THE RISE OF INTELLIGENT MACHINES:

HOW ARTIFICIAL INTELLIGENCE IS TRANSFORMING

THE PUBLIC RELATIONS INDUSTRY

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Abstract

Recent advances in the field of artificial intelligence (AI) have permeated almost every industry in the world. From defeating the best Go player on the planet to diagnosing human illnesses, AI technologies are revolutionizing traditional business practices by enabling machines to perform complex cognitive tasks like interpreting, analyzing, and predicting future outcomes. The purpose of this study is to demonstrate that, contrary to the belief that artificial intelligence is not having a significant impact on the field of public relations, this technology is transforming the way PR practitioners target demographics, measure the effectiveness of their communication efforts, obtain insights into the media landscape, and interact with influencers to deliver their message more efficiently. These new practices are increasing productivity by streamlining and automating time-consuming and repetitive tasks, while also providing more accurate insights into the approximately 44 zettabytes of data available in the digital universe. The development of AI technologies, however, entails serious reputational threats and complex ethical questions that PR professionals must also be ready to address. This thesis concludes that to be successful in the age of artificial intelligence, communication experts must be well-versed in the terminology, functionality, and applications of AI in their business and in the business of their clients.

Key Words: Artificial intelligence, public relations, Big Data, audience listening, sentiment analysis, influencer marketing, crisis communications, news automation

Preface

<u>Research Methodology</u>

In preparation for this thesis, the author reviewed secondary sources discussing the relationship between artificial intelligence and public relations including academic journals, books, specialized industry magazines (such as The Holmes Report and PR Week), online interviews with industry experts, and studies conducted by PR agencies and research organizations. Additionally, the author conducted a content analysis of a series of case studies that illustrate how agencies and companies are using AI-powered tools for public relations purposes.[1] This study is also based on interviews with industry experts Megan Jordan, former SVP of global corporate communications at Herbalife and chief communications officer & SVP of global marketing at ChromaDex, and Alex Smith, senior data visualization engineer at Zignal Labs. For specific segments where the technology was available, the author complemented her analysis with metrics and insights obtained using the tech communication software Crimson Hexagon.

<u>Special Considerations</u>

This study provides a general understanding of the business applications of AI technologies in the fields of communications and public relations. This analysis does not intend to offer an exhaustive explanation of how AI algorithmic models work but rather illustrates a general picture of how this technology is being deployed to advance public relations efforts.

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[1] The author understands a "case study" as a real-life situation where artificial intelligence technologies have been deployed to solve specific challenges in the fields of communications and public relations. These case studies will be described at different levels of specificity and might contain biases considering that some of them were provided by communication tech vendors.

Introduction

Artificial intelligence—a branch of computer science that studies the phenomena that appear when computers perform tasks that, if performed by people, would be regarded as requiring intelligence (Simon 95)—is becoming more ubiquitous, popping up in almost everything we do. From which route to take during our morning commute to what Netflix shows we should watch next, AI algorithms are constantly making decisions for us without us even noticing. And even though the current generation of AI is a long way from getting us intelligent machines like HAL from "2001: A Space Odyssey," Skynet from "The Terminator," or C3PO from "Star Wars," the omnipresence of this technology is having a significant impact on the way we behave, interact and communicate with others.

Not only is artificial intelligence writing poetry, inventing perfume scents, and diagnosing lung cancer, but it is also impacting the way we do business and slowly transforming our economy. According to the International Data Corporation, the global spending on AI systems will reach $97.9 billion in 2023 (more than two and a half times the $37.5 billion spent in 2019), and the compound annual growth rate for the 2018-2023 forecast period will be 28.4%. This rapid growth reflects the growing interest that organizations have in AI's ability to increase their revenue and reduce costs through intelligent automation and machine-powered predictions, which explains why investors, corporate directors, CEOs, managers, and policymakers are focusing their attention on this technology.

The corporate communications industry is not exempt from this increasing interest in artificial intelligence. Public relations departments and agencies are starting to adopt AI technologies to obtain valuable information from the digital world, improve their capacity to understand audiences more accurately and measure the impact of their communication efforts.

Even though intelligent machines are not writing and pitching stories just yet, they are improving the efficiency and accuracy of traditional measurement practices in public relations. For example, PR professionals that would traditionally measure the Advertising Value Equivalency (AVE) or the number of impressions of a news story to demonstrate the success of their earned media campaigns now have access to AI-powered monitoring tools that measure the sentiment of the coverage, the media outlet's level of influence, and the amount of traffic that the story drove to the brand's channels. These new measurement strategies are allowing PR practitioners to report to the C-suite in a language that is relevant to their business goals and not in "vanilla metrics" that are tangential to the company's bottom line. This topic will be further explored in the third chapter of this study.

A second area of the public relations practice that is being transformed by the development of AI technologies is influencer marketing. Traditionally, PR practitioners who wanted to bring more visibility for their product or brand would partner with influencers with a large following. The belief was that the more followers an influencer had, the more products or services he/she would be able to sell. But this did not always prove true. For example, last year, the Instagram star @Arii failed to sell 36 t-shirts of her new clothing line to her 2.6 million followers, which demonstrates that the number of followers does not always equate to real customers. However, with technologies like machine learning—a field of AI that uses statistics to find patterns in massive amounts of data (Hao, "What Is Machine Learning")— PR professionals can now identify influencers with a small following but with a higher level of influence than the most popular ones, increasing their chances of converting a PR effort into an increase in sales. This practice is known as "micro-targeting" and will also be examined in the third chapter of this study.

The third area of public relations being transformed by the power of AI monitoring tools is crisis management. Even though the 2019 USC Center for PR Global Communications Report showed that only 3% of in-house communicators and 1% of CEOs said they would deploy technological tools for crisis management purposes (23), the escalating volume of online conversations is forcing companies to closely monitor social media platforms, blogs and news outlets to prevent or manage an online firestorm with real-life consequences. An example of one of these online firestorms is the social media platform Snap (NYSE: SNAP), which lost an astounding $800 million in market value in 2018 after the company posted a controversial ad asking users if they would rather "slap Rihanna" or punch her ex-boyfriend Chris Brown, who had been charged for assaulting Rihanna eight years earlier. Another example is the clothing retailer H&M (OTCMKTS: HNNMY), whose stores in South Africa were vandalized in 2018 after a Twitter user criticized a company's ad featuring a young black boy wearing a sweatshirt that read "Coolest monkey in the jungle." These online firestorms show that there is a growing need to monitor breaking stories, and AI is giving PR professionals the ability to do so in real-time. This topic will be further explored in the fourth chapter of this paper.

The fourth area of public relations being impacted by the use of AI technologies is media relations. Even though it is still too soon to expect intelligent machines to write and pitch press releases, news outlets like Bloomberg, The Associated Press, The Guardian and The Washington Post are developing "robot reporters" that use AI technologies to cover financial reports, sports and natural disasters. This new practice is starting to transform the relationship between journalists and PR professionals, who are now adjusting their communication strategies to ensure that automated machines can read and report their companies' financials without much human

intervention. This new relationship between reporters and PR practitioners will be studied in the fifth chapter of this report.

There is no doubt that there are more activities in the field of public relations that are currently being impacted by some form of artificial intelligence. Content creation, for example, is now more personalized thanks to the deployment of AI algorithms. Last year, the PR agency FleishmanHillard announced a collaboration with the AI-platform Wibbitz to create customized videos that would connect with communities at a micro-level in real-time ("FleishmanHillard and Wibbitz"). Customer experience is also being improved through the use of intelligent chatbots that can replicate human speech almost flawlessly. The insurance company Progressive, for example, has developed a chatbot that employs the same kind of humor that its quirky spokesperson Flo uses. However, these areas are still in their early stages and are more marketing-oriented than the ones mentioned above and will only be briefly mentioned in this analysis.

This study demonstrates how artificial intelligence technologies are transforming three areas of practice in the public relations industry: social media, crisis management and media relations. The author will first offer a review of the different perspectives that PR scholars and professionals have offered concerning the use of artificial intelligence in their field. Then, the author will focus on explaining the capabilities, applications, advantages and limitations of AI deployment in communications. The next three chapters will explore each one of the areas of the public relations practice that are currently being impacted by artificial intelligence technologies. Each chapter will state the advantages, limitations, and risks of AI applications, and illustrate the author's insight through five case studies relevant to each area of focus.

Chapter 1
AI in PR: The Conversation Has Just Begun

In June 2017, the New Scientist magazine published a story about how long it would take for artificial intelligence to surpass human intelligence. The article was later shared on Twitter through a tweet that read: "AI will be able to beat us at everything by 2060, say experts" (@NewScientist). "Probably closer to 2030 to 2040 imo.[2] 2060 would be a linear extrapolation, but progress is exponential," responded Open AI co-founder and Tesla's CEO, Elon Musk. What Musk didn't know is that the initial tweet had been generated by Echobox, an AI-driven social media management tool that picked the article, generated the message, and shared it at a time of the day that would maximize traffic for the New Scientist's website.

This example illustrates how artificial intelligence technologies are already embedded in many of the tasks that communication professionals perform on a daily basis. But how knowledgeable are PR scholars and industry experts about the impact that AI technologies are having in the field of public relations? And, most importantly, *why* should they care about educating themselves on this topic?

This chapter will show how the conversation about the influence of artificial intelligence is slowly starting to gain importance in the academic and professional realms of the PR industry. This conversation, however, is facing three challenges—skepticism, anxiety and hype— that are obscuring the understanding of this topic by proposing radical perspectives. Finally, the author will state the purpose of this study, her position on this topic, and the research methodology she will use to support her viewpoint.

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[2] Abbreviation for "in my opinion."

AI in PR: The Conversation Has Just Begun

The roots of AI can be traced back to the 1950s, as it will be later explained in the second chapter of this study. Since then, this revolutionary technology has gone through a series of "booms" and "winters" that have disrupted its development. It could be argued that even though the growth of AI and machine learning has been intermittent over the past decades, we are currently witnessing an unprecedented "boom" phase that is attracting increased attention in several fields, including the promotional industries of marketing, advertising and public relations (Galloway & Swiatek 734).

The latest AI-boom phase started in the early 2010s with the rise of big data, which gave computer scientists more computing power and the thousands of data points needed to develop this technology to its fullest. Tech experts Paul R. Daugherty and H. James Wilson categorized this phase as the *third wave of business transformation*, which is prompting leading firms in many industries to work collaboratively with AI systems to become more accurate, flexible, faster, and adaptable to the needs of employees, suppliers and customers in real-time (5-6).

In the field of public relations, this new relationship between humans and intelligent machines is enabling PR professionals to create data-driven campaigns, automate repetition-based tasks, analyze online conversations, predict a crisis and create personalized content. But even though the number of AI tools available for PR professionals is exponentially growing, there seems to be little understanding of the impact this technology is having on the public relations industry. For example, the USC Center for PR Global Communications Report showed that 86% of students and PR professionals considered themselves "somewhat" or "not at all" knowledgeable on the application of artificial intelligence in communications.[3] However, a

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[3] The sample of this study is a "convenience sample." The sample included in the analyses encompassed 1,563 responses from PR professionals and 378 students (42).

significant portion of PR specialists reported that they were using tech services to conduct media monitoring (44%), website analytics (35%), social media management (34%) and social listening (27%), all of which are likely using some form of AI ("PR: Tech…" 28-31).

The public relations academy has provided little scholarly material about the relationship between AI and public relations, but this is slowly changing (Galloway & Swiatek 735). One of the first scholars to explore the impact of AI in public relations was Professor David Phillips, who published *The Automation of Public Relations* around 2015. Phillips is a member of the Chartered Institute for Public Relations (CIPR), which in February 2018 founded the #AIinPR panel to study the impact of artificial intelligence on public relations and the wider business community ("CIPR Artificial Intelligence…"). Additionally, in July 2018 an international academic conference on public relations, "BCN Meeting PR #8 Critical Intersections: Communication, public relations, and beyond in a time of convergence," offered three presentations focused on AI-related topics ("Critical Intersections").

In the professional realm, the conversation about the way AI is transforming the practice of public relations is also starting to flourish. For example, the 2019 ICCO Global Summit dedicated two sessions to exploring the PR tech landscape and discuss how to prepare for the age of artificial intelligence and automation. The summit was partly sponsored by Cision, one of the largest suppliers of communications tech. Furthermore, in July 2019 the Los Angeles chapter of the Public Relations Society of America hosted the panel "AI, Tech and the Future of Public Relations" where professionals discussed the current state of technology in PR, the myth that AI will replace PR practitioners, and the reasons why tech companies may need to rely more heavily on PR experts in the future. Similarly, for its 50th Anniversary Global Conference in June 2020,

the International Association of Business Communicators (IABC) is holding an interactive forum on "Adopting New Technologies for Communication" with a heavy emphasis on AI.

Additionally, PR agencies are conducting their own studies about AI and the impact this technology is having on a wide array of industries. In 2018, FleishmanHillard published its study "Artificial Intelligence & Communications: The Fads, the Fears, the Future," which concluded that there is a lack of education about the reality of this technology (2). One year later, Edelman issued the "2019 Edelman AI Survey," which revealed that people are generally optimistic about the long-term impact of AI but remain concerned about negative consequences like the loss of jobs, misinformation, and social isolation (3).

AI Skepticism, Anxiety & Hype: Three Challenges PR Pros Must Overcome

Even though PR scholars and professionals are increasingly discussing the impact of AI in communications, the conversation is facing three main challenges. The first is the "AI skepticism," or the belief that artificial intelligence is not having a significant impact on the work PR practitioners are doing today. This was evidenced by the USC Center for PR Global Communications Report, which showed that only 3% of PR executives believe AI is an important technology for their practice, and just 18% believe they will be using it in the future (29). These findings suggest that there currently exists a significant misunderstanding —perhaps a knowledge gap— about the actual state of AI technology advancement as it can be applied to supporting or evolving the capabilities within the PR industry.

The second challenge that the conversation about AI and PR is facing is what Galloway and Swiatek called the "AI anxiety" (736). This unease is rooted in the idea that the PR profession will one day be "robotized" to replace PR workers, which would bring harmful

economic, social and ethical consequences for the industry. This concern is reflected on one of the CIPR central research questions, "how much of what we do in public relations already is, or will be replaced by technology, and specifically artificial intelligence?" which seems to suggest that there is a hostile tension between humans and technology (Valin 3). Despite the fear that some may have about being replaced by an intelligent machine, communications professionals must accept that AI is already changing the way they do their work. Instead of replacing them, this technology is *complementing* and *augmenting* their ability to make faster and better-informed decisions.

The third challenge is the "AI hype." The growing need for better metrics and data analysis in the public relations industry has stimulated the competition between communications tech companies like Cision and Meltwater, who now lead a market that is valued in $4.1 billion (Czarnecki, "Report: Communications tech…"). According to Rowan Benecke, chief growth officer at Ruder Finn, tech vendors can sometimes misrepresent their products and tools by focusing too much on what their products can potentially do, rather than what they can do right now (Czarnecki, "PR pros choose…"). This misrepresentation can lead PR professionals to think that AI-powered platforms can help them solve all kinds of business challenges with little human input. The hype might also encourage PR specialists to ignore the pitfalls of using this technology such as unintended biases, misinformation, or data privacy disruption. Thus, to overcome the AI hype, PR experts must bring the discussion back to how AI is helping them solve real problems while clearly stating the limitations and risks that come with the use of this technology.

The study conducted by the CIPR, "Humans Still Needed," showed that approximately 41% of the skills and abilities needed in PR are using some kind of technology to simplify,

monitor, automate and analyze data (Valin 8). Out of that 41%, 12% is truly using some form of AI to create and curate content, identify trends, track issues, generate reports and presentations, process large amounts of information, and enhance customer experience (8). This indicates that, as of today, approximately 10% of the skills needed to practice PR are being augmented or complemented with artificial intelligence, which explains why human input is so critical in the AI adoption process.

Results of the CIPR study show that the adoption of AI capabilities in the field of public relations is at an early stage, and still has a long way to go in comparison to other promotional industries like marketing and advertising. A truly transformational outcome is years away because, as the tech expert Vishal Sikka states, the development of AI is asymmetric and only a few companies have enough access to data and programming experts ("Vishal Sikka…"). However, with the flourishment of AI tools, we are starting to see a shift in the way PR practitioners are monitoring and collecting data, designing their communications strategy, and obtaining metrics they had never had access to before.

AI Is Transforming the Practice of Public Relations

The purpose of this analysis is to demonstrate that, contrary to the belief that artificial intelligence is not having a significant impact on the field of public relations, this technology is already here, and it is transforming various areas of practice of the PR profession. This is why communications professionals must break through all the skepticism, anxiety and hype generated by this term and strive to understand the benefits of this technology, its limitations, and the ethical implications of incorporating it into their daily practice.

To illustrate how artificial intelligence is transforming the practice of public relations, the author will first explain the concept of "artificial intelligence" and its different subsets, applications and limitations. In the following chapters, the author will explain the way communications professionals are using AI tools in three different areas of the practice of public relations: social media and audience listening, crisis management, and media relations. The last section of this study will offer a toolkit for public relations practitioners interested in complementing their practice with intelligent platforms.

Chapter 2
What is AI and Why Should We Care?

The phrase "artificial intelligence technology" casts a very large net and captures a very diverse set of products, services, and technologies that could be applied to almost any industry imaginable. There are immense levels of complexity and confusion around these products and services, both in how they were created, what their true functionality might be, and how they could or should be used.

To understand the way artificial intelligence is transforming the field of public relations, it is important to consider the origins and the underlying function of this revolutionary technology. Amid the skepticism, anxiety, and hype generated by this term, words like "automation," "algorithm," "robots," and "machine learning" are often used interchangeably, which can be misleading and confusing. In this chapter, the author will take a look at the historical development of artificial intelligence and the different types or subsets of this technology that are relevant to the field of communication. Then, the author will analyze the functions that AI is currently fulfilling in PR, including some of the risks and limitations that come with the deployment of this technology.

History & Definition of Artificial Intelligence (AI)

The concept of *artificial intelligence* (AI) is constantly evolving and does not have a unique definition. In the broadest sense, AI refers to machines that can learn, reason and act for themselves (Hao, "What is AI?"). Almost all AI systems are made by *algorithms*, which are essentially a set of instructions that tell a computer what steps to take to solve a problem. A cake recipe, for example, could be thought of as an algorithm. However, not all algorithms are specifically related to AI.

Thanks to science fiction films like "The Terminator" (1984), "2001: A Space Odyssey" (1968) and "Ex-Machina" (2015), people think of AI as a super-intelligent machine that will destroy or replace humanity forever. This dystopian idea of robots surpassing human intelligence is known as ***artificial general intelligence*** (AGI) or "strong AI." However, this advanced technology where machines perform infinite cognitive tasks has not actually been developed yet. The AI technology that we are currently using is known as ***artificial narrow intelligence*** (ANI) or "weak AI." As opposed to strong AI, weak AI can only perform one task. This explains why, as of today, AI-powered tools still need a considerable amount of human input.

The term "artificial intelligence" was officially coined in 1956 when a small group of computer scientists organized by John McCarthy gathered at a DARPA-sponsored[4] conference at Dartmouth College, New Hampshire. The conference was essentially an extended brainstorming session where McCarthy, Marvin Minsky, Claude Shannon, and other researchers discussed the possibility that machines could potentially replicate human intelligence (Daugherty & Wilson 40). The discussion led to the emergence of two schools of thought: The Symbolists, who believed that human intelligence is based on how much humans know; and the Connectionists, who thought intelligence is based on humans' ability to learn (Hao, "MAICON Keynote…").

Connectionists wanted to build a machine that could learn on its own, which is why they started to think of ways to replicate the biological structure of the human brain. In 1957, the psychologist Frank Rosenblatt created an early version of an ***artificial neural network***, a crude replication of neurons in the brain organized into layers. He initially called his network "Perceptrons," but his invention had several limitations that were harshly criticized by

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[4] DARPA, or the Defense Advanced Research Projects Agency, is an agency of the U.S. Department of Defense responsible for the development of emerging technologies for military use. DARPA-funded projects have developed cutting-edge technologies that have influenced many non-military fields such as computer networking, the Internet, and user interfaces in information technology.

researchers Marvin Minsky and Seymour Papert. As a consequence, Rosenblatt's Perceptrons languished for decades.

In 1959, IBM engineer Arthur Samuel created a computer program that could play checkers. Instead of memorizing every rule and step in the book, Samuel's program was designed to play against itself and learn how to improve. This project gave birth to ***machine learning***, the field of study that gives computers the ability to learn without being explicitly programmed (Daugherty & Wilson 41). The ultimate goal of machine learning is to understand the structure of data and translate that data into models and patterns that can be understood by people. These patterns can be used to make predictions on things like what shows are people going to like on Netflix or what their next Amazon purchase is likely to be. But back in the 1960s, the lack of computing power and data points doomed this system to fail, falling into a quiet decade known as the first "AI Winter."

Symbolists, on the other hand, believed that to create intelligent machines, they had to design an expert system: a giant database of symbols that were interconnected through a set of logic rules. Introduced by Alan Newell and Herbert Simon in 1976, ***symbolic AI*** —also known as "good old-fashioned AI"— represented problems using symbols and used logic to search for solutions. IBM's famous chess-playing computer, Deep Blue, is an example of a very powerful symbolic AI system that in 1997 was able to defeat Garry Kasparov, the best chess player in the world.

By the beginning of the 1980s, the general industry and government officials started to show a renewed interest in AI technology. Symbolic AI seemed promising, but experts soon realized that this approach had significant limitations. Despite its extraordinary capabilities, symbolic AI was a labor-intensive process because symbols and logic rules had to be manually

encoded. Distilling all human knowledge into a simple set of logical rules was time-consuming and impossible to do, which eventually prompted a second "AI Winter" in the early 1990s.

Amid the hype of AI Systems in the 1980s, cognitive psychologist and computer scientist Geoffrey Hinton revisited Rosenblatt's Perceptron model and created an enhanced version of an artificial neural network. As opposed to Rosenblatt's Perceptrons, Hinton's network had a set of additional layers that made the system much more accurate and efficient. Hinton called these new networks "Multilayer Perceptrons." This new branch of AI is now known as ***deep learning***, a type of machine learning that uses techniques like backpropagation and clustering to learn new things more efficiently and create categories to classify information from large data sets.

Over the first decade of the 2000s, machine learning began to flourish as experts integrated statistics and probability theories to their approaches. Additionally, technological developments like the Internet, personal computers, digital systems, sensors and mobile phones provided all kinds of data for machine learning specialists to use when training these systems. The more data sets added to machine-learning systems, the more they learn and update their models to change and improve the way they "see" the world. Programmers became less like rule makers and dictators, and more like teachers and trainers (Daugherty & Wilson 42).

Even though symbolic AI is still used today, machine learning and deep learning are being adopted across dozens of industries. Banks use them for fraud detection, dating apps use them to suggest matches, photo-sharing sites use them for automatic face recognition, and marketers use them to predict who will respond favorably to an ad (Daugherty & Wilson 42). Even though the development of such algorithms has been intermittent for more than 50 years, AI has finally starting to democratize, permeating all kinds of products and business operations.

AI Technologies & Applications in Communication

With the development and improvement of machine learning and deep learning approaches, the constellation of AI technologies, capabilities and applications has expanded significantly. For example, AI's capability to predict has allowed companies to detect anomalies (such as bank fraud) or make forecasts (like weather-related problems). In the field of communication, AI's ability to process human language (also known as ***natural language processing***) has allowed companies to understand individual behaviors, preferences, beliefs and interests to deliver more efficient campaign strategies. The following graph is a constellation of some of the fields, capabilities, applications, advantages and risks of using AI technologies in the field of communication (see fig. 1).
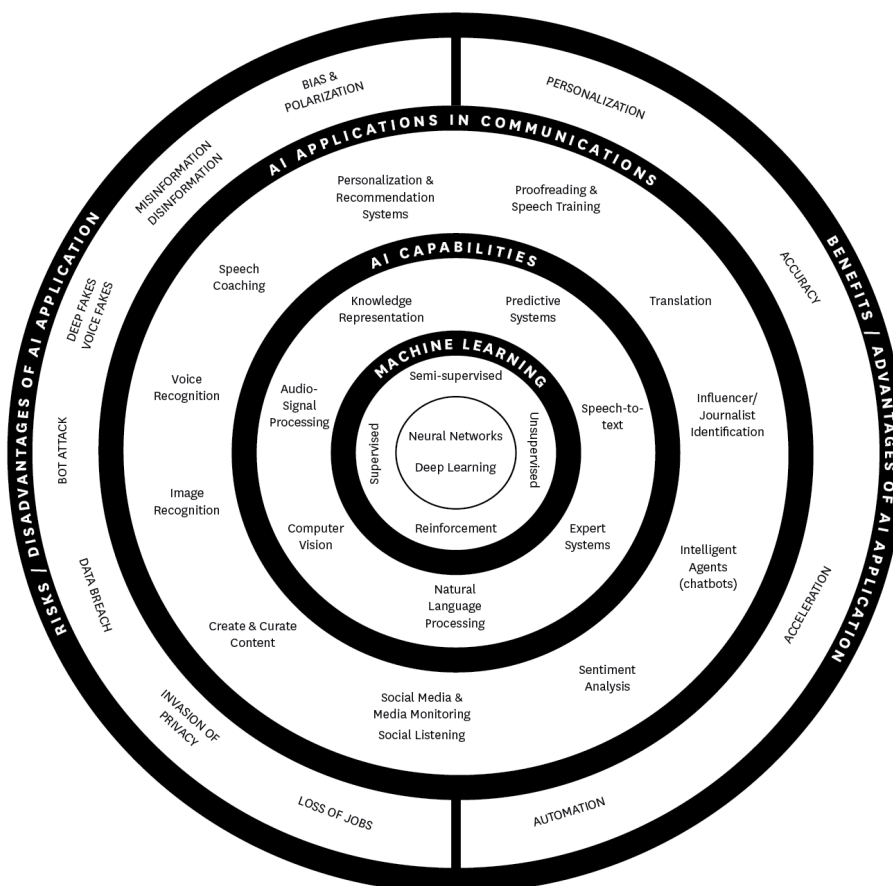

Figure 1: Visual representation of the capabilities, applications, advantages and risks of AI deployment in the field of communication

It is important to consider that not all forms of AI can satisfy every communication need. As mentioned before, the AI technologies available today can only perform one cognitive task, but they can do it with much more precision and accuracy than a human can. This is why communications and public relations professionals need to educate themselves on these new technologies and understand their capabilities, limitations, and potential applications to real-life situations. The following glossary explains some of the most common types, capabilities and applications of AI in the fields of communications, marketing and public relations (see fig. 2).

SUBCATEGORIES OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES			
AI Technology	**AI Subset (Type)**	**Definition**	
Symbolic AI		AI software that uses information stored in a Knowledge Base to solve problems that would usually require a human expert. However, developing these systems takes a considerable amount of human skill, patience and time.	
Machine Learning (ML)		Machine Learning is the process of using statistics to find patterns in data and use those patterns to build assumptions. ML algorithms enable the software to update and "learn" from previous outcomes without the need for programmer intervention. This model-based training allows AI to make better predictions than humans because it can take more factors into account and analyze them in milliseconds. ML can be used to automate time-consuming tasks like coverage tracking and social listening, influencer reach, and pinpointing a crisis on social media.	
	Supervised Learning	A type of ML in which an algorithm is presented with labeled data (pre-classified and sorted data) consisting of example inputs and desired outputs. The algorithm learns the general rules that connect the inputs to the outputs and then applies those rules to a different data set to predict future events. Supervised learning can be used to teach an algorithm to recognize a brand logo ("labeled data") on Instagram, or identify what kind of sentiment surrounds the mention of a brand in a news article.	
		Similarity Learning	An area of supervised machine learning closely related to regression and classification, whose goal is to measure how similar or related two topics are. It has applications in ranking, recommendation systems, visual identity tracking, and face and speaker verification.
	Unsupervised Learning	A type of ML in which no labels are given to the algorithm, allowing it to find structures and patterns on its own. Unsupervised learning is less focused on the output and more focused on finding connections and trends that a human has not previously identified. Unsupervised learning can be used to go through millions of social media mentions and identify the topics that are most associated with a given brand. For example, if it finds lots of mentions that a product is "too expensive," it will show that trend.	

	Semi-supervised Learning	A mix of supervised and unsupervised machine learning. This process is less time-consuming than supervised learning because it works with a small amount of labeled data and a large amount of unlabeled data, making it less costly and more accurate. If this technology becomes sophisticated enough, it will allow PR practitioners to spot "fake news" or inaccuracies about their company, and identify other types of misinformation they had not identified before.	
	Reinforcement Learning	A kind of training in which the algorithm is given a goal (such as operating a robot). Each move made by the algorithm can be either rewarded or punished. This "feedback" allows it to build the most efficient path toward the goal. This technology can be used to engage with users at a personalized level. Facebook, for example, uses reinforcement learning to teach its computers which notifications are users more likely to respond to. Facebook has also used reinforcement learning to decide whether to send people low- or high-quality videos depending on variables like their connection or location.	
	Neural Network (Deep Learning)	A type of machine learning in which a series of algorithms learn from observational data and process information in a way similar to the human brain. The more data, the more evaluations these networks can complete and the smarter they become. However, it is difficult to explain how these networks process the information and reach certain conclusions, which is why they are also known as "black boxes."	
		Deep Neural Networks (DNN)	A technique to train a multilayered neural network where "sensed" data is processed through multiple layers, and each layer uses the output of the previous layer as an input.
		Recurrent Neural Networks (RNN)	A technique to train a multilayered neural network where data flows back and forth through the layers.
		Feedforward Neural Networks (FNN)	A technique to train a multilayered neural network in which data can only flow in one direction.
CAPABILITIES OF ARTIFICIAL INTELLIGENCE			
Natural Language Processing (NLP) or Natural Language Understanding (NLU)		Artificial intelligence leverages natural language processing (NLP) to extract features from human speech, interpret those features as words, prepare responses, and compose speech back to humans. NLP allows communications professionals, for example, to analyze and interpret millions of conversations online.	
Computer Vision		A field that focuses on teaching computers how to identify, categorize, and understand the content in images and videos.	
Audio-Signal Processing		ML that can be used to analyze audio and digital signals in high-noise environments. Applications include computational speech and audio/audiovisual processing.	
Knowledge Representation and Reasoning		A field of AI that represents information about the world in a form that a computer system can use to perform complex tasks.	
Predictive Systems		A system that finds relationships between variables in data sets and their outcomes. These relationships are used to develop models that can be used to predict future outcomes based on historical data.	
Speech-to-Text		Neural networks that convert audio into text in a variety of languages.	

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Expert Systems (Inference)	Expert systems derive from Systemic AI. They use field-specific knowledge combined with a rules engine that determines how that knowledge should be applied. The system improves as more knowledge is added or when the rules are improved.
APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN COMMUNICATIONS	
Sentiment Analysis	Sentiment analysis is a method for identifying and categorizing the polarity of a text, where the goal is to determine whether a particular text has a positive, negative, or neutral value according to a standard categorization.
Social Monitoring (Social or Audience Listening)	Through the use of AI-powered platforms, social media monitoring tools allow communication professionals to "listen" to what is being said about an organization, brand, person or topic across the Internet. These tools work by crawling sites (like blogs, news sites, forums, and social media platforms) continuously and indexing them. Once the data has been obtained, these monitoring tools allow communication specialists to conduct various analyses such as sentiment analysis, topic analysis, comparing queries, identifying most influential authors, charting (e.g. volume over time), and data visualization. Most tools are only allowed to crawl publicly-available data.
Content Creation & Curation	Even though this application is at an early stage, AI is allowing journalists and marketers to generate simple stories such as stock updates and sports results. It also offers insight into which content pieces will resonate more with specific audiences. Additionally, AI-tools help communication professionals identify topics that are trending, which enhances their content strategy.
Voice Recognition	Voice or speaker recognition is the ability of a machine or program to receive and understand human speech. Voice recognition programs are used to improve customer experience and transcribe oral speech into text.
Image Recognition	Image recognition gives a machine the ability to interpret and categorize images. In communication, image recognition is used in influencer marketing to gain more insights on influencers without relying on hashtags or mentions.
Speech Coaching	At an early stage, speech coaching programs use AI to teach professionals how to improve their public speaking skills. These programs measure elements of speech like filler words, tone, and pace to give feedback on areas that need further improvement.
Personalization	AI-powered personalization helps marketers unify data from multiple sources to provide a single view on a customer. Analyzing customer data helps uncover trends and micro-segments according to behavioral patterns, geolocation, time of the day, etc.
Proofreading	AI-powered assistants use natural language processing to correct spelling, grammar and phrasing as well as correctness, tonality, engagement and delivery of a text.
Translation	Using AI, translation programs are now able to interpret the context of a sentence to accurately translate a word into a different language. This technology is still under development.
Influencer/Journalist Identification	AI-assisted influencer or journalist recommendation programs can "notice," via image recognition and natural language processing, patterns in influencer/journalist content or profiles to recommend similar ones. Some of these platforms might also leverage AI to spot "fake influencers" who inflate their following numbers using fraudulent strategies.

	At a basic level, voice assistants like Duplex, Siri, Cortana and Alexa are intelligent agents that use natural language processing (NLP) to convert human speech into words, sounds, and ideas, and machine learning to decode those words into commands. Companies like Google, Apple, Microsoft and Amazon created these assistants to improve their customer experience and satisfy all kinds of customer needs, including answering general questions, giving traffic directions, finding places to eat, or researching a product before purchasing it. By using voice, these companies are allowing users to interact with their products in a faster and more personalized way.
Intelligent Agents (Voice Assistants)	

Figure 2: Glossary of AI subcategories, capabilities and applications. Definitions are based on Paul R. Daugherty & H. James Wilson's book, "Human + Machine: Reimaging Work in the Age of AI," and William Ammerman's book, "The Invisible Brand: Marketing in the Age of Automation, Big Data, and Machine Learning." Application examples are curated from online sources, including AI expert Christopher Penn's interviews and blog posts

Why Should PR Professionals Care about AI?

Identifying opportunities for AI deployment depends on a range of factors that pertain to a specific sector and, within that sector, to a specific type of business. Given the large amount of AI applications, PR professionals must identify specific areas of practice where this technology can create the most value for their organization's business strategy.

AI marketing expert Christopher Penn argues that AI has brought three main benefits for public relations practitioners: automation, acceleration and accuracy (Garret). In other words, AI is making the practice of public relations cheaper, faster and better, something that is benefitting the bottom lines of companies and agencies.

Automation, for instance, is not only taking over some of the busywork that comes with the practice of public relations, but it is also augmenting PR professionals' ability to obtain insights in a matter of seconds. A few years ago, tracking media coverage was a time-consuming task where account coordinators had to perform an extensive search to measure how many times a brand or a company had been mentioned in the media. This process took hours of work; hours that companies had to pay for. Now, PR professionals can leverage the power of AI to detect

how many times their brand is being mentioned, where it is mentioned the most, what is being said about it, and who is saying it.

Other time-consuming tasks like curating journalist or influencer lists are being automated, not only saving PR practitioners a significant amount of time but also allowing them to find reporters and influencers they had not considered before. The PR software provider Cision, for example, has a media database with more than 1.4 million professional media contacts and 910 million social influencer profiles. The platform is equipped with AI and machine learning capabilities that help identify reporters and influencers that overlap with the targeted audiences of any given campaign ("The ultimate media database…"). The benefits of automating repetitive tasks in the field of public relations will be further explored in the next chapter.

If automation is making repetitive tasks more efficient and less expensive, acceleration is enabling PR professionals to obtain information in real-time. Acceleration can be crucial during a crisis when time is the most valuable asset. For example, in 2017 the ride-hailing platform Uber was negatively impacted by #DeleteUber, a social media campaign that encouraged users to delete the app after the company was accused of profiting off of a protest against President Trump's travel ban. In a matter of hours, thousands of American users had deleted their accounts. A social media monitoring platform built on machine learning and natural language processing algorithms called Converseon helped Uber's communications team process massive volumes of online data and spot this crisis in real-time. The benefits of acceleration in the context of crisis management will be studied in the third chapter of this study.

The automation and acceleration of the practice of public relations are also offering something PR professionals have struggled with in the past: accuracy. Measuring and analyzing

people's feelings and impressions toward a brand or a product has always been a challenge for account managers who struggle to justify their budgets and deliver metrics that are relevant for the C-suite. And, as the lines between marketing and public relations blur, organizations are increasingly asking their internal PR teams and agencies to operate under similar expectations as their marketing departments, who can provide quantifiable metrics such as sales and market share (Czarnecki, "PR pros choose…").

With advanced AI technologies like natural language processing, PR practitioners can accurately quantify people's feelings and opinions about a brand and measure that sentiment against other metrics like engagement, stock price, or sales. But they must be careful not to rely solely on the metrics that tech communication platforms provide, and strive to convert those metrics into insights that matter to their top executives (Daniels). In fact, the USC Center for PR Global Communications Report showed that the two main communications goals for CEOs in 2020 are to sell products and services (44%) and differentiating their brand from the competition (39%) ("PR: Tech…" 7). On the contrary, marshaling data and analytics to gain insight into opinions, issues and trends was not selected as their main priority (12%), demonstrating that data and AI are a means for building brand and sales, but not necessarily a business goal itself.

Automation, acceleration, and access to more accurate metrics like the scope of reach, sentiment, and engagement rates with the help of AI-powered platforms are transforming the public relations industry. On the one hand, new types of skills are being needed: big data analytics, user experience, and predictive artificial intelligence are all proficiencies required to compete with marketing and advertising and justify the value and effectiveness of the PR industry. On the other hand, having cheaper, faster, and better access to relevant information is giving PR practitioners the ability to focus on other activities such as creative thinking, strategic

planning and instinct, which are all essential attributes of communications professionals that no machine will ever offer in our lifetimes (Brotman 53).

The next three chapters will focus on illustrating how AI technologies are currently being deployed to automate, accelerate and improve the accuracy of public relations activities such as audience listening, social media monitoring, influencer relations, crisis management and media relations. Each chapter will also offer a glimpse of the ethical implications and potential risks that come with the implementation of artificial intelligence in the field of communications.

Chapter 3
The Growing Role of AI in Social Media

Earlier predictions noted that by 2020, all of our digital interactions would generate 40 times more bytes of data than there are stars in the observable universe ("Data Never Sleeps 7.0"). As more clicks, shares, posts, and comments hit the digital space, this staggering amount of digital data will keep growing exponentially, forcing businesses to look for novel ways to analyze the content of these new streams of information and obtain actionable insights. Artificial intelligence, machine learning, image recognition, and natural language processing tools are playing an important role in helping organizations process and interpret large volumes of data in short periods, allowing them to better understand competitors, consumers, employees, media, and other key stakeholders and improve their performance.

The increased use of communication platforms such as blogs, forums, and social media represents an opportunity for PR professionals to discover, understand and measure people's beliefs, attitudes and behaviors in ways they never had before. And even though analyzing such a wide variety of digital sources can be challenging, PR professionals are now using AI-powered tools to navigate through all that data and deploy social listening strategies, analyze competitive landscapes, conduct social sentiment analyses, and discover key influencers. These new research methods are enhancing and complementing the decision-making process of communications professionals who want to advance their client's business goals.

This chapter will explore the concept of Big Data and explain the reasons why access to vast amounts of information is redefining traditional research methods in the field of public relations. Through a case study about Cisco, the author will illustrate how companies are using AI tools to obtain insights about their competitive landscape and market trends. The author will then conduct a sentiment analysis of Nike's "Just Do It" campaign to illustrate the advantages

and limitations of this new kind of research. The author will also elucidate how PR and marketing agencies are using AI to identify key influencers, detect influencer fraud, and even create AI-powered influencers of their own. The chapter will conclude with a reflection about the ethical implications of these new data collection practices, especially on social media, and what the government and companies are doing to protect users' privacy.

Social Media and the Big Data Revolution

Digital data has been around us for a long time. The earliest recollection of modern data is from 1887 when the American businessman, inventor and statistician Herman Hollerith developed an electromechanical tabulating machine that could read punched paper cards to record and organize census data. More than a hundred years later, with technological developments like the Internet, smart devices, and social networks, the world started generating massive sets of data that soon became impossible to process using traditional business intelligence tools. These revolutionary and more complex data sets are known as ***Big Data***, which are more varied and arrive in increasing volumes and at a higher rate than traditional data.

But what is digital data and why is it so important? Every click, tweet, post, email, online purchase and pretty much any digital interaction generates data that can be stored and processed by computers and transmitted across the Internet. This data is then collected and analyzed by companies to find patterns that will help them understand present trends and predict future outcomes based on past events. For example, Netflix collects data about its viewers' behavioral patterns to understand their preferences and predict which shows they will like in the future. This allows the company to make accurate and personalized recommendations that keep subscribers engaged with the platform's content. Instagram does a similar thing by collecting data on its

users' likes, comments, shares and views to understand their preferences and predict which accounts they are more likely to interact with in the future. Rather than seeing content chronologically, users see posts from accounts they're most likely to engage with, such as family, friends, or their favorite influencers. These personalized feeds are designed to maximize the time that users spend on Instagram.

Data can be classified as structured or unstructured. ***Structured data*** —also known as quantitative data— uses a predefined format where all fields are fixed, making it easy to export, store and organize information in databases like Excel and SQL. For example, transactional data from an online purchase can be recorded with a defined timestamp, items purchased, the amount paid, associated account information, and a confirmation number. Because each field has a specific purpose, finding patterns within this data through a manual query or using machine learning algorithms is relatively easy (Chen).

Unstructured data —or qualitative data— comes in all shapes and sizes. Even though it is typically text (like PDFs, social media posts and emails), it can also be stored in the form of a video file, audio, an image, or a different format. For example, even though the number of likes, shares, views and hashtags in a social media post are structured, the actual posts (in the form of text, image or video) are unstructured. Given the wide range of formats that unstructured data comprises, it is not surprising that this kind of data makes up about 80% of an organization's data (Chen). Gathering, storing and organizing this information in typical databases is difficult, and its analysis requires cutting-edge technologies like machine learning, image recognition, and natural language processing.

The fields of marketing, advertising and public relations are usually more interested in researching and analyzing unstructured data like social media posts, photos and videos, which

allow agencies and companies to move beyond traditional metrics and obtain valuable insights like market trends, customer preferences, and feelings toward a brand. And, as mentioned before, it is only through AI technologies like machine learning, image recognition and natural language processing that PR professionals can analyze large data sets and obtain results in an efficiently and more accurately.

Audience Listening Case Study: Cisco Systems

Cisco Systems Inc. (NASDAQ: CSCO) is a multinational technology company headquartered in San Jose, California. The company develops, manufactures and sells Internet Protocol-based networking products and services related to the communications and information technology industries. With a rich catalog ranging from core networking to the Internet of Things (IoT), the company's market landscape is constantly evolving and comprises a significant number of competitors. In this context, Cisco needed to better understand key market trends and pinpoint opportunities to be more present in the market conversation (Weiner & Kochhar, 27).

One of the main challenges Cisco faced was the vast amount of data the company had to analyze. With increasing volumes of social media and traditional media entries, analyzing key themes through traditional human coding was inefficient and time-consuming. For that reason, Cisco's Strategic Marketing Organization (SMO) decided to partner with Quid, a research platform built on natural language processing that analyzes big unstructured data and visualizes its findings in a way that makes it easier to provide actionable insights (Weiner & Kochhar, 27).

Since IoT was a key area of focus for Cisco, the SMO team prioritized this topic to conduct an audience listening analysis. The purpose of this research, which processed millions of social media and traditional media posts, was to identify key themes in the IoT narrative. These

findings would allow Cisco's marketing and communications teams to prioritize their messaging around the narratives that were the most relevant in the IoT market.

As Cisco began to experiment with Quid's platform, the SMO team created a guide for key stakeholders to explain how the statistical analysis represented by a network should be interpreted (see fig. 3).

How to Interpret Network Diagrams

Each node represents a news story; node sized by degree represents number of connections (i.e., similarity) to other nodes

Connections represent similar language used across nodes

A node bridging two clusters can indicate a story that synthesizes multiple topics

Spread out clusters contain highly differentiated stories

Dense clusters contain highly similar stories

Similar nodes typically cluster together and clusters are grouped by color

Less distance between clusters indicates a high number of inter-related stories

Greater distance between clusters indicates a low number of inter-related stories

Centrally located stories are core to the conversation, indicating central topics or bridging of ideas

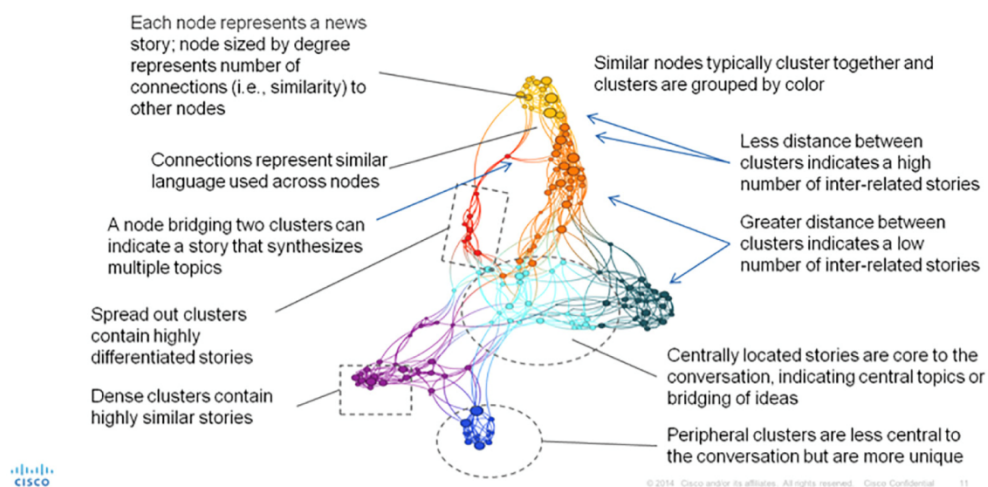Peripheral clusters are less central to the conversation but are more unique

Figure 3: Guide for stakeholders developed by Cisco's SMO team explained how Quid's statistical analysis represented by a network should be interpreted. The network allows readers to identify key themes (clustered in different colors) and visualize the connections between those themes (Image source: "How Cisco Used Quid…")

The SMO and the Corporate Communications teams worked collaboratively to identify key influencers impacting customers' decisions. Since Cisco is a B2B company, the teams needed to get rid of all the "noise" in the data that did not have any impact on key customers or stakeholders. Cisco started the Quid network analysis by eliminating irrelevant content and focusing on key influencers. Then, the inquiry was narrowed down to the top seven narratives in IoT, all of which were depicted in one of Quid's network diagrams (see fig. 4).

Internet of Things Narratives Depicted in Quid Network Diagram

Verticals & IoE/T – Health Manufacturing, Oil, Education, Agriculture (17%)

IoE/T startups Attract Funding (11%)

Smart Cities / Connected Cars (12%)

IoE/T & Security (17%)

Innovation in Smart Homes and Industrial Internet Consortium (15%)

Wearables - Apple Watch & Google Wristband (13%)

Privacy, Big Data and IoE/T (15%)

n = 1,158
4/26/2015 – 7/12/2015
*based on top global English language traditional and social media
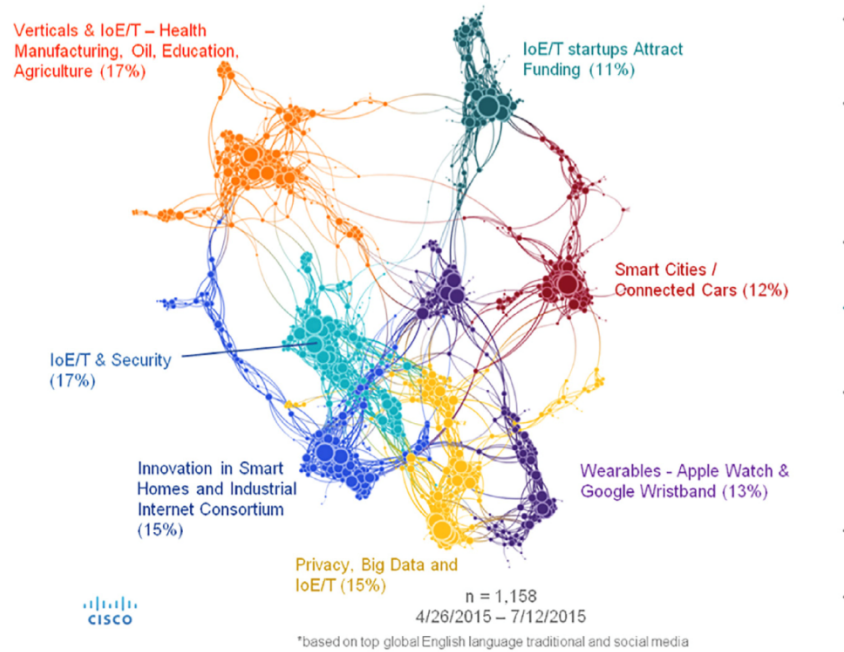
CISCO

Figure 4: Quid's network depicted seven narratives around IoT. Security and verticals (i.e. the industries most associated with IoT) were two of the most important narratives (Image source: "How Cisco Used Quid…")

According to the Institute for Public Relations study, Cisco evaluated each of the narratives to understand the key drivers in the conversation and obtain insights about its competitive landscape:

- The **wearables cluster** (13%) comprised two sections. The more central cluster referred to stories about how IoT (including wearables) was going to change the general industrial landscape, which explains why this sub-cluster was connected to every industry narrative. The other section referred to the release of the Apple Watch and the Google Wristband.

- The largest cluster, **verticals** (17%), contained stories about how various sectors are starting to explore IoT technologies.

- **Security** (17%) and **privacy concerns** (15%) made up more than a quarter of the network. These clusters were closely linked to the **innovation in smart homes** (15%) and wearables clusters, showing an interconnection between these topics.

- The innovation in smart homes and industrial Internet consortium was split in two directions, with Google's release of a camera for Nest appearing in the denser part of the cluster. Other companies like Amazon and startup Nuimo were also featured.

- The **smart cities and connected cars** cluster (12%) focused the narrative on how to find more sustainable ways of living and how IoT could benefit citizens.

After this analysis, the SMO team "created a visual overlay of where Cisco appeared in those narratives" (Weiner & Kochhar, 29). This allowed the communications team to build a roadmap of where to focus its new messaging efforts. For example, the company focused on integrating security across its marketing efforts and published case-studies and blog posts on IoT and the Oil & Gas industry.

Thanks to Quid's natural language processing algorithms, Cisco was able to analyze and process millions of data points (or Big Data) efficiently and accurately. The insights obtained from this new research method allowed the company's SMO and communications teams to develop a successful messaging plan that would increase Cisco's online visibility and fulfill its customers' demand for information.

Interpreting Emotions Using Sentiment Analysis

As stated before, AI technologies like machine learning and natural language processing are transforming the way PR practitioners obtain insights from large amounts of unstructured data, most of it proceeding from traditional media and social media sources. The CIPR study

"Humans Still Needed" found that social media analysis is one of the most common PR activities impacted by artificial intelligence (11). This explains why almost half (44%) of the PR professionals participating in the USC Center for PR Global Communications Report chose media monitoring as the most relevant tool for their current work (28).

Modern-day media monitoring tools do not only offer traditional metrics like how many times a brand is being mentioned online; how many impressions, shares or likes did a post have; or the average age of the users engaging with a post. Instead, a significant number of these tools are now equipped with AI-algorithms that can extract quantitative and qualitative information about individual behaviors, preferences and interests. ***Sentiment analysis***, for example, is a promising process that uses AI to determine whether a piece of writing is positive, negative or neutral. This kind of analysis can help PR professionals gauge public opinion, conduct market research, monitor a brand's reputation, or gain more insights on customer experience.

One of the biggest challenges of this analysis is how complex and subjective human emotions are. Elements like sarcasm, voice intonation and body gestures can change the meaning of a text, while opinions can be subject to the interpretation of the reader. It is estimated that when humans evaluate a text's sentiment, they tend to agree around 80% of the time, which explains why reaching a 100% accuracy level is still difficult for communication tech platforms. Teaching a machine how to analyze grammatical nuances, cultural variations, slangs and spelling errors is challenging, and teaching it to understand how context and tone can change the meaning of a sentence is even harder.

According to Alex Smith, a data visualization engineer at Zignal Labs, a business intelligence company, measuring sentiment can sometimes be like "flipping a coin" or only 50% accurate:

If you were to buy an off-the-shelf solution from IBM, for example, who has the Watson services, this is probably one of the most popular marketing sentiment services and we've used them extensively over the years. But we have found in a lot of our studies on the actual sentiment that it was about as accurate as flipping a coin, 50/50. It was just very general. It's great at picking up "I love something" versus "I hate something," cursing and all those things. On sentiment that is more nuanced, or to see what comments mean to my brand and the context of my brand, is just the 'Wild West' out there.

Smith said that to improve the accuracy of sentiment analysis, Zignal Labs uses supervised machine learning where real humans tag large sets of data as either neutral, positive, or negative, and they also point out instances where this sentiment can be harmful for a specific brand. This tagged data is then fed into machine learning algorithms, which learn to recognize patterns and augment their analysis capability to a given brand. However, this is a premium service because it is a long and personalized process that requires significant human intervention.

We crowdsource a lot of data and the service we use is Amazon Mechanical Turk (…). So, what they do at Mechanical Turk is (…) basically you answer a question. And for that, you get rewarded some small amount, it depends on the task. But that gives us tagged data we can use in machine learning processes (…). We'll just have them tag the data for like, you know, here's a bunch of stories from this profile. Tell us if you think, through the eyes of the brand, is this positive or negative? And what are the concepts or highlight words in the sentence that are telling you that.

Smith continued saying that this process was "a tough nut to crack," but if done correctly, it can bring incredible analysis capabilities that would allow brands not only to analyze the sentiment of millions of posts in real-time but also to stay ahead of their competition. For example, if someone posted a negative comment about Uber, Zignal Labs' advanced sentiment analysis services would have the ability to classify this comment as positive when seen through the eyes of a competitor brand like Lyft. According to Smith, Zignal's sentiment analysis service is about 80% accurate today, and that is about as high as it can get right now. Thus, PR professionals being offered services with 90 to 99% accuracy should remain skeptical and ask

vendors how they are training these algorithms, who tagged the data, and whether this level of accuracy can be demonstrated.

Regardless of its limitations, sentiment analysis should not be completely disregarded by PR professionals who want to understand general feelings and opinions on social media. Receiving millions of negative impressions after a product launch might indicate that the product did not satisfy the customers' needs, whereas noticing an increase in positive mentions after a press conference might indicate that the messaging strategy was successful. To obtain actionable insights, PR practitioners should keep monitoring these results and compare them against other qualitative metrics like word clouds and topic clusters. This kind of analysis will be illustrated in the following Nike "Just Do It" Campaign case study.

Sentiment Analysis Case Study: Nike's "Just Do It" Campaign ft. Colin Kaepernick

On September 3, 2018, the American sportswear company Nike (NYSE: NKE) announced that the former San Francisco 49ers quarterback Colin Kaepernick was going to be the new face of the company's "Just Do It" campaign to commemorate the campaign's 30th anniversary. Kaepernick became known for protesting police brutality against African-Americans and other minorities when he refused to stand during the national anthem at a pre-season game in the American NFL, catching the attention of millions of viewers and the national media. This form of protest was adopted by other U.S. professional athletes and became a hot-button political topic when President Donald Trump asked the NFL to fire all players who were kneeling during the national anthem during a September rally in Alabama. Kaepernick filed a grievance against the NFL for colluding to keep him out of the league and agreed to a confidential settlement in February 2019.

As part of Nike's "Just Do It" launching campaign, Kaepernick shared the following ad through his social media channels:

Figure 5: Colin Kaepernick's "Just Do It" campaign ad. Image obtained from Colin
Kaepernick's Twitter account, @Kaepernick7

The ad has generated more than 2.7 million mentions of the Nike brand since its launch, a 1,400% increase compared to the previous day (Bradley). Regardless of these staggering numbers, a significant portion of mentions seemed to spark a negative sentiment among Twitter users, who immediately protested the political nature of Nike's campaign and uploaded photos of their Nike shoes and NFL jerseys on fire using hashtags like #BoycottNike and #JustDontDoIt. To avoid a potential crisis, Nike's communications team was likely monitoring the conversation closely, a process that the author will illustrate using Crimson Hexagon, an AI-powered intelligence platform.

According to Crimson Hexagon[5], the conversation about Nike's "Just Do It" campaign had an overall negative sentiment. However, this analysis excluded almost half of the 5,724,721 posts discussing this topic, which were classified as neutral (see fig. 6).

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[5] This study analyzed posts on YouTube and Twitter that contained the following Boolean phrases: nike OR kaepernick OR boycottnike OR "boycott nike" OR justdoit OR "just do it" OR "fight the #nikeboycott" OR
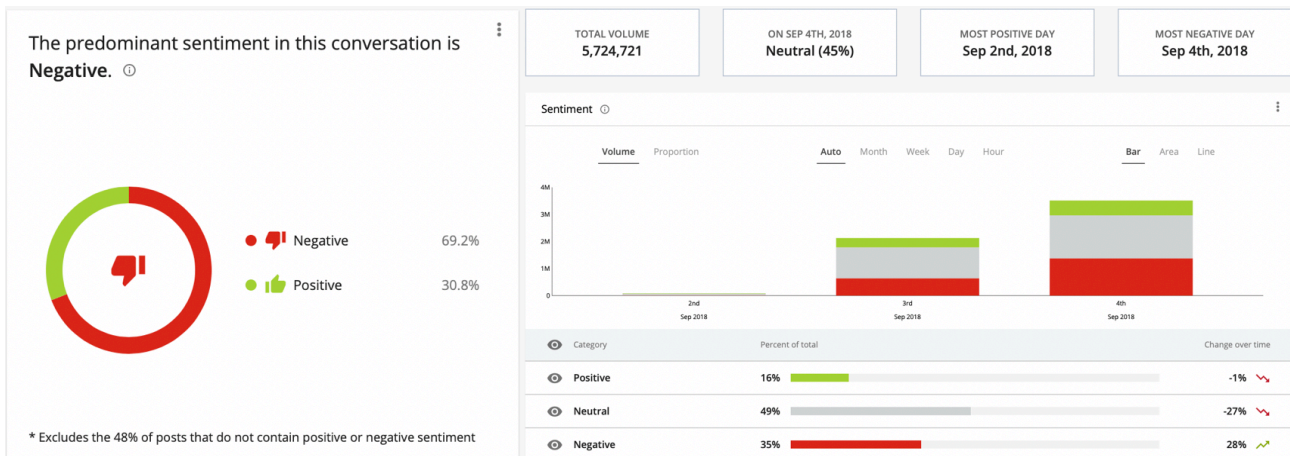
Figure 6: According to Crimson Hexagon, 49% of the total posts mentioning Nike's "Just Do It" campaign was neutral, 35% was negative and 16% was positive. Among those posts that contained a sentiment, 69% were negative and only 30% were positive

Because sentiment analysis occurs at a sentence level, the platform identifies words or phrases within a post that carry a tone or opinion. These phrases are usually written in the form of adjective-noun combinations (like "horrible-car"). Then, the algorithms give each phrase a "sentiment weight" based on words they already know. For example, the word "bad" would generally be given a sentiment score of -0.5 because it carries a negative connotation, while the word "good" would be given a score of 0.5 because it is usually positive.

Given the controversial nature of Nike's campaign, Crimson Hexagon's algorithms might have classified positive comments as negative. A manual revision of a sample of 10 "negative" tweets referring to the "Just Do It" campaign shows that even though some comments include words that people would generally consider negative, like "disrespectful," "racist," or "ignorant," the overall meaning of the posts show support for Nike's campaign (see fig. 7).

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supportnike OR supportkap OR standwithkap OR justdont OR justburnit OR buynike OR @kaepernick7. The search was limited from September 2 to September 4, 2018.
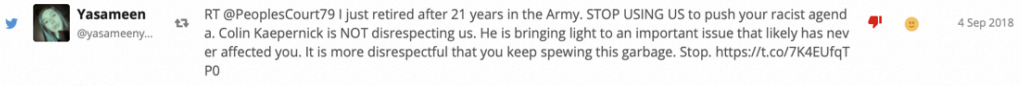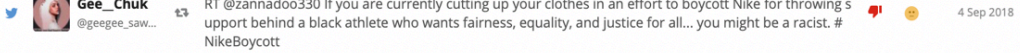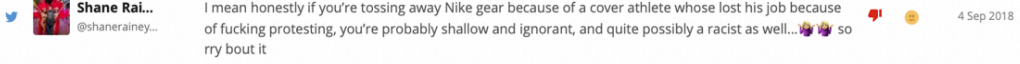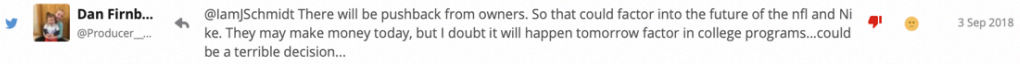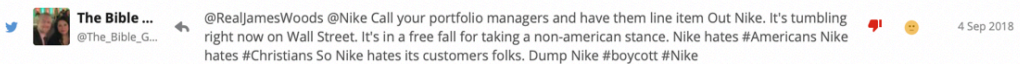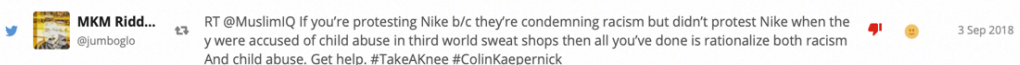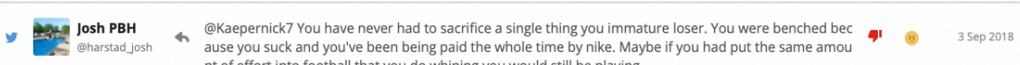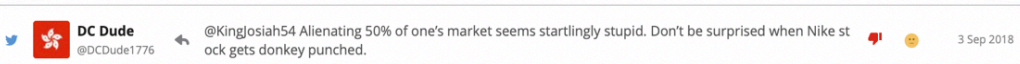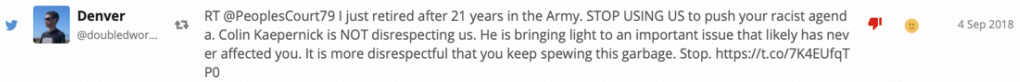
Twitter Samples (Posts automatically classified as "negative")			Sentiment reallocation (manually assigned)
Yasameen @yasameeny...	RT @PeoplesCourt79 I just retired after 21 years in the Army. STOP USING US to push your racist agenda. Colin Kaepernick is NOT disrespecting us. He is bringing light to an important issue that likely has never affected you. It is more disrespectful that you keep spewing this garbage. Stop. https://t.co/7K4EUfqTP0	4 Sep 2018	Positive
Gee__Chuk @geegee_saw...	RT @zannadoo330 If you are currently cutting up your clothes in an effort to boycott Nike for throwing support behind a black athlete who wants fairness, equality, and justice for all... you might be a racist. #NikeBoycott	4 Sep 2018	Positive
Shane Rai... @shanerainey...	I mean honestly if you're tossing away Nike gear because of a cover athlete whose lost his job because of fucking protesting, you're probably shallow and ignorant, and quite possibly a racist as well...👏👏 sorry bout it	4 Sep 2018	Positive
Dan Firnb... @Producer_...	@IamJSchmidt There will be pushback from owners. So that could factor into the future of the nfl and Nike. They may make money today, but I doubt it will happen tomorrow factor in college programs...could be a terrible decision...	3 Sep 2018	Negative
The Bible ... @The_Bible_G...	@RealJamesWoods @Nike Call your portfolio managers and have them line item Out Nike. It's tumbling right now on Wall Street. It's in a free fall for taking a non-american stance. Nike hates #Americans Nike hates #Christians So Nike hates its customers folks. Dump Nike #boycott #Nike	4 Sep 2018	Negative
MKM Ridd... @jumboglo	RT @MuslimIQ If you're protesting Nike b/c they're condemning racism but didn't protest Nike when they were accused of child abuse in third world sweat shops then all you've done is rationalize both racism And child abuse. Get help. #TakeAKnee #ColinKaepernick	3 Sep 2018	Positive
aj ~ Smut... @ariestess69	RT @KryssiKakes Remember that time "patriotic" Merikkkans deliberately called chips "freedom fries" bc they briefly hated the French for having an opinion against our ILLEGAL WAR ACTIVITY? Now y'all are cutting up your #Nike gear. May as well get "RACIST" tattooed on your fat white foreheads.	4 Sep 2018	Positive
Josh PBH @harstad_josh	@Kaepernick7 You have never had to sacrifice a single thing you immature loser. You were benched because you suck and you've been being paid the whole time by nike. Maybe if you had put the same amount of effort into football that you do whining you would still be playing.	3 Sep 2018	Negative
DC Dude @DCDude1776	@KingJosiah54 Alienating 50% of one's market seems startlingly stupid. Don't be surprised when Nike stock gets donkey punched.	3 Sep 2018	Negative
Denver @doubledwor...	RT @PeoplesCourt79 I just retired after 21 years in the Army. STOP USING US to push your racist agenda. Colin Kaepernick is NOT disrespecting us. He is bringing light to an important issue that likely has never affected you. It is more disrespectful that you keep spewing this garbage. Stop. https://t.co/7K4EUfqTP0	4 Sep 2018	Positive

Figure 7: Manual sentiment classification of a 10-tweet sample of posts that were originally classified as negative by AI algorithms in the Crimson Hexagon platform. Results show that 60% of the tweets in this sample are positive for the Nike brand, while 40% show a negative opinion about the campaign.

The last exercise shows that the initial 35% of negative posts about Nike's campaign might be even lower. It is clear that the controversial nature of this conversation cannot be entirely deciphered and quantified by AI technologies that are still being developed. This does not mean, however, that Nike's communications team should have disregarded negative posts about the campaign. Instead, the team should have used other monitoring tools such as word clouds, topic clusters, and top hashtags and retweets to make sure that those negative comments were not taking over the narrative.

For example, a word cloud of the conversation shows that two of the most relevant phrases in the protests against Nike, "boycott" and "#BoycottNike," are in the peripheral side of the conversation, while words like "Nike," "black," "Kaepernick," and "#JustDoIt" are central topics of the discussion (see fig. 8).
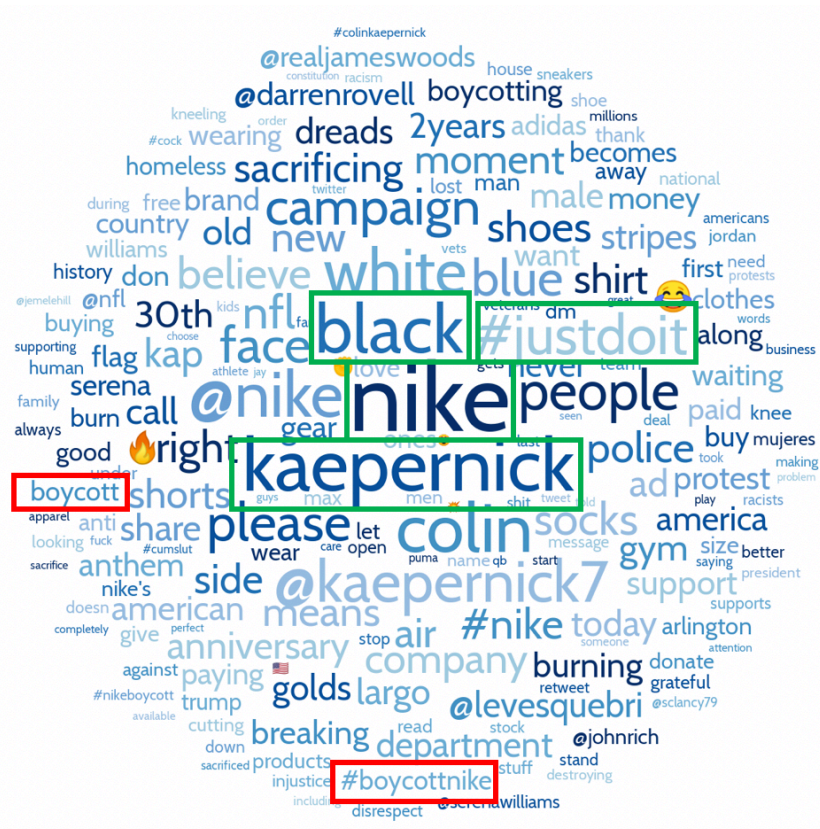
Figure 8: Word cloud of Nike's "Just Do It" campaign online conversation shows that the brand and its new influencer, Colin Kaepernick, are central topics of the conversation

This case study proves that the development of machine learning and natural language processing algorithms capable of interpreting unstructured data like social media is still at an early stage, and it will be some time before they can accurately measure sentiment based on meaning, context, and intention. This, however, does not mean PR professionals should

disregard this feature; instead, they should complement it with other tools such as word clouds and topic clusters to determine the scope and relevance of the conversation.

Refining the Influencer Marketing Strategy

Influencer marketing has become a central part of the marketing and public relations realms. As social media becomes more entrenched in people's lives and takes on uses that go beyond communication, like shopping, the influencer market will keep growing exponentially. It has been estimated that the market size for this industry in 2020 will be between $4.85 billion and $16.6 billion.

Companies looking to expand their reach, increase traffic, generate leads, improve sales and develop a fan base are constantly looking for social media influencers who can bring value and growth to their brand. Traditionally, marketing and communications teams have relied on quantitative metrics to choose the right influencers for their campaigns. The more followers, the broader the reach; the more likes, the more traffic or sales; and the more engagement, the stronger the relationship between customers and brands.

It did not take long before influencers discovered how much they could leverage these metrics to obtain better deals from brands and raise their prices. According to a report from Cheq, a cybersecurity company focused on social media, a "micro-influencer" with 10,000 followers could make $250 for a sponsored post, while someone with one or two million followers could make $250,000 per post (Graham).

Because the price that influencers could charge for a campaign relied solely on their number of followers and engagement metrics, third parties figured out ways to inflate these numbers using bots, which are automated software agents capable of interacting with content,

advertising and offers in a human-like way (Salz). To appear more influential, influencers could

buy fake followers and pay for bots to comment or like their posts. According to Cheq's report,

this fraudulent activity is costing advertisers $1.3 billion a year (Graham).

As a consequence of this practice, prestigious brands are at risk of investing thousands of

dollars in influencer strategies that might not translate into sales, leads or traffic. For example, a

report by Points North Group found that global brands like Ritz-Carlton and Aquaphor had been

exposed to a high number of fake followers as a result of their influencer campaigns (see fig. 9).

Most Fake Followers

Rank	Advertiser	% Fake Followers
1	Ritz-Carlton	78%
2	Aquaphor	52%
3	L'Occitane	39%
4	Pampers	32%
5	DSW	29%
6	Crocs	25%
7	Lulus	22%
8	Neiman Marcus	22%
9	Magnum Ice Cream	20%
10	Olay	19%

Figure 9: A study conducted by Points North Group in 2018 found the top
brands with the highest number of fake followers via their influencer
campaigns. Image source: singlegrain.com

Digital marketing agencies are trying to develop tools and strategies that can help them

root out influencer fraud. For instance, in 2018 the British agency Social Chain Group

announced the launch of Like-Wise, a tool to determine if and how much of an influencer's

influence is real or fake. Like-Wise collects data from the largest engagement bot farms and

builds a database of the millions of fake profiles that replicate engagement behavior by

automatically liking or commenting influencers' posts. When the tool identifies suspicious activity on a particular influencer's account, it uses artificial intelligence technologies to benchmark their engagement over time and compare it to organic, real engagement done by humans (Oakes).

The number of followers, likes, comments, and engagement rates are starting to become irrelevant for marketers and PR professionals who are looking for more authentic influencers that align with their company's brand message and values. Instead of focusing exclusively on quantitative metrics, communications professionals are now choosing influencers based on qualitative criteria like brand affinity and quality of the content (Perrone). But identifying these influencers can be challenging in a digital space where the amount of data produced exceeds the human processing capacity.

As mentioned before, AI technologies like machine learning, natural language processing and image recognition systems can process large amounts of data to identify influencers with the highest probability of driving the most engagement. Brands and agencies are now able to leverage AI's power to scan, decode and interpret millions of posts on social media to identify influencers that were not easily found through traditional research methods like hashtags, mentions or locations. An example of this is the influencer marketing agency Open Influence, which partnered with Amazon Web Services' (AWS) image recognition team to deploy real-time visual search into their existing influencer search engine ("Open Influence's Amazon…").

Even though these new tools are simplifying and speeding up research processes that used to take hours or even days, they cannot completely replace human input. Influencer marketing is a human-to-human activity where both brands and influencers need to develop strong relationships and work collaboratively to deliver meaningful experiences.

Data Privacy Considerations

As mentioned before, traditional media and social media monitoring tools based on machine learning, natural language processing or image recognition technologies must have access to large data sets to function properly. The more data, the more these AI algorithms can learn and become increasingly "smarter." But the growing need for data entails some ethical implications that social media platforms, communications tech vendors, and communications teams must consider.

For example, on July 20, 2018, Facebook suspended Crimson Hexagon from its sites and launched an investigation to determine if the analytics firm was working with the U.S. government and a Russian nonprofit tied to the Kremlin (Grind). In a statement, Facebook said that it allowed third parties to produce "anonymized insights for business purposes," but that the use of this data for surveillance purposes was prohibited (Grind). And even though Facebook announced it would reinstate Crimson Hexagon one month after the investigation launched, as of this writing, the intelligence platform still does not have access to Facebook's data.

This incident suggests that data collection and monitoring practices can have dangerous consequences if they are done for political purposes. Public data can tell companies how people are feeling at a particular time and location, which can be invaluable information for government agencies and political campaigns. According to The Wall Street Journal, privacy experts say that most Americans are unaware that their public data is being analyzed and deployed for purposes different than just selling a product. This is why public relations, marketing and communications professionals must adopt ethical data collection practices and make sure they are being transparent about their research methods.

To conclude, it is undeniable that social media is playing a critical role in our economy, enabling companies to reach out to customers who will benefit from their products. AI intelligence platforms are broadening PR professionals' understanding of the social and traditional media landscapes by allowing them to explore and identify market trends, analyze people's emotions, and pinpoint influencers in more efficiently and accurately. However, all these insights must be complemented with human reasoning, critical thinking and creativity. AI has the power to process vast amounts of data in seconds to provide the "what," and it is up to PR practitioners to put those insights into context to understand "why" it happened and develop strategies accordingly. Additionally, communications teams must be careful to use these insights ethically and transparently.

Chapter 4
From Crisis Management to "Crisis Intelligence"

On May 29, 2018, comedian and actress Roseanne Barr responded to a Twitter thread about Valerie Jarrett —an African-American woman who was senior advisor to former President Obama— with the following tweet: "Muslim brotherhood & planet of the apes had a baby=vj." The tweet caused enormous controversy on social media where angry users accused Barr of being racist. But interestingly enough, not all of these angry users were actually *human*. An analysis conducted by The Wall Street Journal revealed that there were more than 3,800 Russian troll-farm-operated Twitter accounts targeting politically and racially charged issues—like Barr's tweet— to stoke division inside the U.S. in 2018 (Wells et al.).

In an already-polarized cultural and political landscape, Barr's tweet was not taken lightly. Just hours after she posted her tweet, the ABC Network canceled her sitcom show, "Roseanne." In announcing the show's cancellation, ABC's Entertainment President Channing Dungey stated that "Roseanne's Twitter statement is abhorrent, repugnant and inconsistent with our values." Robert A. Iger, the chief executive officer of the Walt Disney Company—ABC's corporate parent—shared Dungey's statement on his Twitter account and stated that "There was only one right thing to do here, and that was the right thing."

This was one of the first times that an offscreen controversy led to the cancelation of a TV show with the highest ratings of a new TV series in years. And even though her TV show was soon rebranded and renamed—the premise being that Barr's character had suddenly died of opioid abuse—the incident continues to trend on social media and is characterized as the comedian's "fall from grace." Due to the fast-paced dynamic of social media, Roseanne's crisis developed and amplified in a matter of minutes, and there wasn't a communications team in place that would help her navigate the murky waters of Twitter.

Crisis communications expert Steven Fink defines a crisis as a "fluid and dynamic state of affairs containing equal parts danger and opportunity. It is a turning point, for better or worse" (7). Fink differentiates the concepts of "crisis management," which deals with the reality or actual management of the crisis; and "crisis communications," which handles the public perception of that reality. He also states that a crisis usually develops in four stages: The **Prodromal** stage or first warning signs that a crisis is coming; the **Acute** stage, when the crisis actually happens; the **Chronic** stage, where numerous negative consequences take place; and the **Resolution** stage (46).

Ideally, says Fink, a crisis management team should be able to go from the Prodromal stage to the Resolution stage "without falling into the morass of the acute and chronic stages" (47). But in a digital world, where news travel almost at the same rate as the speed of light, how can PR professionals predict, prevent and manage a crisis like Roseanne's without it blowing up in the news first? Artificial intelligence might have an answer for that.

This chapter will explore how AI-monitoring tools are helping PR professionals monitor and communicate effectively during a crisis. Based on a case study about the British Red Cross and its communications efforts during Hurricane Sandy, the author will illustrate how AI can improve a crisis communications team's ability to inform and connect with diverse audiences in real-time. The author will then explain how AI tools can help brands like Advanced Micro Devices identify and mitigate the consequences of botnet attacks on social media, a dangerous threat that has become more common since the 2016 elections, and that has affected hundreds of brands and organizations around the world.

Managing a Crisis in the Digital Age Case Study: British Red Cross

As mentioned in chapter 2, some social media monitoring tools are leveraging the power of AI technologies like machine learning and natural language processing to process millions of social media posts in a matter of seconds. Amid a crisis, monitoring online conversations is not only allowing PR professionals to determine people's sentiment, but also to gain detailed insights on how users are communicating and what messages are resonating with a given audience. This feature can be critical in times of crisis.

In 2012, the Atlantic region was facing one of the deadliest and most destructive natural disasters in history: Hurricane Sandy. Sandy developed from a tropical wave in the Caribbean on October 19, moving north from Jamaica until it reached the U.S. coast on October 29. Given the nature of this crisis, there was not much that response teams could do to mitigate the consequences of this hurricane. But communicating frequently and efficiently with people from all of the Atlantic regions affected by this crisis was critical to keep stakeholders informed about the evolution of the hurricane.

The British Red Cross is part of a voluntary network that responds to conflicts, natural disasters and individual emergencies. When Hurricane Sandy hit, this nonprofit organization had the challenge of listening and communicating with diverse audiences at the same time. One of its main communications objectives was to "analyze social data in real-time to identify appeal themes that resonate" with the organization's publics ("Case Study/British Red Cross").

The British Red Cross partnered with Brandwatch, an AI-powered intelligence platform that captured data from various social media sites in multiple languages and processed millions of posts through AI-technologies like natural language processing. The Red Cross' digital team used Brandwatch's insights to determine which terms they should have used to reach the most

people. "Hurricane," "tropical storm," and "superstorm" were being widely used across multiple regions, but "Hurricane" was the most popular term (see fig. 10).

Fig. 1

Fig. 2
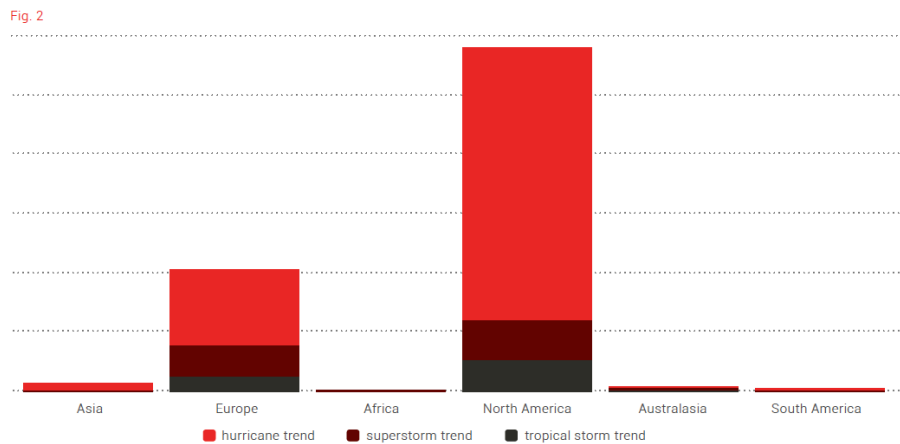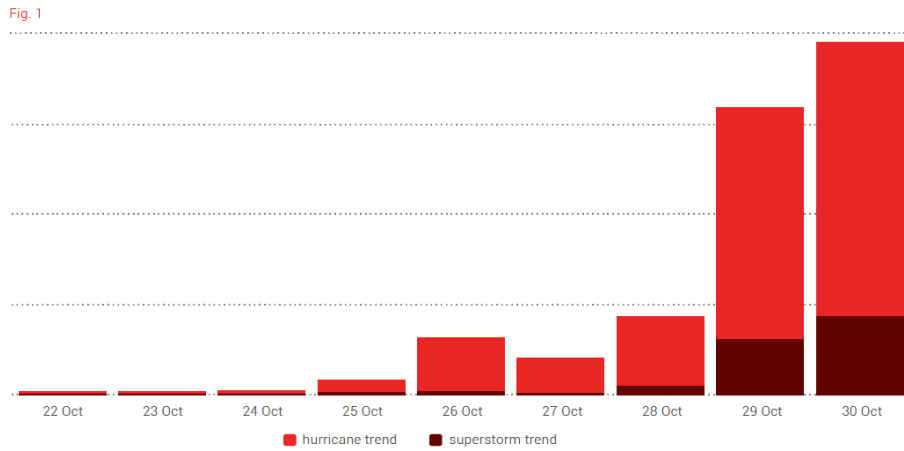
Figure 10: According to Brandwatch, the number of social media posts referring to Sandy as a "hurricane" exceeded the number of posts referring to it as a "superstorm." Additionally, the term was more notably used in Europe and North America than in other regions. Image source: Brandwatch Case Study.

Given the public characterization of this natural disaster as a "hurricane" and the significant volume of the posts, the British Red Cross labeled its social media efforts with the term "Hurricane Sandy" over other trending topics (see fig. 11).

Figure 11: The British Red Cross' communication efforts during Hurricane Sandy.
Source: Twitter

In times of a crisis, monitoring online conversations is helping PR professionals identify key themes and trending topics that will help them enhance their communication efforts, increase their visibility and broaden their message. The British Red Cross was able to communicate with those affected by the hurricane as well as potential donors that could provide financial support for the organization's aid efforts.

Uncovering Social Media Botnet Attacks

The U.S. 2016 elections had a significant impact not only on the country's democratic system but also on the corporate world. During the investigation of Russia's role in interfering with the U.S. elections, former FBI agent Clint Watts described how Russian armies used

Twitter bots to spread false information using accounts that seemed to belong to Midwestern swing-voter Republicans (O-Connor).

"It's a circular system. Sometimes the propaganda outlets themselves will put out false or manipulated stories. Other times, the president will go with a conspiracy, for example, wiretapping. When they do that, they'll then respond to the wiretapping claim with further conspiracy theories about that claim. And then it just amplifies the message in the ecosystem," said Watts in an interview with NPR journalist Kelly McEvers.

According to Josh Ginsberg, co-founder and former CEO of the intelligence software company Zignal Labs, those malicious bots interfering with the 2016 elections jumped over into the corporate space in 2017, becoming a dangerous reputational threat not only for governments but for private corporations as well. For example, the Roseanne Barr incident mentioned at the beginning of this chapter was amplified by bots to divide a country that is going through a highly polarized political time.

As mentioned in the previous chapter, bots are automated software agents programmed to generate messages, follow accounts, and reply or share particular hashtags. These bots operate in a similar way as humans, and some of them are getting more sophisticated with the help of AI technologies. Bots are often part of a larger botnet where botmasters control them through automated commands. Botnets consist of hundreds or even thousands of automated social bots that can target the same topic, hashtag, or profile to manipulate and change the narrative of any social media conversation ("Your Guide to Protecting…" 1-3).

Zignal Labs has identified four main motives for these attacks in the corporate realm: stock price manipulation, impact of corporate reputation and corporate brand, cultural weaponization, and impacting politics and the country's democratic process ("Zignal Bot

Intelligence…"). Roseanne Barr's crisis, for instance, was used as a means of cultural

weaponization.

Smith, Data Visualization Engineer at Zignal Labs, said in an interview that Zignal's Bot

Intelligence platform would consider factors such as number of tweets per day, number of

followers, social media channels and author biographies to identify malicious botnets:

> The platform is evolving a lot. We are getting more and more into the content and topic space with it, kind of the "next generation." The current one uses a lot of metrics. The biggest one is like, let's say, you post 600 times a day on average. How many people *actually* post 600 tweets a day on average, and how does that message stick? And maybe you've only got like three people listening to you blasting out your megaphone. That's one of the most prominent signals. From there, it's about all the data we can get a good hold on a scale like what applications are you posting on? What bio description is going on in your author bio? What locations are you in, are you moving around a lot, or do you seem to be nowhere? So, yeah, it's many facets. And we have more different formulas that started with a few metrics and now it's just blown over the last year and a half or so to include a lot of other kinds of signals that we match altogether to determine if an account is automated.

The following case study about AMD will illustrate how bot attacks are used to

manipulate a company's stock price, and how Zignal Lab's AI-powered Bot Intelligence

Platform allowed AMD to detect these malicious acts in a timely manner.

Botnet Attacks Case Study: Advanced Micro Devices

On March 12, 2018, the multinational semiconductor company Advanced Micro Devices

(NASDAQ: AMD) received a communication from the Israeli research company CTS Labs

notifying that they had found serious security flaws in some AMD chips. CTS researchers gave

AMD 24 hours before publishing the 20-page report using a dedicated website (amdflaws.com)

to bring attention to the flaws. The report came with a disclaimer that CTS "may have, either

directly or indirectly, an economic interest in the performance" of AMD's or other companies'

stock (Goodin).

On the same day that CTS' research was published, short-seller Viceroy Research published a 25-page report discussing AMD's security vulnerabilities and bet that the company's share price would fall.

Using Zignal Labs' Bot Intelligence Platform, AMD was able to detect a malicious botnet amplifying this news on social media. Zignal's platform combines machine learning with expert analysis to monitor, visualize and notify companies that they are being victims of a bot attack. The following graphic is Zignal's visual representation of the social media conversation about AMD's vulnerabilities during the 2018 crisis. Each node represents a social media profile, and the distance between nodes represents how linked together those nodes are. Nodes in white represent human accounts, while nodes with an assigned color represent suspicious accounts. The more clustered these colored dots are (as shown below), the louder and more harmful they can be (see fig. 12).
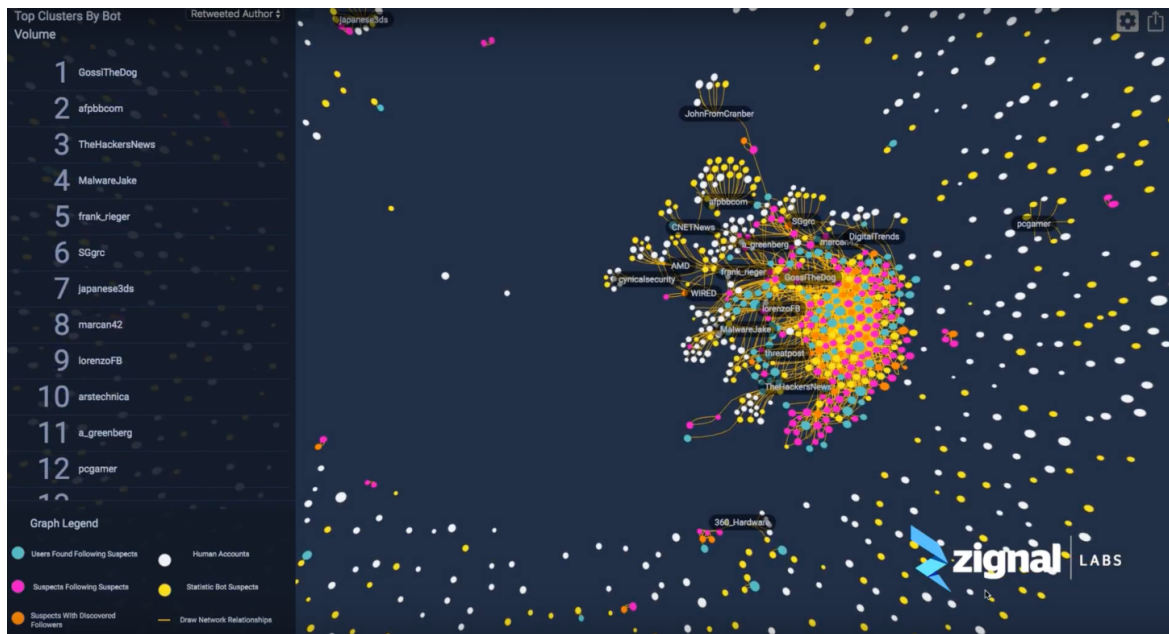
Figure 12: Zignal Labs Bot Intelligence Platform uses machine learning and expert analytics to detect malicious bots amplifying false information or negative news on social media. Image Source: Zignal Labs

A normal, unaltered conversation about AMD's security flaws would be more spread out and would only show a series of white nodes (see fig. 13).

Figure 13: Zignal Labs Bot Intelligence Platform representation of an organic, human conversation on social media. Image Source: Zignal Labs.

An AI-powered tool like Zignal's Intelligence Platform can help PR professionals visualize and anticipate a crisis on social media. AMD's case shows that these attacks are often part of a bigger plan to destabilize a publicly-traded company's reputation and manipulate its stock price. Although the majority of these posts came from fake accounts, the amplification of false or negative news has the power to change people's minds and influence their decisions as the 2016 elections evidenced.

Having access to monitoring tools like Brandwatch or Zignal is helping PR professionals understand public discourses, identify news sources, and pinpoint potential threats on social media. However, human input and critical thinking are still necessary. Communications practitioners must strive to understand the "why" behind these crises and determine what is the

best response to mitigate the consequences of these issues. For example, AMD immediately announced it was launching an investigation to look into the issues CTS Labs pointed out in their report. After the investigation concluded, AMD issued a series of public statements and blog posts acknowledging that there were, in fact, security vulnerabilities in some of its products and announced a series of mitigation strategies to fix them.

By being responsive, transparent and reacting ethically, AMD was able to manage the crisis and mitigate its effects. These are all human skills and values that AI cannot replace, but it can certainly help companies be more informed when it is time to make a critical decision.

Chapter 5
Media Relations and the Rise of the Robot Reporter

In May 2018 Google introduced Smart Compose, a Gmail feature that uses neural networks to predict sentences and make suggestions, allowing people to draft emails faster. This feature saved users altogether an average of two billion keystrokes a week. One year later, the AI research organization OpenAI launched GPT2, an unsupervised machine learning model with the ability to write artificial news articles, answer reading comprehension questions, and tell fictitious stories based on a single prompt. OpenAI's language model led AI experts, journalists, and enthusiasts to consider the possibility that artificial intelligence could one day replace journalists, storytellers, novelists, screenwriters and public relations specialists, all of which rely on writing tasks to perform their jobs.

Even though there is still no AI technology available to write profiles or news releases, we are starting to see the first advances of automated writing in the journalism sphere. For example, in April 2016 Bloomberg's Editor-in-Chief John Micklethwait announced that the news organization had created a 10-person team to lead Project Cyborg, an initiative to automate the writing of news stories. Today, Cyborg assists reporters in churning out thousands of articles on company earnings reports, allowing Bloomberg to stay ahead from the competition. According to Micklethwait, at least 30% of the total content produced at Bloomberg today involves some elements of automation.

This chapter will focus on illustrating how artificial intelligence is not only enabling PR professionals to monitor and measure news coverage in real-time, but it is also starting to change the relationship between reporters and PR specialists. Some news outlets like Bloomberg are at the forefront of the AI-adoption scale, which is enabling them to streamline and increase the

efficiency of their reporting process. In contrast, other news outlets like The New York Times

have no plans for machine-generated news articles in a pursuable future. This asymmetric

adoption process implies that PR professionals must understand where does each news outlet fall

on the AI acceptance rate and deploy specific tactics to ensure that both journalists and

algorithms are correctly receiving, processing and reporting information that is critical to their

clients' bottom lines.

Proving the Value of the Earned Media Strategy

For most non-PR practitioners, "media relations" and "public relations" are synonymous

terms. Even though these two practices are related, they are not the same thing. Public relations

is a field with various goals and specific elements, while media relations strategy—also known

as earned media strategy—is a subset of public relations that is often designed to accomplish one

specific goal.

Media relations can be defined as an organization's interactions (directly or through an

agency) with editors, reporters, and journalists at different publications and broadcast outlets.

The purpose of this engagement is to communicate a client's message or story by convincing the

journalists that a certain product or service is newsworthy and deserves focus or mention in their

publication. Occasionally, media relations can also mean working with media outlets to avoid a

negative story or balance it to mitigate the damage. The media acts as a trusted, third-party

liaison between a company and its target audiences, which is why maintaining a good

relationship with editors and reporters is a vital part of the PR profession.

Like social media monitoring, news monitoring can bring significant advantages for PR

professionals who need to track the development of a conversation in real-time. For example, in

the Colin Kaepernick case study provided in the third chapter of this study, monitoring news coverage in real-time was an important step in determining how positively or negatively was this campaign impacting the press coverage about Nike. If the news were abundant and mostly negative, Nike's crisis PR team should have contacted the media to mitigate the effects of a possible reputational crisis that could also affect the company's bottom line. But beyond news media monitoring, artificial intelligence is also equipping PR professionals with better measurement tools that can help them claim a seat in the C-suite table.

In an era where thousands of articles are posted every day, measuring the effectiveness of a media relations strategy can be challenging. As opposed to marketing or advertising tactics (which can be easily trackable through cookies and other tools), earned media strategy can be hard to track and measure. If a potential customer (or voter or donor) reads a news article about a product or service or organization and decides to pursue more information online and click on an online ad, the attribution goes to the ad and not to the news article. This is why public relations professionals are struggling to find a technical benchmark that can accurately measure and prove the value of their earned media efforts.

For years, some PR professionals have relied on measurement metrics like the advertising value equivalency (AVE) to determine the success of their communications campaign. The AVE measures the amount of coverage—in inches for print publications and seconds or minutes for television and radio broadcast—and multiplies that count by the advertising rate. This crude measurement technique, however, is deeply flawed and inaccurate. The AVE does not consider important signals such as the tone of the coverage, what audiences have seen the coverage, or the scope and reach of the outlet covering the news. Other PR practitioners have relied on the number of impressions, a technique that would measure the potential audience for a given

publication or post. Both the AVE and volume of impressions fail to convey whether a communication effort increased sales or successfully influenced a target audience. So how can artificial intelligence improve traditional metrics like the AVE and impressions to measure the effectiveness of a PR campaign?

According to Jonny Bentwood, global head of data and analytics at Golin, marketing and public relations professionals must start speaking the same language as the C-suite. While PR specialists use vanity metrics such as AVE and impressions, CEOs want to talk about sales and CFOs worry about margins and bottom lines:

> Is it any wonder that with every executive talking a different language that PR has such difficulty trying to push mindshare in their direction by discussing hard-to-grasp concepts such as *earned media penetration* or dubious ones such as *reach*? The customer journey is the solution. Known previously as the purchase funnel, this is the five-step process a potential customer travels through from being first aware of a company solution, to considering it against the competition, forming an opinion about it, purchasing it, and finally advocating its benefits to their community (26).

Thanks to artificial intelligence, PR professionals now have access to a series of metrics that allow them to connect their media strategy to the customer journey. For example, if PR specialists want to measure awareness of a product or brand, they can use communication tech platforms to measure the number of mentions in news media outlets. If the goal is to increase product consideration against its competition, analyzing the sentiment and the content of the articles covering the news and comparing those against the competition could help identify what brands have a significant advantage in the media landscape. But if the goal is to boost intent of purchase, PR pros can use tools like Google Analytics to measure referral traffic—or the number of times that a media article drove traffic to a company's website. Google Analytics also offers a set of features called "Analytics Intelligence" that use machine learning to find key insights and make recommendations. For example, the tool can tell PR specialists which channels (earned,

paid, shared, or owned) brought the most traffic to the website or had the highest conversion rate. As opposed to impressions or AVE, all these new metrics can be directly tied to the goals of the C-suite.

Refining the Media Relations Strategy

Another media-relations challenge of the digital age is identifying reporters who are interested in sharing a company's story with their audience. Agencies and PR departments would traditionally rely on curated media lists that included publications, names, and contact information of journalists that aligned with their client's values, messages, and target audiences. However, curating these lists was time-consuming and could include reporters who had covered a topic exhaustively, pivoted toward a different field, or felt overwhelmed by pitches they did not consider newsworthy or relevant to their area of expertise.

As mentioned before, some communication tech companies have extensive databases with millions of professional media profiles. Cision, for instance, has 1.4 media profiles. However, finding the right reporter at the right time is not always easy. This is why some public relations agencies and communication tech platforms are leveraging the power of AI to boost their clients' media strategy and increase press coverage. For example, the PR agency Interdependence Public Relations uses its proprietary technology, Interviewed™, to break each of their clients' brands into roughly 50 key terms that best describe the brand. The technology uses artificial intelligence and predictive analytics to search for trending news, breaking stories, and emerging trend stories that relate to those key terms. Once it finds a match, the agency contacts the journalist covering these topics and sends a pitch that includes their clients' story ("Methodology"). With time, more agencies and tech communication platforms will continue

adopting AI technologies to improve their ability to find earned media opportunities and position their brands more accurately and efficiently.

Automating News Reporting Case Study: Herbalife Nutrition

The traditional business model that once supported media companies—print subscribers and advertising—has become difficult to sustain as platforms like Google and Facebook swooped in to take a significant share of the digital advertising market. Today, both of these companies account for more than half (58%) of the digital advertising revenue in the U.S., forcing publishing companies to look for aggressive cost-cutting solutions like reducing coverage, curtailing circulation, or terminating staff (Hendrickson).

According to the Pew Research Center, the newsroom employment in the country has dropped by 25% in the last 12 years. This drop has been primarily driven by job losses at newspapers, which have gone from 71,000 workers in 2008 to 38,000 in 2018—a 47% drop (Grieco). With fewer reporters, news media outlets like Bloomberg, the Associated Press and The Washington Post have started to develop automated technologies to assist reporters in writing news stories. However, the automation of news writing brings new challenges for PR professionals who are preparing earnings reports and news releases that will be read not by a human but rather an AI-powered machine.

In recent years, AI language models have become dramatically better at delivering coherent, human-like pieces of journalistic writing. In its first year, The Washington Post's robot writer *Heliograf* produced approximately 850 articles, including 500 pieces about the 2016 election that generated more than 500,000 views. This is 75% more than what the Post's staff generated in 2012. Other robots assisting the newsrooms are Forbes' content management

system, *Bertie*; Bloomberg's business reporter, Cyborg; and the Wordsmith platform used by The Associated Press. These AI-powered machines can report news stories, industry trends, corporate earnings and even sports results in a matter of seconds.

In her article "The Role of Artificial Intelligence in Financial Reporting," the former senior vice president of global corporate communications for Herbalife Nutrition Megan Jordan explained how newsrooms were now building templates for their stories using algorithms that search for content from news releases, websites, and social data using programmed keywords and logic. "Technology also allows information extracted through automation to be combined with comparable estimates to ensure accuracy, and publishes a tagline that identifies the use of automation in reporting for its readers," said Jordan (34-35).

According to Jordan, the automation of news reporting is not only impacting the journalism sphere but it is also having an impact on the way communications professionals communicate with the media. In a personal interview, Jordan narrated her experience working as the head of communications for Herbalife Nutrition (NYSE: HLF), when a newsroom's automated technology wrongly reported her company's quarterly results, which had a negative impact in Herbalife's stock price:

> I was working with Herbalife Nutrition, a direct selling company in 94 countries. The way Herbalife reports its sales is using its own vernacular. They call them "volume points" because that is an easy way to adjust for currency. However, the algorithms that were written by the finance media were written in terms of sales dollars. So, even if we had a record quarter of all-time highest sales ever, we were down in Venezuela because of the currency.
> The news headline would read "Herbalife is down," or "Herbalife down in South America" or something similar. And we thought: "But we had an all-time record and we blew away the numbers!" Then the stock would start trading down and we were looking at it and trying to figure out what had happened. We just had the best day ever! And then we would see more headlines coming out.
> We had to get on the phone and start making phone calls. But the hard part is that you're arguing with an algorithm, so there wasn't even an editor to talk to. You had to ask for the managing editor (they all call it different things) but mostly they call it the

Computer Automated Reporting (CAR) editor. So, I would ask for the managing editor of CAR and maybe they had time to talk to me and maybe they didn't. It took a while before they got back to me. And in the meantime, investors would start reading the detail of the reports and understand that it was actually amazing! And then we would see things start to turn but it took a day or two to get back to where it should have been. So that's when I reached out to the media and tried to say: "What you are doing has a material impact on companies, and that's unethical."

However, Jordan noted that this event did not have a negative impact on her relationship with the media. In fact, this experience strengthened her relationship significantly because it allowed her to meet with media representatives and create new communication strategies to make sure that the reporters revising the robot reporters' articles would have enough information.

> I think that if PR professionals can keep up their skills and understand this new way of reporting so we are all speaking the same language, I think it would be great for relationships. But it requires a different way of working where you have to get in front of it. You have to actually write for the appropriate algorithms and fields in order to get your story covered correctly and that's a whole different skillset.
> (…) What I learned from talking with them about what it takes to do their job is: If I were to create an infographic that was pretty detailed to accompany my press release, then they might pull the wire and just see in a picture form, very visually, that wow! All these numbers are good and going up, so why is this story bad? (…) So, at Herbalife, we started doing infographics with each earnings press release. This was one more tool to help the reporters with accuracy.

Herbalife's case study exemplifies how artificial intelligence is currently transforming a specific field of public relations: financial reporting. However, as these technologies become more sophisticated in the newsrooms, PR professionals must develop specific communication strategies to communicate with automated reporters and protect their clients' reputation and bottom lines.

In summary, AI is transforming the field of media relations by providing PR professionals with more accurate metrics such as content analysis, sentiment analysis, and traffic tracking that can be more easily connected to the customers' journey. These new metrics are allowing PR specialists to speak in the same language as other executives in the C-suite do, and

prove the value of their earned media efforts. Additionally, AI technologies like machine learning and predictive analytics are increasing the efficiency and accuracy of the PR media strategy by identifying reporters who would be highly interested in covering a given organization or brand. Finally, the automation of news reporting using AI-algorithms is also starting to transform the way PR practitioners interact and communicate with the media, pushing them to consider each media outlet's AI acceptance scale and design a communication strategy to ensure that both journalists and algorithms are correctly receiving, processing and reporting information that is critical to their clients.

Conclusion

The world is currently witnessing the rise of intelligent machines, but instead of destroying or replacing humanity, these machines are complementing and augmenting human capabilities.

Even though the development of artificial intelligence technologies in the field of public relations is at its early stages, these technologies are disrupting and transforming traditional practices such as social media monitoring, crisis management, and media relations. This transformation is allowing PR professionals to automate repetitive tasks like curating influencer and media lists, accelerate and streamline old research and measurement methods like AVE and impressions, and obtain more accurate insights into millions of data points to make better-informed decisions—especially in times of a crisis.

Artificial intelligence is giving PR professionals the power to conduct social and audience listening analyses over millions of data points, and helping them identify customer trends, conduct thorough competitive analyses, and identify key topics for potential communication campaigns. Additionally, AI technologies like natural language processing are allowing PR specialists to measure sentiment and emotion toward a brand across hundreds of media channels. Moreover, machine learning and predictive analytics are automating and enhancing the process of identifying journalists and influencers that align with a brand's communication purpose, while also offering real-time insights in times of a crisis. It is, in fact, the beginning of a transformational process.

This process, however, requires a significant amount of human input. It is up to PR professionals to identify which AI technologies will best satisfy their business needs, and it is also up to them to ensure that the information obtained is translated into actionable insights that

will resonate with the expectations of the C-suite. A key part of this process is to map the customer journey and develop strategies that are clearly linked to each phase of this journey—awareness, consideration, opinion, purchase and retention. This is why developing skills such as big data analytics, user experience, and predictive AI is now becoming more important in the field of public relations.

Like any other human-created technology, artificial intelligence is far from being perfect. As seen in this study, many AI applications such as sentiment analysis, fraud detection, and automated news reporting have errors. Additionally, if this technology falls in the wrong hands, it has the power to harm brands and organizations significantly. Botnet attacks, influencer fraud, data breaches, bias and misinformation are some of the potential threats that may arise from the deployment of this technology. Thus, PR professionals must strive to educate and prepare themselves to confront these situations.

The author recommends the following tips for PR professionals who are either struggling with the notion of AI or are eager to embrace it:

- **Get educated:** Learn basic AI terms and functionalities and stay up-to-date with the latest trends in this field. This will help understand the capabilities, limitations and risks of AI deployment in the field of communications.

- **Identify a PR need:** AI is not a magical cure for every problem. Instead, focus on identifying one specific PR task that needs improvement in terms of productivity, efficiency, or accuracy.

- **Ask questions:** Select, test and evaluate AI-powered products that can help improve a specific PR need. Ask vendors what kind of algorithms support their product, how are these algorithms trained or programmed, what kind of data do they use, and what is their

level of accuracy. Focus on what the algorithms can do *today* and not on what they can potentially do in the future.

- **Plan for an "AI crisis":** Prepare a crisis management plan to respond to AI-related crises such as botnet attacks, deep fakes, data breaches, and spread of misinformation. Be aware that there are AI tools in the market that can help identify these crises.

- **Translate data into insights:** Speak the same language of the C-suite by converting metrics obtained through AI platforms into actionable insights that can be directly tied to the customer's journey.

- **Build a tech-savvy team:** Put together a multifunctional team of people with skills like coding, analytics, user experience and data visualization.

- **Focus on creative and critical thinking:** AI algorithms still lag behind human creativity when it comes to radical and original thinking. Creative thinking, strategic planning and instinct are still essential attributes of successful communications professionals that will not be automated in a nearby future.

Both machines and public relations professionals must rise together, complementing and augmenting each other's intrinsic capabilities. Much of the practice of public relations involves soft skills like critical thinking, relationship building, creativity, ethics, leadership and accountability, all of which are deeply human in nature. However, these skills will grow more dependent on algorithmic tools that have the power to offer relevant insights PR professionals wouldn't otherwise know and push their creative boundaries by forcing them to come up with ideas no one has ever heard before. To thrive in the age of artificial intelligence, PR practitioners must cultivate their ability to understand the influence of this technology and embrace it as a partner that will help them connect with other humans in a more profound and meaningful way.

Works Cited

@ElonMusk. "Probably closer to 2030 to 2040 imo. 2060 would be a linear extrapolation, but

    progress is exponential." *Twitter*, 5 Jun. 2017, 5:27 p.m.,

    twitter.com/elonmusk/status/871886151014940672.

@NewScientist. "AI will be able to beat us at everything by 2060, say experts

    http://newscienti.st/2rsPGFO. *Twitter*, 5 Jun. 2017, 5:24 p.m.,

    twitter.com/newscientist/status/871885452306939906?lang=en.

"2019 Edelman AI Survey." *Edelman*, March 2019,

    www.edelman.com/sites/g/files/aatuss191/files/2019-

    03/2019_Edelman_AI_Survey_Whitepaper.pdf. Accessed 4 January 2020.

"AI, tech and the future of public relations." *Public Relations Society of America, L.A. Chapter*,

    25 July 2019, dev.prsala.org/event/ai-tech-and-the-future-of-public-relations/. Accessed

    25 July 2019.

Ammerman, William. *The Invisible Brand: Marketing in the Age of Automation, Big Data, and*

    Machine Learning. McGraw Hill Education, 2019.

"Artificial Intelligence & Communications: The Fads, the Fears, the Future." *Fleishman Hillard*,

    16 July 2018, fleishmanhillard.com/wp-content/uploads/meta/resource-file/2018/ai-

    communications-the-fads-the-fears-the-future-1531886135.pdf. Accessed 4 January

    2020.

Bentwood, Jonny. "Tracking the Customer Journey." *2020 Relevance Report*. USC Annenberg

    Center for Public Relations, 2019.

Bradley, Diana. "'This is what a brand with a powerful purpose looks like': PR pros on Nike's

      Kaepernick gamble." *PR Week*, 4 Sept. 2018, www.prweek.com/article/1491911/this-

      brand-powerful-purpose-looks-like-pr-pros-nikes-kaepernick-gamble. Accessed 19

      January 2020.

Brotman, Gary. "AI in PR – Fact, Fiction and the Future." *2020 Relevance Report*. USC

      Annenberg Center for Public Relations, 2019.

"Case Study / British Red Cross." *Brandwatch*, 15 Feb. 2014,

      www.brandwatch.com/blog/british-red-cross-adapts-social-strategy-for-campaign-

      success/. Accessed 20 January 2019.

Chen, Michael. "Structured vs. Unstructured Data." *Oracle Big Data Blog*, 9 Oct. 2019,

      blogs.oracle.com/bigdata/structured-vs-unstructured-data. Accessed 10 January 2020.

"CIPR Artificial Intelligence #AIinPR Panel." *Chartered Institute for Public Relations*,

      cipr.co.uk/CIPR/Our_work/Policy/CIPR_Artificial_Intelligence_in_PR_panel.aspx.

      Accessed 27 January 2020.

"Critical Intersections: Communication, public relations, and beyond in a time of convergence."

      Barcelona PR Meeting 2018,

      eventum.upf.edu/_files/_event/_17549/_editorFiles/file/BCN%20PR%20Conference%20

      Programme.pdf. Accessed 4 January 2020.

Czarnecki, Sean. "PR pros choose their tech weapons." *PR Week*, 7 Nov. 2018,

      www.prweek.com/article/1497746/pr-pros-choose-tech-weapons. Accessed 6 January

      2020.

---. "Report: Communications tech is now a $4.1 billion industry." *PR Week*, 14 May 2019,

www.prweek.com/article/1584666/report-communications-tech-41-billion-industry.

Accessed 6 January 2020.

"Data Never Sleeps 7.0." *DOMO*, www.domo.com/learn/data-never-sleeps-7. Accessed 10

January 2020.

Daugherty, Paul R. & Wilson, James H. *Human + Machine: Reimagining Work in the Age of AI*.

Harvard Business Review Press, 2018.

Fink, Steven. *Crisis Communications, the Definitive Guide to Managing the Message*. McGraw

Hill Education, 2013.

"FleishmanHillard and Wibbitz Bring AI-based Video Solutions to the Communications

Industry." *FleishmanHillard*, 10 Oct. 2018, fleishmanhillard.com/2018/10/news-and-

opinions/fleishmanhillard-and-wibbitz-bring-ai-based-video-solutions-to-the-

communications-industry/. Accessed February 26, 2020.

Garret, Michelle. "What PR pros need to learn about AI: A conversation with Christopher Penn."

Garret Public Relations, 4 Nov. 2018, michellegarrett.com/2018/11/04/ai-is-already-

impacting-the-pr-world-what-do-pros-need-to-know-to-help-them-today-and-

tomorrow/#_ftn. Accessed 10 January 2020.

Galloway, Chris & Swiatek, Lukasz. "Public relations and artificial intelligence: It's not (just)

about robots." *Public Relations Review*, vol. 44, issue 5, December 2018, (734-740),

www.sciencedirect.com/science/article/abs/pii/S0363811118303667?via%3Dihub.

Accessed 4 January 2020.

Goodin, Dan. "A raft of flaws in AMD chips makes bad hacks much, much worse." *Ars Technica*, 13 March 2018, arstechnica.com/information-technology/2018/03/a-raft-of-flaws-in-amd-chips-make-bad-hacks-much-much-worse/. Accessed 20 January 2020.

Grieco, Elizabeth. "U.S. newsroom employment has dropped by a quarter since 2008, with greatest decline at newspapers." *Pew Research Center*, 9 July 2019, www.pewresearch.org/fact-tank/2019/07/09/u-s-newsroom-employment-has-dropped-by-a-quarter-since-2008/. Accessed 16 February 2020.

Graham, Megan. "Fake followers in influencer marketing will cost brands $1.3 billion this year, report says." *CNBC*, 24 July 2019, www.cnbc.com/2019/07/24/fake-followers-in-influencer-marketing-will-cost-1point3-billion-in-2019.html. Accessed 20 January 2020.

Grind, Kirsten. "Facebook Suspends Analytics Firm on Concerns About Sharing of Public User-Data." *The Wall Street Journal*, 20 July 2018, www.wsj.com/articles/facebook-probing-how-analytics-firm-shares-public-user-data-1532104502. Accessed 20 January 2020.

Hao, Karen. "What is AI? We drew you a flowchart to work it out." *MIT Technology Review*, 10 Nov. 2018, www.technologyreview.com/s/612404/is-this-ai-we-drew-you-a-flowchart-to-work-it-out/. Accessed 8 January 2020.

--. "MAICON Keynote with Karen Hao: What is AI?" *YouTube*, uploaded by Marketing AI Institute, 30 October 2019, www.youtube.com/watch?v=BF8EUUtIgqM.

--. "What Is Machine Learning?" *MIT Technology Review*, 17 Nov. 2018, www.technologyreview.com/s/612437/what-is-machine-learning-we-drew-you-another-flowchart/. Accessed 22 March 2020.

Hendrickson, Clara. "Local journalism in crisis: Why America must revive its local newsrooms." *Brookings*, 12 Nov. 2019, www.brookings.edu/research/local-journalism-in-crisis-why-america-must-revive-its-local-newsrooms/. Accessed 22 March 2020.

"How Cisco Used Quid to Better Understand IoT." *Quid*, 7 July 2016, quid.com/feed/how-cisco-used-quid-to-better-understand-iot. Accessed 18 January 2020.

Jordan, Megan. "The Role of Artificial Intelligence in Financial Reporting." *2019 Relevance Report*. USC Annenberg Center for Public Relations, 2018.

McEvers, Kelly. "How Russian Twitter Bots Pumped Out Fake News During The 2016 Election." *NPR*, 3 April 2017, www.npr.org/transcripts/522503844. Accessed 20 January 2020.

"Methodology." Interdependence Public Relations, www.interdependence.com/our-methodology/. Accessed 20 January 2020.

Micklethwait, John. "Journalism in The Age of AI – DLD 19" *YouTube*, uploaded by DLDconference, 21 January 2019, www.youtube.com/watch?v=65jDYCAnLJU.

Oakes, Omar. "'The follower number means nothing': New tool aims to help marketers root out influencer fraud." *PR Week*, 9 October 2018, www.prweek.com/article/1495460/the-follower-number-means-nothing-new-tool-aims-help-marketers-root-influencer-fraud. Accessed 20 January 2019.

O'Connor, Gabe. "How Russian Twitter Bots Pumped Out Fake News during the 2016 Election." *NPR*, 3 April 2017, www.npr.org/sections/alltechconsidered/2017/04/03/522503844/how-russian-twitter-bots-pumped-out-fake-news-during-the-2016-election. Accessed 20 January 2020.

"Open Influence's Amazon Rekognition Partnership" *YouTube*, uploaded by Open Influence, 8

   August 2017,

   www.youtube.com/watch?time_continue=113&v=wMXB937W7Lo&feature=emb_logo.

Penn, Christopher. "The role of machine learning in public relations." *Shift Communications*,

   www.shiftcomm.com/blog/role-machine-learning-public-relations/. Accessed 10 January

   2020.

"PR Tech: The Future of Technology in Communications." *2019 Global Communications*

   Report, *USC Annenberg Center for Public Relations*, April 2019,

   annenberg.usc.edu/research/center-public-relations/global-communications-report.

   Accessed 4 January 2020.

Salz, Peggy Anne. "Bot Fraud Grows Across All Mobile Businesses and Now Threatens Apps."

   Forbes, 27 June 2019, www.forbes.com/sites/peggyannesalz/2019/06/27/bot-fraud-

   grows-across-all-mobile-businesses-and-now-threatens-apps/#3a7f9043a191. Accessed

   20 January 2020.

Simon, A. Herbert. "Artificial Intelligence: An Empirical Science." *Artificial Intelligence*, vol.

   77, Issue 1, August 1995,

   www.sciencedirect.com/science/article/pii/000437029500039H/pdf?md5=890e2cc441f27

   8e9df244dbc0636cb06&pid=1-s2.0-000437029500039H-main.pdf. Accessed 22 March

   2020.

"The ultimate media database buyer's guide." *Cision*,

   www.cision.com/content/dam/cision/Resources/white-

   papers/Cision_MediaDatabaseBuyersGuide.pdf. Accessed 11 January 2020.

Valin, Jean. "Humans still needed: An analysis of skills and tools in public relations." *Chartered*

  Institute of Public Relations, 23 May 2018,

  cipr.co.uk/CIPR/Our_work/Policy/CIPR_Artificial_Intelligence_in_PR_panel.aspx.

  Accessed 4 January 2020.

"Vishal Sikka: Why AI Needs a Broader, More Realistic Approach." *Knowledge@Wharton*,

  Wharton University of Pennsylvania, 13 Feb. 2018,

  knowledge.wharton.upenn.edu/article/ai-needs-broader-realistic-approach/. Accessed 4

  January 2020.

Weiner, Mark & Kochhar, Sarab. "Irreversible: The Public Relations Big Data Revolution."

  Institute for Public Relations, instituteforpr.org/wp-content/uploads/IPR_PR-Big-Data-

  Revolution_3-29.pdf. Accessed 18 January 2020.

Wells, Georgia, et al. "Russian Trolls Weigh in on Roseanne Barr and Donald Trump Jr." *The*

  Wall Street Journal, 19 June 2018, www.wsj.com/articles/russian-trolls-weigh-in-on-

  roseanne-barr-and-donald-trump-jr-1529425771. Accessed 22 March 2020.

"Worldwide Spending on Artificial Intelligence Systems Will Be Nearly $98 Billion in 2023,

  According to New IDC Spending Guide." *International Data Corporation*, 4 Sept. 2019,

  www.idc.com/getdoc.jsp?containerId=prUS45481219. Accessed February 20, 2020.

"Your Guide to Protecting Your Brand from Social Media Bots." *Zignal Labs*,

  zignallabs.com/the-social-media-bot-problem/. Accessed 20 January 2020.

"Zignal Bot Intelligence Platform" *YouTube,* uploaded by Zignal Labs, 16 July 2018,

  www.youtube.com/watch?v=OZ_kw6cRyec&t=101s.

Interview with Megan Jordan
Former Head of Communications for Herbalife and SVP of Chromadex
January 24, 2020 – via telephone call – at 3:30 p.m.

1. In your experience, how has artificial intelligence helped you plan, monitor, or measure a communications effort?

I use it for outreach, and measurement is kind of built in because we're always using the data to check and adjust if we're hitting the right targets and the data is kind of just baked in.

2. What are usually the metrics that you're looking for?

A lot of when I'm doing the hyper-targeting I'm selling or I have a call to action that's either "go learn more on our landing page or website" or go buy a product. So, usually I can track behavior and see if they followed through on call to action.

3. What kind of AI-powered platforms/software do you often use for the above-mentioned purposes?

There's a couple I've used, I think they all have good things and there are some challenges with all of them. There's a service called NewsCred that I think is pretty good because they actually pull from news and then you can put a top of view on top of it, just make you relevant as a thought leader in a very turn key way. And then there's other marketing tools like Contently, Outbrain. There's a service called Geist. I feel like I get solicited every day, there are so many out there. And I think it's because it's all changing so fast that one vendor that is good today might be completely surpassed tomorrow by someone else who comes up with a better algorithm or software.

4. Some vendors use "AI" to describe their products, even when they're not really using this kind of technology. Is this an issue for you?

I really follow the money. I want to know who's behind it, and I think that's harder now to be able to identify what's really driving it.

5. How has the automation of news reporting helped or affected your work as a public relations professional?

I think how it helps is more on the *proactive* PR side. There is different vendors and software out there that you can use, you can get a lot of content out pretty efficiently. And then the other thing that I think is very helpful is that it is *responsive*, so you can just constantly adjust and hyper target your audience. I think that's how it's really benefitted.

But in terms of how it's affected, I think it has also very much opened the door for misinformation campaigns to really do a lot more damage. And then it costs a lot more money to try to go in and address them. I think that's something that is very significant for corporations because they're not used to seeing them, they don't budget for them and it takes them a long time to put the resources in place to combat those.

6. Herbalife Anecdote:

I was working with Herbalife Nutrition, a direct selling company in 94 countries. The way Herbalife reports its sales is using their own vernacular. They call them "volume points" because that is an easy way to adjust for currency. However, the algorithms that were written by the finance media were written in terms of sales dollars. So, even if we had a record quarter of all-time highest sales ever, we were down in Venezuela because of the currency.

The news headline would read "Herbalife is down," or "Herbalife down in South America" or something similar. And we thought: "But we had an all-time record and we blew

away the numbers!" Then the stock would start trading down and we were looking at it and trying to figure out what had happened. We just had the best day ever! And then we would see more headlines coming out.

We had to get on the phone and start making phone calls. But the hard part is that you're arguing with an algorithm, so there wasn't even an editor to talk to. You had to ask for the managing editor (they all call it different things) but mostly they call it the Computer Automated Reporting (CAR) editor. So, I would ask for the managing editor of CAR and maybe they had time to talk to me and maybe they didn't. It took a while before they got back to me. And in the meantime, investors would start reading the detail of the reports and understand that actually it amazing! And then we would see things start to turn but it took a day or two to get back to where it should have been.

So that's when I reached out to the media, and tried to say: "What you are doing has a material impact on companies, and that's unethical."

7. Do you think the relationship between companies or corporations and media might be affected or changed by the development of these technologies? Do you think the relationship between PR professionals and media outlets is going to change?

I found actually that it strengthened my relationship significantly because they want to get it right too. And they were grateful. I flew to New York and we sat down and talked fields. And they were open to feedback and learning, and I was too. I round up being actually good friends with a lot of the reporters that I had initially reached out to. And that's how Edith Moy end up speaking in one of the CPR panels. She was one of the ones who helped me so much. I met her in New York and she was the managing editor of breaking news at Bloomberg, and she's an Annenberg alumnus and brilliant. And they want to get it right.

I think actually if PR professionals can keep up their skills and understand this new way of reporting so we're all speaking the same language, I think it would be great for relationships. But it requires a different way of working where you have to get in front of it. So, you have to actually write for the appropriate algorithms and fields in order to get your story covered correctly and that's a whole different skillset.

The other thing is that the only way I would have learned this is from taking the time to go meet with them. So, they cut back a lot of the human reporters and so now they're assigned to file stories on a very large number of publicly traded companies during earning season. And what they do is that the computer runs the first draft of the article and then the reporter pulls it and quickly reviews it and compares it to the press release or to the earnings call/deck/transcript, whatever the official document was, and they look for any glaring or errors. So yes, there is human intervention, but they're filing about 70 stories per hour. It really truly is a quick glance. And what I learned from talking with them about what it takes to do their job now is: if I were to create like an infographic that was pretty detailed to accompany my press release, then they may pull it off the Wire and then they'll just see in picture form, very visually, that wow! All these numbers are good and going up, why is this story bad. And it would just be checks and balances where then they might want to take a deeper look. At Herbalife we actually started doing infographics with each earnings press release. This was one more tool to help the reporters with accuracy.

Bloomberg is unique, because Bloomberg their point of view is that their reporting is better because of AI, because it takes all the time away from reporting the facts and they can get into why something is happening instead. They kind of embraced it and that's why I ended up working with them the most, because they were the most open to talking. But it has become so

competitive among the media industries. I was in New York not long ago and one of my reporter friends told me that the Wall Street Journal was hiring 50 new reporters that could handle AI. And they had laid off a huge, huge amount of staff. It was a big shift where basically the Wall Street Journal said "ok, we're doubling down, this is the future."

8. In your opinion, what are the primary benefits and drawbacks of applying AI technologies to the field of public relations?

The ability to mislead, but I think that one of the positives is the *efficiency*, and just being able to get the right message to the right audience as quickly and efficiently as possible, I mean that's a great benefit. Specially if for example, right now with the Coronavirus, or the Sika virus. If there was something like that and you can actually use some of these AI-tools for the public health, just given the speed and the efficiency, I think that's a wonderful development in the field. It's just that I want to make sure that it's real information and it's coming from trusted sources.

9. What kind of PR practices or skills do you think AI will never be able to perform?

Where I see the biggest gap is on the ethics front. Who's going to police the ethics of "yes, you can push this or that information out" or how is it helping people. I just think that oversight is critical and I really think they need some standards to police it. I think you need that professional human oversight. And then the other big piece is kind of along the same way but for different reasons, is the judgement. I agree with Bloomberg's philosophy that yes, you can see, for example going back to the Herbalife situation, you could see that an activist short-seller bet a billion dollars this company would go to zero, and you could see that then this bad article came out, and then this bad article came out, but it couldn't draw the conclusions without the data points.

Appendix B
Interview with Alex Smith
Data Visualization Engineer at Zignal Labs.
January 31, 2020 – via telephone call – at 2:00 p.m.

1. During the 2019 USC Annenberg Center for Public Relations Kenneth Owler Smith Symposium discussion about PR and technology, you mentioned the importance of microtargeting and how AI was making that possible. What is exactly *micro targeting* and why should PR professionals know about this strategy?

Yeah, it's a really cool idea. It's kind of like flipping the whole top down, let's call it "marketing approach" on its head. The classic example I look at is: let's say I'm Nike, and I want to sell some shoes. Well, the obvious approach would be to say, "Kim Kardashian has millions of followers on every platform, I'm going to give her these pair of shoes and pay her a ton of money to be photographed in these shoes, and people will buy the shoes," right? It's simple. That's how it has traditionally been done; finding these mega influencers, which we know are influential and have a following. People are going to buy their stuff because they think they're cool. But it's hard to measure that. You can't track it down to the micro level and especially measure things like, "was my campaign effective?" or "did it stick?"

Micro targeting flips that on its head using things like machine learning. So, let's say that instead of spending a million dollars on giving one person a pair of shoes and a million dollars, I could give out 10,000 pairs of shoes. So now I want to find, let's say, 10,000 people that I know are interested in shoes, maybe Nike, maybe fashion; but they don't need to be mega influencers. They don't need to be Kim Kardashian. They need to just have a lot of quality dialogue or quality interactions with some circle of people: their friends or other people they influence.

Let's say there's a dozen people that these people influence, and I have 10,000 of them. I mean, it's going to net you a huge number, per each little cluster of people that you're able to target at the micro level. Any of those dozen people who follows this person that I picked out of the bucket have quality interactions on shoes. And of those 12 people—if I do know anything about them in a perfect world—, I would know if they're going to buy my shoes, and then I can track all of them as well at the micro level.

So now I've got 120,000 people that I might monitor and see if they bought my shoes, if it shows up on their Instagram or Twitter, and all those things. Then I can actually measure that. It was kind of like a "shotgun approach" with Kim Kardashian where I couldn't know if her followers actually bought my shoes (I mean, you could do that, but it's just a lot of work). But starting from the "bottom up approach," you can track every little bean at the smallest granule and see how long did it take them to buy my shoes, how many bought it on week one or week 10, etc. So, it's really that "bottom up approach" that we're focusing on, especially with machine learning.

1.2 How would you be able to measure those actions?

It's statistics. You need a lot of data—tagged data. If you were to say, "here's a dozen people with one influencer" and look at all the conversations that they're really having and the quality of that. So, are they talking about shoes? Are they all very positively raving about shoes or fashion or just health and fitness in general? It's about knowing, at a topical subject level, everything this circle of people talks about, how much, and who drives that conversation. That's where machine learning comes in.

In order to do that, we need tons and tons of data on every single person and an understanding of where's my message, and where is it going to stick and route through a group

the best to get the most traction. And the flip side of that, on measurement, is kind of what we do now where we would say, "here's my target market," put them on the platform, and build the dashboards and the vanity metrics. We are going to get reports, we are going to get alerts, we are going to have our command center dashboards on 24/7 for our team to monitor how well we are doing, where we thought we were going to be, and where we are at.

2. What kind of machine learning, specifically, do you usually deploy? Is it to interpret language and identify the main topics in a social conversation?

Yeah, *topics* is one part of it, *sentiment* is another. Those are probably the two big ones where natural language processing comes in. And then the other one is the *similarity* parts where you take the last thousand things that each person felt really strongly about, and compare them all against each other and then group them maybe by ones that are very similar and that are going to stick.

If I have one message, maybe I want to cater that message in 10 different ways and target 10 different groups of people. And just by changing little words, concepts, imagery, all those things, I'm making it more aligned. The similarity part of machine learning is like to say, "here are the 10 things that you feel very passionately about imagery on X." So, if I'm going to impact these people and make them buy my things or make them like my message, I better incorporate these things. The similarity part is going to say, "here's the topical groups of people," —maybe sentiment and topic groups of people— who will feel a certain way, and then I can feed my message in there and see who is it going to stick to the most and how do I need to segment them to make that stick.

And then there's also the *predictive* side where I can say, "if I direct my message right there, I can dig deep back" and then say, "oh, maybe I should use these hashtags, or these

different wordings, or different imagery if I want my message to stick to this crowd differently," or "if it's not going to stick at all in this group, how can I make it stick?"

3. You mentioned sentiment analysis in your previous answer, so I would like to explore that topic. Could you please explain how sentiment analysis works, and in terms of accuracy, how reliable is it today?

That's a great subject. If you were to buy an "off the shelf" solution from IBM, for example, who has the Watson services, this is probably one of the most popular marketing sentiment services and we've used them extensively over the years. But we have found in a lot of our studies on the actual sentiment that it was about as accurate as flipping a coin, 50/50. It was just very general. It's great at picking up "I love something" versus "I hate something," cursing and all those things. On sentiment that is more nuanced, or to see what comments mean to my brand and the context of my brand is just the "Wild West."

We really flipped that on its head with machine learning. And we use crowdsourcing a lot for our sentiment. Right now, it's a premium service because it took us a ton of work to make. And the service that we use is Amazon Mechanical Turk. So let's say you're managing this giant company and you've got 10 products, or 10 "profiles" as we call it, which is like a Boolean search in our system. So, what we would do is feed in each profile the results. We might target a group of tweets from influencers, non-influencers, all the different ways you could slice and dice that, data sentiment included. So, what they do in Mechanical Turk is basically have you answer a question. And for that you get rewarded some small amount, like 10 cents or 20 cents, it depends on the task really. But that gives us tagged data that we can use in machine learning processes.

3.1 To train the algorithms.

Exactly. So, we'll just have real people tag the data for a specific brand. We say: "Here's a bunch of stories from this profile. Tell us if you think, through the eyes of this brand, is this positive or negative? And highlight words in the sentence that are telling you that. So, it's a tough nut to crack in some ways to design it, but if you do it right and spend a lot of time analyzing what you're getting back, and understanding the workers (i.e. how they feel, how to reward them best), you can get some really good results out of it.

So, something that Watson sentiment might simply deem as negative can be positive for my brand. And machine learning will allow me to know this because real people tagged this data in a positive manner because they might have read something through the eyes of my brand. So that's kind of like the traditional example of how it works, but yeah, it's all about machine learning and the process of obtaining tons of tagged data. And the easiest way to get tons of tagged data is to pay people to tag it. And then just measure all your models and progress along the way until you get something good.

Our sentiment now is about 80% accurate, which is very good for machine learning. That's about as high as it's going to get anytime soon.

3.2 Do you think it's going to keep improving or do you think it's as good as it gets?

I think with natural language it is about as good as it could, realistically speaking. Where I see the future is matching text with imagery and video. They say that a picture can tell more than a thousand words, right? So, understanding things like imagery and what people typically share and make that part of the model would be a great advance in this area. Right now, sentiment and natural language is all about comparing different beans in the bucket because

they're beans, but we don't know the whole context of each individual bean to make my prediction better.

So, it's about understanding more than just the tagged data, but everything behind the data. I think it's more about understanding everybody's context, but that's something that takes a lot, a lot, a lot of data. It's within the realm of possibility in the next few years, but it's a huge challenge. I mean, you almost get into super-computing at that level.

4. In your opinion, what are like the primary benefits and the main drawbacks of applying AI technologies to the field of PR?

I think the benefit is augmenting ourselves as human workers. We can only read so much in one day, in one sitting. We've got a million meetings and on top of that we are just turning data, and that's how people get burned out. Right. With this augmented intelligence we're only making ourselves stronger by making some healthy assumptions about data based on machine learning.

And the opposite side of that is, are we leaning way *too much* on technology? We are at risk of either automating people and kicking them out of the loop, or relying on a black box. Machine learning is extremely complex and the black box is a part of it. Often times it can be "garbage in" and "garbage out," and you don't know the whole middle process that it took. Understanding more I think about what these things do and not blindly trusting them. I think that's the danger.

5. One of the biggest questions in PR is "Will my campaign work?" Some people think we have to rely entirely on our instinct or intuition to predict if a big idea is going to work. Will we ever be able to predict the effectiveness of our ideas, or do we have to keep relying on our intuition?

I think it's going to be a mix. Intuition is a huge part, we're almost like little quantum computers that predict the future just through gut feelings. But if in 10 years from now we have tagged every single thing, we will have 10 years of data and we will be able to predict behavior in a trackable, measurable way. Absolutely. You can get the prediction at that point.

But it needs a good decade of trackable data on all the various things that a person has ever said, especially how their context is. What's fascinating to me is studying human behavior online versus how they behave in human conversational settings: it is very often night and day. We measure a lot of things on how people behave online. But it's not always the case of how they do in real life. We would like to match that blend of understanding their day to day, actual real-life context as well as their online personas. And that's when you nail it.

6. AI technologies like machine learning and deep learning require a significant amount of data to provide useful insights. Do you think there's a way in which companies can collect data in an ethical way?

Yeah, for example we only work with open source data, anything that's publicly available on Twitter or all the social media platforms, broadcast TV, radio, newspapers, and people commenting on that, sharing it. But it can get really weird. Luckily, Twitter has the foresight, and many of these companies do have the foresight of saying, "no, you can or cannot do that because we think it's weird." That's the ethical part.

People are starting to realize that it's better in Europe with GDPR for instance, where there's a lot less personally identifiable information on all the data, but it's still rich data that can help understand people as a whole.

But data is in the hands of middle-aged corporate executives who want to go out into the world and it can get dangerous. There're certainly companies doing evil things, and also governments for sure. But I think everybody's got their mind in the right place, especially from the data vendor standpoint on ethics. We want to innovate with our customers and build positive, good things and services and tools and all that comes in handy for that. But if we see red flags, we say, "Hey, we won't build stuff like that." We are happy to turn people away, especially if it seems shady. I think it's a two-part process of people building the tools, the data providers, and you know, everybody just being good kids in the sandbox.

6.1 Do you have access to Facebook?

No, not right now. It's another grey area. We have some of it.

6.2 Do you have access to Twitter?

Yeah, and we pay all the major platforms that we ingest. We have some access to Facebook, for example to public pages, but not everything.

6.3 Do you have access to Instagram?

I think there's some level of access. They kind of anonymize some of the data and offer some trends so we can get enough signals for real-time data ingestion and machine learning. But we are able to get kind of the same value of looking at other platforms at the same time whether it's Reddit, Facebook, Twitter, Instagram, we can get a lot of the same good signals about what's trending. Right now, ultimately for us there wasn't a ton of value in what we could get out of Facebook from kind of that that general perspective. But they've got a rich data set that I would

love to understand. But it's a tough one because they kind of cut it all off around 2015, when Facebook started tightening down everything and cutting us all off.

6.4 So, you are relying more on Twitter or the other platforms, but not so much on Facebook's products.

Yeah. Instagram, we get more access to. It's all through their APIs. But yeah, I would love to have more Instagram as well.

Reddit has been a nice strong data source ticket because people comment and talk a lot on that platform. So, when you want to get down to that textual analysis to understand each person and their historic views on things, it helps a lot to have a lot of the things that they are typing in and commenting, versus Facebook, or even Twitter. Just sharing or retweeting sums up, and that's nice, but you don't have to go and express a very detailed opinion about a matter. But with Reddit, they're actually giving great commentary about what is well-received or not, which has a huge value. The more texts you can find, the more comments, replies, all that kind of stuff, that's the gold mine to me.

7. How are companies using Zignal's Bot Intelligence Platform? What kind of actions do they take after they've seen this data reflected on the screen?

It's been an amazing journey. It was something we started doing and noticing around 2015 and 2016. The age of disarray in disinformation happened around those years and it just kind of blew up out of nowhere. And I think it's really been interesting because at first, we were like, "Oh, my gosh, that's just huge percentages we're seeing." It's very blatantly obvious when you do the granular analysis and it was alarming.

It has been interesting because even with the early adopters of this service we were able to see bot attacks. And we also noticed these things would happen on earnings day. It's useful to

know, but it's been interesting because it has kind of evolved into understanding where the actual kind of the "guts" of the conversation are going to happen. This service is really convenient so brands can determine if it's worth spending money and time advertising to people who are not really human.

Most of the times now it's very much about determining how much resources to allocate to a specific audience depending on who is more influential. So, it has turned from a "Oh! No! We are all running around panicking" versus now where it's just kind of like, "Okay, great, let's just mute it. We don't need to spend our time with it."

7.1 So, you should be alarmed the moment an artificial botnet attack translates into actual human action, right?

Exactly. A lot of times we'll have a really good Strategy Insights Team here. They're like and in-house consulting group that does a lot of in-depth analysis. And they help a lot of clients trying to determine if they need to react to one of these attacks or not. In many cases, after doing the analysis you take a look at the news sources and all the links being shared by newspapers that no one has ever heard of and there are only five actual humans in the conversation. So, if you reply, you're only just going to pour gasoline on fire. Sometimes you can just ignore it or just not do anything and keep an eye on it.

7.2 How do you how do you identify who is a bot?

The platform is evolving a lot. We are getting more and more into the content and topic space with it, kind of the "next generation." The current one uses a lot of metrics. The biggest one is like, let's say, you post 600 times a day on average. How many people *actually* post 600 tweets a day on average, and how does that message stick? And maybe you've only got like three people listening to you blasting out your megaphone. That's one of the most prominent signals.

From there, it's about all the data we can get a good hold on a scale like: what applications are you posting on? What bio description is going on in your author bio? What locations are you in, are you moving around a lot, or do you seem to be nowhere? So, yeah, it's many facets. And we have more different formulas that started off with a few metrics and now it's just blown over the last year and a half or so to include a lot of other kind of signals that we match altogether to determine if an account is automated.

7.3 Do you know any instances where they've used bots to *benefit* companies?

Yeah, a while back there was a situation that happened. We were like, "Why are there so many people in this key demographic talking about this?" It just didn't make sense. We were all just scratching our heads as to like, "why is this blowing up?" They were kind of long bodies and then the group had few followers with 200 posts, and there were very new accounts. So, we thought, "Did they buy all these accounts?" We later discovered that this company was being bought by another company, and they were just trying to show a fake target market.

The buyer might have done some social analysis, I'm guessing, where they saw thousands and thousands and thousands of people loving this product, all in this specific demographic. So, they said, "Let's buy them." I think that's it, but it was interesting nonetheless.

8. What activities or skills do you think AI will never be able to perform?

I mean, anything a human does during their normal day to day job. We can't fully automate the full tasks that a lot of people do. I mean, even in journalism where a lot of stories are written with machine learning but they still need a person who has to approve it.

No machine can understand our context outside of the things they can track, really. So, I think there's always going to be a human in the mix. I think it's just going to change in many ways the way we look at data because sometimes it's just more than we can handle. So, if I could

have something that can keep me above water and help me read millions of things a day to

surface the things that really matter, that is when the value of artificial intelligence comes in.

Appendix C
Tech Toolkit for Public Relations Professionals

Audience Intelligence & Social Listening

- **Affinio:** An AI-powered intelligence platform that analyzes consumer data to provide insights on audience behavioral patterns, affinities and common interests.

- **Brandwatch:** An AI-powered social intelligence platform that offers business insights based on millions of online conversations and optimizes targeted influencer, content, and paid social media campaigns. This multilingual platform analyzes blogs, news sites, forums, videos, online reviews, images and social networks. In October 2018, Brandwatch announced a merger with Crimson-Hexagon (below).

- **Crimson-Hexagon:** An AI-powered consumer insights company that analyzes audiences, tracks brand perception and detects market trends. This multilingual platform covers social networks, blogs, forums, news and public data sources. On October 4, 2018, Crimson-Hexagon announced it was in the process of merging with Brandwatch.

- **Meltwater:** An AI-driven intelligence platform that analyzes billions of online conversations to extract relevant insights, connect with influencers, measure campaign performance and identify competitors and market trends.

- **Quid:** An AI-powered platform that searches, analyzes and visualizes insights from written content such as news, product reviews, company investments and forums.

- **Talkwalker:** A social listening and analytics company that uses AI-powered technology to monitor online conversations and images across social networks, news websites, and blogs and forums in 187 languages. The tool provides brand monitoring, competitive analysis, business intelligence, media response analysis and early warning systems.

- **TrendKite:** A digital PR platform that uses AI technology to deliver audience insights, provide data-driven reports, conduct market research and find media contacts to extend a message across paid, owned and shared channels. TrendKite was acquired by Cision in 2019.

- **Zignal Labs:** A media analytics software that uses big data, machine learning and digital media monitoring to measure the impact of earned media projects, identify reputational risks (e.g. bot attacks) and offer a comprehensive competitive analysis.

Social Media Management & Monitoring (SSM)

- **Echobox:** An analytics tool for publishers that looks at the site's visitor data and, using artificial intelligence algorithms, makes editorial and social media management recommendations to drive additional traffic to the publisher's website.

- **Hootsuite:** A social media management platform that monitors social media networks, measures campaign results, and supports content curation and team management.

- **HubSpot:** An inbound marketing and sales platform that provides tools for social media marketing, content management, web analytics and search engine optimization.

- **Sprinklr:** A social media management platform that monitors more than 23 social media channels for the purposes of marketing, advertising, research, care and commerce.

Influencer Relationship Management (IRM)

- **BuzzSumo:** An online tool that offers social media reports and competitor analysis, and identifies influencer shares, topics and domains. The company was acquired by Brandwatch in 2017.

- **Creator IQ:** An influencer marketing platform that uses machine learning to identify, measure and validate relevant creators/influencers for social media campaigns.

- **IzeaX:** A platform that connects marketers with influential creators to help automate influencer marketing, analyze campaign performance, and custom content development.

- **Onalytica:** An influencer relationship management platform that enables brands to identify social media influencers, establish organic relations and measure the impact of social media campaigns.

- **Traackr:** An influencer relationship management platform that enables brands to discover, manage, measure and scale influencer marketing strategies.

Content Creation

- **Audacity:** A free, open source, cross-platform audio software that allows users to record, edit and combine audio files.

- **Canva:** A graphic design tool website that uses a user-friendly drag-and-drop format, and provides access to a wide array of photographs, graphics and fonts.

- **Contently:** A content marketing software that helps companies create a content strategy framework, optimize content distribution, deliver personalized content, and connect with a network of 140,000+ content freelancers.

- **Flourish:** An online platform for data visualization and animated storytelling.

- **Percolate:** A content marketing platform that allows businesses to build and manage marketing programs and organize integrated campaigns.

Conversational Bots

- **Amazon Lex:** A service for building conversational interfaces into any application using voice and text. Amazon Lex uses the same deep learning technologies that power Amazon Alexa to build conversational bots (or "chatbots").

- **Live Chat:** A live-chat software tool that provides help desk software, customer support and web analytics. This tool helps e-commerce companies create sales channels to support and engage with website visitors.

- **Reply.ai:** A chatbot building and management platform that helps businesses optimize conversations with clients across channels and websites.

News Dissemination & Syndication

- **Business Wire:** A company that disseminates press releases from thousands of companies around the world to news media, financial markets, investors, databases, social networks and other audiences. It is a subsidiary of Berkshire Hathaway.

- **Outbrain:** An online advertising platform that distributes digital content on publisher sites such as Fox News, Slate, CNN, The Daily Beast and USA Today. Outbrain uses behavioral targeting to recommend online content to individual readers.

- **Taboola:** An online advertising platform that uses machine-learning algorithms to capture what type of content is most likely to engage with each individual. This content is published in sites like NBC News, Bloomberg, Business Insider, USA Today and more.

Customer Relationship Management (CRM) & Marketing Automation

- **Marketo:** A marketing automation software that helps organizations create, automate, manage and track campaigns across multiple digital channels. Marketo is an Adobe company.

- **NewsCred:** A content marketing platform that offers content and social analytics, audience insights and targeting, influencer and competitor tracking, custom reporting solutions, social and web publishing, paid social and native advertising, and integrations and data consolidation.

- **Oracle Eloqua:** A cloud-based software platform for marketing automation that aims to help B2B marketers and organizations manage their campaigns and drive revenue more efficiently. Eloqua is a subsidiary of Oracle Corporation.

- **Salesforce:** A customer relationship management platform whose cloud-based applications help businesses track customer information, manage customer support, create personalized marketing campaigns, connect with partners and employees and have access to AI-augmented analytics.

- **SugarCRM:** A software company that produces a customer relationship management system known as Sugar. Sugar collects critical information across sales, service and marketing to build better business relationships with customers.

- **Zoho:** A web-based software company that offers a suite of business, collaboration and productivity applications. Zoho offers more than 40 products to aid a company's sales, marketing, finance, support and recruitment needs.

Artificial Intelligence Tools for Developers

- **IBM Watson Studio:** Watson Studio provides a suite of tools for data scientists, developers and subject matter experts to collaboratively build and train AI and machine learning models to prepare and analyze large amounts of data.

- **ONNX (Open Neural Network Exchange):** A collaboration between Microsoft and Facebook. ONNX is an open container format that allows AI models to be exchanged between different cloud service providers. This allows AI developers to use their models in new places, which increases the number of models available to Microsoft and Facebook. This project is available on GitHub.

- **PyTorch:** An open-source deep learning platform for Python, based on Torch, often used for natural language processing (NLP). It is primarily developed by Facebook's AI research group. Uber's Pyro software for deep probabilistic programming is built on it, and Salesforce uses it to explore NLP and multi-task learning. Pytorch is available on GitHub.

- **Tensor Flow:** An open-source software library for high performance numerical computation. The software allows easy deployment of computation across a variety of platforms, servers and devices. Tensor Flow is available on GitHub. It was originally developed by the Google Brain team from Google's AI organization.