Utilizing Social Media to Generate Interest and Increase Knowledge of Relevant Technologies

An Interactive Qualifying Project

Submitted to the faculty of WORCESTER POLYTECHNIC INSTITUTE

In Partial Fulfillment of the Requirement for the

Degree of Bachelor of Science and Bachelor of Arts

Submitted By:

Caitlyn Puiia

Evan Apinis

Eva Plankey

Thomas Kneeland

Submitted To:

On-Site Liaison: Stefan Scheidegger

Project Advisor: Professor Herman Servatius

Project Advisor: Professor Brigitte Servatius

13 October 2021

Abstract

Technology Outlook, a biannual publication of the Swiss Academy of Engineering Sciences (SATW) informs their members in the technology industry about recent technological trends. To spark interest in tech topics and promote discussions, we chose, using SATW's tweet data: blockchain's application in supply chain security, machine learning's application in factchecking, and misinformation of 5G. We then transformed those topics into narratives in a social media posting format that would help increase public interest and knowledge. To gauge the interest from our posts, we interviewed university students and got their opinions on the sample posts created. We finalized our project by revising example content based on the feedback and creating an outlined recommendation for social media posting.

Acknowledgments

The Techaware 2022 team would like to thank and recognize the following people, institutions, and companies for their involvement and support in our project:

- Swiss Academy of Engineering Sciences (SATW) for sponsoring our project and creating and giving us a collaborative and supportive workplace.
- Stefan Scheidegger, Project Sponsor at the SATW, for making our team feel welcome and at home in Switzerland and providing consistent feedback and support throughout our time abroad.
- Prof. Herman and Brigitte Servatius for being the sounding board of our project and for giving us feedback on our projects and papers.
- Prof. Nancy Burnham for both organizing this project and welcoming our entire cohort to Switzerland and helping our transition to a new place.
- Prof. Carol Stimmel for providing a concrete foundation for our project and paper and teaching us skills to use in the academic and professional worlds.

Executive Summary

Introduction

Social media is widely expanding and a well-known way to connect with new people and spread information all around the internet. Despite this vast exchange of information, there remains a lack of interest and knowledge of relevant, notable technologies. We chose topics based on data analytics and input from our sponsor. We felt that blockchain, machine learning, and 5G were important and relevant topics for Swiss society and should be explained further.

Since Switzerland is a true direct democracy the public's knowledge of certain topics can influence the way policy is formed and what is voted on. There are weekly votes within Switzerland and its legislative process is very people-forward and values the opinions of the citizens. This lack of knowledge and interest in more technical and technological topics has been a concern for the government and thus the Swiss Academy of Engineering Sciences was founded by the Swiss government. The Swiss Academy of Engineering Sciences (SATW) is a government organization dedicated to technology research and reporting. In their effort to promote technology and engineering sciences the SATW distributes a biannual report outlining emerging technologies to the public. This biannual report is called the *Technology Outlook* and explains certain technology topics that they feel will influence the Swiss economy and be useful to know when voting.

The goal of this project is to use social media as a tool that can be used to increase citizens' awareness and knowledge of the technology that impacts their lives. We worked with the Schweizerische Akademie der Technischen Wissenschaften (SATW) to analyze data from tweets collected from many university accounts to determine topics and subjects of interest. We then researched those topics and pulled narratives to produce sample social media posts about

said technological topics, along with an outline for their creation, that is designed to elicit engagement. Finally, we formulated our final round of content and a recommendation outlining the content of the social posts, the formatting of the posts themselves, and a plan for further implementation for the future.

Our Process

- We had initially started this project with the idea that we were going to make new social media accounts for the SATW and judge our feedback using analytical data given by the platforms themselves
- The SATW thought it would be a better idea to make mock posts and use focus groups to gain our feedback
- We had ideas of where to get our data such as surveys from the public but instead the SATW felt it would be easier for us to look at their Twitter databases
- Our sponsor felt it was beneficial for us to interview experts on the subject matter we chose as our topics
- We couldn't get as many interviews as we had hoped so we decided to make some posts about the one interview we had and then use our background research to use as the content for our other posts
- We made twelve posts in five subjects
- Due to a lack of time and lack of response for people to join our focus groups we had to change directions and figure out a new and effective way to get the feedback we had hoped for

- We decided that the table-sitting at one of the local universities in Zurich was our best bet. We decided to go and ask students sitting in common spaces to review our content in return for food and many thanks
- The feedback we received was amazing and the table sitting was an amazing idea. We took their feedback and revised our content to compile our final round of content for our recommendation to the SATW
- We revised five pieces of content to create examples for the SATW, one from each subject

Findings

The SATW primarily uses Twitter as its form of social media. They have databases of tweets containing specific technology buzzwords which is where we found our topics of interest. We used those databases to find the most tweeted topics and which ones trended upward in the years 2020-2021. We then took that data, along with the advice of our sponsor Stefan and the interests of our group members and formulated our list of three topics to focus our content on. We knew blockchain was a hot topic and security was a common topic concerning blockchain, leading us to our final topic of blockchain and supply chain security. Another topic that was highly tweeted about was machine learning and our sponsor had told us that using AI to assist in fact-checking was relevant which became our second topic. Our third and final topic was chosen by our sponsor, he felt that 5G and the discourse on social media and its misinformation regarding it was very important to address.

To get feedback on the content we created preliminarily we decided to table sit in the common spaces of the Eidgenössische Technische Hochschule (ETH), a local university in Zurich. We approached students and showed them our content and asked them a series of

questions to get their opinions. Using this feedback, we were able to change and create our final round of content that we revised.

University Student Feedback

The university students of the ETH gave us very helpful feedback regarding our first preliminary round of content. We created a coding system where we isolated the favorites of each topic category but also the most common types of feedback comments. We changed the aesthetics of our videos, recreated them with different backgrounds, and made sure they were more crowd appealing. We changed color schemes and bolded words, and we also changed the wording and the technical nature of some of the posts too.

We also found more feedback we can put into our recommendation for the SATW. Some of our content was not easily understood by non-English speakers and should be adapted for the language most spoken by the people the post is intended for. Since the SATW is in Zurich this language would most likely be Swiss-German.

Recommendations to the SATW

- The majority of published content should be in a video format. Stills such as infographics or text-based content provide a beneficial alternative. If the subject matter is very technical then a still based post is the better option.
- The preference for video length is between thirty and ninety seconds for the best audience retention rate.
- Videos need to contain an eye-catching title or thumbnail that indicates what the video will be about. In addition, the video also should contain subtitles to allow for the audience to read along with the audio.

- The most important aspects of stills are having strong color palettes and keywords. Contrast is important to guide the audience and allow for the post to be more readable. In addition, a still should have a professional theme.
- Regardless of content format there should be a translation of the post provided to the audience. For a video this can be translated into subtitles or have it dubbed in another language. This is especially important for technical based posts.

Table of Contents

Table of Figures

1.0 Introduction

Knowledge of technology and innovation among citizens provides important benefits to their nation. These benefits include improved national security, employment, education, and entrepreneurialism. In a democracy, experts and policymakers depend on an informed public. An informed public aids policymakers in their ability to understand people's opinions and experiences with recent technologies. Therefore, interest and enthusiasm among the public for technology advancement is a key factor to support ongoing public investment in the domains of research and innovation. In addition, citizens can directly impact how government investments are made through technology related referendums. Technology is evolving at an accelerating pace; the ability to keep track of the shifts and changes can be overwhelming for many. If the citizens are not interested, or uninformed, policy decisions may be ineffective or out of touch.

Our group believes that social media can be a tool used to increase citizens' awareness and knowledge of the technologies that impact their lives. We worked with the Schweizerische Akademie der Technischen Wissenschaften (SATW) to produce sample social media posts about technological topics, along with an outline for their creation, that is designed to elicit engagement. Switzerland is a technologically advanced country, but that does not necessarily translate into a Swiss public that is informed, engaged, or invested. Currently, the SATW releases a biannual *Technology Outlook*, this early technology detection report is meant to highlight and inform its audience on important technologies within Switzerland. This report, although well written, could reach more people in different forms, and therefore increase visibility for the technologies discussed within. There has been some effort in the past to address the low engagement with SATW's *Technology Outlook*. Previous Worcester Polytechnic

Institute (WPI) Interactive Qualifying Project (IQP) group projects have surveyed various samples of people in Switzerland to get a feel for their knowledge and familiarity with emerging technologies. They also surveyed what kinds of social media platforms Swiss citizens used most and what kind of media would be most useful to learn about emerging technologies.

The culmination of our project is a recommendation to the SATW containing sample content for social media use to increase engagement and interest in technology. We based this content on three distinct technologies and themes, machine learning and its application in fact-checking, blockchain and its application in protecting supply chains, and the misinformation surrounding 5G. Our data collection provided insights into how to style social media content for the best audience engagement and understanding. These insights came in the form of video lengths and formats, as well as still post text density and technology related technical wording. We used this data to generate finalized social media content as part of our recommendation to the SATW.

2.0 Background

Technology awareness and literacy are important aspects to societal improvement in the current digital age. The overarching goal for our project is: to help raise awareness and knowledge of technologies using social media. Having access to and knowledge of technology has been shown to have positive effects on society and a nation's citizens. When a nation's citizens are interested in technology, those citizens experience increased success in fields such as academics and entrepreneurship (Judson, 2010) (Yeganegi, 2021).

2.1 Importance of Technology Literacy for Society

Lack of quality information and awareness affects the world right now. Especially regarding technology, the sheer volume of informational sources available along with the difficulty in identifying false information can turn people away. Project groups have worked with the SATW in the past through WPI to address the problem of the public's lack of interest in emerging technologies. The most recent 2021 IQP focused on raising technology awareness in Switzerland, stated in their project that, "raising public awareness about emerging technologies has been a long-running problem" (Kiai et al, 2021). Technology and innovation are rapidly expanding as technology progresses, and with new innovations and advances occurring so frequently, it may be difficult to keep up with them. Because of the speed at which development happens, some people may not become informed or aware of trends, which not only allows misinformation to fester but slows societal improvement. The SATW believes "Technological development is overwhelming society. This is shown by the fake news surrounding climate change, the mobile technology 5G, but also the skepticism about the COVID-19 vaccination. A population that is left behind by technological development is neither in the spirit of educated politics nor of a functioning society. That's why it's of elementary importance that the general

public, as diffuse as this term is, keeps coming into contact with how new technologies work, their opportunities and risks, and is informed independently and neutrally." (Stefan Scheidegger SATW, private communication (September 5, 2022))

Having awareness and knowledge of technology, especially new and emerging developments, is important to the success of a nation and its people. Awareness and knowledge of technology has several individual and collective benefits. These benefits include improvement in fields of entrepreneurship and general policymaking.

2.1.1 Technological Innovation's Impact on Society

Technological innovation impacts and progresses a society by creating new educational opportunities. Education and technology literacy will in turn further technological innovation, in a positive feedback loop. Students that achieve higher levels of education may help in advancing their nation's achievements related to innovation. Teaching students more technological skills has been shown to increase the students' confidence in their academic ability. Additionally, technology literacy provides students with a wider set of tools to strengthen or supplement their personal learning habits, leading to better performance (Judson, 2010). Through multiple studies that investigated the relationships between students and their technology, it was "perceived that sometimes technology could facilitate entry to academic achievements" (Judson, 2010, pp. 282). If more innovative technology is being created, then there exists more learning opportunities for students, allowing them to excel. The students learning more about and excelling in technology will have more chances to be involved in business and entrepreneurship because of technological knowledge. Technological literacy is essential to the growth and success of entrepreneurialism. Research indicates that access to technological information leads to a higher number of successful entrepreneurs. These entrepreneurs are also willing to pursue higher-end technological

ventures when compared to their counterparts who do not have the same level of resources (Yeganegi, 2021). Information access also increases the strength of the intellectual property created by said entrepreneurs, and the volume of properties created (Yeganegi, 2021).

The knowledge surrounding technology plays a significant role in government policy. For policy relating to technological topics to be in the public's best interest, it requires knowledge from both the policymakers and the public. Innovative technologies have the potential to need regulation by policymakers, and these regulations will affect future technology and how it will be able to connect with the public. For example, in the Netherlands, the Participatory Technology Assessment (pTA) is used to help represent typical citizens, who are not technology experts and are often overlooked when assessing technology or with policy creation. The pTA utilizes consensus boards, which give experts and policymakers a way to see and understand the general public's opinions and experiences. From this, they create avenues for informed conversation around science, technology, and policy. They also give experts a chance to inform policymakers and members of the population (Sclove, 2010). Due to the structural differences in government between the Netherlands and Switzerland prior knowledge of the Swiss system of innovation is required to understand its impact on policy.

2.1.2 Switzerland's System of Promoting Innovation

Switzerland has a successful history of innovating due to its funding and organizational structure. Derindag claims that innovative success has strong connections to research and development infrastructure as well as education (Derindag, 2021). There are two main governing bodies responsible for the public funding of research and development, these are the *Federal Department of Economic Affairs, Education and Research* (EAER) and the *State Secretariat for Education, Research, and Innovation* (SERI) (Derindag, 2021). These organizations are federally

funded, connecting their activities and expenditures with the interests of the Swiss public. In contrast, at the Swiss canton level there is a responsibility to fund universities as part of the commitment to promoting research. This responsibility to provide funding is part of following the Federal Act on the Promotion of Research and Innovation Article 11, known as RIPA.

Our project sponsors the SATW works in technology information, citizen connections, research funding, and policy influence. Its mission is to spread information and grow communication surrounding technology trends, to help people form well-educated opinions, and to advance Swiss technology development (Swiss Academy of Engineering Sciences, 2022). The group is a member of a larger organization: the Swiss Academies of Arts and Sciences. The Swiss Academies of Arts and Sciences is the largest academic network in Switzerland and provides research funding for projects undertaken by Swiss scientists and researchers. (Swiss Academies of Arts and Sciences, 2022). One example of these funds is the Germaine de Staël program. This program promotes collaboration between researchers from Switzerland and France by providing research teams with funding (Swiss Academies of Arts and Sciences, 2022).

2.1.3 Innovation's Impact on Policy in Switzerland

In Switzerland, the connection between public affairs and policy is that of a direct democracy where citizens vote directly on issues. This is essential when arguing for technology awareness, as there may be policy issues that citizens must vote on, and they need to be aware to make an educated decision for their vote. While exploring the public perception of risks associated with new electricity generation projects and their effects on laws, Volken explains that "especially in Switzerland, with a direct democracy, public acceptance could critically inhibit or facilitate new electricity generation projects locally, but also at national level" (Volken, 2019). Switzerland's direct democracy highlights the importance of technological literacy and

knowledge to make effective regulations. If the citizens are not interested, or uninformed, those regulations will not be as effective and may not represent the people's opinions. This perspective helps clarify the important connection between informed public members and policymakers needed for effective regulations. The following paragraph covers electronic identification within Switzerland as an example to illustrate the importance of technology literacy among the public and policymakers.

Electronic identification in Switzerland displays the importance of the connection between the public and policymakers. Most forms of e-commerce and online payments require a form of electronic identification- typically including a username and password (The Federal Council, 2022). This method of identification is not regulated by any governing body. The Federal Act on Electronic Identification Services (e-ID Act) was created by the Federal Council and Parliament to develop a method of regulated governed electronic identification referred to as e-ID (The Federal Council, 2022). The original proposal for e-ID was rejected by the Swiss citizens at a referendum on March 7, 2021. Following the proposal's rejection, the Federal Council has continued to pursue e-ID and opened a consultation period to develop a plan for designing an electronic identification system that runs from June 29 to October 20, 2022 (Federal Office of Justice, 2022). During the media release on June 29, 2022, the Federal Council addressed the concerns of voters from the March 7 proposal relating to data protection: "Data protection should - as demanded in the motions - be guaranteed by the system itself (privacy by design), but also by minimizing the necessary data flows (principle of data economy) and decentralized data storage" (Federal Office of Justice, 2022). A paper written by Michael Kuperberg, titled *Blockchain Usage for Government-Issued Electronic IDs: A Survey*, explains how blockchain uses a decentralized data storage approach and as such proves itself to be trusted

(Kuperberg et al, 2019). This ongoing policy with electronic identification highlights and shows the importance of technology literacy to Switzerland and the necessity for information.

2.2 Technological Concepts and Their Connection to Society

Innovative thinking contributes to the development and success of a nation. Today, innovation is deeply connected to the fields of science and technology; it is so strongly correlated that these subjects cannot be separated from the concept of innovation (DuBois, 2017). Technology concepts we used in this project include machine learning, blockchain, and 5G. These technologies are both widely talked about in public discourse spaces and have effects on Swiss society. Two of these effects to be further elaborated upon are blockchain's on national security and the prevalence misinformation on the internet associated with 5G. Due to these effects, it is extremely important for members of society to understand them. Innovation in technology holds the key to unlocking societal benefits, especially in the areas we discuss. This key can only be turned if the citizens are informed and have their concerns addressed for the relevant technologies.

2.2.1 Blockchain's Application In Supply Chain Security

Both national security and personal security are large focuses of most nations and are often addressed with technological innovations creating solutions. A nation's ability to remain competitive and technologically advanced relies upon its ability to be innovative. The benefits of this ability to remain competitive are seen on the national security level; failing to stay technologically competitive or innovative poses risks to both global power and national security (Atkinson, 2021).

With the increased progress of technology, technologies such as blockchain have become useful in protecting against the new front of threats and issues online. An issue associated with

combat being faced by nations is supply chain attacks. Blockchain is being leveraged to protect national security industrial bases from being targeted. Cybercriminals have been known to use "digital networks for surveillance, theft, and sabotage" (Hsieh & Ravich, 2017). Due to the globalization of manufacturing supply chains, attacks on industrial-based machines are emerging rapidly. These attacks are through methods of maliciously modified electronic components being introduced into the hardware that industrial-based machines operate on. Using blockchain technology, the structure of the data produced by large industrial corporations "can be transformed to enable new kinds of forensics that can defeat these attacks at scale" (Hsieh & Ravich, 2017).

2.2.2 5G and Misinformation Surrounding It

Every innovation gives rise to a spread of information that could be potentially harmful as it relates to rumors and misconceptions. Whilst there exists positive and useful information there is also information that is neither the truth nor the full truth. The idea of false information or simply misconceptions is evident with the introduction of 5G. There is a misconception amongst many Swiss citizens that 5G is inherently dangerous (Frey, 2021, p. 1592). Despite numerous networking advancements made possible by 5G's capabilities, there are Swiss people who are protesting in favor of limiting its use for fear of their physical safety (Frey, 2021, p. 1592). In fact, some are even worried that 5G radiation could kill them. There are concerns that people who subscribe to this misinformation about 5G may be able to make differences in Swiss polls, voting for restrictive policies (Frey, 2021, p. 1593). While there is a grain of truth in these rumors, it is being blown out of proportion. Excessive amounts of prolonged exposure to radio frequency waves (RF) and electromagnetic fields (EMF) can lead to health risks such as cancer, but the volume of exposure that a person is going to realistically experience in their lifetime will

not be high enough to cause concern (Das, 2021). We have seen similar concerns in the past with older technologies, but it has never constituted a public health crisis. The exposure caused by 5G is measured to be "similar to that from existing mobile phone base stations," so there is negligible risk in transitioning from older cell stations to 5G stations (Das, 2021). It is imperative that Swiss citizens avoid misinformation, so that they are not persuaded into making questionable choices that they would not otherwise make. If people are misled into believing that 5G could kill them, then they will not receive the benefits that 5G can offer. Fortunately, there exists methods to debunk these false narratives created by misinformation.

2.2.3 Machine Learning Used For Fact-Checking

Despite the example of misinformation related to new innovations described with 5G, existing innovations such as machine learning can help slow the spread or correct the information. When it comes to fighting misinformation, tools fueled by machine learning have proven to be effective (Sushila & Vahida, 2022). (Sushila & Vahida, 2022). Verification and fact-checking sites are leading tools right now to stop misinformation. There are websites one may visit to find out whether a circulating story is true or not such as Snopes or Fullfact; some fact-checking companies even leave seals of approval on news outlet posts, letting users know that the article is trustworthy. However, the manual review of circulating stories that is done by humans can take some time, and human reviewers can only cover so many stories at once. Therefore, if a misleading story gains traction quickly enough, the damage can already be done before the human fact-checkers have the time to take notice and post their reviews (Sushila & Vahida, 2022). A computer-controlled verification algorithm, however, can verify/falsify data instantly, putting abrupt ends to misleading posts before they can gain traction (Sushila & Vahida, 2022). To put this in practice, researchers fed an algorithm "a real-world dataset for rumor and non-rumor events from Twitter" (Sushila & Vahida, 2022). This way, the algorithm

had a repertoire of examples displaying what real and false posts were composed of. Using that dataset, a deep-learning algorithm was able to use pattern recognition to distinguish between factual and fake news (Sushila & Vahida, 2022). This "rumor detection" technology also becomes more effective the more it is used; every item that it looks at is then saved to its memory, adding to the repertoire (Sushila & Vahida, 2022). The technologies of blockchain and machine learning have shown their ability to benefit society. On the contrary, 5G has shown that its benefits are potentially being masked by misinformation. For these three technological innovations to be utilized to their fullest potential, knowledge about their applications is required, such as machine learning's usefulness in fact-checking.

2.3 Social Media As A Tool

Social media can be a powerful tool for education and generating enthusiasm about a particular subject. While many organizations use social media to promote or attempt to sell a product, social media can also be useful in engaging with an audience to deliver an informational narrative (Dolan, 2019). By creating research-backed recommendations for social media posts along with examples of such, the project assists the SATW in their mission to increase engagement with and understanding of technology information. Before being able to create social media narratives, it is crucial to understand key aspects of social media and engagement, and how it relates to visibility for the concepts discussed. The SATW works primarily with the social media platform Twitter. Understanding the demographic of twitter users and how engagement functions on this platform is crucial. This was beneficial to our creation of social media content as part of our recommendation to the SATW on how to use social media as a tool to raise technology interest.

2.3.1 How social media can support innovation

Within social media the ability to debate, defend, and discuss new innovative technologies is beneficial to the spread of information. The essence of social media is "rooted in the connections and relationships it enables" (Bhimani et al., 2019). These connections can help spread information about the new and emerging technologies that are created within Switzerland. There is also increased use of social media and related technologies within different companies. The increased use develops an innovative approach, accompanied with tools to connect with many aspects of the innovation ecosystem (Bhimani et al., 2019). Social media fosters communication and connects people and companies to others who may be interested in collaborating or getting involved in the scientific sector. One very public example of how businesses can leverage social media is the study, *The case of the Finnish company Nokia's creation of WP7 mobile phone*, by Bhimani et al. This example shows how social media was used to generate and develop ideas through information sharing (Bhimani et al., 2019). Social media has also been used in an influx of social media-related articles and literature which might show and suggest a shift in acceptance of social media and use on a wider scale (Bhimani et al., 2019).

2.3.2 Past support and Projects

In 2021, a project group was given a prompt like ours to work on "stories" that can be used to inform the public about recent technologies. The previous group found that "the average Swiss citizen obtained their information about AI (Artificial Intelligence) through the internet, notably…social media platforms" (Kiai et al, 2021). A 2017 IQP team reinforced that social media and internet news properties were predominant in the public's ability to gain knowledge about advanced technologies (Tomboulides, at al. 2017). Using SATW's official Twitter, a survey was conducted that found that their audience used primarily Twitter, Facebook, and

LinkedIn as social media, so these platforms were the focus of the research group. The 2021 group created comic-style posts to be put on Twitter, based on additional surveys asking the audience what technologies were of interest or low knowledge. The project group acknowledged that this is a small sample size and is made up of SATW's regular audience which is people who are already engaged in technology awareness and have an interest in it (Kiai et al., 2021). Their work solidifies the conclusion that social media can help with the dissemination of information by bringing innovative concepts to the people in a more digestible and entertaining way. Creating interactive and entertaining social media posts and surveys can aid in increasing interest about technology and innovation in Switzerland.

2.3.3 Platform: Twitter

Twitter was established in 2006. Come 2015, it was the third most popular social media platform by active users (Chaffey, 2016). The platform has not sustained the growth seen previously or by other social media platforms as in 2021 the social media platform ranks seventh amongst the most widely used social media platforms (Auxier, 2021). Twitter is very formal and informational and is now more of a professional platform than in the past. Twitter, unlike many other social media platforms, contains a character limit. This limit of 280 characters means that a large post containing solely text with more than 280 characters would need to be broken up into a series of tweets. The type of posts seen on twitter include text based, picture based, and video based. There is also the ability to add links within tweets to reference an article for viewers to open. Engagement types seen on Twitter include likes, comments, and retweets. A retweet is when someone sees a tweet from another account and chooses to reshare it to their account. This is how engagement and visibility are measured on Twitter since unlike other platforms it does not track the views of posted content. Retweets are especially important, as they increase the

visibility of an account to users outside of their standard audience which improves the number of views and potentially a posts engagement.

2.3.4 Developing Engaging Narratives

Many studies have focused on how to provide information to the public in the best way possible, and some have concluded that answering broad questions is a better approach than deciding what information people should know (Volken, 2019). This ties into the fact that the audience is who decides how successful a post is, or how much activity it gets (Davids, 2021). One must answer questions to be respectful to the audience, so that the post can get more engagement and visibility.

Attention to and engagement with a post can be measured by views, likes, shares, and comments. In addition, likes and comments on social media platforms such as Instagram and Facebook are indicative measures of consumers' reactions to organizations' narratives (Dhanesh, 2022). Research has shown that content containing images or visual aids generate greater levels of engagement between the consumers and the organization (Dhanesh, 2022). The same research provides a comparison between visuals and word text that indicates visuals generate more engaging content (Dhanesh, 2022). It is also within the scientific space as this methodology has been used on social media to promote and improve vaccination confidence regarding the COVID-19 virus (Chen, 2022). Increasing engagement in content through visuals is important regarding the effectiveness of social media posts. The authors of *Social media engagement behavior: A framework for engaging customers through social media content* explain in their research that “while many managers may expect that highly entertaining content is likely to be the most viral in terms of increasing likes, shares, and comments, this study’s findings demonstrate that this result is not the case regarding the generation of shares and comments”

(Dolan, 2019, p. 2233). These results indicate that using a method of increasing the engagement on a post such as visual aids is important since content going viral cannot be depended upon.

3.0 Methodology

We established three objectives that helped us reach our goal and create our deliverable of example content. They are determining our focus topics, creating well-researched content, and then finalizing content. Our first two weeks were spent determining our focus topics with the SATW. We then did outside research as well as contacted experts to create content for the third and fourth weeks. In the fifth week, we gathered opinions and used them in the sixth week to create finalized example content which was used for our recommendation presentation to the SATW in the seventh week.

3.1 Collecting Tweet Information

The first objective focused on understanding the most relevant technology topics in Switzerland and Europe. This was necessary as it permitted the ability to generate valuable and practical content. The ideal outcome was to find technological topics that were both socially relevant to the public and important to developing society. We investigated public policy and found technology-related topics that helped us determine a well-rounded list of topics. We used data given to us by the SATW to pick out all the tweets containing the topics that we had chosen, and discovered what themes connected to them received the most engagement. Using this, we then formulated a good foundation of ideas and themes to use when researching for our content creation.

3.1.1 Determining Technological Topics

To determine our focus topics, we used a database provided by the SATW that contained every tweet from verified university Twitter accounts in Europe regarding technology. Specifically, we looked at university tweets from Switzerland, Austria, Germany, France, Israel, Italy, and the United Kingdom. These countries were selected to align with the SATW's research regarding their biannual technology outlook. The SATW's Twitter database contained the total

number of tweets per year for all tracked technology topics and provided information about the tweets' origin. The data shown was represented as percentages of the tweets for each specific topic over the total number of tweets collected.

After collecting the number of tweets made under each topic, we determined the topics that were most frequently mentioned by universities from 2020 to September 2022. To determine the most talked about technologies, we looked at the number of tweets each technological topic had from and sorted them by the most tweeted about and least tweeted about. We also looked at which topics increased or decreased in tweets over the span of these two years. For us to accurately model the discourse between universities and the public we created a short list of topics to choose from. To be added to this list the topic needed to be top five in relevancy for 2020 and 2021. The same topics also had to have had a positive change in discourse between the two years. From the short list we compiled of technologies, we then selected topics to focus our content generation on. We consulted with the SATW to cross-reference this list of focus topics with policy referendums occurring during the latter stages of 2022 and early 2023 to find a correlation or alter our topics of focus.

3.1.2 Determining Specific Themes

After having found our topics of interest, we proceeded to zone in on tweets made only by Swiss universities that related to those topics. Using resources provided by the SATW database, for each of our topics we obtained a list of tweets posted from 2020 onwards that contained any key words or phrases relating to the topic itself. For each tweet collected, in addition to its content we also took note of which account posted it, the date that it was posted, the link to the tweet itself, and its "popularity number." The popularity number for a post is simply a summation of the number of likes, retweets, and comments that a post has received; this

gives a good representation of how engaging a tweet is. Once these lists were obtained, we were ready to begin coding them to find trends.

To help us understand the patterns of the tweets and their popularity, we created a coding system for the tweets pertaining to our chosen topics. In that coding system, tweets were given keywords and then placed into more generalized categories, such as ethics, medicine, or interviews. This coding system helped us see the different topics addressed by these accounts and how prevalent each topic was. It also helped us determine the type of content or style that garners the most engagement. These broader categories were then consolidated into a smaller set of even more generalized categories, such as STEM or politics. This revealed a better view of the popular contexts that our focus topics were in. See Appendix A as a sample of our coding and categories. A "normalized popularity number" was then calculated for each of the broad categories. The normalized popularity number for each category was created by dividing the total popularity number of all tweets in a category by the number of tweets themselves in the category, representing how visible an average tweet for that category is expected to be. The popularity number on each individual tweet is how we made inferences about the style of content that gets the most interaction, i.e., pictures, videos, or links. Using the normalized popularity number calculated in our coding system showed which content category gets the most interaction, i.e., cultural, political, or STEM. We started to create an outline for the styling by taking note of tweets that were more popular than others and observing if they utilized certain wording, pictures, videos, or article references.

3.2 Create Well-researched Content

The second objective in our work was to create preliminary social media content. It was in our best interest to make sure we had a well-rounded understanding and knowledge about the

topics and themes we were working on. This was primarily done through additional research on each specific topic by reading academic papers. We hoped to meet with experts on these topics as well, but were only successful in meeting with one, Dr. Karl Aberer. He is a professor at the EPFL working in information systems and served as our expert in the field of machine learning and fact-checking. It was a semi-structured interview, and the list of sample questions can be found in Appendix C. This interview was held over zoom which allowed us with his consent, to record the interview. Following the completion of the interview we transcribed the recording.

For our content creation we aimed to provide a well-rounded variety of content styles. To do this we used the same information but would reframe the post to be in different forms. It was important to keep the information consistent as it allowed us to directly compare the delivery methods. The content forms used were videos, animations, and stills. Stills is a category containing anything text based with no movement. Most of the content was created using our research from academic papers, but we also used the interview with Dr. Aberer to create videos and infographics.

3.3. Analyzing and Refining

In order to refine and finalize our content, we needed to gather opinions on how an audience, like that present on social media, would react to it. We did this by going to ETH Zurich and approaching students to ask them for a few minutes of their time to participate in a research study. The consent form used to participate in this study can be found in Appendix B. We then would show them one section of our content with at least one still and at least one video. Our content sections were blockchain basics, blockchain and supply chains, machine learning basics, machine learning and fact-checking, and 5G and misinformation. We then asked predetermined questions as seen in Appendix D. We recorded their answers into a spreadsheet

and coded them to find what critiques and opinions were shared the most among respondents. We then created a second batch of finalized and subjectively good content, based upon the use of the audience feedback. *Good content* is content that people understand, want to see, and are likely to interact with. This batch consisted of five pieces, they were chosen based upon being the most successful and favorite among respondents for each section of our content. These revised pieces of content were our sample content based upon our findings presented to the SATW as part of our recommendation for social media usage.

4.0 Our Content and Explanations

The result of this project was an outline of recommendations packaged with sample content that we presented to the SATW. This demonstrates social media's role in raising interest in and awareness of technologies, as well as explaining how content can be set up to increase visibility.

4.1 Topic Selection and Content

The data we obtained and analyzed from the SATW, as well as discussions with our sponsor, led us to focus on three major concepts: machine learning as it relates to fact-checking, 5G as it relates to misinformation, and blockchain as it relates to supply chain security. Regarding machine learning, we found that politics was the most engaging theme, from which we narrowed in on fact-checking. 5G was chosen as a topic to look at misinformation, and we also found that it was the most mentioned theme. Blockchain was most engaged with when it was discussed with security, and we narrowed that down to supply chain security for our research.

year	2020									
Sum of count	country									
concept	Austrian	Dutch	French	German	Israeli	Italian	Swedish	Swiss	UK	Grand Total
TO2021 5G	2.21%	1.63%	6.35%	3.12%	0.00%	6.96%	2.17%	1.89%	6.62%	4.97%
TO2021 additive manufacturing	7.18%	8.13%	8.40%	15.69%	15.15%	3.77%	17.39%	6.44%	22.86%	12.02%
TO2021 alternative fuels	1.66%	4.07%	0.96%	3.70%	6.06%	1.74%	2.17%	2.27%	1.95%	2.10%
TO2021 antimicrobial polymers	0.00%	0.00%	0.00%	0.19%	3.03%	0.29%	0.00%	0.00%	0.30%	0.14%
TO2021 Artificial Photosynthesis	0.00%	0.00%	0.06%	0.19%	0.00%	0.58%	0.00%	0.00%	0.00%	0.12%
TO2021 augmented reality	11.60%	4.07%	6.86%	12.67%	0.00%	8.41%	6.52%	12.50%	8.57%	9.07%
TO2021 autonomous vehicles	4.42%	6.50%	1.92%	7.60%	6.06%	0.58%	4.35%	2.27%	4.66%	3.94%
TO2021 big data analytics	3.87%	2.44%	18.21%	5.17%	0.00%	7.83%	8.70%	4.55%	7.52%	10.37%
TO2021 biocatalysis biosynthesis	0.55%	0.00%	0.06%	0.58%	0.00%	0.00%	0.00%	0.38%	0.00%	0.21%
TO2021 biopolymers bioplastics	0.55%	4.07%	0.32%	0.78%	0.00%	2.61%	2.17%	0.76%	1.80%	1.01%
TO2021 bioprinting	1.66%	0.00%	0.13%	0.10%	0.00%	0.58%	0.00%	0.38%	0.00%	0.21%
TO2021 blockchain	14.36%	1.63%	7.44%	3.41%	0.00%	6.67%	2.17%	8.33%	2.26%	5.66%
TO2021 cobots	0.55%	1.63%	0.51%	1.17%	3.03%	0.87%	0.00%	1.14%	0.15%	0.73%
TO2021 connected machines	0.00%	0.00%	0.83%	0.58%	0.00%	0.58%	0.00%	0.76%	0.60%	0.64%
TO2021 decentralized energy systems	0.00%	0.00%	0.19%	1.46%	0.00%	0.00%	0.00%	0.38%	0.00%	0.45%
TO2021 digital twin	0.55%	2.44%	0.90%	0.29%	0.00%	0.29%	6.52%	0.00%	0.00%	0.59%
TO2021 drones	5.52%	7.32%	4.55%	3.41%	9.09%	4.93%	0.00%	6.44%	7.97%	5.07%
TO2021 functional fibers	0.00%	0.00%	0.26%	0.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.16%
TO2021 future protein sources	0.00%	3.25%	0.13%	0.78%	0.00%	0.00%	2.17%	0.00%	0.60%	0.45%
TO2021 geothermal energy	0.00%	0.00%	0.51%	1.46%	0.00%	0.58%	0.00%	2.65%	0.15%	0.78%
TO2021 Internet of Things	6.08%	6.50%	16.22%	3.70%	0.00%	4.35%	4.35%	4.92%	2.41%	8.39%
TO2021 large-scale energy storage	1.66%	2.44%	0.83%	3.51%	0.00%	0.29%	0.00%	0.76%	1.20%	1.56%
TO2021 laser surface processing	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TO2021 machine learning	8.29%	6.50%	10.96%	6.24%	3.03%	10.43%	10.87%	8.71%	6.32%	8.60%
TO2021 medical wearables	6.08%	1.63%	2.69%	2.53%	0.00%	2.03%	0.00%	6.82%	3.91%	3.11%
TO2021 microbiome	7.18%	0.81%	0.96%	1.66%	12.12%	3.48%	0.00%	4.92%	1.20%	1.96%
TO2021 mobile robot	1.10%	2.44%	0.32%	0.97%	0.00%	0.87%	0.00%	0.38%	0.45%	0.64%
TO2021 mobility concepts	1.66%	3.25%	3.53%	5.17%	3.03%	12.46%	0.00%	1.89%	3.46%	4.41%
TO2021 optical space communication	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TO2021 personalized food	0.00%	0.00%	0.06%	0.10%	0.00%	2.03%	0.00%	0.00%	0.30%	0.26%
TO2021 photovoltaics	1.66%	13.01%	1.79%	6.73%	24.24%	6.67%	10.87%	8.33%	4.36%	4.78%
TO2021 point-of-care diagnostics	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.15%	0.02%
TO2021 quantum cryptography	0.00%	0.81%	0.13%	0.10%	0.00%	0.29%	2.17%	0.00%	0.00%	0.14%
TO2021 Quantumcomputing	8.84%	9.76%	1.35%	3.02%	3.03%	2.90%	4.35%	3.41%	1.80%	2.69%
TO2021 recycling of rare earths	1.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%
TO2021 SCION	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TO2021 smart grids	0.00%	1.63%	0.90%	0.97%	0.00%	1.16%	2.17%	0.38%	1.35%	0.97%
TO2021 stem cells	1.10%	0.81%	0.96%	1.36%	3.03%	2.32%	8.70%	4.55%	4.36%	2.03%
TO2021 surgical robots	0.00%	0.81%	0.32%	0.58%	6.06%	2.61%	0.00%	0.38%	0.30%	0.61%
TO2021 sustainable food systems	0.00%	1.63%	0.00%	0.00%	0.00%	0.87%	2.17%	0.38%	2.26%	0.52%
TO2021 synthetic biology	0.55%	0.81%	0.38%	0.68%	3.03%	0.00%	0.00%	3.03%	0.15%	0.59%
TO2021 thermal interface materials	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Grand Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Figure 1 - 2020 Tweet Data

year	2021									
Sum of count	**country**									
concept	**Austrian**	**Dutch**	**French**	**German**	**Israeli**	**Italian**	**Swedish**	**Swiss**	**UK**	**Grand Total**
TO2021 5G	3.76%	0.00%	4.84%	2.82%	0.00%	4.45%	0.00%	1.06%	2.88%	3.47%
TO2021 additive manufacturing	6.57%	6.93%	6.81%	8.58%	12.50%	4.87%	1.96%	2.64%	11.65%	7.37%
TO2021 alternative fuels	1.41%	0.00%	1.24%	4.18%	5.00%	1.91%	0.00%	1.06%	2.01%	2.05%
TO2021 antimicrobial polymers	0.47%	0.00%	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	0.14%	0.07%
TO2021 Artificial Photosynthesis	0.47%	0.00%	0.20%	0.73%	0.00%	0.21%	0.00%	1.06%	0.14%	0.38%
TO2021 augmented reality	6.57%	3.96%	8.90%	10.98%	2.50%	8.26%	1.96%	10.03%	12.09%	9.52%
TO2021 autonomous vehicles	6.10%	4.95%	3.08%	7.74%	0.00%	2.75%	5.88%	1.32%	4.03%	4.24%
TO2021 big data analytics	3.29%	2.97%	16.23%	4.08%	0.00%	10.17%	1.96%	5.01%	2.88%	8.68%
TO2021 biocatalysis biosynthesis	0.00%	0.00%	0.00%	0.52%	0.00%	0.00%	0.00%	0.53%	0.14%	0.18%
TO2021 biopolymers bioplastics	0.00%	0.00%	0.79%	0.84%	2.50%	1.27%	0.00%	0.53%	1.01%	0.81%
TO2021 bioprinting	1.41%	0.00%	0.26%	0.31%	5.00%	0.21%	1.96%	0.53%	0.14%	0.38%
TO2021 blockchain	14.55%	0.99%	11.06%	4.18%	7.50%	6.14%	9.80%	10.55%	6.91%	8.25%
TO2021 cobots	0.47%	0.00%	1.11%	1.26%	0.00%	2.75%	3.92%	0.26%	0.43%	1.10%
TO2021 connected machines	2.82%	0.99%	1.31%	0.10%	0.00%	1.69%	0.00%	0.00%	0.72%	0.92%
TO2021 decentralized energy systems	0.00%	0.00%	0.07%	1.36%	0.00%	0.00%	0.00%	0.00%	0.14%	0.34%
TO2021 digital twin	3.29%	0.99%	1.96%	1.36%	0.00%	0.42%	0.00%	2.90%	1.44%	1.67%
TO2021 drones	3.29%	8.91%	6.09%	3.97%	2.50%	4.45%	11.76%	6.07%	8.35%	5.77%
TO2021 functional fibers	0.47%	0.00%	0.07%	0.31%	0.00%	0.21%	0.00%	0.00%	0.43%	0.20%
TO2021 future protein sources	0.00%	1.98%	0.07%	0.42%	0.00%	0.85%	0.00%	0.00%	0.43%	0.32%
TO2021 geothermal energy	0.00%	0.00%	1.05%	1.26%	2.50%	0.64%	0.00%	2.37%	0.72%	1.04%
TO2021 Internet of Things	3.29%	14.85%	9.03%	2.51%	0.00%	3.18%	0.00%	2.11%	3.60%	5.23%
TO2021 large-scale energy storage	0.00%	1.98%	0.59%	4.29%	0.00%	0.21%	7.84%	0.79%	1.01%	1.51%
TO2021 laser surface processing	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TO2021 machine learning	13.62%	9.90%	8.77%	7.95%	12.50%	7.42%	21.57%	15.57%	6.62%	9.13%
TO2021 medical wearables	3.76%	0.00%	2.23%	2.30%	2.50%	2.12%	3.92%	3.17%	3.74%	2.59%
TO2021 microbiome	4.23%	2.97%	1.18%	2.09%	15.00%	3.18%	5.88%	3.69%	1.15%	2.16%
TO2021 mobile robot	0.47%	1.98%	0.33%	0.73%	0.00%	0.21%	0.00%	0.26%	1.15%	0.56%
TO2021 mobility concepts	2.35%	3.96%	5.37%	7.95%	0.00%	14.83%	1.96%	4.75%	4.32%	6.45%
TO2021 optical space communication	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TO2021 personalized food	0.00%	0.00%	0.20%	0.00%	0.00%	3.81%	0.00%	0.00%	0.43%	0.54%
TO2021 photovoltaics	4.23%	14.85%	2.62%	7.95%	15.00%	3.81%	7.84%	12.14%	10.50%	6.47%
TO2021 point-of-care diagnostics	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%	0.02%
TO2021 quantum cryptography	0.47%	0.00%	0.20%	0.00%	2.50%	0.21%	0.00%	0.53%	0.00%	0.18%
TO2021 Quantumcomputing	7.04%	3.96%	2.23%	6.38%	5.00%	2.54%	7.84%	4.75%	2.16%	3.72%
TO2021 recycling of rare earths	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TO2021 SCION	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TO2021 smart grids	0.47%	1.98%	0.59%	0.73%	0.00%	0.64%	1.96%	0.00%	2.16%	0.86%
TO2021 stem cells	2.82%	1.98%	0.33%	1.26%	5.00%	3.60%	0.00%	2.90%	2.45%	1.62%
TO2021 surgical robots	0.00%	0.99%	0.39%	0.00%	0.00%	1.48%	0.00%	1.06%	0.72%	0.52%
TO2021 sustainable food systems	0.47%	7.92%	0.33%	0.21%	0.00%	1.06%	1.96%	0.00%	3.02%	0.97%
TO2021 synthetic biology	1.88%	0.00%	0.52%	0.63%	0.00%	0.42%	0.00%	2.37%	0.14%	0.68%
TO2021 thermal interface materials	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Grand Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Figure 2 - 2021 Tweet Data

year	(Multiple Items)									
Sum of count	country									
concept	Austrian	Dutch	French	German	Israeli	Italian	Swedish	Swiss	UK	Grand Total
TO2021 5G	3.05%	0.89%	5.60%	2.98%	0.00%	5.51%	1.03%	1.40%	4.71%	4.21%
TO2021 additive manufacturing	6.85%	7.59%	7.61%	12.26%	13.70%	4.41%	9.28%	4.20%	17.13%	9.65%
TO2021 alternative fuels	1.52%	2.23%	1.10%	3.94%	5.48%	1.84%	1.03%	1.56%	1.99%	2.07%
TO2021 antimicrobial polymers	0.25%	0.00%	0.00%	0.10%	2.74%	0.12%	0.00%	0.00%	0.22%	0.10%
TO2021 Artificial Photosynthesis	0.25%	0.00%	0.13%	0.45%	0.00%	0.37%	0.00%	0.62%	0.07%	0.25%
TO2021 augmented reality	8.88%	4.02%	7.87%	11.86%	1.37%	8.32%	4.12%	11.04%	10.37%	9.30%
TO2021 autonomous vehicles	5.33%	5.80%	2.49%	7.67%	2.74%	1.84%	5.15%	1.71%	4.34%	4.09%
TO2021 big data analytics	3.55%	2.68%	17.23%	4.64%	0.00%	9.18%	5.15%	4.82%	5.15%	9.51%
TO2021 biocatalysis biosynthesis	0.25%	0.00%	0.03%	0.55%	0.00%	0.00%	0.00%	0.47%	0.07%	0.20%
TO2021 biopolymers bioplastics	0.25%	2.23%	0.55%	0.81%	1.37%	1.84%	1.03%	0.62%	1.40%	0.91%
TO2021 bioprinting	1.52%	0.00%	0.19%	0.20%	2.74%	0.37%	1.03%	0.47%	0.07%	0.30%
TO2021 blockchain	14.47%	1.34%	9.23%	3.78%	4.11%	6.36%	6.19%	9.64%	4.63%	6.98%
TO2021 cobots	0.51%	0.89%	0.81%	1.21%	1.37%	1.96%	2.06%	0.62%	0.29%	0.92%
TO2021 connected machines	1.52%	0.45%	1.07%	0.35%	0.00%	1.22%	0.00%	0.31%	0.66%	0.78%
TO2021 decentralized energy systems	0.00%	0.00%	0.13%	1.41%	0.00%	0.00%	0.00%	0.16%	0.07%	0.39%
TO2021 digital twin	2.03%	1.79%	1.42%	0.81%	0.00%	0.37%	3.09%	1.71%	0.74%	1.14%
TO2021 drones	4.31%	8.04%	5.31%	3.68%	5.48%	4.65%	6.19%	6.22%	8.16%	5.43%
TO2021 functional fibers	0.25%	0.00%	0.16%	0.30%	0.00%	0.12%	0.00%	0.00%	0.22%	0.18%
TO2021 future protein sources	0.00%	2.68%	0.10%	0.61%	0.00%	0.49%	1.03%	0.00%	0.51%	0.38%
TO2021 geothermal energy	0.00%	0.00%	0.78%	1.36%	1.37%	0.61%	0.00%	2.49%	0.44%	0.91%
TO2021 Internet of Things	4.57%	10.27%	12.66%	3.13%	0.00%	3.67%	2.06%	3.27%	3.01%	6.78%
TO2021 large-scale energy storage	0.76%	2.23%	0.71%	3.88%	0.00%	0.24%	4.12%	0.78%	1.10%	1.53%
TO2021 laser surface processing	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TO2021 machine learning	11.17%	8.04%	9.88%	7.06%	8.22%	8.69%	16.49%	12.75%	6.47%	8.87%
TO2021 medical wearables	4.82%	0.89%	2.46%	2.42%	1.37%	2.08%	2.06%	4.67%	3.82%	2.85%
TO2021 microbiome	5.58%	1.79%	1.07%	1.87%	13.70%	3.30%	3.09%	4.20%	1.18%	2.06%
TO2021 mobile robot	0.76%	2.23%	0.32%	0.86%	0.00%	0.49%	0.00%	0.31%	0.81%	0.60%
TO2021 mobility concepts	2.03%	3.57%	4.44%	6.51%	1.37%	13.83%	1.03%	3.58%	3.90%	5.45%
TO2021 optical space communication	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TO2021 personalized food	0.00%	0.00%	0.13%	0.05%	0.00%	3.06%	0.00%	0.00%	0.37%	0.40%
TO2021 photovoltaics	3.05%	13.84%	2.20%	7.32%	19.18%	5.02%	9.28%	10.58%	7.50%	5.65%
TO2021 point-of-care diagnostics	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.15%	0.02%
TO2021 quantum cryptography	0.25%	0.45%	0.16%	0.05%	1.37%	0.24%	1.03%	0.31%	0.00%	0.16%
TO2021 Quantumcomputing	7.87%	7.14%	1.78%	4.64%	4.11%	2.69%	6.19%	4.20%	1.99%	3.22%
TO2021 recycling of rare earths	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%
TO2021 SCION	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TO2021 smart grids	0.25%	1.79%	0.74%	0.86%	0.00%	0.86%	2.06%	0.16%	1.76%	0.91%
TO2021 stem cells	2.03%	1.34%	0.65%	1.31%	4.11%	3.06%	4.12%	3.58%	3.38%	1.82%
TO2021 surgical robots	0.00%	0.89%	0.36%	0.30%	2.74%	1.96%	0.00%	0.78%	0.51%	0.56%
TO2021 sustainable food systems	0.25%	4.46%	0.16%	0.10%	0.00%	0.98%	2.06%	0.16%	2.65%	0.75%
TO2021 synthetic biology	1.27%	0.45%	0.45%	0.66%	1.37%	0.24%	0.00%	2.64%	0.15%	0.63%
TO2021 thermal interface materials	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Grand Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Figure 3 - 2020-2021 Tweet Data

The top four topics discussed in both 2020 and 2021 were augmented reality, machine learning, blockchain, and photovoltaics. The fifth topic changed, being medical wearables in 2020, then drones in 2021. From this shortlist of the four technologies that were the most discussed between the two years, blockchain, machine learning, and photovoltaics had an increase in the number of tweets. A notable omission from this is augmented reality; this technology despite being within the top five for popularity in both 2020 and 2021 was not increasing in popularity. Instead, augmented reality's impressive numbers were reliant on previous years where it had been one of the most discussed technologies. To determine the trends between 2020 and 2021 the change in tweet percentages was used, in doing so it could be seen

that augmented reality decreased from 12.50% in 2020 to 10.03% in 2021. Another method of modeling this change that was used in our results was to view the number of tweets difference between years once adjusted for the difference in total number of tweets over the given year. This was done by finding the ratio of number of tweets between years and applying this factor to the number of tweets in 2021 to find an adjusted and relative value. By this measure augmented reality was observed to have a decrease in seven tweets once adjusted between 2020 and 2021. Blockchain saw a gain of six tweets, photovoltaics gained ten tweets, and machine learning gained eighteen tweets between 2020 and 2021. For the percentage of total tweets in Switzerland blockchain increased from 8.33% of tweets in 2020 to 10.55% in 2021. Machine learning experienced the largest increase from 8.71% to 15.57% over the same time period. We chose to look at machine learning and blockchain, due to their relevancy within our criteria and personal interest. We also discussed topics with our sponsor and decided upon a mutual interest in 5G. This was an exception to our data analysis methodology as 5G did not increase between 2020 and 2021. It decreased by 0.83% and remained outside of the top five technologies in both datasets. In addition, Austria was the only country that observed an increase in discourse between 2020 and 2021 for this technology. Despite this 5G piqued our curiosity due to the abundance of misinformation on social media that can have a negative effect on the adoption of the technology.

4.1.1 Machine Learning's Application in Factchecking

The compiled list of 98 tweets about machine learning were thematically sorted and analyzed, leading us to focus on how fact-checking is an application of machine learning in our content.

Tweet #	Link	Keyword Summary	Popularity		Made of:	Major Categories	Number of Tweets	Popularity?	Normalization	Rank
1	https://twitte	Nature	22			politics	6	40	6.666666667	
2	https://twitte	Politics	18			science	32	101	3.15625	
3	https://twitte	gender	18			technology	11	25	2.272727273	
4	https://twitte	biology	15			medical	8	19	2.375	
5	https://twitte	Research	10			course/conference	14	34	2.428571429	
6		Nature	7			interview/personal nev	4	7	1.75	
7	https://twitte	Chemistry	6			culture/art	7	14	2	
8	https://twitte	Environmental	5			ethics/philosophy	2	3	1.5	
9	https://twitte	Science/Patterns	5			misc	14	36	2.571428571	
10	https://twitte	Robots	5							
11	https://twitte	Course	5			Totals:	98	279		
12	https://twitte	Research	5							
13	https://twitte	Course	5		politics	political	6	40	6.666666667	First
14	https://twitte	Course	4		science, te	STEM	57	168	2.947368421	Second
15	https://twitte	Marketing	4		course, int	uni news	18	41	2.277777778	Third
16	https://twitte	Medical	4		culture, et	culture	9	17	1.888888889	
17	https://twitte	Cookies/Internet	3			misc	8	13	1.625	
18	https://twitte	Big Data	3							
19	https://twitte	Research	3			Totals:	98	279		

Figure 4 - Machine Learning Coding

The machine learning tweets were first sorted into nine minor categories consisting of politics, science, technology, medical, courses/conferences, interviews/personal news, culture/art, ethics/philosophy, and miscellaneous topics. These nine minor categories were made up of many closely related keyword summaries to gather insight into some of the most common discussions occurring online. In this preliminary categorization, politics emerged with the highest normalized popularity score of 6.67, followed by science with 3.16, and miscellaneous topics reaching 2.57. The normalized popularity score as previously defined is the average popularity score for a given tweet within the specified category. This is calculated by finding the total popularity number and dividing it by the number of tweets. These nine categories were further refined into just five categories that were more loosely related than the previous categorization. Politics and miscellaneous topics remained their own categories while science, technology, and medicals were placed under the broader category: STEM. Courses/conferences and interviews/personal news became university news while culture/art and ethics/philosophy became culture. Following reorganization of categories politics retained its position with a normalized popularity score of 6.67, followed by STEM with 2.95, and university news had a 2.28 popularity score.

By utilizing our coding chart, we determined that our focus for machine learning was to be in its application within politics. The chart indicated that fact checking was a good candidate for machine learning because of its relevancy in the field of politics. Based upon this decision the approach for content was from the angle of machine learning and its application within the field of automated fact checking misinformation on the internet.

For our background research into the subject, we were able to contact an expert in the field: Dr. Karl Aberer, a distributed information systems professor at the Ecole Polytechnique Federale de Lausanne (EPFL). The semi-structured interview was conducted over Zoom which gave us the ability to record the interview. We prepared a list of questions for the interview that can be seen in Appendix C. Using Dr. Aberer's responses to our questions we were able to create content pieces centered around the information he provided. Our preliminary content consisted of three stills, one animation, and two videos. Stills are pieces of content that contain just text and visual aids without any animation. In our machine learning and fact checking creation process we split the topic into two main content categories.

The first category was machine learning basics, the purpose of these pieces was to act as an elementary introduction to machine learnings application within automated fact checking. The second category was machine learning pros and cons. The pieces of content created for this topic were centered around the pros and cons of machine learning in automated fact checking. This category relied upon some rudimentary level of knowledge about machine learning in order to understand its fact checking application. This was the reason for the separation in machine learning content pieces. For both categories, however, we used many statements from Dr. Aberer in formulating our pieces of content that can be seen below.

Figure 5 - Content example 1 which is a series of posts

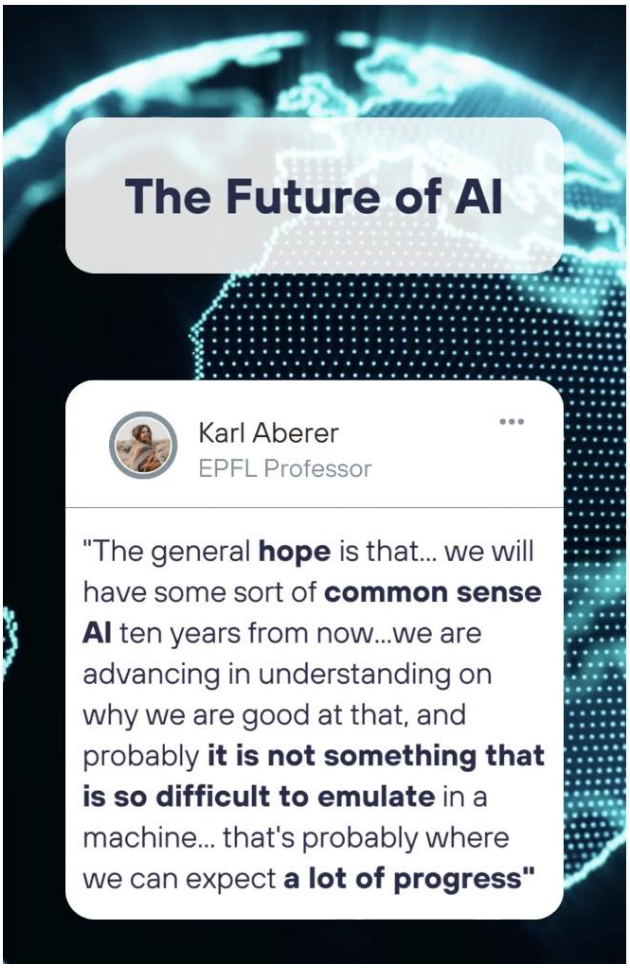

Figure 6 - Content example 2 a screenshot from a TikTok

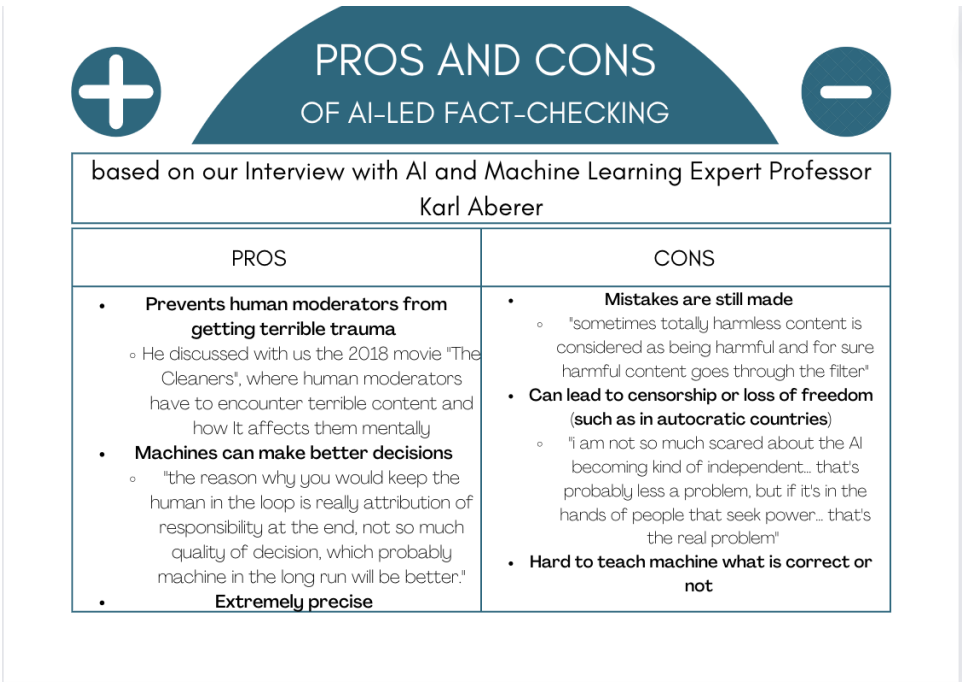

Figure 7 - Content example 3 a twitter infographic

4.1.2 Misinformation About 5G

5G was a difficult topic to organize and find themes for. We found there to be 10 total tweets from Swiss universities between January 1, 2020, to September 1, 2022.

Tweet #	Link	Keyword Summary	Popularity
1		Microwaves	16
2		Question/Answer	7
3		Conference	3
4		Opinions (Trust/Mistrust)	2
5		Benefits	1
6		Opinions (Trust/Mistrust)	1
7		Opinions (Trust/Mistrust)	1
8		Ethics	1
9		Seminar	1
10		Politics	1
		Total:	34

Major Categories	Number of Tweets	Popularity?	Normalization	Rank
Politics	2	2	1	
Course/Conference	2	4	2	Third
Misconceptions	4	11	2.75	Second
Information	2	17	8.5	First
Totals:	10	34		

Figure 8 - 5G Coding

This is a smaller topic, but there are still distinct themes seen. Due to the smaller sample size, we only had one round of categorization which resulted in four categories: politics, course/conferences, misconceptions, and information. Information was the highest category, with

misconceptions being second. While information's normalized popularity of 8.5 is inflated due to its smaller sample size when compared to misconceptions these results validate our initial selection. 5G was selected because of discussions with our sponsor regarding the misinformation surrounding the technology. This was relevant in our coding as the two primary themes are tightly connected. The posts regarding information highlighted the capabilities of 5G, helping to dispel the relevancy of misinformation. These posts help to inform and educate the public, preventing the dissemination of misinformation. As a result of our findings validating the initial discussion surrounding 5G as a topic, we pursued our content creation focused on creating posts that would help assist the discourse around misinformation. For the content creation of 5G and misinformation we used research from the background chapter and sources such as the World Health Organization to create counterarguments and factual statements. We created one still and one video dispelling common misconceptions.

Figure 9 - Content example 1 a series of posts

4.1.3 Blockchain and Supply Chain Security

The database included 100 total tweets for blockchain from January 1, 2020, to September 1, 2022.

Tweet #	Link	Keyword Summary	Popularity		Made of:	Major Categories	Number of Tweets	Popularity?	Normalization	Rank
1		research collab	9			conferences/courses	22	48	2.181818182	
2	https://tw	Conference	9			NFTs	11	23	2.090909091	
3		NFTs/potential	7			cryptocurrency/economy	19	31	1.631578947	
4		supplychain	6			law/legal	7	13	1.857142857	
5		cryptocurreny/financ	6			politics	5	10	2	
6	https://tw	security	6			security	5	16	3.2	
7	https://tw	Interview	5			sustainibility/environment	5	8	1.6	
8	https://tw	Workshop	5			opinions	6	12	2	
9	https://tw	law/legal contracts	5			university news	8	19	2.375	
10	https://tw	security	4			misc	12	22	1.833333333	
11		opinions	4							
12	https://tw	courses	4			Totals:	100	202		
13		congratulations	4							
14	https://tw	Economy	4		conferenc	university news	33	76	2.303030303	Second
15	https://tw	Security	4			NFTs	11	23	2.090909091	Third
16		NFTs	3			crypto/economics	21	33	1.571428571	
17		courses	3			security	5	16	3.2	First
18		NFTs	3			legal/politics	15	30	2	
19	https://tw	female led business	3			sustainibility	5	8	1.6	
20	Account D	introduction?	3		opinions,	informing	9	15	1.666666667	
21		contracts	3			misc	1	1	1	
22	https://tw	Conference	3							
23		bitcoin	3			Totals:	100	202		

Figure 10 - Blockchain Coding

Blockchain's tweets were put into ten preliminary categories: conferences/courses, NFTs (non-fungible tokens), cryptocurrency/economy, law/legal, politics, security, sustainability/environment, opinions, university news, and miscellaneous. Security led the preliminary categories in normalized popularity with 3.2, followed by university news with 2.375, and conferences/courses at 2.18. These ten categories were further reduced to eight major categories with conferences/courses and university news combined under the umbrella of university news. Law/legal and politics were also generalized into just politics. With the more generalized categories, security remained the most popular amongst the public with a normalized popularity of 3.2. University news was once again the second most popular with 2.30 and NFTs became the third highest with a normalized popularity of 2.09. Most of the discussion surrounding blockchain is based on security. When presenting this information to our sponsor,

we had a mutual agreement in not wanting to focus on the general security of blockchain. This is because blockchain is inherently secured due to its design, it was evident in our coding that stories surrounding this were already in abundance.

When digging deeper into specific security-oriented tweets, the minority discussed the security of supply chains, which is a theme that interests both us and our sponsor. It is an area of blockchain security that is not discussed as much and has more of a social implication than alternative themes. We also made content based on the basics of blockchain, as we anticipated that the topic would be very technical and harder to understand in specifics without an informational background. The first two stills shown below are part of a series for the blockchain basics subsection as a precursor to the infographic still below those.

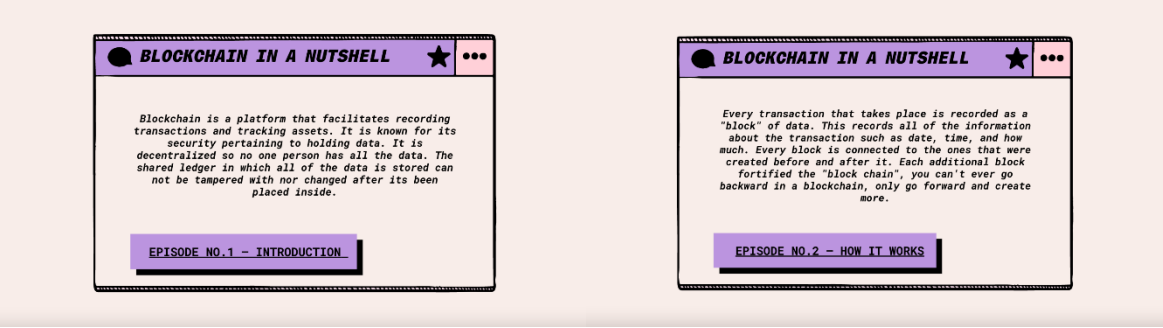

Figure 11 - Content example 1 a series of posts

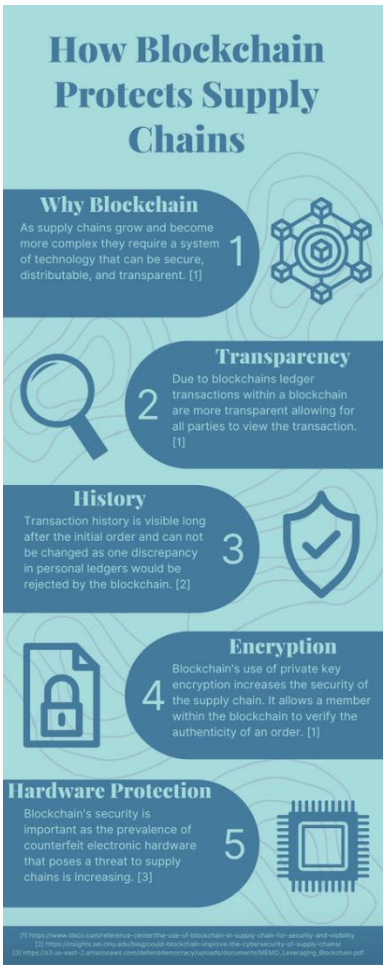

Figure 12 - Content example 2 an infographic

4.2 Interview Results and Finalized Content

After conducting our interviews with ETH and MQP students, we gathered 46 responses for our sections of content. These 46 responses were distributed evenly across 5G misconceptions, machine learning basics, machine learning pros and cons, blockchain and supply chains with nine responses each and blockchain basics receiving ten responses. There was a total of twelve pieces of content shown with five videos and seven stills and animations. The general results on content styling revealed a few notable trends. The most surprising of these results was that the pieces of content favored by respondents were not the pieces of content with the best performing feedback.

The video produced for 5G misinformation was the only piece of content in a section that was both the favorite and the best performing. The video was preferred by five of the respondents while the other four preferred the still. The most noticeable statistic for the 5G video was that all nine respondents felt the length of one minute and ten seconds was a good length. In the machine learning sub-section, the first still received the best feedback but was even with the machine learning basics video at four favorites each. For machine learning pros and cons, blockchain basics, and blockchain and supply chain the favorite piece of content was not the piece of content with the most positive feedback.

Video style content was the preferred content style by respondents compared to stills and animations. Video content was the favorite piece of content in 5G, machine learning pros and cons, and blockchain basics. Machine learning basics showed an even split between the video and a still and the infographic still was preferred in blockchain and supply chain. This preference can be shown by the average favoritism. Of the 46 responses there was one respondent that could not choose a favorite for the blockchain basics subsection. This resulted in videos being the favorite content for twenty-four responses. Twenty-one responses had stills and animations as their preferred content style. Considering there were only five videos and seven stills the average favoritism for videos was 4.8 opposed to 3.0 for stills and animations.

It was evident from the responses that video length did not directly determine whether someone would watch or scroll a video. During the interviews two questions were asked for each video, the first asked about how the interviewee felt about the video length. The second question asked whether the interviewee would have watched the video on their feed or if they would have scrolled. We gathered forty-six responses for each of these questions. The best example of this analysis is the 5G misconceptions video. All nine responses said that the video length was good,

however four of the nine responses indicated they would scroll and an additional three said maybe. The machine learning pro and cons video is another example, seven responses indicated the video length was good, but seven responses also indicated that they would scroll. The other three videos showed more even responses. The blockchain basics video had an even split of five responses believing the length was good and the other five believing it was too short. For this video six responses indicated they would scroll while four said they would watch.

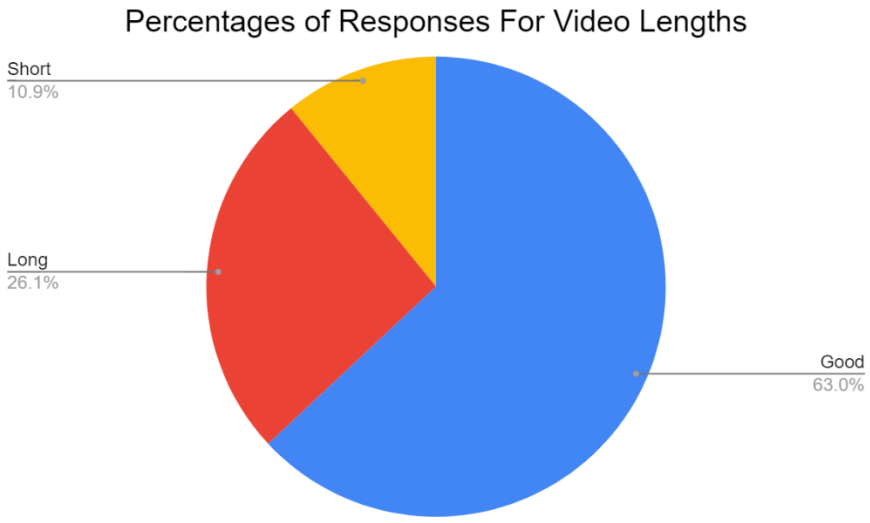

Figure 13 - Video content feedback

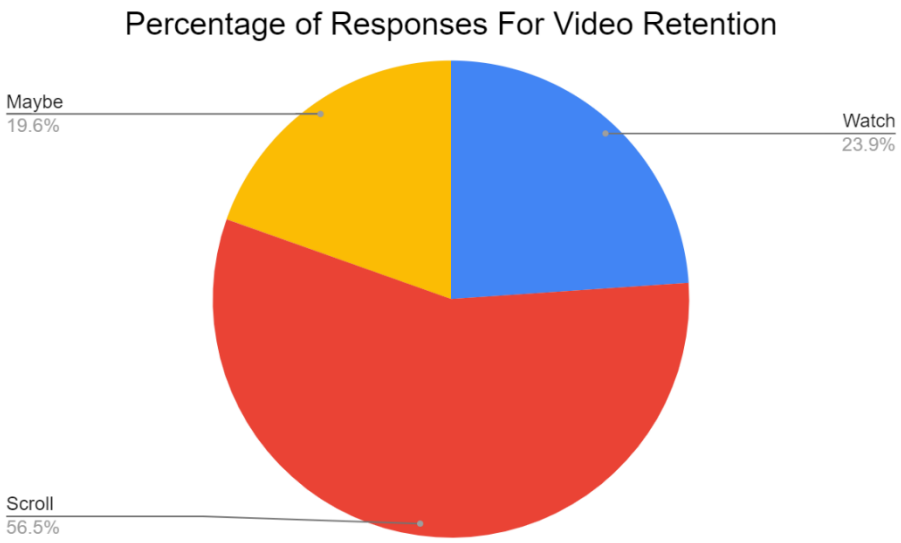

Figure 14 - Video content feedback

The last result that was applicable for content types regardless of topic was that stills and animations that were visually appealing were also easy to read. For stills and animations, the interviewees were asked if the post was readable and then if it was visually appealing or attention grabbing. Due to there being seven stills and animations opposed to five videos we gathered sixty-four responses to both questions. There were thirty-three responses indicating that the still or animation was easy to read and thirty-nine found that the still or animation was visually appealing. Fifteen responses found the still or animation not readable and sixteen responses indicated that the still or animation was not visually appealing. The pie charts provided below display the correlation between visually appealing/attention grabbing posts and their readability.

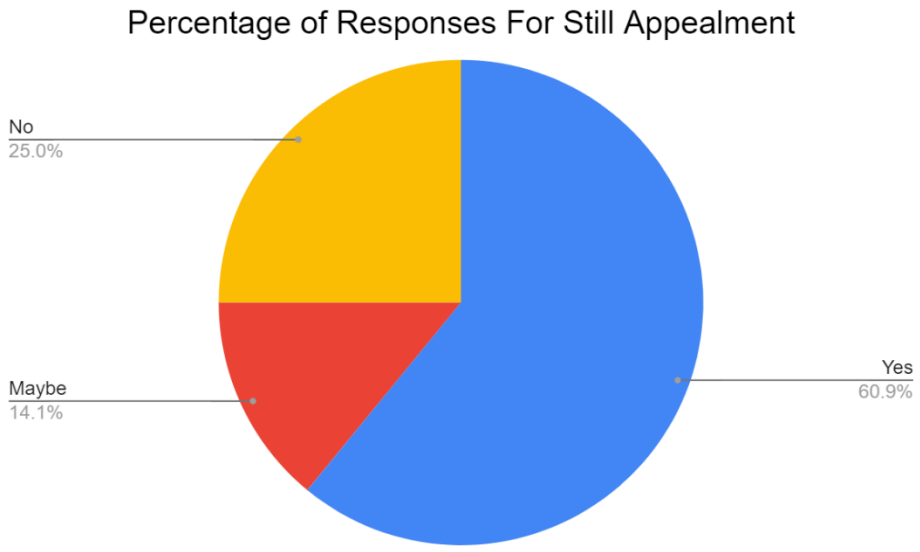

Figure 15 - Still content feedback

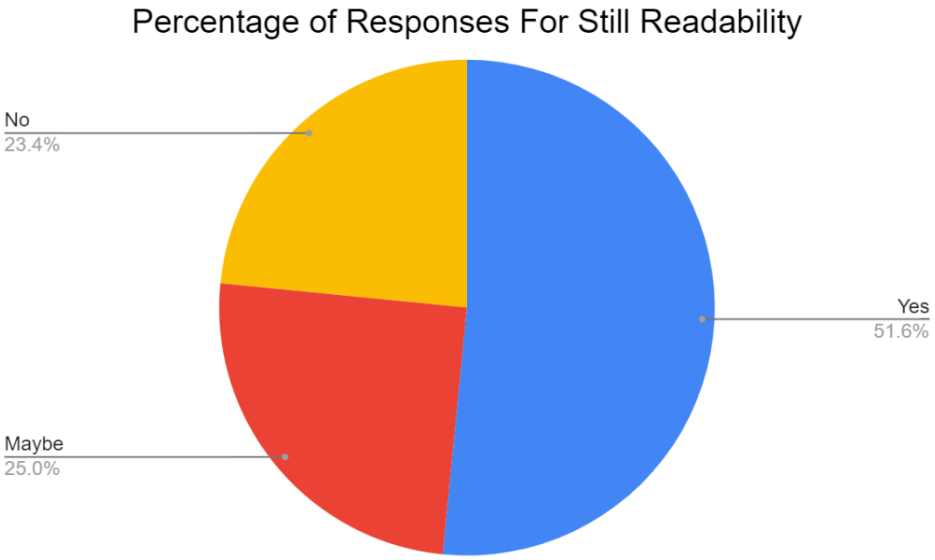

Figure 16 - Still content feedback

Our respondents were very clear with us about the specific opinions they had about our content. There were distinct trends in the comments we received, which are pivotal to our refined content. We learned that videos with titles and captions are more likely to make someone want to watch the entire video. People also liked videos with colors and images, as opposed to watching

someone speak. Our responses also indicated that for informational videos, a more formal approach makes the video more trustworthy and engaging. For stills and animations, text density and font size are very important. Less dense text with a larger font is both more visually appealing and easier to read. Having highlighted or bolded text for keywords is also helpful for understanding and retention. There is also a hurdle of language, since our audience was mostly Swiss and some don't speak English as well, it is difficult to portray technical concepts in a language that is not their mother tongue. Even for those who did speak English, overly technical terms proved to be a boundary to how engaging they found the content.

The finalized pieces of content were selected based upon the interview results. As part of our recommendations, we wanted to prepare three to five pieces of finalized sample content for the SATW. For this we chose the piece of content from each subject section that the audience reacted most positively to. Our five pieces of content that moved forward to the final stage were the 5G and misinformation video, the machine learning basics still series, the machine learning pros and cons video, the blockchain basics video, and the blockchain and supply chain infographic still. Our method for revising these pieces of content was to code the most common critiques and feedback.

The 5G misinformation video was favored by respondents five to four when compared to its still counterpart. The video received overall decent feedback from the interviews we conducted, but our team and sponsors had some additional comments about it. The responses indicated that the video did not have enough text and that it did not grab attention. Respondents elaborated that they were looking for some sort of thumbnail that contained text as a first visual to be more engaged with. Following the interviews, we also held a peer review for our content and decided that we wanted to keep the humor style of the video but that it could be seen as

insensitive to groups who believed the misinformation. We moved forward with the video by focusing on the misinformation coming from a social media source rather than any one person. This was to prevent isolation for any group of people that may believe the misinformation and dismiss the video.

In the machine learning basics section both the series of stills and the video received equal favoritism with four favorite responses each. Ultimately, we chose the series of stills as our final content piece because it received more positive feedback when compared to the video. The preliminary piece of content can be seen in Figure 9. Our interview results revealed three aspects of improvement for this post. The most common feedback was that the language used was too technical and difficult to understand for non-native English speakers. In addition, bolding important aspects of the text would make the content easier to visually understand. The final piece of feedback was that the format of the content needed to be slightly adjusted, having the question text at the same level as the informational text made it confusing to read. Most of the respondents indicated that they started by reading the answer on the right side of the still as opposed to the question on the left side. Our solution to this was to offset the question and answer from each other slightly to highlight the differences. The finalized piece of content for our machine learning basics section can be seen below.

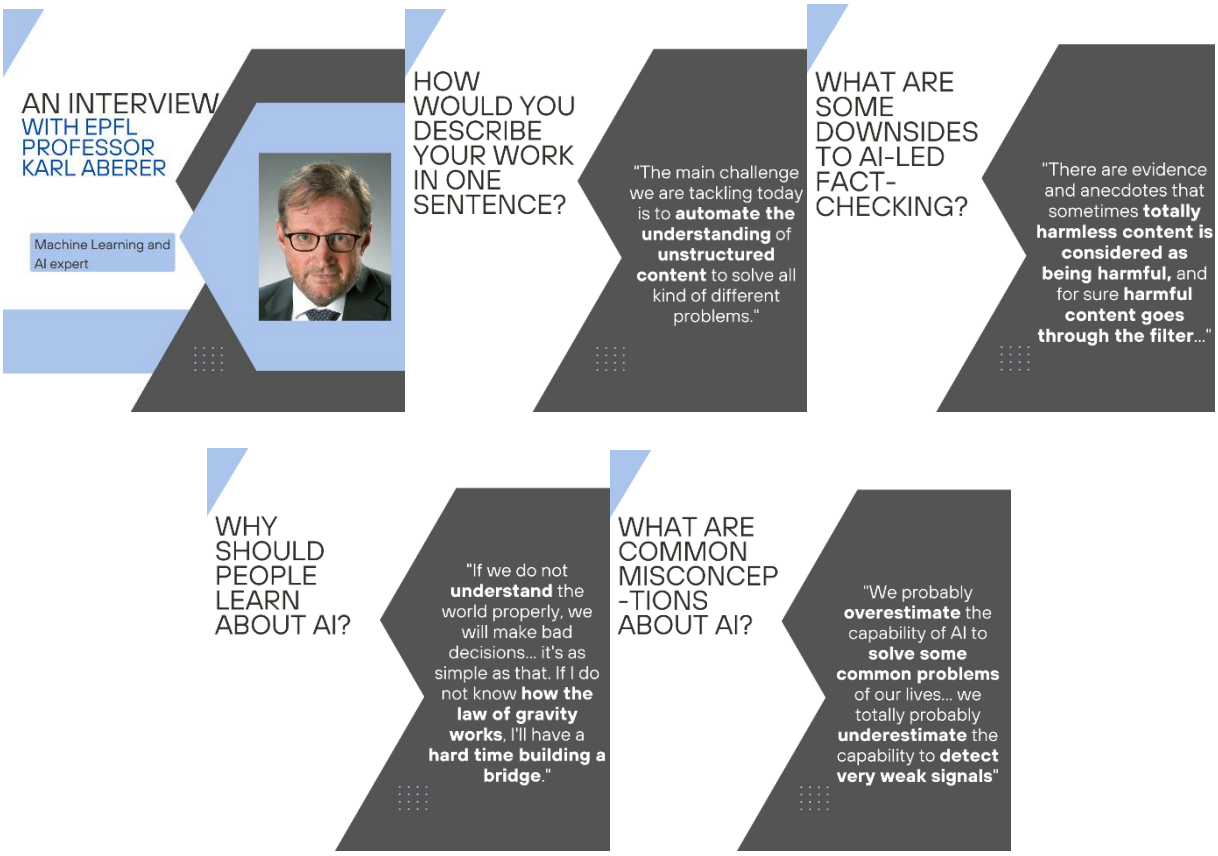

Figure 17 - Machine Learning Basics Finalized Still

For the machine learning pros and cons the video format outperformed the still and animation by being the favorite post from five of the nine respondents. Like the 5G misconception video respondents indicated that the video needed a title screen of some sort in order to make the post more eye catching. The second major and most prevalent piece of feedback from interviews was that the video needed to be shot in a more formal manner. This was important as it would make the video feel more trustworthy. For the finalized filming of this video, we changed the scenery to use a proper backdrop and give the video the legitimacy it needed based on the information it was providing.

Blockchain basics had the clearest favorite of all content subject sections with the video being preferred by six respondents compared to three for the still posts. Despite this the post had

just as much feedback from respondents as all the others. The most common responses we received were that the video was too fast, it needed to be more formal, and that there needed to be more information. The blockchain basics video had the text panning onto the screen as the video played, many respondents believed that there was not enough information within this text and that the speed at which it came in could have been slowed. The alternative solution was to extend the length of the video after the full text had appeared. To address the formality of the video, the animations and visuals used needed to be changed and adding sources to the video were helpful as some respondents felt that the video “seemed like a scam”. In the final product the video was lengthened to contain multiple shorter segments within it that contained information and their source, making the video more formal.

The blockchain and supply chain still infographic outperformed the video by five to four in terms of respondents' favorite. Despite this the infographic received more critique and feedback than the video. In redesigning the infographic, the most common interview responses were that it was visually hard to follow, and that the language used was too technical and confusing, especially for non-English native speakers. Respondents further emphasized that for the piece to be attractive it needed better color contrast, the blue on blue that can be seen in Figure 14 made for difficult reading. For the finalized piece of content, that can be seen below, the colors were changed to emphasize the text and the language used was simplified. This was done to shift the focus on to the general examples of supply chains being protected by blockchain rather than the technical details of how that was difficult to understand.

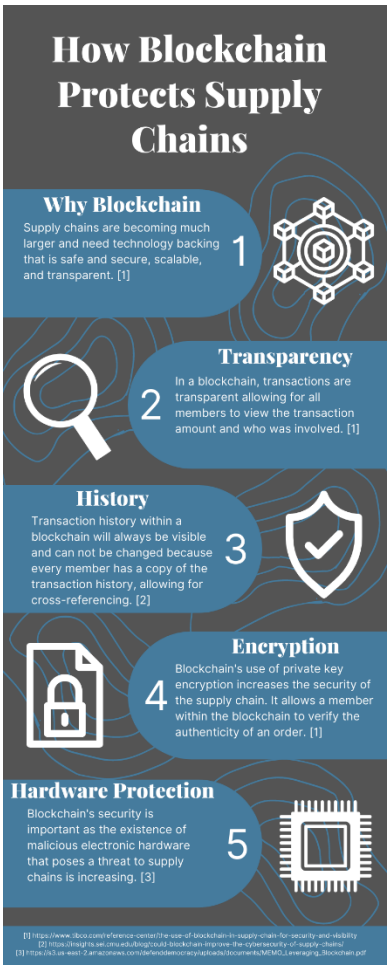

Figure 18 - Blockchain finalized still

5.0 Recommendations and Conclusions

Our recommendations for the SATW were created after careful consideration of the feedback we received from the university students, our background research, and our experiences. We hope that these will be helpful and useful to the SATW to further its influence on the Swiss public. We want our content to be post-worthy and for our recommendations to be understandable to all those who will benefit from it.

5.1 Recommendations to the SATW on making content

We have several recommendations for the SATW moving forward following the completion of our project. These recommendations are a guideline for formulating effective content that can assist the SATW in increasing interest and engagement with relevant technologies in Switzerland.

Choosing a format for content can be one of the most difficult decisions in the social media posting process. Our research found that there was a preference among the audience for different types of content depending on the complexity of the subject. We suggest that more than half of the published content should be in the form of videos due to the audience's general acceptance preference towards video styles. However, having an alternative form such as a still, this can be a series of text-based posts or an infographic, is helpful in diversifying a social media account. If the technological subject which you are posting is in-depth about the technology and contains many technical terms, then we suggest using a still-based approach. Through our interviews it could be seen that for a more generally well known and understood topic videos were the preferred choice but when a topic became very technical, having a text-based approach became favorable.

If the choice of content is a video the four main tips are related to video length, thumbnails, captioning, and style. Overall, video length wasn’t the main factor in whether someone would watch the video or scroll away. Length is still important for audience enjoyment and focus, and we found that videos shouldn’t be longer than about one minute and thirty seconds. The main factor to whether someone would watch a video or not is the thumbnail or title. When a video has a clear title that helps the viewer understand what to expect, they are more likely to watch it. The title not only needs to be eye-catching and interesting but should

give some insight to the topics discussed within. Captioning is also Important for videos, especially when a language barrier is present. Captioning should come both in the form of subtitles and keywords. We found that comedic style videos typically appeal to a large audience, but formal videos are more preferred by those with a background in the subject. Formal style in videos comes in the form of clothing of the subjects, background, and delivery of information.

Alternatively, if the delivery method is chosen to be a still, our feedback shows that the important things to pay attention to are color palettes, keywords, and style. Colors are important to catch the eye of a viewer, but they cannot be too harsh or bright or they will overwhelm the information. When making a piece of content with a longer quote or a lot of words in general, keywords must be pointed out, similar to videos. The best way to do this on a still is to bold or underline a few words from a section of text. Headers can also be used. There cannot be too many things highlighted as keywords or a viewer may become distracted or not retain the information. Having no keywords highlighted also makes a viewer lose focus and not be as interested in the topic. For still styles, across the board, formal is best. Stills should look professional, and information should be presented plainly.

The final suggestion we have regardless of content type would be to have translations available for the content being posted. One of the most common responses to our content was that it would have been easy to understand if they knew English better. We find that having a translation available, especially for the more technical subjects, is useful. Our suggestions for video-based content are to have subtitles made for an alternative language than English, or to dub the video in a secondary language. For still-based content our suggestion would be to have an English variant and version with the text translated to the language of choice for the intended audience.

We presented our findings to the SATW in the form of a slideshow and sent our finalized content to them. This information gives them the tools necessary to create content that will attract more people to their pages and increase the visibility of the technologies they discuss.

5.2 Conclusions on Social Media as a Tool

We learned in our interviews how best to set up content for social media, as well as how people feel about social media as an informational tool overall. About half of our university student respondents told us that they either don't use social media, or that they only use it for entertainment. This is a harder audience to reach with content about technology, but we still found that they enjoyed the comedy video. If reaching the entertainment focused audience is not one's goal, though, thankfully many respondents did show interest in following accounts posting content like ours. This shows hope for the SATW that there is an up-and-coming audience of young technologically minded people who are interested and excited to continue learning more. People who ranked themselves as having a higher amount of technological knowledge tended to be the most interested. Many respondents, regardless of their confidence in their knowledge of technology, did find themselves more interested in the technologies after viewing our content. This tells us that social media can absolutely be used as a successful tool to raise interest in technologies. We believe that by using our recommendations and feedback, this can help the SATW foster their social media presence and increase their visibility to a wider audience.

Bibliography

Ashford, N. A., & Hall, R. P. (2011). The Importance of Technological Innovation. In *Technology, Globalization, and Sustainable Development* (pp. 271–286). Yale University Press. http://www.jstor.org/stable/j.ctt1nq0rs.14

Atkinson, R. D. (2021). Time for a New National Innovation System for Security and Prosperity. *PRISM*, *9*(2), 58–75. https://www.jstor.org/stable/27008976

Auxier, B., & Anderson, M. (2021). Social media use in 2021. Pew Research Center, 1, 1-4.

Bhimani, H., Mention, A.-L., & Barlatier, P.-J. (2019). Social media and innovation: A systematic literature review and future research directions. *Technological Forecasting and Social Change*, *144*, 251–269. https://doi.org/10.1016/j.techfore.2018.10.007

Bozic, C., & Dunlap, D. (2013). The Role of Innovation Education in Student Learning, Economic Development, and University Engagement. *The Journal of Technology Studies*, *39*(1/2), 102–111. http://www.jstor.org/stable/43604299

Chaffey, D. (2016). Global social media research summary 2016. *Smart Insights: Social Media Marketing*.

Chen, S., Forster, S., Yang, J., Yu, F., Jiao, L., Gates, J., . . . Adam, M. (2022). Animated, video entertainment-education to improve vaccine confidence globally during the COVID-19 pandemic: An online randomized controlled experiment with 24,000 participants. *Trials, 23*(1) https://doi.org/10.1186/s13063-022-06067-5

Das, S. (2021, Aug 30). 5G saga: Is the 5G health scare unfounded? *BioSpectrum*, http://ezproxy.wpi.edu/login?url=https://www.proquest.com/magazines/5g-saga-is-health-scare-unfounded/docview/2566056254/se-2

Davids, Z., & Brown, I. (2021). The collective storytelling organizational framework for social media use. *Telematics and Informatics, 62*, 1-17. https://doi.org/10.1016/j.tele.2021.101636

Derindag, O. F., Lambovska, M., & Todorova, D. (2022). INNOVATION DEVELOPMENT FACTORS: SWITZERLAND EXPERIENCE. *Pressburg Economic Review*, *1*(1), 57–65. Retrieved from https://review.pressburgcentre.org/per/article/view/7

Dhanesh, G., Duthler, G., & Li, K. (2022). Social media engagement with organization-generated content: Role of visuals in enhancing public engagement with organizations on facebook and instagram. *Public Relations Review*, *48*(2) https://doi.org/10.1016/j.pubrev.2022.102174

Dolan, R., Conduit, J., Frethey-Bentham, C., Fahy, J., & Goodman, S. (2019). Social media engagement behavior: A framework for engaging customers through social media content. *European Journal of Marketing, 53*(10), 2213-2243. https://doi.org/10.1108/EJM-03-2017-0182

DuBois, R. F., Gerstein, D. M., Keagle, J. M., Stavridis, J., Hamre, J. J., & Morrissy, R. (2017). The Importance of Science and Technology. In *Science, Technology, and U.S. National Security Strategy: Preparing Military Leadership for the Future* (pp. 2–4). Center for Strategic and International Studies (CSIS). http://www.jstor.org/stable/resrep23147.8

Federal Office of Justice. (2022). *E-ID: Federal Council opens consultation*. E-ID: Bundesrat eröffnet Vernehmlassung. https://www.bj.admin.ch/bj/de/home/aktuell/mm.msg-id-89515.html#

Frey, R. (2021). Psychological drivers of individual differences in risk perception: A systematic case study focusing on 5G. Psychological Science, 32(10), 1592-1604. doi:10.1177/0956797621998312

Hess, A. K., & Schubert, I. (2019). Functional perceptions, barriers, and demographics concerning e-cargo bike sharing in Switzerland. *Transportation Research Part D: Transport and Environment*, *71*, 153–168. https://doi.org/10.1016/j.trd.2018.12.013

Hou, L. (2018). Study on the perceived popularity of TikTok. http://dspace.bu.ac.th/jspui/handle/123456789/3649

Hsieh, M., & Ravich, S. (2017). Leveraging Blockchain Technology To Protect The National Security Industrial Base From Supply Chain Attacks. *Center on Sanctions & Illicit Finance,* pp. 1-9. https://s3.us-east-2.amazonaws.com/defenddemocracy/uploads/documents/MEMO_Leveraging_Blockchain.pdf

Judson, E. (2010). Improving technology literacy: does it open doors to traditional content? *Educational Technology Research and Development*, *58*(3), 271–284. http://www.jstor.org/stable/40603177

Kiai, K., Lepping, K., Johnson, E., & Martin, B. (2021). *Raising awareness for new and emerging technologies among the Swiss public* [Interactive Qualifying Project]. Worcester Polytechnic Institute. https://digital.wpi.edu/concern/student_works/gx41mm915?locale=en

Kuperberg, M., & Kemper, S., & Durak, C. (2019). Blockchain Usage for Government-Issued Electronic IDs: A Survey. *Advanced Information Systems Engineering Workshops, 349*, pp. 155-168. https://doi.org/10.1007/978-3-030-20948-3_14

Nelson, A. J. (2020). National Models of Innovation: Research, Development and Procurement. In *Innovation and Its Discontents: National Models of Military Innovation and the Dual-Use Conundrum* (pp. 11–23). Center for International & Security Studies, U. Maryland. http://www.jstor.org/stable/resrep25192.6

O'Brien, J. M., & Toreno, J. (2021). Welcome to the TikTok Economy. (cover story). *Fortune*, *184*(2), 112–124. https://search.ebscohost.com/login.aspx?direct=true&db=bsh&AN=152752958&site=ehost-live

Sclove, R. E. (2010). Reinventing Technology Assessment. *Issues in Science and Technology*, 27(1), 34–38. http://www.jstor.org/stable/43315432

Shivakumar, S. (2022). *Securing Intellectual Property for Innovation and National Security*. Center for Strategic and International Studies (CSIS). http://www.jstor.org/stable/resrep39791

Sushila, S., & Vahida, A. (2022). Rumor detection in social network based on user, content and lexical features. *Multimedia Tools and Applications*, *81*(12), 17347-17368. https://doi.org/10.1007/s11042-022-12761-y

Swiss Academies of Arts and Sciences. (2022). *Core mission: Science and society*. Core Mission and Goals | Swiss Academies of Arts and Sciences. https://akademien-schweiz.ch/en/uber-uns/kernauftrag/

Swiss Academy of Engineering Sciences. (2022). *Who is SATW? – questions and answers*. SATW. https://www.satw.ch/en/service/the-satw/who-is-satw-questions-and-answers

The Federal Council. (2022). *Federal Act on Electronic Identification Services (e-ID act)*. Der Bundesrat admin.ch - Startseite. https://www.admin.ch/gov/en/start/documentation/votes/20210307/federal-act-on-electronic-identification-services.html#:~:text=The%20new%20act%20regulates%20how,The%20e%2DID%20is%20voluntary.

Tomboulides, D., Dooney, J., Abbott, T., & Mcintyre, L. (2019). Strategies to inform the Swiss public on artificial intelligence [IQP, Worcester Polytechnic Institute]. https://digital.wpi.edu/pdfviewer/cc08hh93x

Volken, S., Wong-Parodi, G., Trutnevyte, E. *Public awareness and perception of environmental, health and safety risks to electricity generation: an explorative interview study in Switzerland* (2019) Journal of Risk Research, 22 (4), pp. 432-447. https://www.tandfonline.com/doi/full/10.1080/13669877.2017.1391320

Yeganegi, Sepideh, et al. "The Role of Information Availability: A Longitudinal Analysis of Technology Entrepreneurship." *Technological Forecasting and Social Change*, vol. 170, 19 May 2021, https://doi.org/10.1016/j.techfore.2021.120910

Appendices

Appendix A: Sample Coding for Database Tweets

To sort the collected data from the university Twitter database, we will use a coding table for each technological topic. An example of this coding table is shown below in *Figure 2*. The table contains the tweet number, which is matched to the database collection and sorted by the tweets popularity number. The next column contains a keyword summary. This is a specific one or two-word description regarding what the tweet is about. The keyword summary is generalized into categories that encompass multiple keywords, as seen below with robots and animals being categorized into technology and biology. There is a further level of generalization that combines multiple categories into an overarching generalization. This can be seen with technology and biology being classified into the general category of STEM. The total number of tweets within these categories and their popularity sum will also be tracked. This will then be used to determine a normalized popularity that consists of the mean popularity for all tweets within the specified category.

tweet number	keyword summary	popularity
1	ukraine	20
2	robots	15
3	animals	15
4	music	12
5	ethics	10
6	course offering	5
total tweets: 6	total pop:	77

categories (I)	number of tweets	popularity	normalized popularity
politics	1	20	20
technology	1	15	15
biology	1	15	15
culture	2	22	11
university news	1	5	5
categories (II)	**number of tweets**	**popularity**	**normalized popularity**
politics	1	20	20
STEM	2	30	15
culture	2	22	11
university news	1	5	5
total	6	77	

Figure 19 - Sample Coding Table for Database Tweets

This shows how our coding was set-up and organized, using fake tweet summaries that lead into initial categories and final categories.

Appendix B: Informed Consent Form

Informed Consent Agreement for Participation in a Research Study

Investigator: Primary – Herman Servatius, Secondary – Evan Apinis, Eva Plankey, Caitlyn Puiia, Thomas Kneeland

Contact Information: Primary – hservat@wpi.edu, Secondary – gr-ZurichA22-Techaware@wpi.edu

Title of Research Study: Exploring Social Media to Garner More Interest and Knowledge of Relevant Technologies

Sponsor: Schweizerische Akademie der Technischen Wissenschaften (SATW)

Introduction
You are being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study: The purpose of this study is to gather reactions to sample social media content about a few popular technologies among the Swiss public. The study will aid in the creation of effective social media styling and allow for an outline of recommendations for our sponsor the SATW.

Procedures to be followed: In this study, you will be shown various sample social media posts about a technology, either blockchain, machine learning, or 5G. The posts will be shown in a variety of styles including still images, animations, and videos. After each post is shown you will be asked various questions about the effectiveness of the post and your reaction to it. Additional questions will be asked after all content is shown to gather your opinions on what you were shown. One member of our group will ask you the questions while another records your answers.

Risks to study participants: The risk and discomfort in this study is low to none.

Benefits to research participants and others: This research has benefits to the SATW and their social media following in the form of creating social media content styles that cater to their audience better.

Record keeping and confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you.

Compensation or treatment in the event of injury: This study will not require the subject to participate in any activity that poses a health risk, therefore there is not any compensation or treatment available. You do not give up any of your legal rights by signing this statement.

Cost/Payment: The participant does not need to cover any costs or payments.

For more information about this research or about the rights of research participants, or in case of research-related injury, contact:
IRB Chair, Professor Kent Rissmiller, Tel. 508-831-5019, Email: kjr@wpi.edu
University Compliance Officer, Michael J. Curley, Tel. 508-831-6919, Email: mjcurley@wpi.edu

Your participation in this research is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

By signing below, you acknowledge that you have been informed about and consent to be a participant in the study described above. Make sure that your questions are answered to your satisfaction before signing. You are entitled to retain a copy of this consent agreement.

_____ **Date: _____**

Study Participant Signature

_____

Study Participant Name (Please print)

_____ Date: _____

Signature of Person who explained this study

Special Exceptions: Under certain circumstances**,** an IRB may approve a consent procedure which differs from some of the elements of informed consent set forth above. Before doing so, however, the IRB must make findings regarding the research justification for different

procedures (i.e. a waiver of some of the informed consent requirements must be necessary for the research is to be "practicably carried out.") The IRB must also find that the research involves "no more than minimal risk to the subjects." Other requirements are found at 45 C.F.R. §46.116.

Appendix C: Sample Expert Interview Questions

General Questions

What made you interested in pursuing this specific field? What is the most satisfying part of the work that you do?

What basic information do you think is necessary to form an understanding of your field?

How does your field connect to the average person's day-to-day life?

Do you believe there is a subject within your field that is overlooked? Including but not limited to social media?

Is there something within your field that you feel needs a lot of improvement still?

How would we explain your niche focus to a generalized audience?

If you could describe your field and your work in one sentence or less, how would you do it?

What was your background before getting involved in the career and field you are in?

What do you see on social media related to your field? Either that you agree with or that you disagree with?

Do you find public discourse about a topic within your field surprising?

If you could give one message relating to your field that everyone around the world would hear, what would it be?

Machine Learning Specific

Are there any misconceptions surrounding how machine learning is assisting in fact checking?

Do you foresee machine learning in fact checking reaching a point where the manual checkers are no longer needed?

Is there a certain type of misinformation or form of claims that is most challenging for machine learning algorithms to decipher?

Appendix D: Preliminary Content Interview Questions

Demographics

What is your age?

Are you from Switzerland?

What is your subject of study?

Do you feel knowledgeable about technologies?

Videos

What did you think about the length of the video?

If this video came up on your feed, would you have watched it or would you have scrolled?

Stills

Was this easy to read?

Was this visually appealing/attention grabbing?

Overall

Do you have a favorite post? If so, which?

Did seeing any of these posts inspire any interest in the topic(s)?

Would you like, comment, or share any of these posts?

If an account was releasing all these kinds of posts regularly, would you follow them?