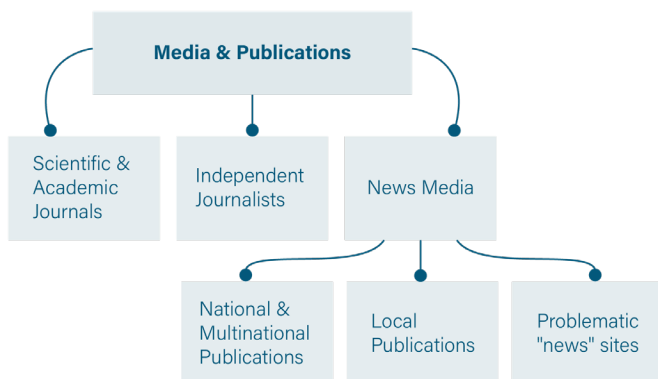
Figure 7: Stakeholder map: media & publications

Educators in this ecosystem are persons, who either within or outside of a formal education system, teach about media literacy and digital literacy.

Educators have been sub categorized as primary, secondary or post secondary educators. The different levels of educators would deal with distinct types of education in media and digital literacy as well as different expectations from their students and pupils.
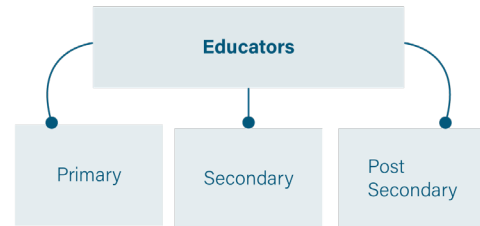
Figure 8: Stakeholder map: educators

Advocacy and social interest groups in this system are groups that work at countering misinformation and disinformation provide resources and education for media literacy. They also provide education and fact checking to better navigate online spaces. Some also provide digital literacy education and resources aimed at closing the digital divide in Canada.

It is worth noting that there are many special interest groups with ideological, political, and financial motivations who also perpetuate the spread of problematic online information.

Figure 9: Stakeholder map: advocacy & social interest groups

Lawyers and legal professionals are involved within the system in multiple ways and are also involved indirectly in multiple aspects of the system.

There are lawyers who work for government agencies, lawyers who work for social media platforms and technology companies, and lawyers working for individual users and traditional media

companies. Lawyers work to protect the interest of their clients and are therefore entrenched in multiple parts of the system depending on who they represent.

Some specific lawyers have been identified in three sub categories which are important to this system.
- Technology industry lawyers - Are individuals working to protect the interest of technology companies and their assets.
- Hate speech, defamation and libel lawyers - Are lawyers who fight for or against individuals using illegal forms of language towards other individuals.
- Data and privacy lawyers - are lawyers who work in data protection and privacy laws.
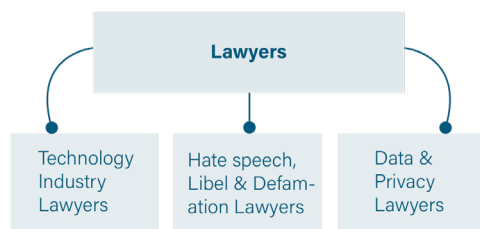
Figure 10: Stakeholder map: lawyers

Background & context
Current context & landscape

System Dynamics

Important system dynamics and interactions that affect the proliferation of problematic information online are highlighted in this section. This is not an exhaustive list, rather a collection of major contributing factors synthesized through research and analysis of stakeholder interviews, a public survey and a literature review.
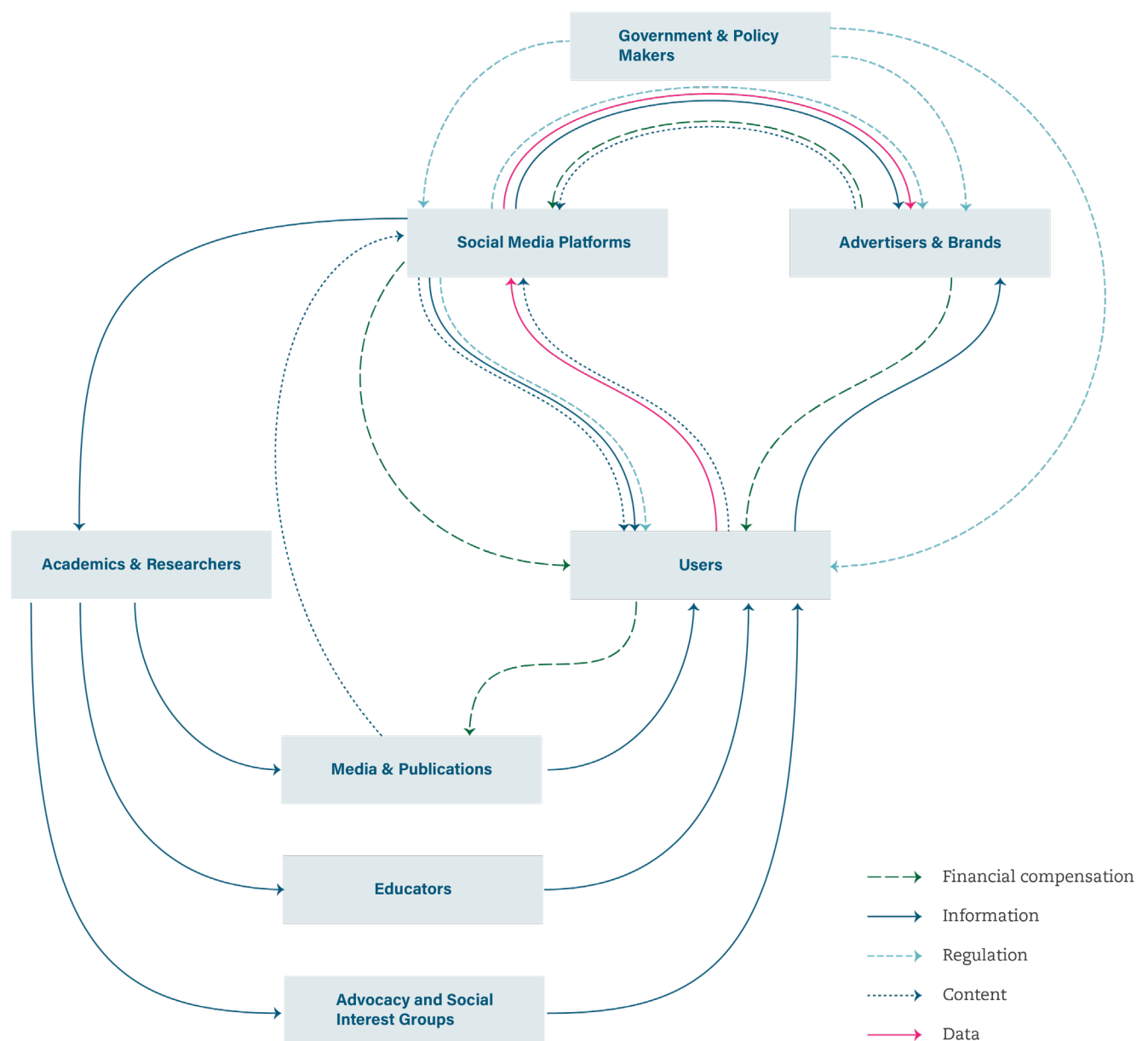
Figure 11: System dynamics & influence map

Background & context
Current context & landscape

Financial motivations: ad revenue, users, & the platform business model.

Online platforms and social media companies owe most of their profits to ad revenue, which they obtain by selling ad space on their platforms to individuals, companies, and advertisers (Cuofano, 2019; McFarlane, 2020). Due to the digital nature of these platforms, they can monitor precisely the number of accounts that have been exposed to an ad as well as if users engaged with the ad and for how long. This allows platforms to provide advertisers with detailed information regarding the engagement of an ad, they can also track the ad's performance among certain demographics and more effectively target the ad based on performance metrics (Arens, 2020; Barnhart, 2020a).

Furthermore, platforms can predict the types of ads a user would be interested in and filter those ads to the user. This makes social media platforms extremely efficient at essentially selling users' attention to advertisers.

This model incentivizes platforms to continuously grow their user base, and wherever possible, increase the engagement of existing users to be able to increase their profits from ad space. Digital platforms are in a unique position to be able to do this well as they constantly collect vast amounts of data from their users, both on and off the application. They then use this data to better target their sites to any given individual user through advanced machine learning algorithms (Barnhart, 2020b; Hao, 2021).

Misinformation and Disinformation on these platforms is rampant and it garners more engagement than verifiably factual news and media (Aral, 2020; Törnberg, 2018; Vosoughi et al., 2018). Due to the nature of their revenue model, social media companies are largely disincentivized to prevent the spread of false information on their platforms (Hao, 2021). As Hatim Ratman, a professor at Northwestern's Kellogg school of management explains: "Viral content pays. It attracts more advertisement, more eyeballs, more time and attention to the platforms" (Ratman, 2020). Social media platforms are rewarded for ignoring the problem of misinformation and disinformation on their sites, and their algorithms may actually exacerbate the issue by filtering users into "echo-chambers" where opinion polarization can cause news to spread faster (Törnberg, 2018).

Financial gain from advertising revenue has also been highlighted as a reason for the proliferation of problematic information from individual user accounts. Having a large or influential account on many of these platforms means direct financial compensation for creating and distributing content, both through advertisements as well as through sponsorships and partnerships with brands (Lieber, 2018). This entrenches a whole culture around social influence and clout, and encourages users to build a large, engaged, following to continue to profit from ad revenue and brand promotions.

This can sometimes translate to individuals publishing or spreading sensationalized information that will garner more engagement and attention, which, as was highlighted previously, means often the spreading of misinformation and disinformation. Some of these accounts will become influential across multiple platforms and be able to build their audience in these different spaces. Moreover, large influential accounts are also valuable to the online platform because they inspire engagement and perpetuate interaction among users. Social media

Background & context
Current context & landscape

companies are then incentivized to keep these large user accounts on their platforms, regardless of the nature of the content they produce or share.

Ideological motivations: Socio-political stances, partisanship & online culture.
It has been shown time and again that people are more likely to trust the veracity of information that is in alignment with their social or political beliefs (Edison, 2017; Kleiner, 2020; Marwick, 2018), they are also more likely to share this information (Marwick, 2018; Pennycook et al., 2021). As previously discussed, a combination of naive realism, the illusory effect, confirmation bias, tribalism, and normative influence theory are partially to blame for this (Hassan, 2021; Kumar et al., 2018; Noor, 2020; Sharma et al., 2019). On either side of the political spectrum, individuals are about 15 percent more likely to believe in news ideologically in line with their beliefs (Allcott & Gentzkow, 2016), and about twice as likely to share headlines that they find politically concordant (Pennycook et al., 2021).

This filtering process creates digital silos, or "echo-chambers", of people who share similar socio-political opinions which are continuously reinforced by other members of the group (Hao, 2021).

Echo-chambers have been seen to further exacerbate the spread of misinformation and disinformation in online spaces (Sharma et al., 2019; Törnberg, 2018). It is also suggested that they play a "role in the formation of interpretive frames and collective identities" (Törnberg, 2018). In this way echo-chambers are a self-reinforcing loop, where individuals conform to and consume the media within the environment in order to maintain their identity as part of the group.

Background & context
Canadian context

A lot of research about the social and political effects of problematic online information is focused on the American experience and political ecosystem. Canada has its own set of unique factors in terms of legislation and social issues that impact the dissemination of problematic information online. Some of these are explored in this section, however this is an area which would benefit from further research and exploration.

Canadian legislation & initiatives

Canadian laws and policies
This section will take a high-level look at several Canadian laws and policies that can affect the online information ecosystem. Many of these policies have specific goals which are not directly related to the issue of misinformation and disinformation; however, they have an indirect impact on the issue in certain ways.

The Digital Charter Implementation Act
One of the more recent pieces of policy is The Digital Charter Implementation Act proposed in November of 2020 through bill C-11 (Innovation, Science and Economic Development Canada, 2020a). This proposed legislation has the intention of strengthening privacy protections for Canadians, specifically as they relate to technology companies and personal information collected by them (Digital Charter Implementation Act, 2020). The Act has two parts: Part one, titled Consumer Privacy Protection Act, outlines legislation around consumer information privacy and industry responsibility. Part two, titled Personal Information and Data Protection Tribunal outlines enforcement power to assure the provisions of The Act are met.

The proposed legislation highlights that its purpose is "to establish [ ] rules to govern the protection of personal information in a manner that recognizes

the right of privacy of individuals with respect to their personal information and the need of organizations to collect, use or disclose personal information for purposes that a reasonable person would consider appropriate in the circumstances" (Digital Charter Implementation Act, 2020).

As of this writing, the proposed legislation sets out new regulation around data and personal information usage as well as responsibilities for disclosure and deletion of personal information if an individual requests it; however, it does list some exceptions to these regulations (Digital Charter Implementation Act, 2020).

The bill has received mixed feedback and been both praised and criticized. The office of the privacy commissioner released a statement saying, "Bill C-11 opens the door to new commercial uses of personal information without consent but does not specify that such uses are conditional on privacy rights being respected" (Office of the privacy commissioner, 2020). As well as highlighting the fact that the bill gives equal weight to both personal privacy rights and economic interests of businesses (Office of the privacy commissioner, 2020).

The ministry of Science, Innovation and Development Canada highlight in a Fact Sheet on their website that The Act increases user data protection and portability as well as the ability

Background & context
Canadian context

for users to withdraw consent and personal information from companies. The website also stipulates that The Act outlines requirements for transparency from enterprises around automated systems such that "Businesses would have to be transparent about how they use such systems to make significant predictions, recommendations or decisions about individuals" (Innovation, Science and Economic Development Canada, 2020a).

In a separate, more recent website from the ministry "10 Principles of the Charter" are outlined. While the charter largely relates to personal information, data and enterprises, there are two principles out of the ten listed in The Charter that directly address disinformation. The first, number eight, titled "A strong democracy" states that "the Government of Canada will defend freedom of expression and protect against online threats and disinformation designed to undermine the integrity of elections and Democratic institutions." (Innovation, Science and Economic Development Canada, 2021). The second, number nine, titled "Free from hate and violent extremism" states that "Canadians can expect that digital platforms will not foster or disseminate hate, violent extremism or criminal content (Innovation, Science and Economic Development Canada, 2021).

It is worth noting that, as of this writing, the ministry of Science, Innovation and Development Canada lays out the information of the charter, as well as emphasizing the components of the charter that include enforcement of digital platforms, but it does not offer recommendations as to how enterprises including digital platforms can monitor the dissemination of socio-political disinformation, misinformation, hate speech, violent extremism, or criminal content online. And while they highlight these ten principles, the charter itself does not include specific language

discussing misinformation, disinformation, hate speech or algorithms. It is therefore unclear what the outcome will be in enacting these laws that regulate platforms, data management and personal information privacy, or what the subsequent responses from the large technology companies will be.

Advertising laws
Advertisers are regulated under the Canadian Competition Act, which regulates deceitful or misrepresentative advertisements and "contains criminal and civil provisions to address false or misleading representations and deceptive marketing practices" (Competition Bureau Canada, 2018). It is worth noting that the act applies regardless of the medium used. Therefore, advertising on social media, as well as sponsorships with influencers is still governed under the Competition Act regulations (Canadian Advertising and Marketing Law).

Advertisers also must abide by standards set by the Canadian Code of Advertising Standards and the Broadcast Code for Advertising to Children, these latter two are industry self-regulating documents which are widely accepted by the industry (Ad Standards, 2019).

While both the government and the industry regulate advertisements to prevent the proliferation of misinformation and disinformation in advertising, in practice this does not appear to be the case. Browsing any social media platform will expose multiple ads directly from brands as well as sponsored individuals that violate both The Canadian Code of Advertising Standards and the Competition Act. Furthermore, the global nature of digital platforms makes it hard to enforce Canadian advertising regulations on these sites.

Background & context
Canadian context

Laws that explicitly regulate political advertising during election times came into effect with the Election Modernization Act in 2018. Most fundamentally, the advertising provision requires that online platforms that display ads must keep a record of them for five years after the election (Sinha et al., 2019). Digital platforms reacted differently to the new provision, with some, such as Google banning Canadian political ads altogether (Google, 2021), and others like Facebook, complying and using their "Ad Library" to archive Canadian political ads (Facebook, 2021).

Election laws
As part of the Elections Modernization Act in 2018 the Canadian government implemented provisions to prohibit the publishing of false statements about a candidate (Canada Elections Act, S91(1)(a,b)) presumably recognizing the impact that the spread of misinformation and disinformation can have on politics and democracy.

Recently, however the Canadian Supreme Court struck down this section of the Canada Elections Act. The Court ruled that this law was "overly broad" and an unnecessary infringement on freedom of expression and therefore in violation of the Canadian Charter of Rights and Freedoms (Thompson, 2021). The decision in this case does state that "The dissemination of deliberately false statements obstructs the search for the truth and, as a result, it does not enjoy the same level of protection under s. 2(b) of the Charter" (Canadian Constitution Foundation v. Canada, 2021). The justice goes on to highlight libel and defamation laws as ways that the Canadian legislation already protects against this type of expression. This could suggest that amendment to this legislation to make it more specific or targeted would be acceptable.

This decision comes as a bill that is intended to curb hate speech online is currently being drafted by the Heritage Minister (Thompson, 2021). It will be interesting to see how this future legislation will balance free expression with regulating misinformation and disinformation as this is clearly a contested space in Canadian politics and legislation. When legislation that is only narrowly applicable to disinformation surrounding candidates during an election period is considered an unnecessary infringement on freedom of expression, it is hard to imagine future legislation around misinformation and disinformation more broadly being accepted.

Free speech laws
The Canadian charter of rights and freedoms outlines freedom of expression as a Fundamental Freedom and states under section 2(b) that "2. Everyone has the following fundamental freedoms: (b) freedom of thought, belief, opinion, and expression including freedom of the press and other media of communication" (Canadian Charter of Rights and Freedoms, S2(b). However, free speech is not considered absolute in Canada; various provincial charters, as well as the Canadian Criminal Code have put in place restrictions on free speech. For example, "Sections 318 and 319 of the Criminal Code make it a criminal offence to advocate genocide, publicly incite hatred, and willfully promote hatred against an "identifiable group" (mediasmarts, n.d). A number of other Canadian laws have also placed limits on freedom of expression "whether as part of the law's intended purpose or as an indirect consequence. Perjury, counseling suicide, and creating child pornography are all forms of expression, but they have been limited through designation in the federal Criminal Code as criminal offenses" (Walker, 2018).

Background & context
Canadian context

Social context

Increasingly Canadian society lives in a world which is dominated by digital spaces. It has become effectively impossible to live a life entirely free of the virtual world. For many individuals, digital spaces are important places where they interact for work, school, and to socialize, especially during the COVID-19 pandemic, where physical interaction decreased dramatically. This has important implications for society and individuals.

While the increasing ubiquity and accessibility of technology means many more people have unprecedented access to the digital world, it has also increased the necessity of digital access, as well as the severity of the consequences that come with lack of access. In Canada that means that individuals from marginalized groups, such as rural or remote populations, urban disenfranchised populations, and immigrants or people with language barriers have a harder time participating in modern digital life (Andrey et al., 2021; CIRA, 2021).

The Canadian digital divide
Studies of the digital divide in Canada often focus on the lack of accessibility, which remote and first nations populations experience. Remote communities often are forced to rely on satellites for internet and communication (CRTC, 2018). These tend to be more expensive and to provide much slower connectivity than wired telecommunications due to latency issues and limited bandwidth (Rosenberg and Lappalainen, 2021). Meanwhile there is a mainstream trend towards more complex and richer online content, as well as online applications that require powerful connectivity to participate fully (CIRA, 2021; Rosenberg and Lappalainen, 2021).

Lack of competition among the three Canadian telecommunications giants is often cited as the reason for the lack of infrastructure in rural Canada. As these companies are disincentivized to invest in expensive infrastructure projects and instead focus on connectivity in dense urban areas with higher population densities (CIRA, 2018). There is also the issue of the sheer size of Canada, which is one of the largest countries in the world, in which large portions of the Canadian landscape are entirely uninhabited and difficult to access. The result is that Canada lags behind all but one of its G7 peers for connectivity, according to the International Telecommunications Union ICT Development Index (CIRA, 2018).

It is unclear what the impacts that this lack of accessibility poses for remote and first nations populations regarding problematic information online. This is a space where further research is needed to understand what the experience of remote and first nations populations is with problematic online information. This is especially important as the Government of Canada has recently announced the $1.75 billion-dollar Universal Broadband Fund, with the explicit goal of providing all Canadians with high-speed internet by 2030 (Innovation, Science and Economic Development Canada, 2021), which could have an impact on the information ecosystems of these remote and first nations populations.

An additional consideration is how emerging technologies such as, SpaceX's Starlink, will impact accessibility in remote communities. Starlink which provides high speed satellite-based internet services is headquartered in the United States, with a Basic International Telecommunications Services (BITS) license in Canada (Arevalo,

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Canadian context

2020). Widespread support for SpaceX from rural Canadians and some politicians was part of the push to grant the company its Canadian license (Arevalo, 2020; Wallis, 2020). These types of technologies will compete with Canadian broadband service providers for business, especially in rural and remote communities, while also being able to avoid the some of the domestic companies' infrastructure constraints that impact their ability to deliver service. In the future, issues around regulating these global technologies may arise.

While many conversations around the Canadian digital divide focus on the discrepancies between urban and remote or First Nations populations, another important digital divide occurs amongst distinct urban populations. Households with low socioeconomic status, the elderly, individuals for whom English is not a first language as well as newcomers to Canada all face digital accessibility and digital literacy challenges. The global COVID-19 pandemic has further exacerbated these issues as more Canadians are forced to access many social services, school and work in a digital manner.

The barriers to accessibility for urban residents include affordability, digital literacy, and language. Canada ranks among the top five most expensive countries, when it comes to internet (Picodi, 2019). The lack of affordability means that many low-income Canadians have difficulty obtaining basic internet service in their homes, and must rely on workplaces, public libraries, or schools to have online access (Andrey et al., 2021). Many of these spaces were closed at multiple times during the pandemic which affected access for the thousands of people who relied on them. Lack of access can negatively impact the development of digital literacy skills, which further marginalizes

vulnerable populations such as seniors, newcomers to Canada, and low-income families (CIRA, 2018; Andrey et al., 2021).

Digital literacy refers to the extent to which an individual is comfortable navigating digital technologies and learning new ones (CIRA, 2018; ABC Life Literacy Canada, n.d.). Digital literacy skills are an important part of navigating the online world. "Those lacking in digital literacy skills are more likely to fall prey to malware, online scams and social engineering attacks, such as phishing" (CIRA, 2018). Digital literacy skills are also increasingly important for employment, even "low-skilled" jobs increasingly require at least moderate digital literacy skills (ABC Life Literacy Canada, n.d.). Digital media literacy interventions have also been shown to increase an individual's ability to discern between mainstream and false news headlines (Guess et al., 2020). However, the long-term impacts of digital literacy skills on the spread of problematic information online is yet to be effectively studied.

Additionally, many newcomers to Canada experience the compounding effect of a language barrier. Often immigrants come from countries where the digital experience and ecosystem is different from the Canadian one. There are some digital processes in Canada, including social services, employment, and school requirements which could be digital or entirely in-person processes in a newcomers' country of origin. If they also lack a full understanding of English or French, they may experience further difficulty learning to navigate Canadian online spaces.

Many researchers have suggested that strengthening digital literacy skills and digital media literacy skills has an impact on reducing individuals'

Background & context
Canadian context

susceptibility to misinformation and disinformation (Guess et al., 2020; Hobbs, 2010; Hodson, 2020; Lord and Vogt, 2021). The result of the digital divide amongst Canadians is a lack of access for marginalized populations. This lack of access can create a gap in digital literacy skills amongst those same populations, which could in turn lead to an increase in the susceptibility of these populations to problematic online content.

Francophone Canada
Another important consideration, when discussing the Canadian context, is Canada's large francophone population. French is one of Canada's national languages, and as such a large population of Canadians have a different sociocultural experience in online spaces. This is evidenced through different responses from francophone and anglophone Canadians about their experience with online media as well as their perceptions of misinformation and disinformation (Brin et al., 2020).

However, most studies about problematic information online in Canada use and assume English as the default language. Additionally, many of the initiatives put forward by technology platforms to curb disinformation, misinformation, and hate speech focus on the English language. As such, problematic information online in other languages is more likely to propagate unchallenged (Madraki et al., 2021; Paul, 2021).

Methodology

This work began with an extensive literature review; complemented by primary research which consisted of a public survey and expert interviews. Finally, a 2x2 method approach was used to generate foresight scenarios.

Literature review

The systems mapping of this study necessitated an extensive and varied literature review. While it was extensive it was not exhaustive, and no formal method of selection was applied to the process of filtering studies or papers to research and review. Once the literature review was completed, the research papers, videos and audio clips were clustered by themes in order to more readily draw connections between them and to discern competing research.

Interviews

Ten participants were recruited from the different stakeholder groups for interviews, with particular emphasis on primary stakeholders. Journalists, academics, educators, and individuals working in the technology industry were recruited based on their knowledge and expertise in their given field.

Each participant was interviewed for between thirty and forty-five minutes about their specific area of expertise using an unstructured interview guide. Most of the questions asked were specific to each participant and relevant to their particular field, with a few overlapping questions which were asked to all participants.

The overlapping questions were "Are there technologies or societal phenomena on the horizon that you feel will be important in this space in the future?" and "Is there something I haven't asked that you would like to speak to?" These questions were used to understand issues of importance, both currently and in the future, in the participants' field.

Once all the interviews were concluded, a thematic analysis was undertaken to evaluate prominent and reoccurring themes across the different interviews.

Survey

The survey was conducted over a period of four weeks, members of the public we recruited via social media channels such as Facebook, Instagram, and Twitter. In total 47 respondents completed the survey, answering 13 questions about their perceptions around misinformation and disinformation online. To view the complete survey questions and responses see Appendix A.

Foresight

The selected scenario generation method for the foresight component of this study is the 2x2 matrix method. In this method, two high impact, high uncertainty drivers, termed uncertain critical drivers, are chosen and plotted on an x and y axis. On either end of the each axis the variables are expressed at their extreme manifestations (UNDP, 2018). In the four quadrants the two variables are used to imagine a future where those two components are prevalent (Rhydderch, 2017; UNDP, 2018). In doing so four robust and distinct scenarios can emerge.

Foresight
Scenario generation using the 2x2 method

In order to complete the 2x2 method, first, weak signals were gathered over a period of five weeks. From these, drivers were distilled and subsequently analyzed using the information gathered through the literature review and interview process to determine which drivers could be considered uncertain critical drivers. Four of these drivers were established and a number of draft 2x2 matrices were plotted before the one in this study was selected. These two particular critical drivers were selected based on their relevance to the insights gathered from the stakeholder interviews and the survey responses.

The 2x2 matrix was implemented to generate four future scenarios. Once the scenarios were developed, they were evaluated to ensure that they contained political, social, technological, and economic components, in order to provide richness and consistency across the four scenarios.

Method & Approach

Signals, drivers & critical uncertainties
In order to implement the 2x2 method the first step is the gathering of weak signals of change. The definitions for weak signals vary but can be summarized as "an indicator of a potentially emerging issue, that may become significant in the future" (Dufva, 2019). "They tend to capture emergent phenomenon sooner than traditional social science methods" (IFTF, n.d).

In this study the weak signals were subsequently categorized as social, technological, environmental, economic, political or value based (STEEP-V). Once categorized, they were clustered into groups based on where they related in larger system, in terms of system dynamics and/or stakeholders involved.

While clustering the weak signals prominent drivers began to emerge. Drivers can be defined as the forces behind the observable weak signals (Rhydderch, 2017). Of the drivers identified a select few were considered as uncertain critical drivers in this system, based on their high level of uncertainty and their corresponding high level of

influence or criticality. Uncertain critical drivers are also sometimes termed "critical uncertainties". A number of these drivers emerged from this process and were experimented with in draft matrices. A brief overview of these uncertain critical drivers and potential matrices will be outlined here before proceeding to the selected matrix and scenarios.

The uncertain critical drivers are:
- Public trust - This is a broad and multidimensional category. Trust arose in multiple ways as an important driver during the literature review and interview stages. Some sub-genres of public trust include *trust in government and public institutions, trust in media, trust in academics and researchers, and trust in private entities or companies.*

- Regulation - Regulation is also a category which can be subdivided in a number of ways and can be applied to different entities within the system. Regulation can refer to *government regulation;* of technology companies, of data usage, or of general users. Regulation could also mean *institutional self regulation*; that is technology companies self regulating, or

Foresight
Scenario generation using the 2x2 method

regulating their users. These are just a few examples of potential regulation.

- Data - Data is the last critical uncertainty which was surfaced through this process. Data can be further divided into *data usage, data ownership* and *data regulation,* and each of these sub categories can be further divided. For example *data regulation* can refer to data being regulated by government entities, or it can refer to regulation of data use by technology companies. *Data usage* can refer to the usage of data by technology companies, or by advertisers, or it can refer to legislation around data usage decided by the government.

Each one of these could be used on an axis where two opposing sides of the uncertain critical driver are explored. However, some of the uncertain critical drivers outlined have lower elements of criticality or uncertainty than others. For example, currently, public trust in government is more uncertain than public trust in media. Government regulation around data could be considered more uncertain than industry self regulation.

This provided many potential axis combinations. As mentioned previously, before selecting the two which made up the final scenarios a number of combinations were experimented with. Due to the multifaceted nature of these drivers, when they are expressed at their extremes on either end of the axis there are multiple possibilities available. There are no true "opposites" when dealing with themes such as regulation, data usage, or trust in institutions.

The following list is a brief outline of the draft matrices:
- Trust in institutions X government regulation

- In this combination the "opposite" of trust in institutions was considered as trust in private companies and the "opposite" of government regulation was industry self regulation.

- Data regulation by technology companies X trust in government - In this combination the opposite of data regulation by technology companies was data regulation by individuals and the opposite of trust in government was trust in individuals and close, insular groups. Another version of this matrix was created where the opposite of data regulation by technology companies was data regulation by the government.

- Industry self regulation X data usage laws - In this matrix the opposite of industry self regulation was government regulation and data usage laws was divided into increased or decreased laws around data usage for advertisers and technology companies.

The choice as to which combination of uncertain critical drivers to use in the final 2x2 was made based on a number of factors. First, the relative level of criticality and uncertainty of the selected drivers, the ability for plausible future scenarios to emerge from the quadrant combinations, and lastly the potential insights generated from these scenarios.

Uncertain critical drivers or critical uncertainties
The first uncertain critical driver is *trust in Institutions* which refers to the general population's belief that institutions (The Government, academia, media, etc.) are acting in a truthful manner and in the best interest of the general population. Trends in online information systems would suggest that the opposite of this trust in institutions is trust

Foresight
Scenario generation using the 2x2 method

in insular, interpersonal groups of like-minded individuals.

The second uncertain critical driver is *data ownership*. Data has developed into a valuable commodity. On one end of the axis data is treated as a commodity, where individual rights to data are considered secondary to public and corporate use of data. This view holds that data is a natural resource that should be leveraged to the benefit of society at large (Smith, 2019; Neri, 2020). Increasingly however there has been push back against this view of data. Recently, some governments have created legislation around data usage and privacy. At the other end of the axis, data is considered personal property, individuals have a say in the use and ownership of their data.

Time Horizon
The selected time horizon for this scenario development using the 2x2 matrix is ten years in the future (year 2031). This (relatively short) time horizon was selected due to the accelerated and exponential nature of technological systems. It also highlights the urgency at which any interventions, if desired, would need to be implemented in order to be successful in such a fast-moving space.

Data as a commodity

Trust in Individuals ←————————————→ **Trust in Institutions**

Data is Property
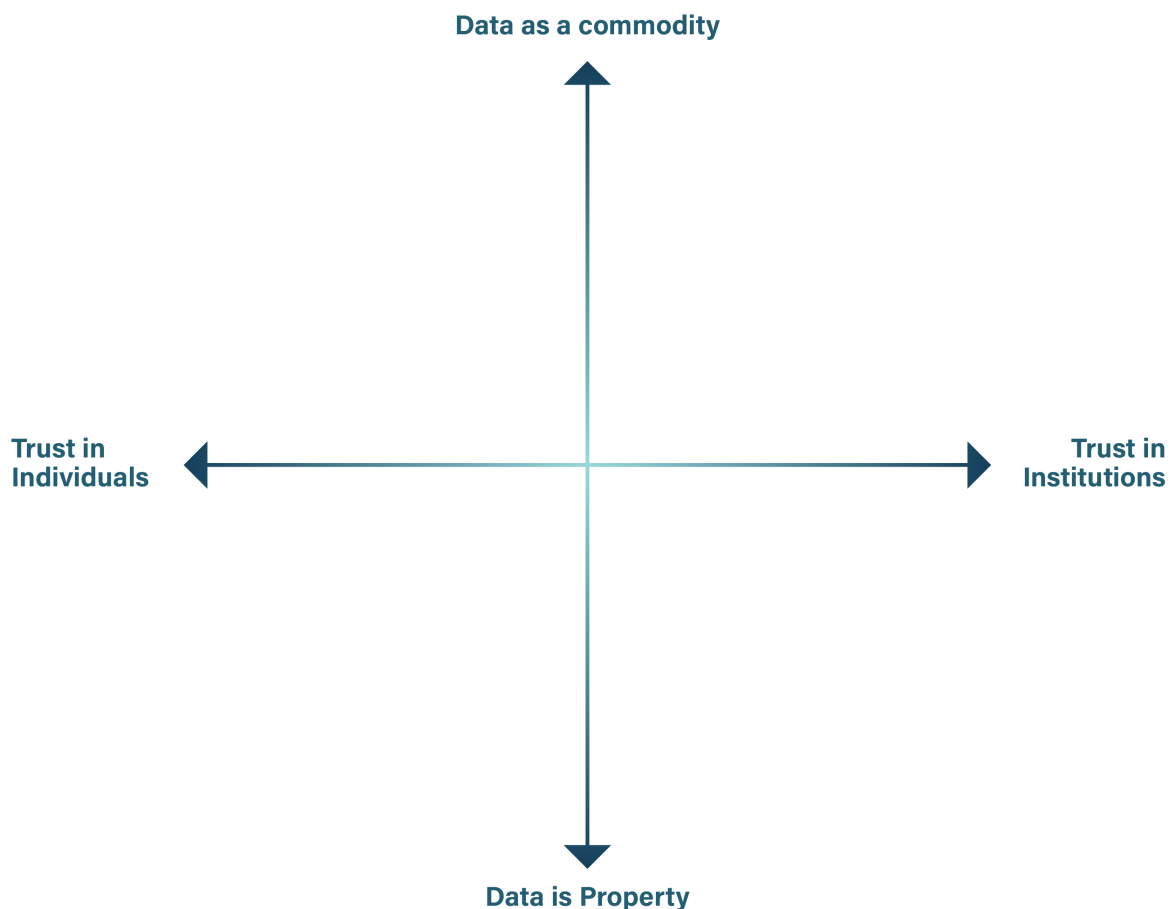
Figure 12: *2x2*

Foresight

Scenario generation using the 2x2 method

> ### Scenarios
>
> The four contrasting scenarios which emerged from the 2x2 matrix are outlined in this section. Each scenario has been given a name illustrative of the future it embodies.
>
> The scenario descriptions are comprised of sections. The first is a back casting section, which explains how this future might have emerged from the present. Next, the future scenarios will be explored from the lenses of society & government, institutional trust, technology platforms & data, and problematic online information. Lastly a section where implications and insights from each scenario are discussed.

Dataveillance

The convergence of data as a commodity and trust in insular groups and individuals
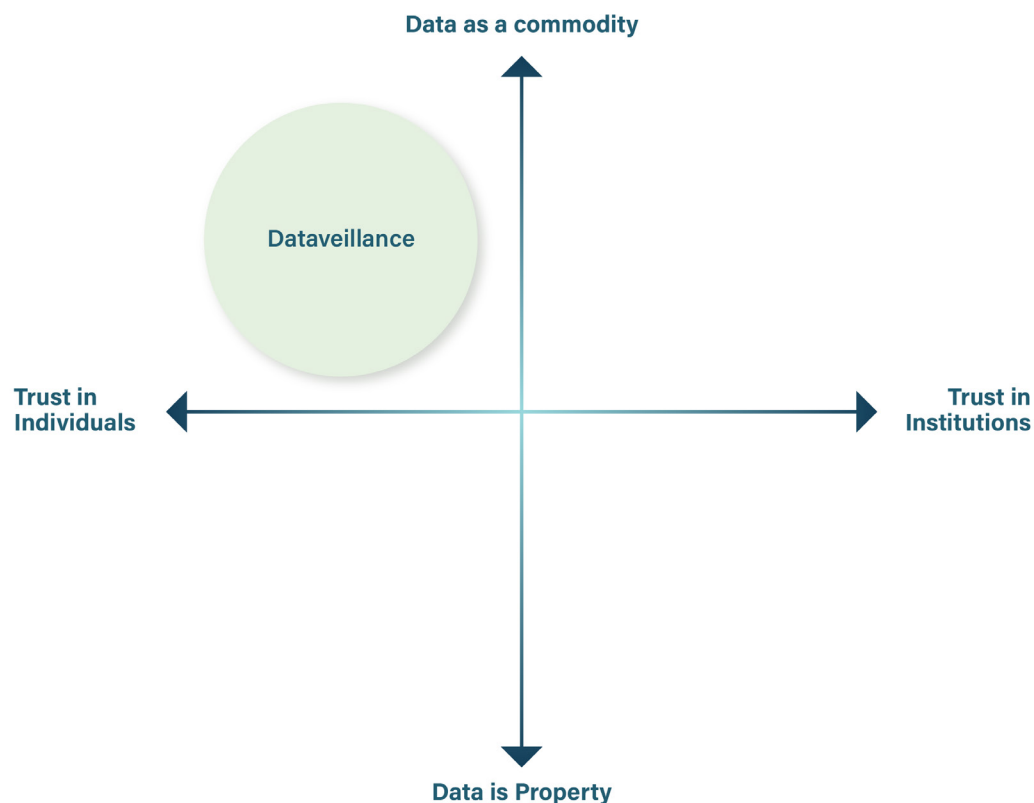
Figure 13: 2x2 : Dataveillance

Foresight
Scenario generation using the 2x2 method

Back casting: How did we get here?
Early in the 2020's the Canadian government proposed legislation which was aimed at curbing the power of "Big Tech" companies. However, infighting amongst and between parties meant that the government struggled to enact any type of regulation to reign in the power of big tech and the proposed Acts died in parliament.

Data and the algorithmic power that comes with it now rest solely in the hands of big tech companies, who have become behemoths, more financially successful than their historical equivalents in steel or rail with revenues vastly eclipsing the wealth of most nations. They work hard to lobby governments around the world to maintain the status quo and increase their influence and power. As the technology industry outpaces all other industries, so does its influence. Technology elites and CEOs become societal aristocracy, they have strong influence over governmental policy directions and markets.

The Canadian government, like many other governments is forced to make deals with these technology giants in order to stay technologically competitive and relevant. As technology companies become more financially successful and influential, they increasingly control the terms of agreements in government contracts. What ensues is a parasitic relationship between big technology companies and the Canadian government.

This lack of effective political discourse caused the Canadian public to become increasingly disillusioned with public institutions. Increasingly relying on special interest groups and individuals they trust for news, insights, and information about the world.

Traditional media has become almost entirely obsolete. Being forced to compete for years with sensationalized headlines and false information caused the industry to slowly assimilate into this new information culture. Those who did not assimilate became smaller and smaller enterprises only serving niche audiences.

2031
Canadian society is more divided than ever. Rampant spread of disinformation and misinformation combined with an increase in political polarization means that online discourse is hostile and ideologically charged. People with opposing viewpoints use online tools and persuasion to recruit individuals into their networks. All salient issues take on political leanings and people are forced to choose sides and align with the groups they have chosen and been filtered into.

Social tension is high and increasingly intense, there are regular protests and counterprotests as Canadians clash over all issues governing society. The federal and provincial governments have a hard time legislating and enacting policies. No political party is able to gain a majority in the house due to the fractured nature of the public sphere. Increasingly, minority governments are unwilling to work with other parties to push forward policies, this leads to a largely stagnated political system.

Trust in institutions has entirely collapsed. The tense political environment means the government regularly fails to enact policies. Canadians are left feeling disillusioned with their political leaders. Regulation of the tech sphere is particularly neglected. The breakneck speed at which technology advances leaves government policy makers arguing over dated solutions and rarely making any headway.

Foresight
Scenario generation using the 2x2 method

As partisanship continues to increase, public trust in media and academia declines; with neutral information constantly being politicized, Canadians increasingly filter their viewpoints towards political extremes.

Individual users have no say over their personal data and its use. The complete commodification of data and lack of effective regulation means that data is extracted, used, sold, bought, entirely outside of the purview of society. This lack of regulation over personal data has left it entirely in the hands of businesses.

Research and development in the tech sector are at all-time highs. The incentive to keep users on platforms to collect and profit from their data is the strongest motivator for this continued development. The tech industry continues to expand, and new markets emerge in niche and novel industries to take advantage of the ubiquity of tech. The increased R&D means that new technologies are constantly emerging. The "Internet of things" effectively runs uninterrupted in the background of daily life and artificial intelligence has developed a deep computationally derived understanding of human nuance, language, and emotion.

Technology permeates every part of human life, and huge technological advancements in the last ten years have allowed many of the world's complicated environmental and ecological issues to be managed. Technologies such as carbon capture, nuclear energy, solar energy, and electric battery efficiencies have seen huge improvements in efficiency and capacity. The climate crisis has been mitigated thanks to technological advances in green energy sectors. However, the use of technology, instead of an emphasis on societal and behavioral changes has had lasting effects on the global landscape and social culture.

Problematic information online is ubiquitous and platforms, focused on growth and profits do little to police its spread. Favouring more technological solutions, AI and machine learning are implemented by various platforms to police individual user's online presence. Technologies which regulate these platforms become more adept at recognizing problematic information but can never entirely stop the spread. Furthermore, individuals continuously find ways to "game the system" and share the content they want and so it persists unabated. Technology platforms have no real reason to make this issue a priority.

New markets emerge in "disinformation for hire" where motivated individuals can pay for campaigns of false information to their benefit. Increasingly to avoid this space people begin to logoff completely in a form of protest against technology giants and their unchallenged reach and influence. These individuals live away from technology and city centers and as technology free as they can.

Insights
Lower regulation and the dynamic between technology and advertising revenue increases the research and development of technology in this future, which has the potential to benefit society in the form of new and more powerful technologies and personalization. The unprecedented access and reach of technology in daily life increases dependency on technology and decreases individual privacy.

The interplay between technology companies and advertising rewards "sensationalized" information and will continue to do so in online spaces. An interesting consequence of this could be that

Foresight
Scenario generation using the 2x2 method

traditional news media will be forced to compete even more with disinformation that is emotionally charged and intended to elicit a response from individuals and cause them to want to share it. In competing with this type of information traditional news media will begin to assimilate and this will cause a further erosion of trust from individuals, particularly among individuals who have largely been supportive of traditional journalism. Any remaining trust in traditional media will fade and people will be left with no unbiased news; instead, all news will be filtered through partisan organizations.

The effective polarization of Canadians continues to increase, caused by increased partisanship and exacerbated by tribalism online. This leads to stronger socio-political opposition of individuals with different viewpoints and ideologies.

Stagnation in government caused by lack of cooperation and inter-party disputes will also be prevalent leading to ineffectual government and the fraying of social institutions which could have an impact on further reaching policies such as infrastructure, development and immigration.

Techno-coop

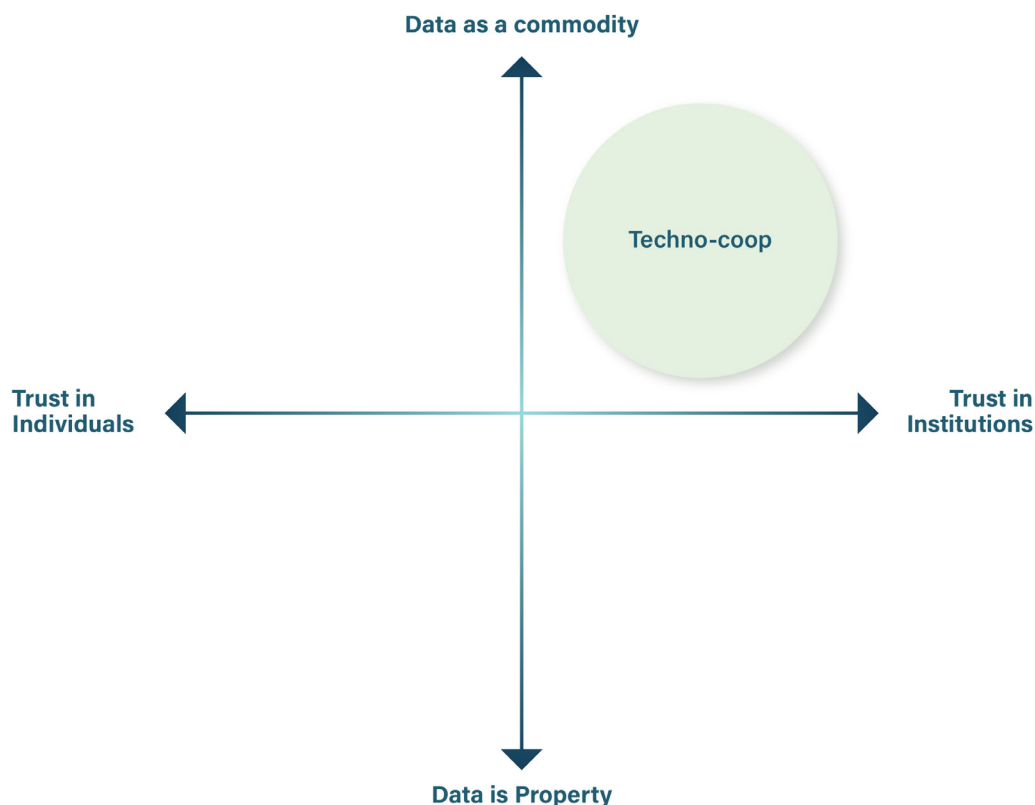*The convergence of data as a commodity and trust in institutions*

Figure 14: 2x2 : Techno-coop

Foresight
Scenario generation using the 2x2 method

Back casting: How did we get here?
After the Pandemic spending of the early 2020s, the Canadian government pushed for a period of austerity and solidarity. Post-pandemic protectionism ensues, and Canadians focus their spending powers on local companies and in supporting Canadian interests.

A period of economic stability is the result and while some other economies see increasing political polarization and social infighting Canadians become increasingly cohesive. Democratization of the stock market and financial tech industries lead to a digital shift in ownership over big technology companies. Groups of individuals form large cooperatives which buy and/or start technology companies and platforms, putting big data into the hands of cooperatives. A cause and effect of this is an increase in trust in institutions such as government and traditional media.

The technology cooperatives and government spend large sums in the mid 2020's targeting marginalized and rural communities to decrease the digital divide and reduce the societal causes of problematic online information. This helps usher in an era of Canada as a digitally robust nation. The Digital Stewardship act of 2027 implemented through government and technology partnerships signed in agreement with other OECD countries serves to "curate" the online spaces in Canada and abroad and regularly cleanse the internet of "unwanted" content.

Large scale digital fatigue played a role in this movement, as individuals became overwhelmed by the amount of content online including advertisements. There was a backlash against this type of content, with people turning away from platforms over aggressive and excessive advertising. As platforms lost more and more users, they began to rethink their business models and governments around the world began to rethink their role in relation to these platforms and the users on them.

2031
The government works alongside the technology industry cooperatives in what becomes a symbiotic partnership with sharing of data and resources. Average users have very little power over their data or the platforms they are a part of, but trust in the platforms is higher due to the type of cooperative ownership structure and strong legislation protecting the public interest.

There is relative socio-political stability in Canada and a marked increase in civic engagement. Canada sees an increase in protectionist sentiments and the country is becoming progressively more insular and disliking of outsiders. A partial consequence of this is that internally, Canadians become more cohesive. Public trust in government and social institutions is high and civic participation and discourse increase. Political polarization in Canada decreases except in small fringe groups on the extremes.

Trust in media and academia is also high, which has caused people to value higher education and respect journalists and scientists. As a result, funding structures begin to favour traditional journalism and academia through strategic partnerships with the technology cooperatives; citizen journalists are encouraged to join media organizations or form small ones of their own and begin to conform to journalistic integrity practices such as fact checking.

Foresight
Scenario generation using the 2x2 method

There is a sharp decrease in the financial power that advertisers and advertising have on platforms as governments step in to curate content. This shift means that influencer culture has declined, and once powerful social media platforms see dwindling users and engagement. Digital fatigue from overuse of technology and screens has also caused a societal shift further away from social media. Many of the niche social platforms of the 2020s have completely disappeared. Others are places where a relatively small number of users interact with one another for specific reasons.

The social media era has ended and peoples' online lives look a lot different in 2031. Increased personalization means that digital experiences are completely different from one individual to another depending on their lifestyle, preferences and needs. The technology cooperatives gather all the data from individuals and use this to create powerful digital experiences. Stewardship and curation of the internet in the last 10 years has become common practice and online spaces are regularly "cleansed" of undesirable content by powerful regulatory bodies.

The technology cooperatives are large, ubiquitous, and powerful; they are extremely interconnected with the government through various partnerships, contracts and agreements. Governmental regulation and oversight of technology companies and platforms is relatively low due to governments and tech companies working in conjunction with one another and sharing information and data. Government-technology partnerships provide stewardship and curation of the digital world that Canadians experience and regulate data use and individual behaviour online.

Problematic online information in the form of misinformation, disinformation, and hate speech, is minimal. As a society Canadians value rigorous journalism and diligent academic pursuits. The government-technology regulatory bodies that oversee digital spaces regularly cleanse the online spaces, and enforce strict regulations around problematic online information from users. The decreased digital divide and increased social cohesion in turn decreases the amount of problematic information online.

Insights
The internet, a web of interconnected networks in the early days, has matured into a space of stewardship and curation by powerful technology, international, and government entities. The shift in the flow of ideas, information, and communication will require a large global shift in mindset about the digital spaces people inhabit and the roles of different stakeholders in the system.

Digital fatigue could cause a collective desire for communication technology and social media to be on the sidelines and in the background of daily life, rather than a central component.

Hyper-personalization of technology will be the norm which will allow individuals to have extremely curated and distinct experiences with technology and digital information ecosystems. What could it mean for humans if online realities are different from person to person?

For there to be an increase in trust in institutions large business model shifts and changes in structures within the technology industry could be necessary.

Foresight
Scenario generation using the 2x2 method

Techanarchism

The convergence of data as a property and trust in insular groups and individuals
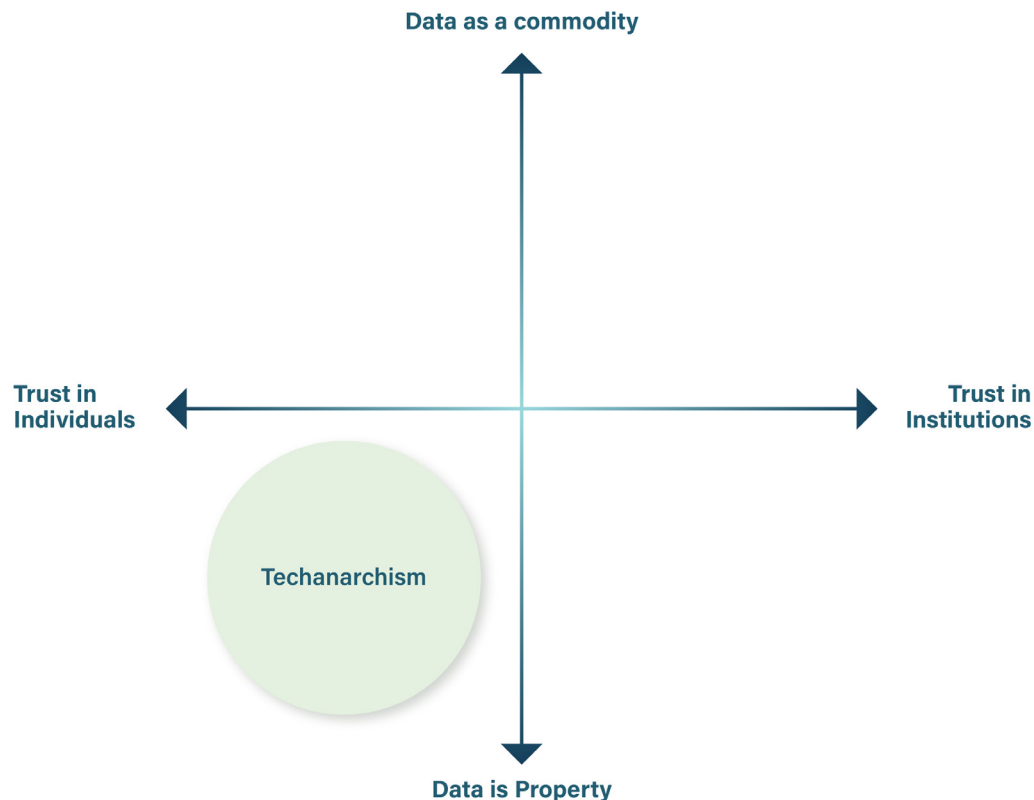
Figure 15: 2x2 : Techanarchism

Back casting: How did we get here?
After a brief increase of public trust in institutions during the pandemic, the decades-long downward trend continued unabated.

In a last-ditch effort to curb the ever-increasing power of tech platforms, the Canadian government along with a few other OECD nations introduces legislation which treats data as personal property, data becomes protected under laws akin to private property laws. This forces technology companies and platforms to request permission to use data belonging to individuals and compensate people for that data.

Increasing political tension and effective polarization in Canada fueled by societal divisions and lack of trust in traditional media, see the public split entirely along ideological and political lines.

2031
Political polarization and extremism become deeply entrenched. Groups of far right and extreme left form their own online communities outside

Foresight
Scenario generation using the 2x2 method

of mainstream platforms where they are entirely isolated from other individuals. These micro social networks made up completely of like-minded individuals are entirely separate information realities.

Trust in institutions is nonexistent, instead individuals trust influencers, celebrities, famous citizen journalists and the "digitally famous", as well as their insular groups of like-minded individuals.

Data is individual property, as such, people have the freedom to buy, sell, and rent their data. For technology companies to gain access to personal data they need to compensate or exploit individuals to obtain access. New business models have emerged that buy, sell, trade and exploit people's data. Some individuals sell their data and others refuse to, differences emerge across socioeconomic lines between individuals who sell or trade their data and individuals who do not.

A consequence of these micro social networks is that they have eroded the power of large tech companies over time as individuals have more power over their data and create their own spaces. The technology and advertising financial model collapses as people create their own platforms and advertisers can purchase data directly from individuals or through brokerages and do not need to rely on large technology companies to gain insight and advertise to people.

The microplatform economy ensues; some platforms are completely private spaces which charge users membership fees and remove any individuals, who do not conform to the platform's culture and ideas. Others are public and allow advertising to generate revenue. Elite platforms also emerge which charge exorbitant user fees for exclusivity and require that their members meet

certain criteria to join.

These societal splits impact physical geography as well. Increasingly individuals move into communities where they are surrounded by the same like-minded individuals and social networks. They work hard to elect individuals with their own set of values to public office. They create towns, education systems, and entire societal structures around their insular identities.

Within each community specific information realities are ascribed to; depending on the deep narratives from within these communities some contain a lot of problematic content and others do not. The spread of information between communities becomes increasingly difficult, as the groups are isolated, and many disagree on issues. Intergroup disinformation is rampant. Within groups strong social narratives have emerged, some of which are factually incorrect and some which are not. Individuals generally choose to believe whatever information their larger community believes. Failing to conform is considered grounds for removal from online spaces and shunning in social spheres.

Insights
Stratification in society has occurred to a very large extent. People are separated by social status as well as by ideology; discrimination and ostracization also occur along these lines. Societal divisions are deeper than ever, and technology helps maintain and perpetuate these divisions.

Information ecosystems are extremely different depending on the group an individual belongs to. There is increased importance in adhering to in-group behaviour and cultural norms.
Technology companies lose a lot of their current

Foresight
Scenario generation using the 2x2 method

power as legislation emerges that forces them to compensate for the use of personal data. Individual users gain power in this type of arrangement, but data ownership for individuals will not lead to more agency in the system if the exploitative aspects of market dynamics also persist. Especially, if and when markets emerge which buy, sell and trade in human data.

Technosocialism

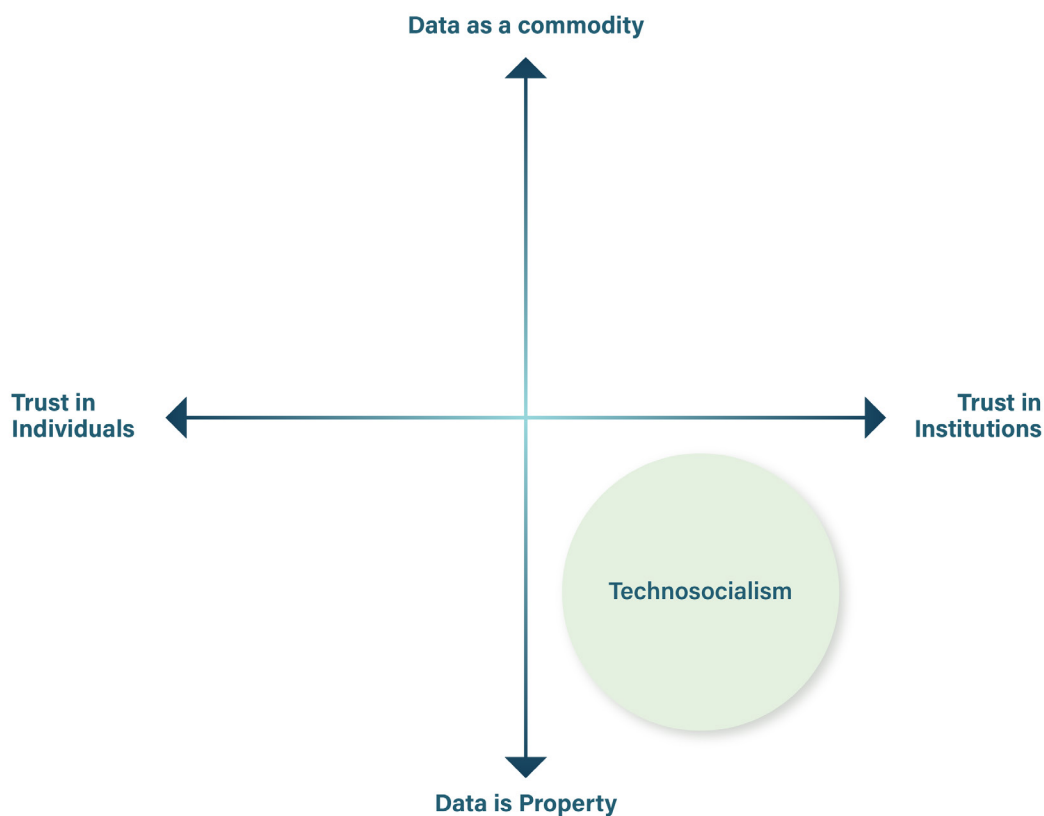*The convergence of data as a property and trust in institutions*

Figure 16: 2x2 : Technosocialism

Back casting: How did we get here?
After years of protest by individual users, as well as boycotts of technology platforms and digital warfare, individuals wrestle away control of their data from big technology platforms. Big tech attempts to gain the power back by taking users

Foresight
Scenario generation using the 2x2 method

and user groups to court where the fight for data ownership takes place. When the highest courts in Canada and the government side with Canadian citizens over technology companies, trust in public institutions becomes cemented in Canadian society.

Novel types of ownership laws are erected around data and its use. Technology platforms can use data but are forced to abide by strict regulations that have been imposed. Technology companies are also increasingly regulated, audited and scrutinized. As platform regulations become more commonplace, technology platforms impose heavy handed removals of posts and censorship to remain compliant with imposed regulations.

2031
Technology companies are no longer allowed to own data, and it is treated under a new type of social ownership, technically belonging to individuals but stored in large "databanks", overseen by elected social representatives. Individuals are permitted to remove their data from said banks at any time for personal storage, however, to participate in the "public market" of data they are forced to waive certain rights, essentially lending data to companies and the government for use.

Remaining anonymous online has become almost impossible, the communal data ownership model makes people more concerned about privacy and authenticity when it comes to their data and that of others. Technologies around protection of data as well as authenticity of online presence are the norm. Consequently, problematic information is rare in online spaces, as "bad actors" with ideological or political motivations, who create disinformation, are regularly de-platformed or heavily sanctioned.

Misinformation is regularly removed from platforms. Individuals who share misinformation are given information about correct and incorrect content and presented with educational information on digital literacy. Continued sharing of misinformation or problematic content leads to citations and eventual removal from platforms

Authentically and responsibly produced content including citizen journalism is highly encouraged and individuals have high trust in the media and the integrity of the journalists, who are producing information.

The advertiser-led and influencer-led market of the 2010's and early 2020's has declined significantly as regulations around advertising have become more restrictive. As problematic content is removed the trend in sensationalization of content declines. Online social platforms are still extremely popular but the type of content shared and social culture of the spaces has shifted.

There is a reduction in the speed of research and development in the technology industry, as strict regulations of data use mean the "move fast and break things" mindset of the industry is no longer possible. Instead, technology platforms need to seek out and obtain approval for data usage, as well as abide by regular auditing of their use. This allows for increased transparency of algorithms, and greater visibility of the mechanisms of artificial intelligence decision making. New strict intellectual property laws are erected to protect technology platforms from vulnerabilities for sharing their IP.

Algorithmic transparency laws are enacted to force more accountability from technology companies. Algorithms are regularly audited to ensure they are fair, unbiased, and non-harmful. Technology

Foresight
Scenario generation using the 2x2 method

companies begin to build these practices into their business models. Creating technology using pre-audited, unbiased, and anonymized data sets.

The advertising revenue model for tech platforms has been disrupted, as advertisers and tech platforms have significantly less access to data from users. Many technology platforms begin charging fees to their users to help generate revenue.

Technology companies increase censorship on their platforms and more readily ban/de-platform problematic users to abide by stricter regulations from government and the powerful databanks. This leads to a small but vocal subculture, comprised of individuals who have been removed from online spaces. As well as other individuals who do not believe that technology companies and governments should govern online spaces in this heavy-handed way.

Insights
Data ownership in this scenario occurs through individuals exercising their collective agency, which also has the effect of strengthening social cohesion and trust in institutions.

A temporary decline in the speed of research and development in the technology sector could occur as stricter regulations force regular pauses in the previously fast technology development cycle. Audits and regulations also increase transparency of algorithms and serve as necessary checks on the technology industry.

Censorship on platforms increases and posts as well as users are regularly removed from these platforms. Regulation may reduce the viability of advertising revenue model for platforms, and many

platforms could choose to start charging users.

Anonymity online is no longer possible, digital identities are tied to offline identities, this causes a reduction in the number of "bad actors" in digital spaces, as they are no longer able to hide behind their screens.

Society could see entirely new models of ownership , legislation and regulation develop in this ecosystem, especially around data and intellectual property.

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Interviews

The interviews were conducted with expert stakeholders and were used to gather further insight into the various areas of expertise. Once the interviews were conducted, an analysis was undertaken to extract and cluster themes which were prominent across the different interviews and stakeholders. These prominent themes are discussed here.

Media & digital literacy education
"Digital literacy, if I were to give you a definition, is more than just technological know-how... it includes a wide variety of ethical, social & reflective practices" - Rebecca Boucher. MediaSmarts

Various interview participants discussed the importance of media and digital literacy education for youth and adults alike. Media literacy can be defined as a critical thinking skill that enables a person to access, analyze, evaluate, and communicate messages across different types of media (Potter, 2010).

Media and digital literacy education is increasingly essential, for individuals of all ages, especially as more of human life is being moved to online spaces and individuals spend more time interacting on platforms.

In Canada this will also mean creating informed and socially conscious digital literacy programs which are geared towards remote and indigenous communities, as connectivity for these regions increases. As well as under served and marginalized urban residents, with programs that are specific for older individuals, as well as those for whom English is a second language. Lastly, when increasing digital literacy among Canadians

it will be important to create francophone specific programs which take into account the distinct social landscape of online spaces in French.

Building individual resilience to problematic online information through increased media and digital literacy skill will continue to be essential to decrease the spread of misinformation and disinformation online.

The decline of legacy media
"Reinvest in Journalism" - Jane Lytvynenko. Buzzfeed News

Digitization has vastly impacted the news media industry. The decline in cost of production, and the open nature of the internet have allowed new entrants into this space. The internet has also caused a shift in market power and financial benefits from traditional media to online platforms. Because of this, traditional media are often forced to compete for readership on online platforms where it is often mixed in with many types of content.

Many traditional media business models have also failed to adapt to the changing landscape of information technology and consumption. Media companies have maintained inflexible subscription-based revenue models in a world where consumers are accustomed to an ever-increasing amount of free information on demand.

There are often huge differences in the types and quality of information which is available for free compared to information which is subscription based. However, the average user may not be aware of these differences. To complicate this further, there are quality news sites which will provide a certain amount of content for free to

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readers. As well as publications which provide free high quality news or information and are funded through grants or donations.

However, many "free" news sites can be contributing to the spread of disinformation or misinformation. These sites often promote a specific ideological viewpoint through the content they publish or they are sites which create news for the specific purpose of hosting ads on their site and gaining revenue from advertisers or brands.

Regulation
"Regulation is going to be really hard to do until the policy makers can demonstrate that they understand the problem" - Anonymous interview participant

During the various interviews, participants expressed vastly different viewpoints about the topic of regulation. Different participants thought of different aspects of the system when discussing regulation, such as regulating platforms, or individual users; and by whom, such as platforms self-regulating or government-imposed regulation.

Some stakeholders outside of the technology industry feel that technology platforms could be doing more to regulate and remove certain types of content from the online spaces in their purview. However, stakeholders within the technology industry highlight how difficult this is to actually do in practice.

An example highlighted in one of the interviews with a technology industry professional was around removing certain types of content, such as hate speech or verifiable misinformation, from online spaces. When companies do this, the technology inadvertently removes content which

is not restricted as well, and is likely to remove content which is attempting to bring attention to this unwanted content. For example, a post on a social media site which contains hate speech could be flagged and removed, as well as a post from a marginalized person explaining that they were targeted with hate speech.

A separate interview participant who is a researcher and academic highlighted how individuals and groups will use emojis and cryptic images rather than text to spread hateful or misleading content and further subvert algorithms. These types of posts are more difficult to detect and might require another user to flag the post before they are able to be removed.

This exposes the difficulty of actually regulating this type of content online. This also calls into question who decides what should be considered removable content and why. Who should be the arbiters of these online spaces?

A common theme regularly acknowledged when discussing regulation was that regulation alone would not be a magic bullet solution to this issue.

In practice, regulation will be a space of increased dispute and discord. However, for regulation in this space to be effective collaborative efforts between multiple stakeholder groups will likely have to become the norm.

"Bad actors"
"There were two different types of motivations for people who operate [partisan] websites, one is ideological, and the second is financial". - Jane Lytvynenko. Buzzfeed News

"Bad actors" are individuals who for specific

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reasons attempt to further a particular point of view or opinion in online spaces. They do so for ideological or financial reasons and are often the initiators or instigators of disinformation.

Bad actors are a large part of the system of problematic information online. In some cases, they will create coordinated, targeted campaigns of disinformation which are shared and re-shared across multiple accounts and on multiple platforms, with the intention of generating buzz around manufactured information. In this way they are gaming the algorithms, attempting to have the story highlighted as popular so that it is filtered onto more user profiles. In other cases, these actors will develop websites which have the appearance of genuine news sites and publish news stories which are partially or wholly false with the intention of having individuals think they are publishing factual news. In many cases, multiple tactics will be combined.

Some bad actors attempt to spread information that is sensationalized and problematic apparently in an effort to gain followers and have influence over an increasing number of people. These individuals could have alternative motivations which would be difficult to measure or discern.

Marginalized communities
Marginalized communities are negatively impacted by the growing digital divide, in Canada especially indigenous communities and individuals who live in rural and remote parts of the country who face lower connectivity than urban Canadians. The digital divide also impacts urban individuals of lower socioeconomic status as well as seniors. The COVID-19 pandemic has only made the digital divide more harmful as more of daily life has moved to online spaces.

Marginalized communities, such as racial and ethnic minorities, are often disproportionately targeted in ideologically motivated disinformation campaigns, as well as blatant hate speech. They are generally easy targets of "othering" by motivated individuals and groups, due to physical distinctions. Individuals who are looking to sew discord and create division point to groups outside of their own to place blame for the causes of civil unrest or economic uncertainty.

Additionally, efforts to minimize the spread of misinformation and disinformation often use English as the default language which can further exclude some of the communities who need it the most.

Overall, the interviews provided nuanced information about the system of problematic online information and its spread. What was interesting was the perspectives of the different stakeholders within the system. Depending on where in the system they are involved their perspectives around themes such as regulation could be quite different. This highlights a need for more interconnectivity between the various stakeholder groups in the system, especially if discussions around complex topics such as industry regulation, or the decline of legacy media organizations are being had.

Survey

The public survey received 47 respondents and provided a snapshot of Canadians' opinions about misinformation and disinformation in Canada. This section will briefly highlight interesting survey responses. To view the survey in its entirety see Appendix A.

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All the respondents said they felt false information online is a problem, however 26 percent of respondents felt that information online should not be regulated. Of those that felt information should be regulated 38 percent of people believe that technology companies should be partially responsible for regulation on their platforms and 22 percent believe that users should be partially responsible for regulating information online.

40 percent of survey respondents also reported that they regularly see false information online and 60 percent reported that they sometimes see false information online; none reported never or rarely seeing false information online.

The last set of questions asked respondents about where they get their news from and their sharing habits on social media. Interestingly, respondents largely reported that they either always or regularly fact check the information they see and share online. Only 6 percent of respondents reported never fact checking information they share online. Additionally 4 percent of respondents report rarely, and 2 percent report never fact checking information that they see online.

A notable insight garnered from the survey is that generally individuals endeavor to be responsible about the information that they share online, regularly fact checking what they post and often fact checking the information they see.

A second important insight from the survey is who individuals feel should be responsible for regulating the online information. Respondents were quite divided on the issue. Suggesting that this is indeed a complex question and society disagrees as to who should share the responsibility for regulating

Question: Do you think online content should be regulated?

26% no

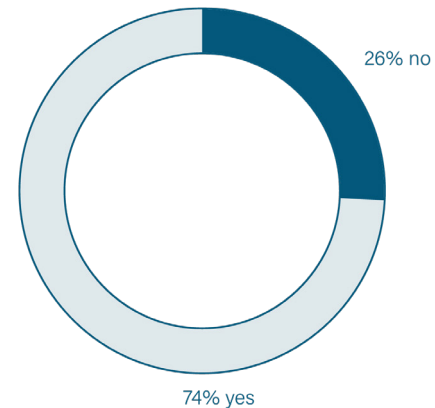74% yes

Figure 17: Survey: do you think online content should be regulated?

Question: Do you "fact-check" the information you SHARE on your social media? (fact-check in this case is defined as confirming the accuracy or truthfulness of information using a third party website or literature)
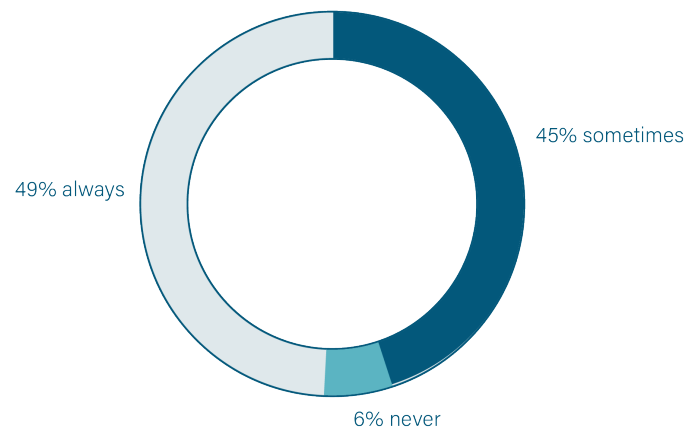

45% sometimes

49% always

6% never

Figure 18: Survey: do you fact-check information you share online

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online information systems. Alternatively, this could indicate that distinct stakeholder groups have differing opinions as to who should be responsible for regulation, and their reasoning could be motivated by self interest.

A final insight that should be noted is that respondents rate the amount of false information they see online as high. All respondents felt they saw information online that was false regularly or sometimes as opposed to rarely, or never.

It is important to take into consideration that the nature of these questions is qualitative and subjective to the individual respondents. The information gathered was useful in providing insight into the experience that everyday Canadians have with information in their lived environment. As well as their perceptions of misinformation and disinformation. Lastly, it provided valuable perspective on their views around regulation and their opinions on who should be responsible for regulating online spaces.

While the information gathered from this survey is useful, this is an area where further research could be beneficial.

Foresight

Using the 2x2 method allowed an opportunity to visualize potential futures as well as their implications.

Insights
These four possible futures provide insights into important potential aspects of today's information technology and communication ecosystem.

The first is that a disruption in the current advertising revenue model of technology companies could have drastic and cascading effects on the information ecosystem online. One such effect is the development of other types of business models for platforms by shifting their priorities away from advertisers. If users and platforms were unable to profit from advertising revenue in the way that they do today, the production and type of information online would likely change dramatically.

A second implication is that changing data ownership will not necessarily change the current system dynamics. If data ownership regulations changed but large, powerful companies demanded unfettered data use in order to provide their services many individuals would choose to release their data rights. If data ownership regulations changed and systems were put in place to regulate and govern the use of data, then the system wide structures and culture could shift and data use by businesses and individuals would change.

There are ways in which problematic online information is reduced. Decreasing individual anonymity online, and penalizing technology platforms in ways that cause them to remove problematic content and users are two such ways. However, both mechanisms have potentially harmful consequences. Online anonymity can protect vulnerable individuals and groups, and forcing platforms to remove content would increase censorship on these sites.

Removing content also leads to a lot of "false positives", that is, information which would be flagged as problematic but not actually be problematic could get removed. This also calls into question who is deciding what is considered

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"problematic content", and how are these decisions being made.

Lastly, an important implication gathered through these scenarios is the importance of data use in technology research and development. Without free access to large amounts of data gathered from individuals', technology companies could face regulatory challenges developing new technologies quickly, which in turn, could lead to a decrease in the rate of technology development. Especially in technologies which rely on personal data such as voice recognition, facial recognition and biomedical technologies.

This could have positive results, forcing technology companies to be more transparent and accountable for their algorithms as well as the data that they use, this could also catalyze the development of technology around the ethical use of data, such as anonymization and security technologies. This could also lead to shifting cultural mindsets around data use and technology development.

Discussion

As a species humans evolved communication systems over time in situations where individuals were, by necessity, near one another. Physical communication involves interactions beyond dialogue and includes nonverbal facial expressions, tone of voice and body language. While digital communication systems and social platforms can include a number of these physical attributes the experience is not comparable.

The introduction of technology and digital

communication has drastically changed the dynamics of human interaction, in ways which are not yet fully understood.

The world is experiencing a global, digital culture shock, the likes of which have never been seen before. Humans collectively create spaces, in which interaction online takes place in a multitude of ways, both as designers and developers as well as users.

Some digital systems have become extensions of offline systems and can have positive outcomes. For instance, the availability of digital news has meant that news organizations can update the news more frequently and share breaking news stories almost instantly. However, this same phenomenon has sped up the news cycle and created an imperative for news organizations to publish stories quickly, sometimes at the expense of accuracy. It has also created an important space for citizen journalists, who are often the first to experience, observe, and record breaking news stories, however they are not bound by the same scholastic responsibility as professional journalists. These examples highlight the plurality of the consequences which arise from digitization of information systems. The subsequent reverberations have both positive and negative connotations.

One of the consequences of the digitalization of communication is the prevalence of problematic information, misinformation and disinformation in online spaces. Problematic information has existed in recorded history for thousands of years. However, online spaces make the spread of information easier than ever before, and where information spreads so too do misinformation and disinformation. The crisis of problematic online information is a convergence of multiple complex systems and issues, some of

Discussion

which have been around for centuries and some of which have emerged in recent years. It is the interplay between these systems, as well as the biological, psychological, and sociological make up of individuals that create and perpetuate this information problem.

Online digital spaces do not exist by accident, rather they were and are created by technology companies, comprised of individual developers, designers and executives. They are for profit entities driven by specific motivations, and this is reflected in the design of these platforms, their business models and the algorithms that run them. Many platforms rely on financial feasibility through advertising revenue generated by users interacting with online ads. As such the business models of these platforms prioritize advertising and advertisers in several ways. Growth is a priority, growth in the number of users, but also in user engagement. Having a large, engaged pool of users to advertise to is directly beneficial to a platform's business model.

The result of this is that digital platforms, and the algorithms which have been created to run them prioritize highly engaging content and influential users, which leads to the proliferation of problematic online information which is more engaging than its factual counterparts. This is by design.

Developing effective policies or mitigation techniques to address the proliferation of problematic online information poses a huge challenge. The ecosystem is massive, extremely layered and complex. Negative consequences of policies could potentially reverberate through the system in cascading ways creating further consequences downstream. Meanwhile the

consequences of inaction are just as extensive and potentially harmful.

Possible interventions

As mentioned, this is such a large and complex issue that singular solutions to parts of the problem, while important in their own way, will only make partial progress. Without comprehensive, system wide investigation, interventions, and solutions the issue of problematic online information will continue to grow.

Building collective and individual capacity for recognizing and removing problematic information from online spaces is extremely important. However, it is also important to disincentivize the proliferation of this type of information and incentivize the spread of accurate information.

The proposed interventions were developed through a synthesis of information from the literature review, survey, and interviews as well as a consideration of the given strategy in each of the four potential futures identified in the foresight section.

Addressing the social causes of problematic online information
One intervention proposed is to tackle the societal issues which underlie the spread and sharing of misinformation and disinformation online. As highlighted earlier misinformation and disinformation spread more easily at times

Possible interventions

of societal, political, and/or economic turmoil or upheaval, such as during an election.

This is a huge task, societal issues which can increase the spread of misinformation and disinformation are themselves complex problems, with unclear solutions and difficult paths forward. Some of these include political polarization, extremism, economic inequality, and public trust in institutions.

Introducing policy which is aimed at addressing some of the societal issues that create and perpetuate turmoil and uncertainty, could help reduce the spread of problematic information.

Increasing digital connectivity and digital literacy
This recommendation is not novel, digital literacy initiatives are often proposed to decrease the spread of problematic online information. Increased digital literacy training and education can cause people to think more critically about the information they see and share online.

An element to digital literacy that is not often discussed is the need to increase not just knowledge about the information people interact with online but also education in engagement and discourse online. That is, education on how to be a competent digital citizen.

When discussing increasing connectivity and bridging the digital divide in Canada, it would be beneficial to maintain digital literacy as an integral part of these initiatives to ensure that connectivity and access also come with education.

Algorithmic and data transparency
Another possible intervention would involve

increasing algorithmic transparency of online platforms.

Algorithmic and data transparency would force greater accountability for technology companies. Requiring technology companies to disclose the algorithms and subjecting them to external scrutiny and review would allow for external discussion around these algorithms and their potential consequences.

This would require strong intellectual property protections for these companies to ensure their rights and property are protected. Social media and technology platforms can shroud their algorithms in secrecy, creating digital "black boxes", with little obligation to disclose how these algorithms function and make decisions.

Furthermore, this transparency would also allow technology companies to highlight exactly what they have control over and what they do not have control over. There are many difficult challenges and tradeoffs which occur in the development and deployment of some of these algorithms. Having external transparency would enable outsiders to develop a better understanding of the constraints faced by developers when creating these technologies.

A second consideration is data transparency, this is something which has become a topic of increasing interest to policy makers and regulators.

Currently, there is very little transparency in how technology companies gather and use user data, and users have little to no control over their data and its use. There are already indications that society is moving towards different models of data usage and ownership. For example,

Possible interventions

legislative initiatives in United Kingdom and France force companies to provide greater access and transparency to users over their own data.

Disruption in the models around how data is collected, the transparency with which it is handled and the rights users have to access it could have drastic consequences for technology companies, their platforms as well as the information ecosystem as a whole.

Disruption of the advertiser – platform business model

As previously discussed, the current business model for online platforms relies heavily on advertising revenue. This skews the services of the platform toward prioritizing the advertiser or ad over the user. Resulting in a proliferation of viral content which can often be problematic. The mechanisms of this have been highlighted in detail in previous sections of this paper.

This model could be disrupted through stricter regulations on advertisers, on the types of advertisements, or on the way platforms interact with them. Regulation in advertising is commonplace and is intended to protect consumers. However, many of these regulations do not extend effectively into online spaces, or do to the international nature of platforms, the ads originate outside of jurisdictional borders. Developing effective regulations to the types, quantity and positioning of online advertisements could require large scale international collaborative efforts.

Technology platforms would have to pivot to new priorities and move away from prioritizing the interest of advertisers. This could have the effect of reducing problematic online information as the

incentive to create highly clickable, viral content to increase engagement would be lessened.

Another possibility in this space would be to prioritize accurate and verifiable content, either financially, algorithmically, or both. This is not easily done, as this challenges the democratic nature of online platforms, and brings up the issue of who is the arbiter of truth in these spaces.

Building capacity in the system

Fighting problematic content will require capacity building at every level of the system. Not just within stakeholder groups but also between them.

An issue of this scale and level of complexity requires that stakeholder groups keep up with rapid technological developments and are able to mobilize resources to tackle this problem in a holistic way.

Decisions on where and how to invest resources and time into various initiatives needs to happen with input from multiple stakeholders in the system. Solutions should also be multifaceted and interdisciplinary. This would allow for solutions that involve multiple stakeholder groups working together, rather than separating the issues and placing the responsibility on one stakeholder group or another.

Limitations

This study has several limitations, or areas where future research could expand further.

Limitations

The first is that the study was conducted with a relatively small sample size of individuals, both in terms of the interviews and the Survey. Future research would benefit from a larger and more diverse group to collect survey data. It is worth noting that the small sample size of survey respondents was gathered through accessing the researcher's own networks; there is a risk that the survey presents a skewed view of the population and not an accurate depiction of Canadian Society.

The focus of this study is Canada, so it would also be incumbent upon future research in this area to ensure survey data is collected from members of all provinces and territories. It would also be beneficial to gather certain demographic information from survey respondents to assess potential correlations between demographic identifiers and survey responses about misinformation and disinformation, while still maintaining important anonymity.

In addition to increasing the number of survey participants, the number of interview participants and length of some interviews could also be increased. In order to gain a fuller picture of this landscape multiple interview participants from every stakeholder group would be ideal. Additionally, the number of francophone, indigenous and other minority groups interviewed was lacking, future research would benefit from a more diverse group of participants as well as considerations to examine the experience of these groups.

A second limitation of this study was its relatively tight timeline. With more time, further background research and a deeper exploration of the literature could be conducted. This could be especially beneficial for the systems, and context components of this paper which could benefit from being explored more broadly.

Conclusion

The issue of problematic information in online spaces is a complex one. However, it is extremely important that we begin to address this issue as a crisis of our time. Rather than framing this issue around specifically misinformation, disinformation, hate speech or digital literacy, as a society it is imperative that we take a step back and look at the issue from a system level.

This systemic approach can allow for a more holistic view of the issues surrounding the proliferation of problematic information online as well as the stakeholders involved and the system dynamics therein. It also allows us to visualize cascading effects within the system and the complex changes that would occur with the introduction of intervention strategies.

Furthermore, using the system approach to map out the landscape of the issue means that when the development of future scenarios using foresight tools occurs, they can be more robust. By taking into consideration multiple elements in the system that might otherwise remain unexplored.

The foresight component of this paper focuses on the development of future scenarios in order to consider and measure the possible intervention strategies in future spaces. It also serves as a thought experiment to explore the extrapolations of present-day issues.

This exploration begins to answer the questions: What could the impacts of problematic information online look like in the future in Canada? And How might we build individual and collective resilience to problematic information online? While this research is only a step in this direction, it is an important one. The problems surrounding problematic information online and their impacts

in global information streams and collective sensemaking ability.

"We sometimes need reminding that it's people on the platforms who are taking actions. Even if it's a bot, someone had to code that bot. If it's a politician, there's an army of supporters standing by for just that false information. If one social media network is good at mitigating that information, there's always other channels or other ways that this problem presents itself. We need to look across platforms, across regions, across languages. Look at, what are the societal divisions that disinformation exploits and look at that alongside the systems that allow it to flourish" (Jane Lytvynenko. - Buzzfeed news, Interview participant).

Appendix

Appendix A: Survey results

Question: Do you think false information online is a problem?

100%
yes
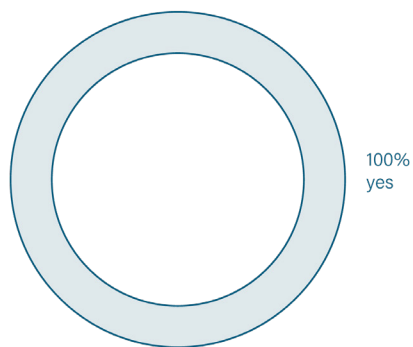
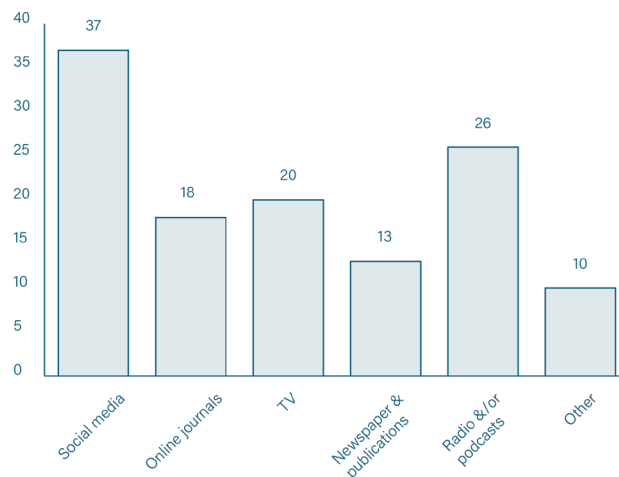Question: Where do you get most of your news or information?
(Please select all that apply)

Social media	Online journals	TV	Newspaper & publications	Radio &/or podcasts	Other
37	18	20	13	26	10

Question: How often do you see false information online? (Select only one)

40% regularly

60% sometimes
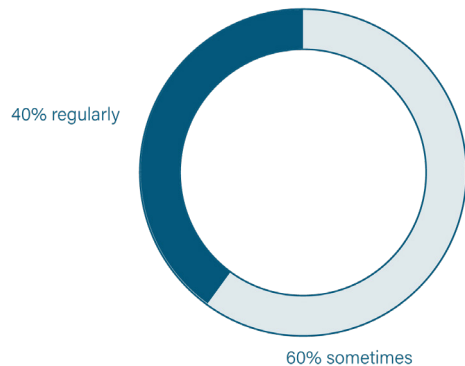
Question: If you selected "other" for please specify

- Online news articles (eg Toronto star, Globe and Mail, The Sun, variety of others)
- Online news sites
- Online news sources, Apple News App, google news website
- Online news channels, Google News
- Bloomberg
- Newspapers online
- Talking to friends/family
- Friends who I know that use credible sources for news.
- online newspapers
- Friends/family

Question: Do you "fact-check" the information you SEE online?
(fact-check in this case is defined as confirming the accuracy or
truthfulness of information using a third party website or literature)
(Select only one)

45% regularely

49% sometimes

2% never

4% rarely
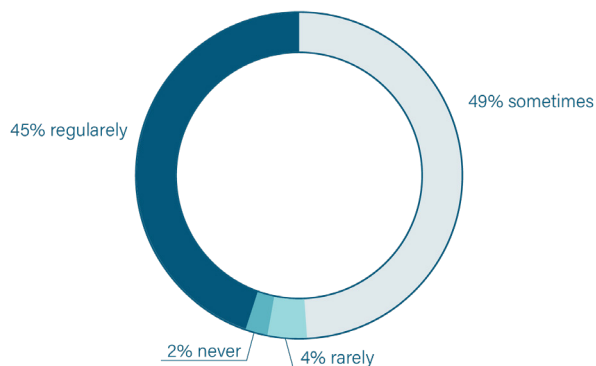
Appendix

Appendix A: Survey results

Question: What type of information are you likely to share on social media? (Select all that apply)

15% health & wellness information
30% news articles
7% other
17% blogs, opinions
31% memes, jokes, satire

Question: Do you think online content should be regulated?

26% no
74% yes

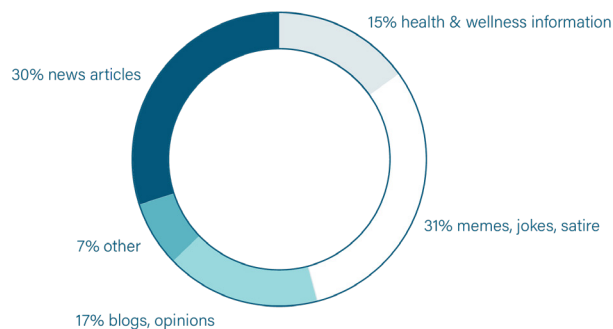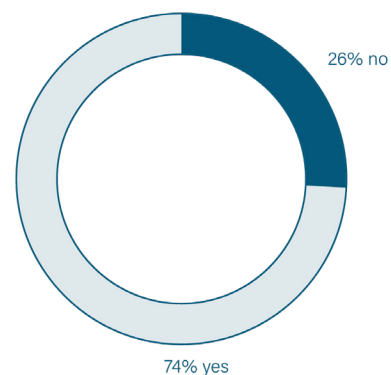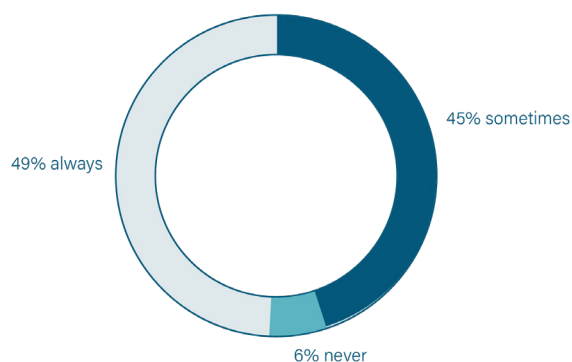Question: Do you "fact-check" the information you SHARE on your social media? (fact-check in this case is defined as confirming the accuracy or truthfulness of information using a third party website or literature)

45% sometimes
49% always
6% never

Question: Who do you think should be responsible for regulation of online content? (Select all that apply)

9% other
11% I don't believe it should be regulated
20% the government
22% individual users
38% social media & technology companies
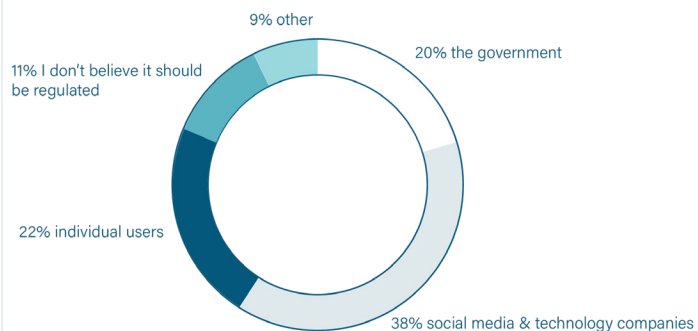
Question: How often do you re-share information on one or more social media platforms? (Specifically referring to information that is not original content created by you) (select only one)

26% never
% less than once a week
2% more than twice a day
6% once or twice per day
32% once every few weeks
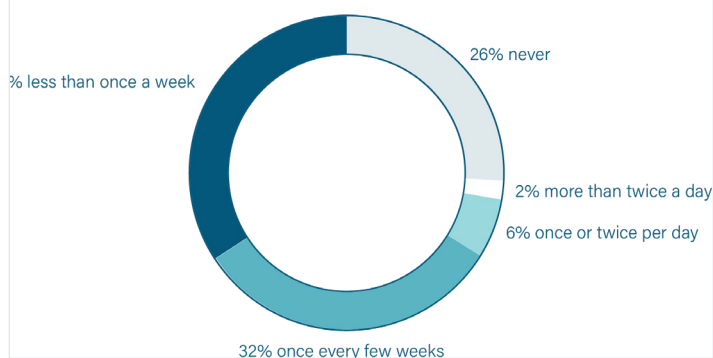
Question: If you selected "other" please specify

- Not sure who should do it but some regulations should be in place.
- I honestly don't know. This is such a tricky thing.
- I'm not sure I've seen a good answer to this question, most everyone, governments, corporations, even individuals have an agenda. Can exactly trust any existing entity to fairly regulate our content.
- Unions that represent social media consumers if they exist
- A mix of stakeholders to ensure distribution of power
- Professionals in the specific fields
- A non partisan group. Special body of various backgrounds

Appendix
Appendix B: Personas

Media & Publications

- Scientific & Academic Journals
- Independent Journalists
- News Media
  - National & Multinational Publications
  - Local Publications
  - Problematic "news" sites

Social Media Platforms

- CEO & Leadership
- Employees
  - Content Moderators
  - Designers, Developers, Engineers
  - Researchers, data scientists

Users

- "Average" Users
  - Individuals who Share Content
  - Individuals who do not Share Content
- Citizen Journalists
- Large User Accounts
- Fake News Producing Individuals
  - Financially Motivated
  - Ideologically Motivated
  - Socially Motivated
- Trolls
- Bot Accounts

Advertisers

- Advertising & Marketing Companies
- Companies Using Social Media for ads

Government & Policy Makers

- Legislators
- Analysts & Researchers
- Regulators

Educators

- Primary
- Secondary
- Post Secondary

Lawyers

- Technology Industry Lawyers
- Hate speech, Libel & Defamation Lawyers
- Data & Privacy Lawyers

Advocacy and Social Interest Groups

Academics & Researchers

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