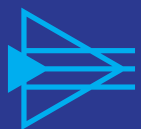
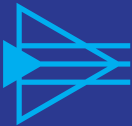
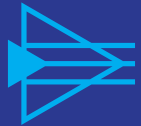


2019 Trend Report For Journalism, Media & Technology



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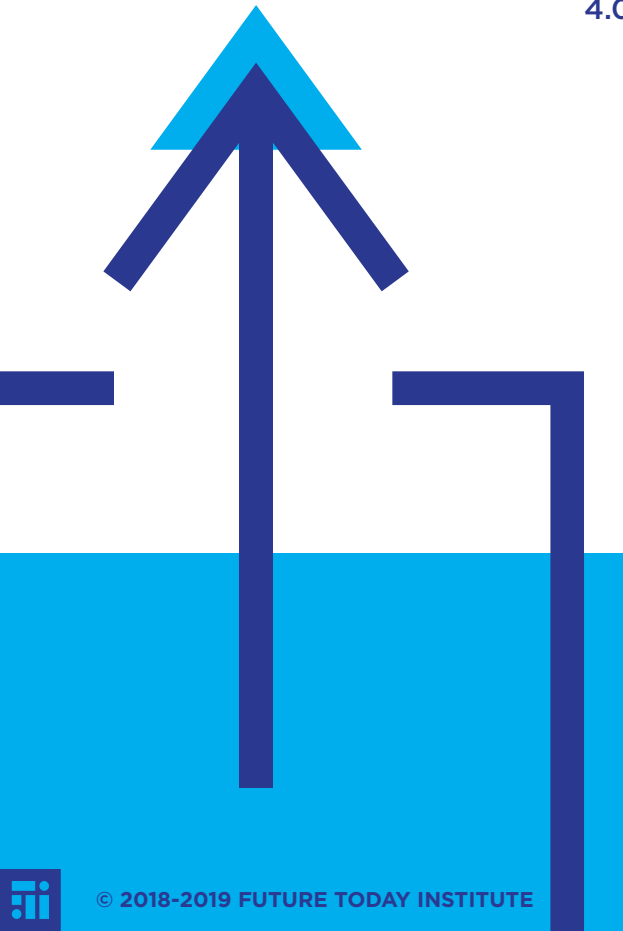
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Welcome

It's been a difficult year for journalism, media and technology.

A sitting United States president has repeatedly called media “the enemy of the people” who publish only “fake news” to confuse and mislead voters. On the same day that more than 350 newspapers ran thoughtful editorials explaining that journalists are not the enemy, that the president repeatedly assaulted the free press on Twitter, arguing that “THE FAKE NEWS MEDIA IS THE OPPOSITION PARTY. It is very bad for our Great Country... BUT WE ARE WINNING!” followed by “There is nothing that I would want more for our Country than true FREEDOM OF THE PRESS. The fact is that the Press is FREE to write and say anything it wants, but much of what it says is FAKE NEWS, pushing a political agenda or just plain trying to hurt people. HONESTY WINS!” A week earlier, a stunning Ipsos poll showed that 43% of Republicans say that the president “should have the authority to close news outlets

engaged in bad behavior.”

Meanwhile, it appears as though the platforms distributing news content are reluctant to address the problem head-on. Facebook, Twitter and Google have each made some efforts to confront the spread of misinformation, however in the digital realm attention is currency—and we keep proving the value of political vitriol, trolling and salacious content.

At the same time, we've seen the closure of even more news organizations in the past year, from the Village Voice, to a number of regional GateHouse newspapers, to *Interview Magazine*. There have been layoffs everywhere. Tronc cut the *Daily News* staff in half, for example—and this time around, new digital upstarts including BuzzFeed, Gizmodo Media Group, the Outline, Vice and Upworthy have also been forced to reorganize.

And yet, I feel hopeful about the year ahead. That's because there

are thousands of incredibly bright, talented, conscientious people working hard in our newsrooms, within corporate media, and inside tech companies, big and small. I'm also energized by the incredible technology on the horizon—it will not only help combat the spread of misinformation, it will offer creative solutions to funding quality news.

I'm reminded of something Helen Keller once said. “Optimism is the faith that leads to achievement. Nothing can be done without hope and confidence.” I look at the horizon, and at the people working within our newsrooms, and I feel optimistic—but I know there's hard work ahead.

That's the reason we've put together this industry-specific report. I hope it will help your organization see opportunity as you plan for the future. Factor these trends into your strategic thinking for the coming year, and adjust your planning, operations and business models accordingly.

As of the publication date, The Future Today Institute's annual trend reports have garnered more than 7.5 million cumulative views. We're glad to see so many leadership teams all around the world using these trends as part of a formal, ongoing process to reduce risk, harness new opportunities and drive change within their fields.

Regardless of what the next news cycle brings, always remember that the future is not yet written. It really is up to you and your organization. You have the power to create your preferred future, today.

Sincerely,



Amy Webb

Founder

The Future Today Institute

This is a robust, detailed report with 108 trends that cover many different themes and areas. The sprawling nature of this annual report was intentional. That's because the future of journalism, media and technology is influenced by myriad dependencies. You cannot know the future of your field without looking broadly.

To meaningfully plan for the future, organizations must listen for signals actively rather than reflexively. It is important to view your field through different lenses, considering adjacent sources of disruption. In the coming months, we hope that you'll spend time with all of the analysis in our 2019 Journalism, Media and Technology Industry Trends Report.



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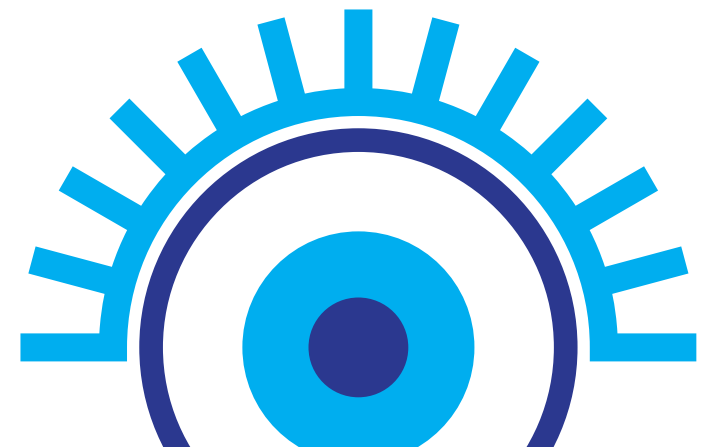
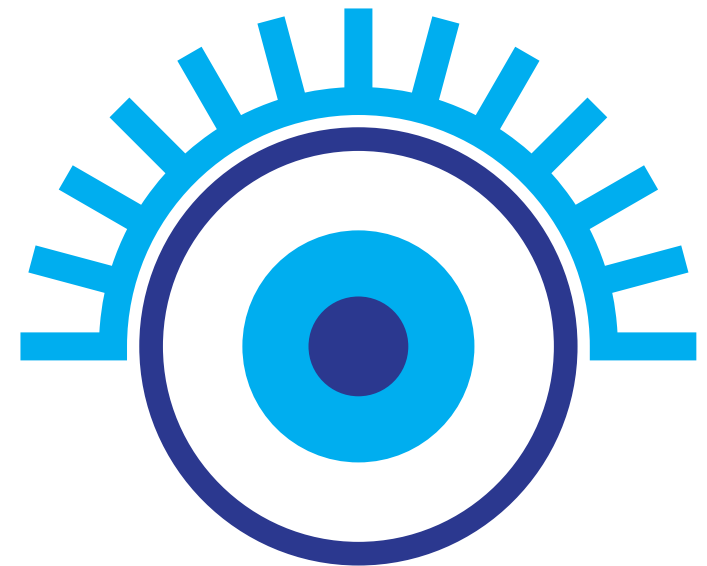
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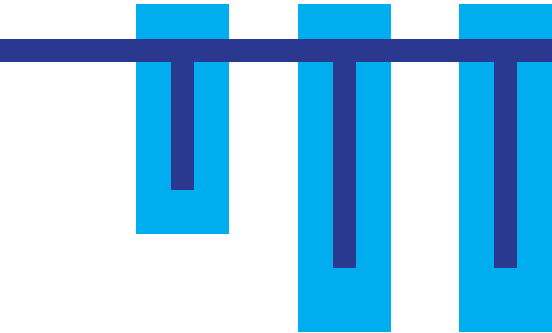
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Executive Summary

This is the second annual edition of FTI's 2019 Journalism, Media and Industry Trends Report. It follows the same approach as our popular FTI Annual Trend Report, now in its 11th year. Combined, these reports have garnered more than 7.5 million cumulative views.



Key Takeaways



2018 marks the beginning of the end of traditional smartphones.

During the next decade, we will start to transition to the next era of computing and connected devices, which we will wear and will command using our voices, gesture and touch. The transition from smartphones to smart wearables and invisible interfaces—earbuds that have biometric sensors and speakers; rings and bracelets that sense motion; smart glasses that record and display information—will forever change how we experience the physical world. This doesn't necessarily signal a post-screen existence. We anticipate foldable and scrollable screens for portable, longer-form reading and writing. It's difficult to overstate the dramatic effect our transition away from traditional mobile phones will have on journalism, entertainment media, and related technologies.

Blockchain emerged as a significant driver of change in 2019 and beyond.

The blockchain ecosystem is still maturing, however we've now seen

enough development, adoption and consolidation that it warrants its own, full section. There are numerous opportunities for media and journalism organizations. For that reason, we've included an explainer, a list of companies to watch, and a cross-indexed list of trends to compliment blockchain technology. We've also included detailed scenarios in this section.

Artificial Intelligence is not a tech trend—it is the third era of computing.

And yet there is a tremendous amount of misplaced optimism and fear about what, exactly, AI can and cannot do. You will see the AI ecosystem represented in many of the trends in this report, and it is vitally important that all decision-makers and teams familiarize themselves with current and emerging AI trends.

We need to pay closer attention to China.

The Chinese government is investing hundreds of billions of dollars into artificial intelligence. No other country on earth has the potential for 100

million of its citizens to gain so much economic status and power within the next twenty years—we've never seen socioeconomic mobility on that scale before. No other country is currently building sweeping alliances that range from Africa to Latin America and Eastern Europe. No other country's government is racing towards the future with as much force and velocity as China, and this could signal big shifts in the balance of geopolitical power in the years ahead. This is especially important as China's Baidu, Alibaba and Tencent prepare to take on Google, Amazon and Facebook.

Mixed Reality is entering the mainstream.

The mixed reality ecosystem has grown enough that we now see concrete opportunities on the horizon for media organizations. From immersive video to wearable technology, news and entertainment media organizations should begin mapping their strategy for new kinds of devices and platforms.

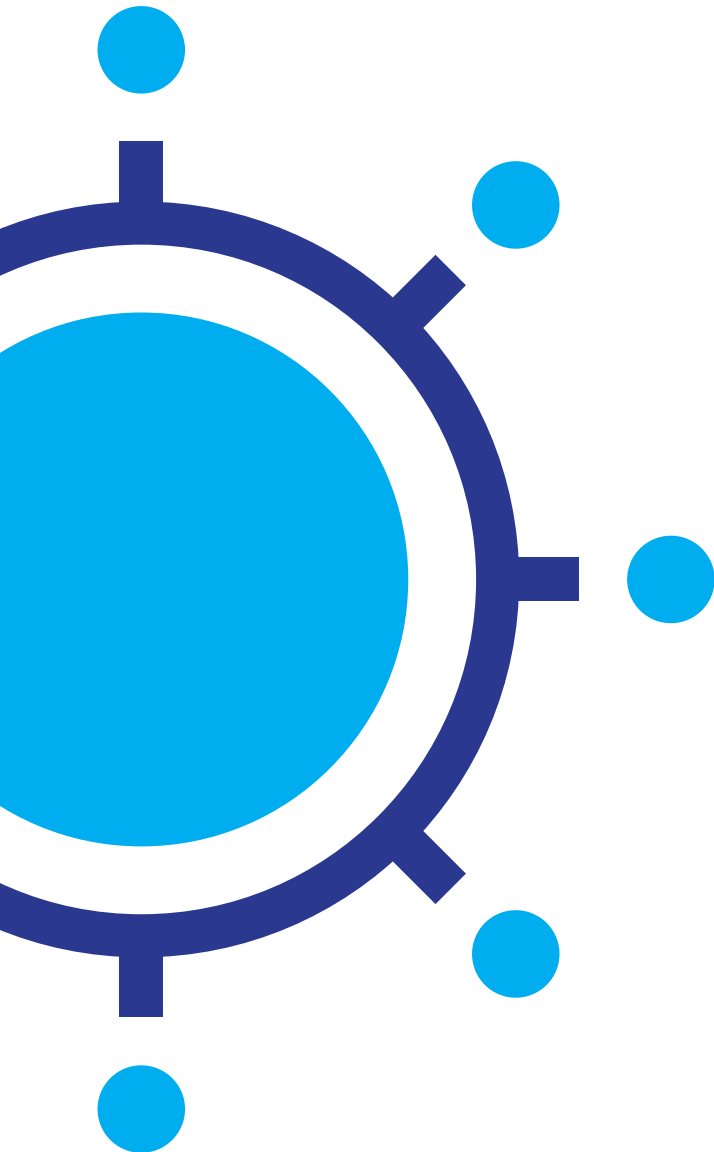
Methodology

The Future Today Institute Forecasting Methodology's Six-Step Funnel

The Future Today Institute's forecasting model uses quantitative and qualitative data to identify weak signals and map their trajectories into tech trends. Our six steps alternate between broad and narrow scopes, which include: identifying weak signals at the fringe, spotting patterns, interrogating trend candidates, calculating a trend's velocity, writing scenarios and finally, pressure-testing strategies and recommendations.



How To Monitor Trends and Signals In Your Organization



Every organization should continuously monitor weak signals, track emerging trends and develop strategy for the future. However there are different approaches to that work, depending on the answers or information your organization is seeking.

Begin by asking two important questions:

1. Does your organization need specific, tactical answers to a question with clear parameters—or are you developing strategic insights?

Examples: *What might subscription models and packages look like in the near-future?* (tactical)

How will people get content using new forms of consumer technology in the near-future? (strategic insights)

2. Have you already defined general themes and a list of specific topics for your research?

Each research mode requires a different approach:

How To Monitor Trends and Signals In Your Organization cont.

The Four Futures: What mode are you in right now?

Do you need specific, tactical answers to a question with clear parameters—or are you developing strategic insights?

Have you already defined general themes/ topics for your research?	Need Tactical Answers	Developing Strategic Insights
	YES	NO
YES	<p>Foresight Mode</p> <p>Writing my strategic plan/ developing specific actions</p>	<p>Education Mode</p> <p>Staying on top of specific trends within my industry and adjacent to my industry</p>
NO	<p>Discovery Mode</p> <p>Pure research — looking for ideas, opportunities, possible disruption</p>	<p>Speculation Mode</p> <p>Getting inspiration, learning from other fields, thinking about the farther-future</p>

Foresight Mode

Formulate a specific question. Map your immediate, adjacent and theoretical stakeholders. Develop a weak signals map using the 10 Drivers of Modern Change along with the list of themes and ideas you’ve already made. Begin to look for patterns.

Discovery Mode

Formulate a specific question. Develop an initial, general list of topics using the 10 Drivers of Modern Change. Create a list of secondary drivers specific to your question and industry. Determine a broad list of key stakeholders. Ask the Leading Questions (see below). Create a weak signals map as you go.

Education Mode

Using the 10 Drivers of Modern Change along with the list of themes and ideas you’ve already made, focus your attention on the adjacent and theoretical stakeholders as well as adjacent industries and fields. Use the Leading Questions to guide your research.

Speculation Mode

Engage in speculative research across many different topics. Find sources of

information that are far afield of your usual work. Practice active reading, taking notes and sketching connections.

Leading Questions

When you know the topics you want to research to surface new signals, but you don’t necessary need to answer a specific question, ask and answer the following questions as you fill in your weak signals map.

1. Who’s working directly in this [node] space? Include those who are already familiar to our organization, those who are adjacently related, and those who are theoretical (think very broadly to include all kinds of different operators).
2. Who’s been funding/ encouraging experimentation?
3. Which populations will be directly affected by advancements in 5/10/15 years?
4. What are our addressable markets in 5/10/15 years?
5. Who would be incentivized to work against advancement in general?

How Your Organization Can Take Action On Emerging Trends

Our 2019 Trend Report reveals the strategic opportunities and risk confronting your organization in the near future.

This report can help prepare your organization for the years ahead and better position you to see disruption before it fully erupts. We encourage you to use our report as a tool to identify change and to learn how new technologies might impact your organization in the near-future. The Report is also a good source of potential new collaborators and partners. Most importantly, use our report as a jumping off point for deeper strategic planning.

Explaining why these trends matter.

Rather than simply offering an overview of the trends that will matter, this report takes the additional step of explaining why and how these trends will impact your organization. In some cases, we have also included plausible scenarios, to help you and your team envision the potential outcomes of these trends during the next 12-24 months.

Relating these trends back to your organization.

Our 2019 Journalism, Media, and Technology Trends Report is a practical resource for your organization. It should influence your strategic thinking throughout the year.

Think about the trends in this report and ask yourself the following questions:

1. How might this trend impact journalism, media and technology and all of its parts?
2. What are the next-order implications of this trend on our industry?
3. Does this trend signal greater disruption to our traditional business practices and revenue models?
4. Does this trend indicate a future disruption to established roles and responsibilities within our organization? If so, how can we reverse-engineer that disruption and deal with it in the present day?
5. How are organizations in adjacent industries addressing this trend? What insights can we learn?
6. How are our known and theoretical competitors acting on this trend (or failing to do so?)
7. How will this trend influence the wants, needs and expectations of our customers?
8. How does this trend inspire me to think about the future of journalism, media and technology and my role within the ecosystem?
9. How does this trend inspire my team/ organization?
10. How does this trend help me/ my team/ my organization think about innovation?

How To Use Our Report

Each trend offers six important pieces of information for your organization.

The Future Today Institute’s 11th annual Tech Trends Report prepares staff, managers, executives, funders and startups for the year ahead, so that they are better positioned to see technological disruption before it fully erupts. We encourage you to use our report as a tool to identify change and to learn how new technologies might impact your organization in the near-future. The Report is also a good source of potential new collaborators and partners. Most importantly, use our report as a jumping off point for deeper strategic planning.

Note: the trends featured in this annual industry report have been curated specifically for journalism, media and related technology fields.

We recommend using our 2019 Tech Trends Report as part of a formalized process to evaluate disruptive technologies throughout the year.

TREND 018 • FIRST YEAR ON THE LIST

AI For the Creative Process

01 Key Insight
Can AI learn to be creative? In the past few years, we've already seen examples of AI systems creating something from scratch—music, dress designs, bicycles, and more.

02 Examples
Last year, researchers from Rutgers University, College of Charleston, and Facebook's AI Research Lab created an AI system whose purpose was to make art. The result was so convincing that human art critics couldn't distinguish between the AI-generated works and those made by humans. That research builds on an earlier study (from Rutgers and Facebook's AI Lab) that trained an algorithm to identify a work's artist, genre and style of art.

03 What's Next
"Break Free" is a single from the album IAMAI, which was written, produced and performed using artificial intelligence. Sony's Flow Machine worked along a human lyricist and together, they created a popular song. YouTuber Taryn Southern used the Amper AI system to create her latest songs. Aliva AI is a composer intended to help film directors, advertising agencies and game studios create original scores for their projects. Magenta, a project from Google Brain, is being used to create art and music—anyone can use its NSynth tool to generate new music. AI being used in creative fields has some worried, especially since some of the robo-created works seem to appeal to humans as much as flesh-and-blood artists. Creative uses for AI is an important step in advancing the entire body of work and research, as we transition from artificial narrow intelligence to artificial general intelligence.

04 Watchlist
Alphabet; Rutgers University; Facebook; College of Charleston; Sony; IBM; Amazon; Baidu; Tencent; Alibaba.

05 TREND 018 • FIRST YEAR ON THE LIST

06

	HIGH DEGREE OF CERTAINTY		
LONGER-TERM IMPACT	INFORMS STRATEGY	ACT NOW	IMMEDIATE IMPACT
	REVISIT LATER	KEEP VIGILANT WATCH	
	LOW DEGREE OF CERTAINTY		

© 2018 FUTURE TODAY INSTITUTE

01 Key Insight

Short, easy explanation of this trend so that you can internalize it and discuss with your colleagues.

02 Examples

Real-world use cases, some of which will sound familiar.

03 What's Next

What this trend means for you and your organization in the coming year.

04 Watchlist

These are the organizations and stakeholders most deeply involved in this trend.

05 Years On The List

We've noted how many years FTI has been tracking the trend in our annual Tech Trends Report, which began publication 11 years ago. This measurement is an indication of how the trend is progressing.

06 Action Meter

An easy-to-read graphic indicating where the trend is along its trajectory. It tells you whether the trend needs monitoring, should inform your strategy, or requires action.

Why We Include Scenarios With Trends

Narratives help illuminate our possible futures.

In this report, you will find a variety of scenarios that fit four different emotive framings: optimistic, pragmatic, pessimistic and catastrophic. Some are set in the very near future, while others imagine the world after 2029.

The Future Today Institute's methodology for modeling potential business, policy and societal impacts of technology and science involves surfacing emerging trends, identifying commonalities and connections between them, mapping their trajectories over time, describing plausible outcomes, and ultimately building strategy to achieve desired outcomes. The first half of the methodology explains the "what," while the second half describes the "what if." That second half, more formally, is called "scenario planning" and develops scenarios about the future using a wide variety of data across numerous sources: statistics, patent filings, academic and archival research, policy briefings, conference papers, structured interviews with lots of people, and even critical design and speculative fiction.

Scenario planning originated at the start of the Cold War, in the 1950s. Herman Kahn, a futurist at the RAND Corporation, was given the job of researching nuclear warfare, and he knew that raw data alone wouldn't provide enough context for military leaders. So instead, he created something new, which he called "scenarios." They would fill in the descriptive detail and narration needed to help those in charge with creating military strategy understand the plausible outcomes—what could happen, if a certain set of actions were taken. Simultaneously in France, the futurists Bertrand de Jouvenel and Gaston Berger developed and used scenarios to describe preferred outcomes—what should happen, given the current circumstances. Their work forced the military and our elected leaders into, as Kahn put it, "thinking about the unthinkable"

and the aftermath of nuclear war. It was such a successful exercise that their approaches were adopted by other governments and companies around the world. The Royal Dutch Shell company popularized scenario planning, when it revealed that scenarios had led managers to anticipate the global energy crisis (1973 and 1979) and the collapse of the market in 1986 and to mitigate risk in advance of their competition.¹ Scenarios are such a powerful tool that Shell still, 45 years later, employs a large, dedicated team researching and writing them.



¹ <https://www.strategy-business.com/article/8220?gko=Od07f>

When, Exactly, To Take Action On Tech Trends

We encourage you to use our Tech Trends Report as the basis for strategic meetings — as long as you commit to taking incremental action right away. Many organizations prefer to take a “wait and see” approach after seeing new research, and that’s a mistake. Your team must take some action, even if it’s small, to build momentum so that you may confront the future on your own terms.

We recognize how difficult it is to take risks during a time of economic uncertainty. However the future of journalism, media and technology requires courageous leadership right now.

For that reason, the Future Today Institute created a simple framework to help you continually monitor technology as it moves from the fringe to the mainstream. Focus on taking incremental action often as you think more exponentially. Incremental actions will position your organization to make smarter strategic decisions in advance, rather than trying to play catch-up after a disastrous event.

This is our framework, and we encourage your organization to use it as you read through our report.



Our Trends Aren't Trendy

Before the description of each trend, you'll see how many years it has been on our list. The trends that futurists research are never shiny, flashes in the pan. As you'll see, the trends in our report are not trendy. (At least, not intentionally.) Instead, they emerge from weak signals at the fringe and reveal changes afoot. Real trends tend to take shape over many years. We use trends to help us see potential opportunities, challenges and plausible scenarios for next-order impacts.

A trend is a new manifestation of sustained change within an industry sector, society, or human behavior.

Fundamentally, a trend leverages our basic human needs and desires in a meaningful way, and it aligns human nature with breakthrough technologies and inventions.

The Four Laws of Trends

All trends share a set of four conspicuous, universal features.

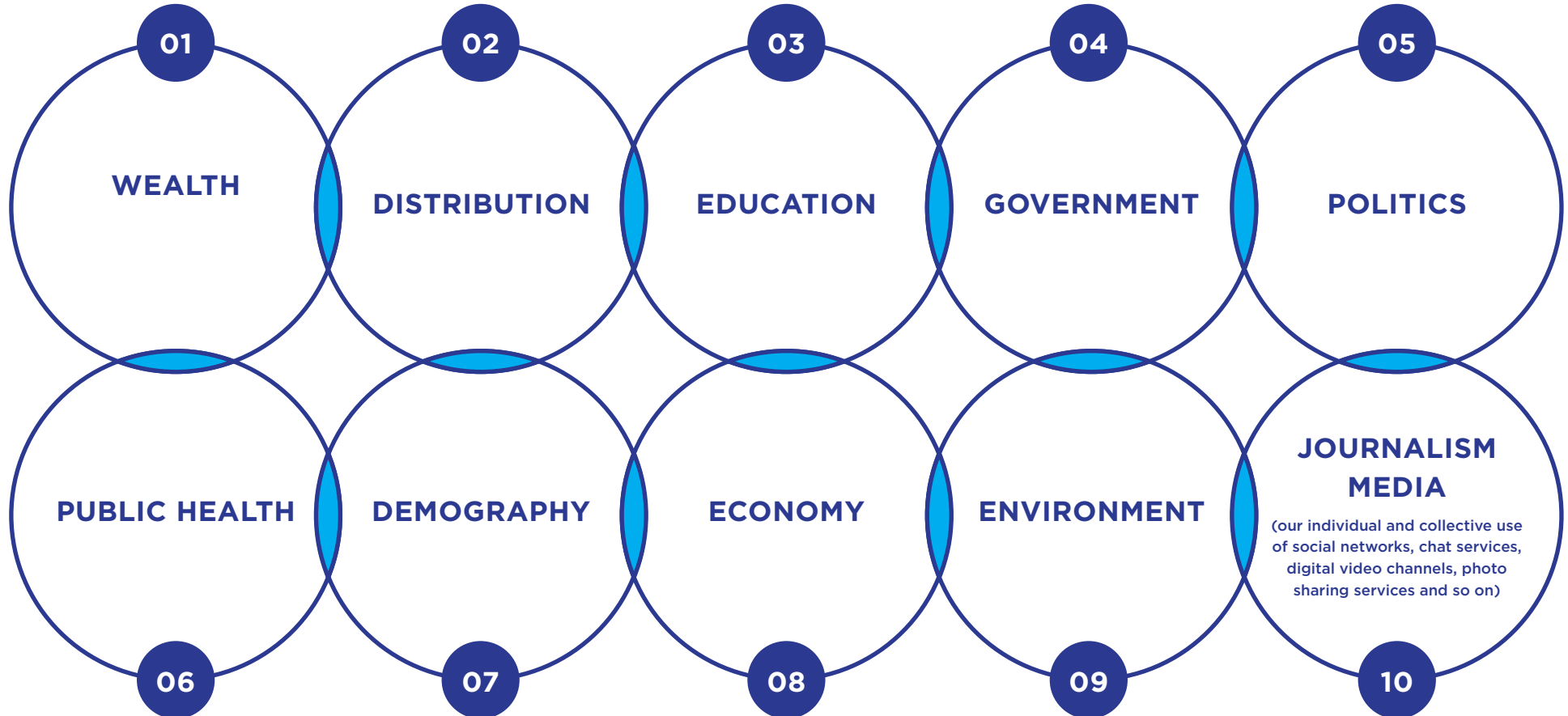
- Trends are the convergence of weak signals from the fringe.
- Trends are driven by basic human needs.
- Trends evolve as they emerge.
- Trends are timely, but they persist.

At any moment, there are thousands of small shifts in technology—developments on the fringes of science and society—that will impact journalism, media and technology itself in the future.

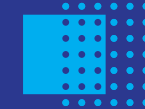
The 10 Sources of All Future Change

To understand the future of one thing, you must widen your aperture. Otherwise, you're essentially looking at the world through a pinhole.

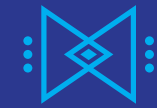
Historically, the sources of all future change tend to come from the 10 primary sources you see below. When FTI researches tech trends, we do so using the prism of these sources. Technology is not listed because it underpins every facet of our lives.



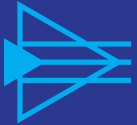
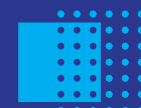
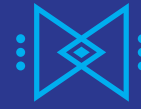
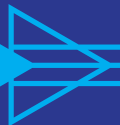
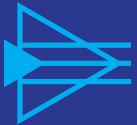
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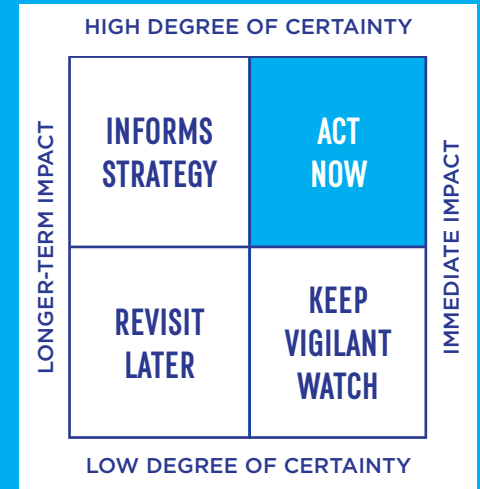


Artificial Intelligence

- 001 Natural Language Generation
- 002 Natural Language Understanding (NLU)
- 003 Machine Reading Comprehension (MRC)
- 004 Real-Time Machine Learning
- 005 Real-Time Context in Machine Learning
- 006 Generative Algorithms For Voice, Sound and Video
- 007 Image Completion
- 008 AI For Seeing Through Walls
- 009 Predictive Machine Vision
- 010 New Generative Modeling Techniques
- 011 Much Faster Deep Learning
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- 026 AI For Deep Linking Everywhere
- 027 Making AI Explain Itself
- 028 Accountability and Trust
- 029 China's AI Boom
- 030 I-Teams For Algorithms and Data



Artificial Intelligence: The Third Era of Computing



“We are now solving problems with machine learning and artificial intelligence that were ... in the realm of science fiction for the last several decades. And natural language understanding, machine vision problems, it really is an amazing renaissance.”

– Jeff Bezos

Key Insight

Many facets of artificial intelligence (AI) have made our list since we first started publishing this report more than a decade ago. AI itself isn't the trend—it is too broad and important to monitor without distinguishing between signals. For that reason, we have identified different themes with-in AI that you should be following.

What You Need To Know About AI

The roots of modern artificial intelligence extend back hundreds of years, long before the Big Nine were building AI agents with names like Siri, Alexa and Tiān Māo. Throughout that time, there has been no singular definition for AI, like there is for other technologies. When it comes to AI, describing it concretely isn't as easy, and that's because AI rep-

resents many things, even as the field continues to grow. What passed as AI in the 1950s—a calculator capable of long division—hardly seems like an advanced piece of technology today. This is what's known as the “odd paradox”—as soon as new techniques are invented and move into the mainstream, they become invisible to us. We no longer think of that technology as AI.

In its most basic form, artificial intelligence is a system that makes autonomous decisions. The tasks AI performs duplicate or mimic acts of human intelligence, like recognizing sounds and objects, solving problems, understanding language, and using strategy to meet goals. Some AI systems are enormous, like performing millions of computations quickly—while others are narrow and intended for a single task, like catching foul language in emails.

There are nine big tech companies—six American, and three Chinese—that are overwhelmingly responsible for the future of artificial intelligence. They are Google, Amazon, Microsoft, Apple, IBM and Facebook in the U.S., and Baidu, Alibaba and Tencent in China.



Artificial Intelligence cont.

The Big Nine

There are nine big tech companies—six American, and three Chinese—that are overwhelmingly responsible for the future of artificial intelligence. They are Google, Amazon, Microsoft, Apple, IBM and Facebook in the U.S., and Baidu, Alibaba and Tencent in China. Just nine companies are primarily responsible for the overwhelming majority of research, funding, government involvement and consumer-grade applications. University researchers and labs rely on these companies for data, tools and funding. So do news organizations—and we all use their products and services. The Big Nine are also responsible for mergers and acquisitions, funding AI startups, and supporting the next generation of developers.

Artificial Intelligence Is The Third Era of Computing

The best way to think of AI isn't as a particular tool, software application or spoken interface. AI represents the next era of computing, after the tabulating era (very early computers) and the programmable systems era.

There Are Different Categories Of AI

There are two kinds of AI—weak (or “narrow”) and strong (or “general”). The anti-lock breaks in your car, the spam filter and autocomplete functions in your email, and the recommendations that Amazon and Spotify make are all examples of artificial narrow intelligence. Maeve and Dolores in *Westworld*, the Samantha operating system in *Her*, and the H.A.L. supercomputer from *2001: A Space Odyssey* are anthropomorphized representations of artificial general intelligence (AGI)—but actual AGI doesn't necessarily require humanlike appearances or voices. Systems capable of general decision-making and automation outside of narrow specialties (DeepMind beating a world champion Go master) is an example of early, limited AGI.

AI, Neural Networks and Deep Neural Networks

A neural network is the place where information is sent and received, and a program is the set of meticulous, step-by-step instructions that tell a system precisely what to do so that it

will accomplish a specific task. How you want the computer to get from start to finish—essentially, a set of rules—is the “algorithm.”

A deep neural network is one that has many hidden layers. There's no set number of layers required to make a network “deep.” Deep neural networks tend to work better and are more powerful than traditional neural networks (which can be recurrent or feedforward).

AI, Machine Learning and Deep Learning

Machine learning programs run on neural networks and analyze data in order to help computers find new things without being explicitly programmed where to look. Within the field of AI, machine learning is useful because it can help computers to predict and make real-time decisions without human intervention.

Deep learning is a relatively new branch of machine learning. Programmers use special deep learning algorithms alongside a corpus of data—typically many terabytes of text, images, videos, speech and the like. Often, these systems are trained to learn on their own. In practical terms, this means that more and more human processes will be automated. Including the writing of

software, which computers will soon start to do themselves.

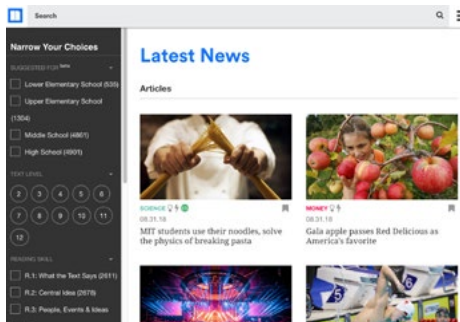
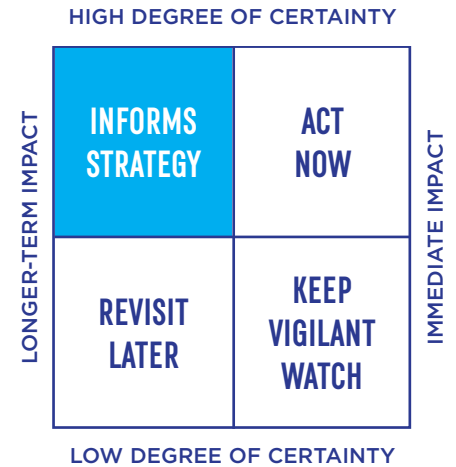
Overcoming Misplaced Optimism and Fear

When it comes to AI, many organizations and their leaders have developed a misplaced sense of optimism or fear. (And sometimes a combination of both.)

It seems like not a day goes by without a new headline promising that AI will cure all that ails us, or that it will take our jobs, or that it just might kill us all. The real future of AI does promise excitement, but probably not quite how you've imagined.



Natural Language Generation



Newsela is an educational startup and reading level converter that provides text-sets and articles for educators.

Key Insight

Natural Language Generation (NLG) has been used by media companies and marketing firms to generate content based on large datasets. NLG is powerful because it can integrate keywords, improving SEO and personalized customer communication at scale.

The technology is still evolving. NLG machines are learning to translate content into different languages and generate content for different mediums and in different voices or styles. One day, publishers may generate content in different reading levels to improve search engine ranks or reach a wider audience.

Examples

Algorithms can rewrite structured data into a narrative using natural language generation. Dozens of news and other organizations, including **Bloomberg** and the **Associated Press**, have been using **Automated Insights**, which mines data and is capable of writing more than 2,000 stories per second using natural language generation to produce stories about fantasy football, earnings reports and the like. **Narrative Science** employs its NLG system to build narratives out of big data sets and to help non-data science people make better sense of what's happening within their organizations. NLG will have myriad use cases across professional fields, assisting lawyers, politicians, doctors, consultants, financial analysts, marketers and beyond, who will soon incorporate our personal information as data points for narratives.

NLG To Grow Audience

Free, easy-to-use reading level converters have existed for at least five years. They are most widely used by educators. News organizations like the **Washington Post** and the **Guardian** have partnered with **Newsela**, an educational startup and reading level converter, to provide text-sets and articles for educators.

Google's search results ranking algorithm is a black box in terms of what factors improve page rank. SEO experts have suggested that adjusting the reading level of the page might have an affect. John Mueller, Senior Webmaster at Google echoed this idea when in March 2018 he tweeted, "Speak in the language of your audience; present your awesomeness in a way they can understand." It is also worth noting that in 2010, Google introduced a search filter Reading Level. (It was removed in 2014 with little explanation.)



Natural Language Generation cont.



NLG has been applied most frequently in beats where lots of data is readily available, like financial services, sports, and weather. Publications such as **ProPublica** and **Urbs Media** are experimenting with NLG to find stories and insight in public datasets and government election coverage.

In 2016, the Washington Post experimented with customized headlines based on user segments. This project, dubbed **Bandito**, could be married with NLG to provide story headlines personalized at a group level. NLG could also be integrated with chatbots to match brand voice and style. The team at **Quartz BotStudio** has found that “it is clear that users will gravitate to low-friction ways of getting the information and entertainment they want.”

What's Next

Instead of reading levels, publishers might focus instead on reading contexts using data to determine how to serve and customize content based on where the user is. If the user is reading while walking, an app might suggest, “Would you like to listen to this article instead?” In contexts where search matters, NLG technology will likely prioritize keywords and keep reading levels between 3rd grade (for stories related to finance, sports, business insights) and 8th grade (for more nuanced topics like politics).

Another aspect to consider is language. Not all languages are the same to model. Many NLGs are built on English and Chinese. Globally, this will impact how information is accessible to non-English speaking audiences.

Watchlist

Amazon; Google; Washington Post; Newsela; Rewordify; Readable.io; Urbs Media; Quartz; ProPublica; Automated Insights; Bloomberg; Narrative Science; Associated Press; the Guardian; BBC; Baidu; Tencent; Alibaba; Microsoft; Facebook; Apple; IBM



BY ELENA GIRALT

SCENARIO

Optimistic Natural Language Generation Scenario—New Audience and Revenue Growth By The Year 2023

Given what we know about the proliferation of voice-enabled devices, content-automation and the advancement of NLG technology, there will be more use cases for personally customized content based on preference, location, and even reading level.

In a world where customers are brand agnostic, providing content in different formats will result in a competitive advantage for content creators. As customers become more accustomed to web searches using voice, they will begin to ask for general content with specific conditions.

“Alexa, please only provide news articles that are less than 2 minutes long.”

“Alexa, I haven’t had my coffee yet, please only give me the headlines.”

In family settings, parents may implement content guidelines for smart devices in order to control what their children are exposed to.

“Alexa, please only serve news information from these trusted sources: NPR, Bloomberg, NYT.”

“Alexa, when Alice or Billy ask for news, please only respond with sources from PBS Kids.”

Imagine a more personalized news experience using NLG, one that’s tailored for each person. This value add could grow audience and become a new kind of subscription service in the near future.

Pessimistic Scenario—Bias in NLG Reduces Audiences and Depletes Revenue By 2023

Given what we know about machine learning techniques and current studies in the field, it is likely that NLG as an area of research will suffer from strong bias in data with most of the training data coming from predominantly Caucasian and English or Asian (specifically Chinese) languages. Not all languages model the same so in the US, NLG features will be optimized for English instead of Spanish or other languages. NLG might not understand different dialects and accents or worse, it might conflate accents with lower reading levels. Globally, this will impact how information is accessible to non-English speaking audiences.



Natural Language Generation cont.

002 Natural Language Understanding (NLU)

We are surrounded by unstructured text in the real world—it exists in our social media posts, our blog entries, on company websites, within city hall digital records, and elsewhere. NLU allows researchers to quantify and learn from all of that text by extracting concepts, mapping relationships and analyzing emotion. NLU will augment the work of professional researchers—those working in science and medicine, law and policy, infrastructure, agriculture, transportation, education and beyond—allowing them to glean deeper insights than ever before.

003 Machine Reading Comprehension (MRC)

For AI researchers, machine reading comprehension has been a challenging goal, but an important one. MRC makes it possible for systems to read, infer meaning, and immediately deliver answers while sifting through enormous data sets. One practical application on the consumer side: if you perform a search query, wouldn't you rather have a system offer you a precise answer than just a list of URLs where you can go to hunt down more specifics—even showing you where,

on the page, that information comes from? If you are an airline mechanic and you're trying to troubleshoot a tricky engine problem without further delaying a flight, it would be easier if you had a computer read all of the technical documentation for you and suggest likely fixes. Or, better yet, let the machines figure out what's wrong on their own, by making all technical manuals and documentation available to them for reading and analysis. That's the promise of MRC. MRC isn't focused on keywords alone. In the future, a trained MRC system could be transferred to different domains where no human has created labels or even a standard taxonomy. MRC is a necessary step in realizing artificial general intelligence, but in the near-term it could potentially turn everything from technical manuals to historical maps to our medical records into easily searchable repositories of information.

004 Real-Time Machine Learning

Machine learning describes a system that uses algorithms to analyze big data sets in order to perform a wide array of tasks better than we can. Over time, the system gets better at those tasks. It learns, even though we might not describe it as "intelligent." One challenge for machines

has always been efficiency, since until recently systems had to stop, pull and parse data. New research into real-time machine learning shows that it's possible to use a continual flow of transactional data and adjust models in real-time. This signals a big change in how data moves, and in how we retrieve information. For example, real-time machine learning makes it possible to translate speech automatically, even as multiple languages are spoken. It can be used to improve classification and predictions, promising more accurate risk calculations. This could allow content creators to more closely tailor content for consumers. Rather than using historic data alone (Reader #1234 only likes sports stories), real-time preferences would add context to the recommendation (Reader #1234 might want election news more in the next ten days).

005 Real-Time Context in Machine Learning

The world is awash with information, misinformation, and superficial thinking. IBM's Project Debater is an example of how context can be used in real-time learning systems. Project Debater can debate humans on complex topics. It digests massive texts, constructs a well-structured speech on a given topic, delivers it with clari-



Natural Language Generation cont.



ty and purpose, and rebuts its opponent. Eventually, Project Debater will help people reason by providing compelling, evidence-based arguments and limiting the influence of emotion, bias, or ambiguity. Debater is just one example of emerging systems that are capable of learning in real-time and using real-world context.

006 Generative Algorithms For Voice, Sound and Video

Researchers at MIT's CSAIL are studying how children learn new words in order to train computers on automatic speech recognition. As humans, we are able to master a new concept from just one or two examples; for machines, this is a more difficult task when it comes to language. Meanwhile, researchers are training computers to watch videos and predict corresponding sounds in our physical world. For example, what sound is generated when a wooden drumstick taps a couch? A pile of leaves? A glass windowpane? The focus of this research is to help systems understand how objects interact with each other in the physical realm. But future versions of the algorithms could be used to automatically produce sound and sound effects for games, videos, movies and TV shows. It also raises

the specter of audio fraud—what happens when computers are able to spoof our voices and natural sound? There have already been a few early successes: in 2017, researchers at the **University of Washington** developed a model that convincingly showed **President Barack Obama** giving a speech—that he never actually gave in real life.

007 Image Completion

If a computer system has access to enough images—millions and millions—it can patch and fill in holes in pictures. There are practical applications for professional photographers as well as everyone who wants to take a better selfie. Soon, if the foreground of a mountain is out of focus, or if your skin has an unsightly blemish, another version can be swapped in to generate the perfect picture. But what are the next-order scenarios and implications? How will we draw the line between reality and enhancement? How much image completion should be allowed without tacking on a warning label or disclosure? Online daters, journalists, and marketers should be asking these questions. But so should policymakers. Image completion is also a useful tool for law enforcement and military intelligence officers—computers can now assist them in identifying who or what



Natural Language Generation cont.

is in the frame. Given the bias we've already seen across machine learning algorithms and data sets, image completion could become part of a future debate about privacy and our devices.

008 AI For Seeing Through Walls

MIT computer vision scientists have discovered how to use computer vision to track data from what they call "accidental cameras." Windows, mirrors, corners, houseplants and other common objects can be used, along with AI, to track subtle changes in light, shadow, and vibrations. The result? We may soon all have x-ray vision. This technology could be harnessed by reporters for investigative work.

009 Predictive Machine Vision

Researchers at MIT's CSAIL have trained computers to not only recognize what's in a video, but to predict what humans will do next. Trained on YouTube videos and TV shows such as "The Office" and "Desperate Housewives," a computer system can now predict whether two people are likely to hug, kiss, shake hands or slap a high five. This research will someday enable robots to more easily navigate

human environments—and to interact with us humans by taking cues from our own body language. It could also be used in retail environments, while we're operating machinery, or while we're in classrooms learning.

010 New Generative Modeling Techniques

Autoregressive Quantile Networks for Generative Modeling (or AIQN for short) sounds complicated but it's an innovative idea to help improve algorithms and make them more stable. The implication: this could quicken the pace of advancements in AI—and that could mean faster opportunities and innovations within journalism, media and technology.

011 Much Faster Deep Learning

Deep Learning (DL) is a relatively new branch of machine learning, and it will soon be an invisible part of every organization. Programmers use special deep learning algorithms alongside a corpus of data—typically many terabytes of text, images, videos, speech and the like. The system is trained to learn on its own. While conceptually, deep learning isn't new, what's changed recently is the amount of

compute power and the volume of data that's become available. In practical terms, this means that more and more human processes will be automated, including the writing of software, which computers will soon start to do themselves. DL has been hampered by the processing power of computer networks. Just a few years ago, it would take a month or longer to train an image recognition model on the **ImageNet** dataset. Today, with more advanced equipment, **Facebook** can do the same in under an hour. As computers become faster—and as hardware architecture evolves—our systems will perform tasks at super-human speeds.

012 Reinforcement Learning and Hierarchical RL - 12

Reinforcement Learning (RL) is a powerful tool for sorting out decision-making problems, and it's being used to train AI systems to achieve super-human capabilities. Inside of a computer simulation, a system tries, fails, learns, experiments and then tries again—in rapid succession, altering its future attempts each time. It's because of RL that **AlphaGo**, a computer developed by **DeepMind** (part of **Alphabet**) learned how to beat the greatest Go players in the world. One problem with RL: agents have difficulty when they don't have



Natural Language Generation cont.

enough supervision, or when they're objective is to run scenarios for a very long time horizon. Researchers will try to solve those problems using **Hierarchical Reinforcement Learning**—that discovers high-level actions and work through learning challenges methodically, in order to master new tasks at speeds we humans can't imagine. This is important for non-techies, too: RL will improve the "intelligence" in our AI systems, helping cars learn to drive in unusual conditions and helping military drones perform complicated maneuvers that have never been attempted before in the physical world.

013 Continuous Learning

At the moment, deep learning techniques have helped systems learn to solve complex tasks that more closely matches what humans can do—but those tasks are still specific, such as beating a human at a game. And they require a rigid sequence: gather data, determine the goal, deploy an algorithm. This process requires humans and can be time-consuming, especially during early phases when supervised training is required. Continuous Learning (CL) is more about autonomous and incremental skill building and development, and researchers will continue pushing the limits of what's possible in the coming years.

014 Multitask Learning

If you watched the original Karate Kid movie, you'll remember Mr. Miyagi promising to teach Daniel karate—and Daniel getting frustrated with days of painting fences, sanding floors and "wax on, wax off." To Daniel, none of these activities seemed related, and they certainly didn't appear to help him with his stated objective: to learn karate. Of course, it turns out that all of these chores were indeed connected, and Daniel's repetitive learning is what helped him become a formidable karate champion. Researchers are now training systems to learn like Daniel. When developers use Machine Learning, they are doing so to try and solve for a particular task or problem. They supervise the system, fine-tuning it and making adjustments until the models performs as desired. But focusing only on a single task often leads to inefficiencies—perhaps there's a better solution to the problem than the method developed by the researcher. A new area of research—multitask learning—helps systems learn more like Daniel, exploiting the relationships between various, related tasks in order to solve problems better.

015 Adversarial Machine Learning

In short, an adversarial piece of content—a photo, a video, an audio file—is encoded with a tiny modification, usually one that's imperceptible to humans. It's created in order to help computer scientists adjust machine learning models. Hackers use adversarial examples in a machine learning system to attack it, causing the model to make a mistake. In order for machine learning systems to learn, they must recognize subtle differences. Researchers also use adversarial information in order to train systems in how to recognize misleading information in order to secure it. Adversarial information is sort of like an optical illusion and it's typically imperceptible to the human eye or ear. It could be one pixel out of a million that's the wrong color or is misaligned—to you, all those pixels together might still look like a photo of a rainbow, but to a machine learning model, that one out-of-place pixel could render the image gibberish. When that happens, an adjustment is made to the system and it continues training. Adversarial images can be used to knowingly and purposely trick a machine learning system. If an attacker trains a model, using very slightly altered images, the adversarial examples could then



Natural Language Generation cont.



Alibaba Headquarters, Hangzhou, China: The main building of the Alibaba group headquarters.

be deployed out into other models. Adversarial examples can be embedded—intentionally, or by accident—into photos, multimedia stories, virtual reality content and the like. This is important to keep in mind, especially as fake news continues to proliferate in digital channels. It’s especially perplexing for search engines (**Google**, **Bing**) and for any service that automatically tags our photos (law enforcement databases, **Facebook**).

016 A Bigger Role For Ambient Interfaces

Also known as “zero-UIs,” our modern interfaces are becoming more and more like ambient music—able to do more for us with fewer direct actions, yet still able to captivate our attention. Digital Assistants figuratively and literally automatically deliver you the information you need to know, just as you need to know it. Rather than relying on a single input screen, or even a series of screens, we’ll instead interact with computers with less friction. In our modern age of information, the average adult now makes more than 20,000 decisions a day—some big, like whether or not to invest in the stock market, and some small, like whether to glance at your mobile phone when you see the screen light up. New DAs promise to

prioritize those decisions, delegate them on our behalf, and even to autonomously answer for us, depending on the circumstance. Much of this invisible decision-making will happen without your direct supervision or input. What makes ambient design so tantalizing is that it should require us to make fewer and fewer decisions in the near-future. Think of it as a sort of autocomplete for intention. We will interact both actively and passively with our DAs, found in our hearables, thermostats, cars and pockets. They will listen and observe in the background, sometimes asking questions—other times offering up text, audio or haptic notifications as needed, and those will be decided by algorithm. The real promise of ambient interfaces is explained by **Metcalfe’s Law**, which says that the value of a network is the square of the total number of people using it. As more people become part of ambient networks of information, the more use cases we’ll see in the future.

017 Digital Assistants Become Ubiquitous

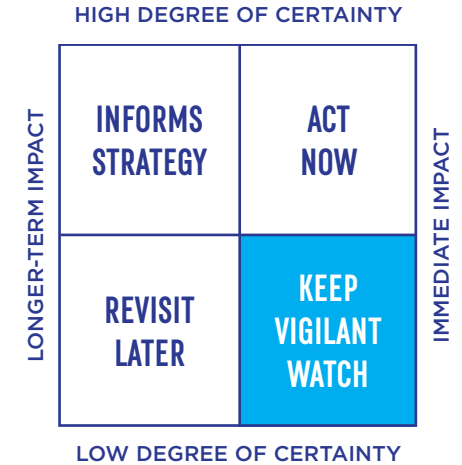
Digital Assistants (DAs)—like **Alibaba’s Tiān Māo** and **Amazon’s Alexa**—use semantic and natural language processing, along with our data, in order to anticipate what we want or

need to do next, sometimes before we even know to ask. DAs will become more pervasive in the near-future, as device prices fall (look for entry-level speakers that cost less than \$20) and as systems get better at interacting with us. Millions of smart speakers are being installed in hotel rooms throughout China, while in the West we can expect to see speakers in offices.

DAs will soon be found outside of smart speakers. Watch for new collaborations between device manufacturers and DA platforms—you’ll speak to Alexa in your car and on your morning jog, while Google will soon be accessible during work meetings and at your desk. You’ll also start to notice DAs hidden throughout other connected devices, such as your home thermostat, your refrigerator and your phone. Researchers at **MIT**, **Stanford**, and the **University of Texas at Austin** are building infrastructure so that our devices will be able to listen and watch: They’ll know the places we go, the people we interact with, our habits, our tastes and preferences, and more. Then they’ll use this data to anticipate our needs. Marketers, credit card companies, banks, local government agencies (police, highway administration), political campaigns and many others can harness DAs to both surface and deliver critical information.



AI For the Creative Process



“Break Free” is a song composed by AI and performed by Taryn Southern.

Key Insight

Can AI learn to be creative? In the past few years, we’ve already seen examples of AI systems creating something from scratch—music, dress designs, bicycles, and more.

Examples

Last year, researchers from **Rutgers University**, **College of Charleston**, and **Facebook’s AI Research Lab** created an AI system whose purpose was to make art. The result was so convincing that human art critics couldn’t distinguish between the AI-generated works and those made by humans. That research builds on an earlier study (from Rutgers and Facebook’s AI Lab) that trained an algorithm to identify a work’s artist, genre and style of art.

What’s Next

“**Break Free**” is a single from the album **IAMAI**, which was written, produced and performed using artificial intelligence. **Sony’s Flow Machine** worked along a human lyricist and together, they created a popular song. **YouTuber Taryn Southern** used the **Amper AI** system to create her latest songs. **Aiva AI** is a composer intended to help film directors, advertising agencies and game studios create original scores for their projects. **Magenta**, a project from **Google Brain**, is being used to create art and music—anyone can use its **NSynth** tool to generate new music. AI being used in creative fields has some worried, especially since some of the robo-created works seem to appeal to humans as much as flesh-and-blood artists. Creative uses for AI is an important step in advancing the entire body of work and research, as we transition

from artificial narrow intelligence to artificial general intelligence.

Watchlist

Alphabet; Rutgers University; Facebook; College of Charleston; Sony; IBM; Amazon; Baidu; Tencent; Alibaba.



Bots



Chatbots are being used by newsrooms worldwide.

Key Insight

The term “bot” has become part of our mainstream vocabulary. Bots at the most basic level are software applications designed to automate a specified task. In the context of journalism, bots can be divided into two main categories: news bots and productivity bots. News bots can help aggregate and automatically alert a user about a specified event, whereas productivity bots are tools journalism organizations should be using to help automate and streamline their day to day operations. The major risk associated with news bots is that they are only as reliable as the programming behind it. People or groups with nefarious interests can use bots to disseminate erroneous information.

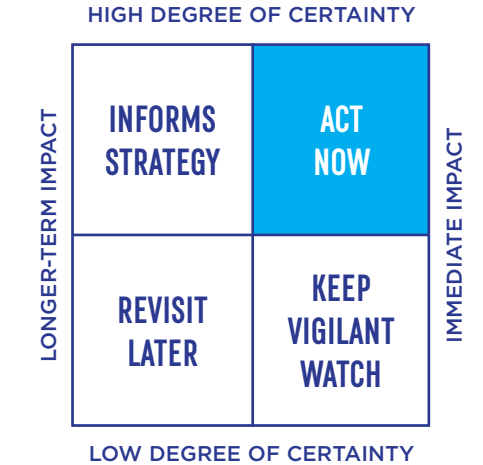
Examples

Many newsrooms have experimented with chatbots, including **BuzzFeed**,

TexasTribune, **Quartz**, **Mic**, **Los Angeles Times** and elsewhere. Imagine you're a media outlet and you want to stay updated and report on earthquakes that happen across the world. You can manually sign up for alerts from the United States Geological Survey (USGS), receive an alert, and have someone write a blurb about the earthquake...or you can design a bot. Using easy to program software, an earthquake tracking bot could take notifications from the USGS and create or publish a blurb about the most recent earthquake. The automation allows news to go out in a timelier manner and allows individuals to use their time on more difficult tasks.

What's Next

Bots will continue to play an important role in journalism and other content-rich fields. On the creator level, seminars and courses are being



offered at institutions such as the **University of Texas** to help students and professionals learn how to design bots that suit specific needs. Media organizations will continue to develop and refine bots to automate news related tasks freeing up time to allow individuals to devote time to more important tasks.

Japanese media startup **JX Press Corp** developed a tool that leverages social media and artificial intelligence to scour posts across different platforms and then write news reports. Look for more companies to harness the combination of bots and AI to create new kinds of content. With elections taking place around the world, misinformation bots will continue to play a big role on **Facebook**, **Twitter** and **Instagram**. We expect to see more companies touting tech based solutions to address the issue.



Bots cont.

Watchlist

NewsDigest; Facebook; Google; Jigsaw; Twitter; Instagram; Chatfuel; Pandorabots; Twilio; Amazon; iFlytek; Slack; WeChat; Tencent; Baidu; Weibo; Alibaba; IBM; Alphabet; Microsoft; Snapchat; Coral Project.



Will Your Bot Be Biased?

We are training bots in our own image. When developing your content and messaging bots, we recommend that you rate your work before deployment. Answer these questions to determine, in advance, whether or not you've accidentally encoded bias into your system.

- What are the values of your organization? (If you don't have them in writing, you have some work to do before building your bot.)
- How will you make sure that your bot reflects the values of your organization?
- What if your bot interacts with someone (or another bot) whose values run counter to yours and your organization's?
- Is your bot's purpose explicit? Will people interacting with your bot clearly understand what its purpose is after the first few interactions?
- Does the corpus (the initial, base set of questions and answers) you've created reflect only one gender, race or ethnicity? Or only one side of a story? If so, was that intentional?
- How well do you know the training data you're using? If you didn't create it, are you certain it's free of bias?
- Does your bot clearly explain where its answers are coming from? Are you able to include any evidence of your reporting, quotes and data?
- Is your bot intuitive and easy to use, either on a designated platform or across platforms?
- Did you assign your bot a traditional gender, ethnic or racial identity? If so, does it reference any stereotypes?
- Does your bot respond to gendered or sexist remarks? Does it respond to racial epithets or religious slurs? If it does respond, are the responses appropriate to people of the group targeted?
- Even if your bot is designed for another purpose, can you still use it to help people learn about their own biases or broaden their world-views?



Artificial Intelligence cont.



020 Ongoing Bias In AI

Every single day, you are creating unimaginable amounts of data, both actively (uploading and tagging photos on **Facebook**) and passively (searching online for medical symptoms, driving to work). That data is mined and used, often without your direct knowledge or understanding, by algorithms. It is used to create advertising, to help potential employers predict our behaviors, to determine our mortgage rates and even to help law enforcement predict whether or not we're likely to commit a crime. Researchers at a number of universities—including the **University of Maryland, Columbia University, Carnegie Mellon, MIT, Princeton, University of California-Berkeley, International Computer Science Institute**, among others—have started to discover unintended, but explicit bias in algorithms. Part of the problem has to do with the building blocks of AI: computers are trained using a limited initial set of data, and the training programs are built by humans. Often, the training sets reveal unacknowledged bias hidden within us. As our computer systems become more adept at making decisions, we may find ourselves sorted by algorithms into groups that don't make any obvious sense to us—but which could have massive reper-

cussions. You, or someone you know, could wind up on the wrong side of the algorithm and discover you're ineligible for a loan, or a particular medication, or the ability to rent an apartment, for reasons which aren't transparent or easy to understand.

021 The AI Cloud

In the past year, the corporate leaders of the AI ecosystem have been racing to capture AI cloudshare—and to become the trusted provider of AI on remote servers. **Amazon Web Services, Microsoft's Azure, IBM and Alphabet** are all rolling out new offerings and packages for developers, hoping to make it easier and more affordable for a wide swath of AI startups to launch their ideas into the marketplace. This isn't just about hosting. Each company now offers off-the-shelf AI software. Amazon's **SageMaker** lets developers train their own neural nets, while **Rekognition** detects and tracks people, activities and objects in video. **AWS Lambda** lets you run code without provisioning or managing servers. Microsoft's Azure platform includes both a machine learning studio, to help developers build and deploy solutions—and a toolkit for AI to run locally on connected devices.

022 Proprietary, Homegrown AI Languages

As we enter the third era of computing, the largest companies are starting to compete for both marketshare and mindshare. Companies such as **Microsoft, IBM, Amazon and Alphabet** are releasing software packages for developers—as well as unique programming languages for AI applications. **Uber** released its own probabilistic programming language, Pyro, which it wrote in Python. It's a move that signals likely fragmentation in the future of the AI ecosystem, not unlike our **OSX vs Android**, and earlier **Mac vs PC** camps. News organizations should prepare now for fragmentation, offering training for developers and helping to develop workforce.

023 AI Chipsets

The standard CPUs found in our desktops, laptops, tablets and mobile phones have certainly gotten powerful—but they're not really designed to meet the demands of machine learning. The problem with our current CPUs is that they don't have enough processing units to make all the connections and computations required in the next era of computing. Enter a suite of new processors found



Artificial Intelligence cont.

on an SoC—“system on a chip.” **Huawei**, **Apple**, **Alphabet**, **IBM**, **NVIDIA**, **Intel** and **Qualcomm** are all working new systems architecture and SoCs, and some come pre-trained. In short, this means that the chips are ready to work on AI projects and should promise better speeds and more secure data. Late in 2017, **Elon Musk** told developers that **Tesla** is also working on its own custom AI hardware chips. Alphabet’s chip is called a **Tensor Processing Unit** (or TPU), and was specifically built for the deep learning branch of AI. It is designed to work with the company’s **TensorFlow** system. For reference, TPUs are what was used in the famous AlphaGo match between the **DeepMind** system and a world Go champion.

While marketing pre-trained chips to businesses will speed up commercialization and as a result will further R&D, the challenge, of course, is that developers might need to wrestle with different frameworks in the near-future, especially if the various device manufacturers all decide to start creating unique protocols. We anticipate an eventual convergence, pitting just a few companies—and their SoCs and languages—against each other.

024 Marketplaces For AI Algorithms

Most organizations can’t staff a team of developers who have unlimited time to create, test and refine algorithms. As a result, communities of developers are offering up their algorithms in emerging algorithm marketplaces. **Algorithmia** is now the largest public marketplace for algorithms, where developers can upload their work to the cloud and receive payment when others pay to access it. **Decentralized** is a marketplace for machine learning algos, while **DataXu** offers a marketplace for its proprietary algorithms. **Amazon**, **Microsoft**, **Salesforce**, **Google** and **IBM** all offer algorithm marketplaces for their frameworks and services. **Quantiacs** allows developers to build algorithmic trading systems, and it matches their algorithms up with capital from institutional investors. **PrecisionHawk** has launched a marketplace for predictive agriculture algos. A number of other networks, such as **Nara Logics** and **Clarifai** offer tools for developers to build deep learning into any application.

025 More Consolidation in AI

Some in the AI ecosystem now worry

that the future of AI is already under the direction of too few companies. Just nine big companies dominate the AI landscape: **Alphabet**, **Amazon**, **Microsoft**, **IBM**, **Facebook** and **Apple** in the US, along with Chinese behemoths **Tencent**, **Baidu** and **Alibaba** (with significant fortification and support from the **Chinese** government). On the investment side, **Intel Capital**, **Google Ventures**, **GE Ventures**, **Samsung Ventures**, **Tencent** and **In-Q-Tel** lead. As with any technology, when just a few companies dominate the field, they tend to monopolize both talent and intellectual property. They’re also partnering to build on each others’ work. When it comes to the future of AI, we should ask whether consolidation makes sense for the greater good, and whether competition—and therefore access—will eventually be hindered as we’ve seen in other fields such as telecommunications and cable.

026 AI For Deep Linking Everywhere

Deep mobile linking has been around since the beginning of smartphones, and it makes it easier to find and share data across all of the apps in your phone. There are three kinds of deep links: traditional, deferred and contextual. Traditional deep links re-



Artificial Intelligence cont.

route you from one app or site (such as a link posted in **Twitter**) directly to the app, as long as you have that app installed. Deferred deep links either link straight to content if the app is installed, or to an app store for you to download the app first. Contextual deep links offer much more robust information—they take you from site to app, app to site, or app to app, and they can also offer personalized information. For example, when you land at the airport, you might find that your airline app sends you a link to **Uber**. With advancements in machine learning, app-to-app experiences that are tailored to the habits of individual users should become more ubiquitous.

027 Making AI Explain Itself

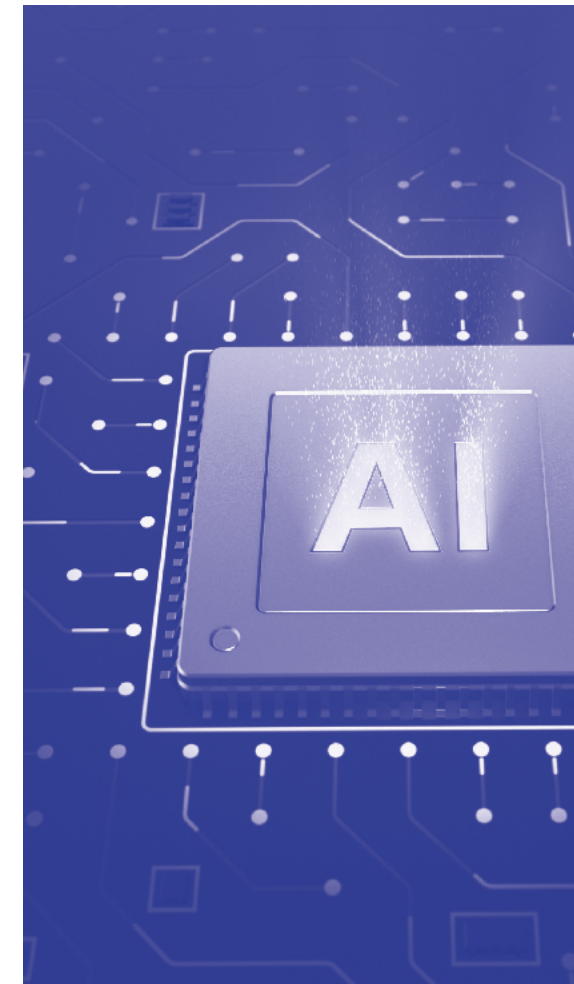
You've undoubtedly heard someone argue that AI is becoming a "black box"—that even those researchers working in the field don't understand how our newest systems work. That's not entirely true, however there is growing concern voiced by computer and cognitive scientists, journalists and legal scholars who argue that AI systems shouldn't be so secretive. Going forward, we will debate whether and how AI should be able to explain its decisions and how to offer more transparency. There will be numerous

debates about accountability as well. One big challenge is that offering such transparency could reveal the highly lucrative secret sauce of commercial products. Another challenge: asking the systems to simultaneously explain their decision-making process could degrade the speed and quality of output. Imagine sitting beside a genius mathematician who gives you correct answers—and then asking her to stop and show her work, over and over again.

028 Accountability and Trust

We will soon reach a point when we will no longer be able to tell if a data set has been tampered with, either intentionally or accidentally. AI systems rely on our trust. If we no longer trust the outcome, decades of research and technological advancement will be for naught. Leaders in every sector—government, business, the nonprofit world and so on—must have confidence in the data and algorithms used. Building trust and accountability is a matter of showing the work performed. This is a complicated process, as understandably corporations, government offices, law enforcement agencies and other organizations want to keep data private. Committing to transparency in method would create trust without necessarily

divulging any personal data used. In addition, hiring an ethicist to work directly with managers and developers, as well as greatly diversifying the pool of developers to include people of different races, ethnicities and genders, will solve for inherent bias in AI systems.





Artificial Intelligence cont.

029 China's AI Boom

The development of AI is our modern version of an arms race. Right now, **China** is laying the groundwork to become the world's unchallenged AI hegemon.

In just the past few years, China has made tremendous leaps in the field of AI. It has promised to become "the world's primary AI innovation center" by 2030, and as a nation, China is already making serious progress towards that goal. China-based AI startups now account for 48% of all

investment globally. In April, **SenseTime** earned a \$4.5 billion valuation, making it the world's most valuable AI startup. Meanwhile, Chinese researchers hold five times the number of AI-related patents compared to their counterparts in the U.S.

The country's massive, population—nearing 1.4 billion people—offers researchers and startups there command of what may be the most valuable natural resource in the future—human data—without the privacy and security restrictions common in much of the rest of the world. If data is the new oil, then China is the new OPEC.

Alibaba, China's version of **Amazon**, will invest \$15 billion into AI research over the next three years, planting research centers in seven cities worldwide, including San Mateo, Calif., and Bellevue, Wash. **Baidu** (a Chinese search-engine company often likened to **Google**) established an AI research center in the Silicon Valley, and **Tencent** (developer of the mega-popular messaging app WeChat) began hunting for American talent when it opened an AI lab in Seattle last year. It has since upped its stakes in companies like **Tesla** and **Snap**. The payoff for the Chinese is not just a typical return on investment—Chinese firms expect IP as well.

The kind of rich data the Chinese are mining can be used to train AI to

detect patterns used in everything from education and manufacturing to retail and military applications. The Chinese startup **Megvii Face++**, for instance, is pioneering faceprint technologies. Faceprints are a newer form of biometric authentication that use the unique features of our faces—our bone structure, skin color, even capillaries—to identify us. Faceprints are the new fingerprints, and they're secure enough to be used for financial transactions—and they are used by China's police force for widespread surveillance.

China is quietly weaponizing AI, too. China's **People Liberation Army** is catching up to the U.S. when it comes to military applications, using AI for things like spotting hidden images on drones. The military is equipping helicopters and jet fighters with AI. Government leaders created a top-secret military lab—a Chinese version of **DARPA** in the US—and is building billion-dollar AI national laboratories. China's military is achieving remarkable AI successes, including a recent test of "swarm intelligence," that can automate dozens of armed drones.

No other country's government is racing towards the future with as much concentrated force and velocity as China. The country's extraordinary investments in AI could signal big shifts in the balance of geopolitical power in the years ahead.





I-Teams For Algorithms and Data



Cambridge Analytica and Facebook have seeded mistrust of algorithms and digital content.

Key Insight

With the increased use of data and algorithms powering our everyday lives, special-ops teams will deploy to investigate AI.

Examples

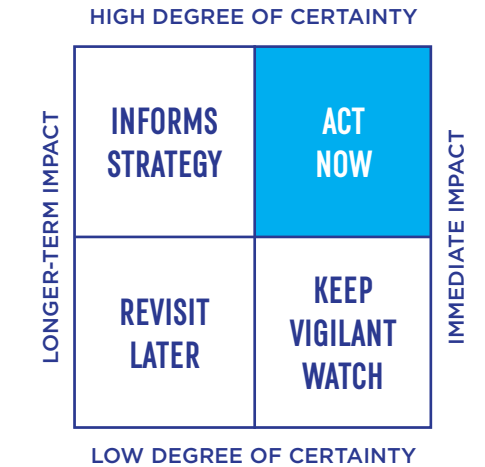
The **Cambridge Analytica** scandal proved how vulnerable we are to misinformation created by and spread algorithmically. Some newsrooms are now reporting on the algorithms themselves. Reporters at the **New York Times**, **Wall Street Journal**, **ProPublica** and **Washington Post** have been applying the core practices and skills of reporting to investigating algorithms.

As technology advances, transparency in our systems grows murkier. Understanding where information comes from, how it's spread, and the impact it has—not to mention the outcomes of algorithmic decision-making—re-

quires a special skills set. Investigating algorithms has never been more important than it is now. A report from the **Reuters Institute for the Study of Journalism at Oxford** revealed that in the U.S., 41 % of those surveyed said the government should do more to make it easier to detect fake information online, compared to 61 percent in the United Kingdom and France and more than 70 percent in Spain and South Korea.

What's Next

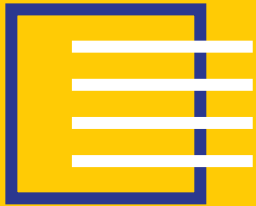
New techniques in AI—generative adversarial networks and adversarial machine learning, for example—are making it easier to trick both machines and humans. We will soon reach a point when we will no longer be able to tell if a data set has been tampered with, either intentionally or accidentally. AI systems rely on our trust. If we no longer trust the outcome, decades of research and



technological advancement will be for naught. Building trust and accountability is a matter of showing the work performed. This is a complicated process, as understandably news organizations would want to keep certain data and reporting methods private.

Watchlist

Brown Institute at Columbia University; Macromedia University of Applied Sciences; Tow Center for Digital Journalism at Columbia University; AlgorithmWatch.org; ProPublica; Philip Merrill College of Journalism at the University of Maryland; Media Change and Innovation Division at the University of Zurich; Annenberg School of Communication & Journalism and the University of Southern California; Washington Post; New York Times; Wall Street Journal; National Public Radio; Investigative Reporters & Editors; National Institute for Computer-Assisted Reporting.



Computational Journalism

031 Computational
Photography

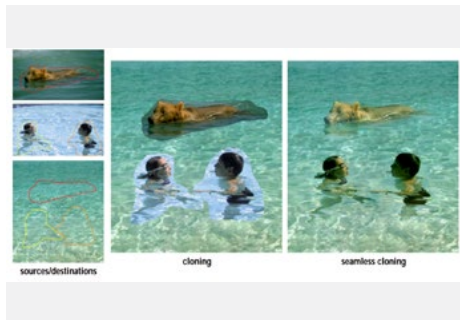
032 Computational
Journalism

033 Faceprints

034 Voiceprints



Computational Photography



Alex Berg, an associate professor at UNC Chapel Hill, shows image compositing and in-painting using gradient domain processing.

Key Insight

Computational photography is the convergence of computer vision, computer graphics, the internet and photography. Rather than relying on optical processes alone, it uses digital capturing and processing techniques to capture real life.

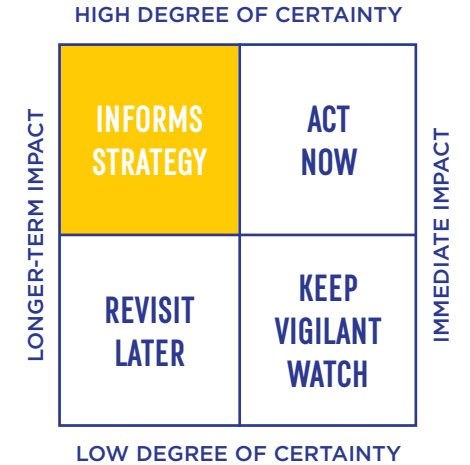
Examples

Everyone with a smartphone now has access to computational photography tools. In its iPhones, Apple uses computational photography to achieve a shallow depth of field, while Facebook corrects any 360-degree photos you upload.

What's Next

New research from **Nvidia** and the **University of California-Santa Barbara** reveal a computational zoom technique, which allows photographers

to change the composition of their photographs in real time. Photos are taken in a stack, and then rendered with multiple views. This would allow photographers to change perspective and the relative size of objects within a photo after it has been taken. Other use cases of computational photography include seamlessly removing or adding objects to scenes, changing shadows and reflections, and the like. Meanwhile, **MIT's CSAIL** and **Google** developed a technique that now automatically retouches and enhances the photos we take with our mobile phones. Clearly there are ethical implications here for journalists—how much editing should be allowed and under what circumstances? Likewise, journalists should develop techniques to reveal how much editing has been done to a photo—either intentionally or automatically—before using them for reporting or in stories.



Watchlist

MIT's CSAIL; MIT's Media Lab; Nvidia; University of California-Santa Barbara; Google; Apple; Samsung; Facebook; Synopsys; Industrial Light and Magic; LG; Huawei; Morpho; Qualcomm; Stanford University Computational Imaging Lab; the Gcam team at Google Research.



Computational Journalism



Neura uses machine learning algorithms to analyze sensor data to create insights about end-user real-world experiences.

Key Insight

What are the ways in which data and algorithms can enhance reporting? **Computer Assisted Reporting** (or **CAR**, as its known by industry professionals) is an investigative journalism technique. Reporters find, clean and mine public records and documents, crunch data and uncover hidden stories. Aided by machine learning algorithms and AI, computational journalism is the evolution of CAR.

Examples

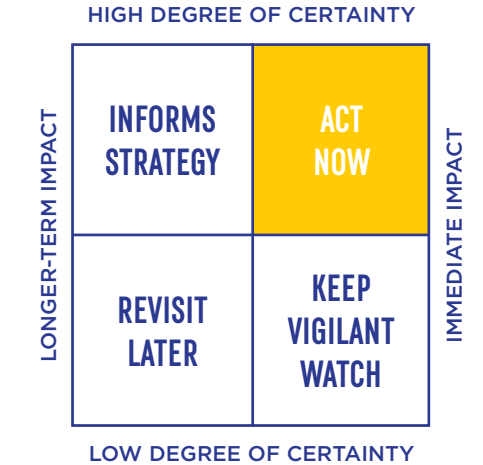
It's one thing to find and mine public data—analyzing what's there, and connecting the seemingly unconnectable dots, is another challenge entirely. Computational journalism techniques such as multi-language indexing, automated reporting, entity extraction, algorithmic visualization, multidimensional analysis of data sets, and flexible data scraping are allow-

ing journalists to combine what they find in the data and then see the connections between facts, keywords and concepts. In this way, they can reveal interconnected relationships between people and organizations that they might not have otherwise seen.

One modality is to harness the data from a crowd in a technique known as "crowdlearning." **Crowdlearning** is a computational journalism technique that queries our passive data—our mobile and online activity, our public health records, our locations—to learn or understand something new. One company making good use of this technique is **Neura**, an AI-startup that learns from a broad spectrum real-world and digital user data throughout the day.

What's Next

We anticipate increased demand in computational journalism and jour-



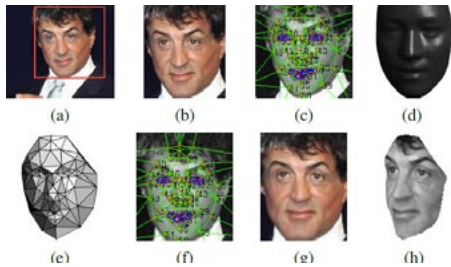
nalists with complimentary skills sets. There are a host of stories waiting to be discovered, written and produced.

Watchlist

Google; Bing; Apple; Microsoft; Neura; Investigative Reporters & Editors; National Institute for Computer-Assisted Reporting; Coral Project; Stanford Computational Journalism Lab; Duke University; University of British Columbia; University of Texas at Austin; Brown Institute at Columbia University; Tow Center for Digital Journalism at Columbia University; Philip Merrill College of Journalism at the University of Maryland; Media Change and Innovation Division at the University of Zurich; Annenberg School of Communication & Journalism and the University of Southern California; Wall Street Journal; New York Times; Washington Post; Tamedia; ProPublica; National Public Radio.



Faceprints



The stages of facial alignment used in a Facebook study on deep learning and facial recognition.

Key Insight

Advanced computing systems can now use unique features of our faces—our bone structure, skin color, even capillaries—to identify us. Faceprints are the new fingerprints.

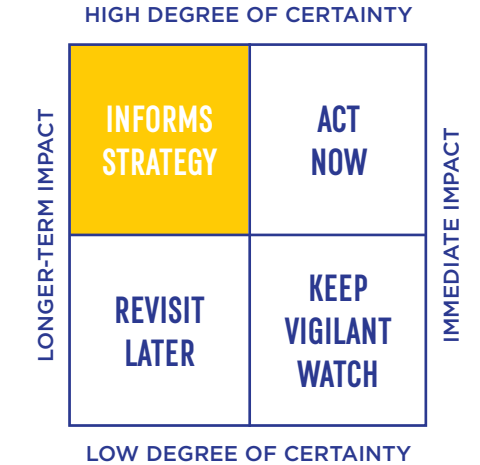
Examples

Faceprints are a newer form of biometric authentication. In 2014, Facebook announced its “**Deep-Face**” software, which was capable of recognizing the people in photos with 97% accuracy (that’s about the same accuracy as humans). **Saks Fifth Avenue** is one example of a luxury store that’s now using faceprints to track VIP customers. Last year, **Apple** introduced its **Face ID system** with the **iPhone X**. It unlocks the phone using infrared and visible light scans to identify the unique characteristics of your face. **China’s Byton** has built an electric SUV that you unlock with

a faceprint, rather than a key fob. Researchers in **Japan** and **China** are working on representation models that require only a portion of your face, even in low light, to accurately predict someone’s identity—even as they change their hairstyles, get plastic surgery or grow a beard.

What’s Next

German researchers are working to create thermal faceprints by taking heat maps of our faces and using machine vision to recognize patterns. Their technology can accurately identify a face—and in under 35 milliseconds, regardless of the amount of lighting or the facial expressions people make. Researchers at **NEC** in Japan are taking multiple 3D scans to quickly check a person’s face against those catalogued in a registry; it’s expected to deploy the system for everyone participating in the 2020



Olympics. Chinese startup **Megvii Face++**, supported heavily with sovereign wealth funds from both China and **Russia**, is pioneering faceprint technologies that are secure enough to be used for financial transactions. Face++ is also being used by China’s police force for widespread surveillance. Unlike fingerprinting or iris/retinal scanning, which are difficult to do without someone’s direct knowledge, faceprints can be taken surreptitiously, even from far away.

We anticipate legal challenges, at least here in the U.S. In 2017, a federal judge allowed a class-action suit brought against **Shutterfly** for allegedly violating the **Illinois Biometric Information Privacy Act**, which requires companies to secure written releases before collecting biometric data, which includes their faces. (This Illinois state law is the only one of its kind in the U.S.)



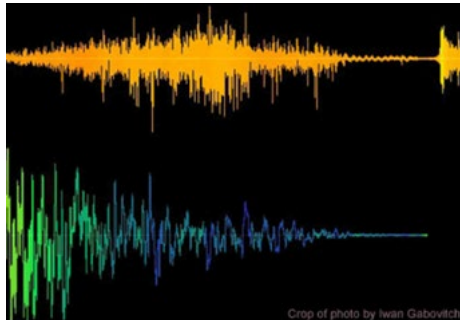
Faceprints cont.

Watchlist

FaceTec; Megvii; CyLab Biometrics Center at Carnegie Mellon University; Noveto; SenseTime; Sensible Vision; China; Russia; Alphabet; LG; Apple; Facebook; Alibaba; Samsung; Android; NEC; U.S. Government Accountability Office



Voiceprints



Voiceprint recognition is the use of various AI techniques to recognize a person's voice.

Key Insight

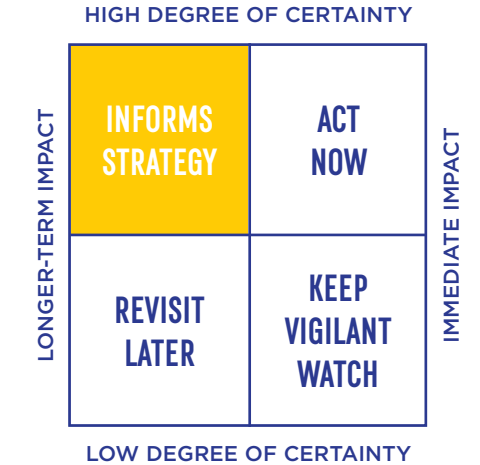
Technology has made it possible to recognize who you are, even without seeing your face.

Examples

Voiceprints are the set of unique characteristics that make up your individual voice. New machine learning techniques, combined with vast datasets of recorded voices, have now enabled researchers to identify us simply by listening for the micro-signatures produced when we speak. San Diego-based **KnuEdge** built a military-grade platform capable of recognizing our individual voices, even in a noisy environment. Founded by **NASA's** former Chief Administrator and its Chief Technology Officer, KnuEdge hired world-class voice impersonators to see if they could fool the system, but the technology prevailed every time.

What's Next

Nuance Communications is working with auto manufacturers, including **Ford** and **BMW**, to develop more accurate voice recognition in the cockpit. Theoretically, this same technology could be used to detect whether a driver has had too much to drink or is suffering from a health condition, making it unsafe to operate the vehicle. Voiceprints could be used to unlock the door when your arms are full of packages—and to help digital assistants, such as **Alexa**, customize interactions for each member of your family. Researchers at **Carnegie Mellon University** discovered a generative technique allowing them to build a 3D version of someone's face using only their voiceprint. This system is being deployed by law enforcement agencies to identify prank callers and those who trick local agencies into sending out SWAT teams to take out retaliation or revenge on others.



Watchlist

KnuEdge; MIT Media Lab; Amazon; Microsoft; DARPA; Alphabet; Nuance Communications; Apple; IBM; Carnegie Mellon University; Alibaba; Tencent; Samsung.



Blockchain Technologies

035 Tokenomics

036 Tokens For Smart
Royalties and
Freelancers

037 Immutable
Journalism

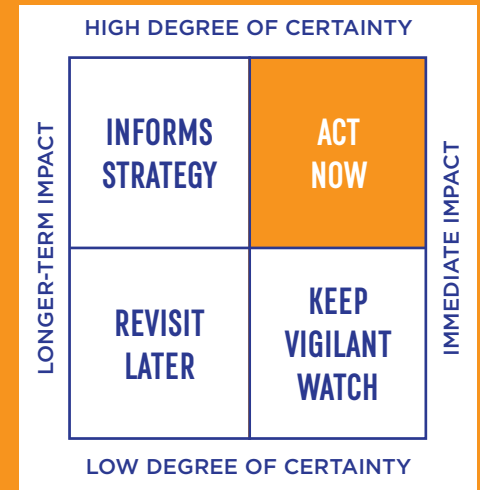
038 Self-Sovereign
Identity

039 Distributed
Computing For
a Cause

040 Decentralized
Curation



Blockchain Technologies



Key Insight

Blockchain technology hit an inflection point in 2017. It evolved beyond Bitcoin, from a fringe form of digital currency, and broke into mainstream, as a revolutionary way to share and store information. While this technology is still developing, its broad and far-reaching applications have the potential to impact a range of industries. For that reason, we have outlined key themes within blockchain technology that are relevant for journalism, media, and adjacent areas of technology.

At its core, blockchain enables multiple parties to agree on a single source of truth without having to trust one another.

Blockchain: A Primer For Journalism and Media

Who started it?

We don't know for sure. Blockchain was first introduced in 2008 when a person or group of people under the name "Satoshi Nakamoto" published the seminal paper "Bitcoin: a Peer to Peer Electronic Cash System." Whether Nakamoto is a real person, or a community of people, we still don't know, because they've never come forward publicly.

In 2015, Canadian computer programmer Vitalik Buterin co-founded Ethereum, a blockchain-based protocol that allowed for more sophisticated functionality in the form of smart contracts. Smart contracts are self-executing agreements where the terms of the agreement are directly written into lines of code. Ethereum was also the first blockchain project to fund-raise through an "Initial Coin Offering"

or ICO. Ethereum raised \$19 million in 2014. In 2017, more than 400 ICOs raised \$5.6 billion.

In the years since, distributed ledger technologies (DLTs) have evolved into countless permutations and applications across almost every industry imaginable.

What is Blockchain, exactly?

"Blockchain" is shorthand for "Distributed Ledger Technology." Blockchain is a method of sharing and storing information on a distributed ledger where identities and transactions are cryptographically protected. At its core, blockchain enables multiple parties to agree on a single source of truth without having to trust one another. It facilitates agreement and aligns incentives using consensus algorithms. In theory, blockchain reduces the need for intermediaries (such as banks) to coordinate or verify transactions.



Blockchain Technologies cont.



Where is the Blockchain?

There isn't just one blockchain. In fact, there are different types: private, public, and federated. Blockchains can be started by individuals, companies or consortiums, and they live on multiple machines simultaneously. There is no singular place where "the blockchain" is hosted.

How does it work?

Let's assume we have a network of 100 individual nodes running a blockchain ledger. Every node has access to see the full ledger because the ledger is distributed. No single node controls the network and all nodes have the option to become miners if they choose because the network is decentralized. Some nodes on the network choose to be miners which means they have the responsibility to verify pending transactions. This work costs more, in terms of energy usage and CPU—and so miners are rewarded for their efforts. Every miner that verifies a block of transactions wins a block reward, for example 12.5 bitcoins. Transactions are verified by running what are called "proof-of-work" and "proof-of-stake" consensus algorithms, and miners compete against each other to verify transactions. Once a miner verifies a set of transactions or a "block," the node broadcasts the new block to the entire network. If the majority of the network agrees the block is valid,

it is cryptographically added to the existing chain of blocks or "block-chain" which forms the ledger and miners being working on the next block. Since it is impossible to predict which miner will verify the next transaction, it is nearly impossible to collude against, attack, or defraud the network. The network is secure as long as miners act independently of one another. Much of the mining is automated using sophisticated tools.

Drawbacks

Blockchain is still nascent technology and there are a lot of challenges that need to be addressed before it can reach mass adoption. The primary challenges of blockchain relate to speed, scale, and regulation.

Decentralized systems are inherently less efficient than centralized systems and there are trade-offs between security and scale. Bitcoin and Ethereum process between three to six transactions per second whereas Visa can process thousands of transactions per second.

The regulatory environment for blockchains and ICOs is still unclear. In the US, the U.S. Securities and Exchange Commission, the Financial Crimes Enforcement Network, the U.S. Commodity Futures Trading Commission and state governments all have differing and, at times conflicting, policies related to blockchains and cryptoassets.



BLOCKCHAIN TERMS AND LINGO

51% attack

A hypothetical attack on a blockchain where a group of miners working collectively controls more than 50% of the network's mining power. These miners could collude to verify fraudulent transactions.

Altcoins

Any coin other than Bitcoin.

Bitcoin

Bitcoin was the first cryptocurrency and the first blockchain. It was introduced in 2008 by Satoshi Nakamoto. The currency is abbreviated as BTC on exchanges.

Block height

Number of blocks preceding a particular block. The first block on a blockchain is referred to as the "genesis block" and has a block height of zero.

Block rewards

Tokens are distributed by the network to the miner that verifies a particular block. Block rewards are different from mining fees and tips which are distributed by individuals (as opposed to the network) to incentivize miners to verify their transactions first.

Blockchain

A new way to share and store information on a distributed system where transactions and identities are cryptographically secured. Blockchains are a subset of distributed ledger technologies (DLTs). Bitcoin, Ethereum and Litecoin are some of the more famous examples of blockchain networks.

Cold storage

Refers to storing a digital "wallet" or private keys offline, in a piece of hardware not connected to the internet.

Consensus Algorithms

Algorithms used on blockchain protocols to reach agreement among the miners. Examples include: proof of work, proof of stake, proof of authority, and byzantine fault tolerance.

Crypto-asset

Tokenized asset issued on a public ledger. Includes crypto-currencies like bitcoin but also platform tokens, utility tokens, and tokenized securities.

Crypto-currency

A crypto-asset that designed to function as money; a medium of

exchange. Crypto-currencies' value fluctuates depending on demand and supply, similar to traditional currency in the global economy.

DAO

Decentralized Autonomous Organization. Many coins use DAOs as a form of governance and decision-making among the network. The Ethereum DAO is the most famous because it resulted in a contentious hard fork and a \$50 million hack. (Not to be confused with the venture capital fund called DAO, which built on top of Ethereum.)

Dapp

Decentralized applications running on blockchain platforms.

Ethereum

Ethereum is the second largest coin by marketcap after Bitcoin. It was introduced in 2015 by Vitalik Buterin. The currency is abbreviated as ETH on exchanges.

Fiat

Government-issued currency.

Fork

The splitting of a single blockchain, creating two alternative blockchains on different parts of the network.

Forks can be accidental, temporary, intentional, permanent, planned or contentious. They can be the result of software upgrades or governance decisions that nodes refuse to acknowledge or forget to install.

Fork—hard fork

Software update on a blockchain protocol that is not backward compatible, creating a separate blockchain. Ethereum's hardfork resulted in Ethereum and Ethereum Classic.

Fork—soft fork

Software update on a blockchain protocol that is backward compatible with older versions.

FUD

Fear, uncertainty, and doubt.

Full node

A node on the network that can act as a miner, verifying transactions on the blockchain network.

Governance

Set rules that govern the blockchain protocol; governance structures can include on-chain rules like smart contracts and code specifications and off-chain rules like a board of directors and annual meetings.



BLOCKCHAIN TERMS AND LINGO

Hash pointer

Unique alphanumeric string links blocks in the chain together with a one way math function.

Hashing

One-way math function that takes any input and produces an unique alphanumeric string, used in blockchain to condense information into blocks, useful for assigning any digital file or asset with a unique identifier.

HODL

Misspelling of the word “hold,” it’s a term used by crypto investors to describe keeping coins despite market volatility and price crashes.

Hot storage

Refers to storing a digital “wallet” or private keys online, usually within an application or exchange connected to the internet. Examples include Poloniex, Coinbase and Bittrex.

ICO

Short for Initial Coin Offering. It’s a relatively unregulated way of raising money.

Immutability

A primary characteristic of blockchains, which create a record of transactions that does not change and prevents “back-dating” in record keeping. Also referred to as “digital granite.”

Light Node

A node on the network that can transact with other nodes but cannot verify transactions.

Mempool

Aggregate number and size of unconfirmed transactions on a blockchain.

Public Key + Private Key

Cryptography (similar to what’s used in credit cards) for identities, alphanumeric addresses used to send and receive transactions.

SHA256

Cryptographic hash algorithm used in most blockchains.

Shilling

Aggressively promoting a coin or crypto-asset.

Smart Contracts

Self-enforcing agreements where the terms are built directly into code and issued on a blockchain.

Solidity

Programming language invented by Vitalik Buterin for smart contracts on Ethereum.

Token

Digital identity for something that can be owned.

TPS

Transactions per second, used to compare the speeds of different blockchains.

Wallet

File that contains a collection of private keys.

Whitepaper

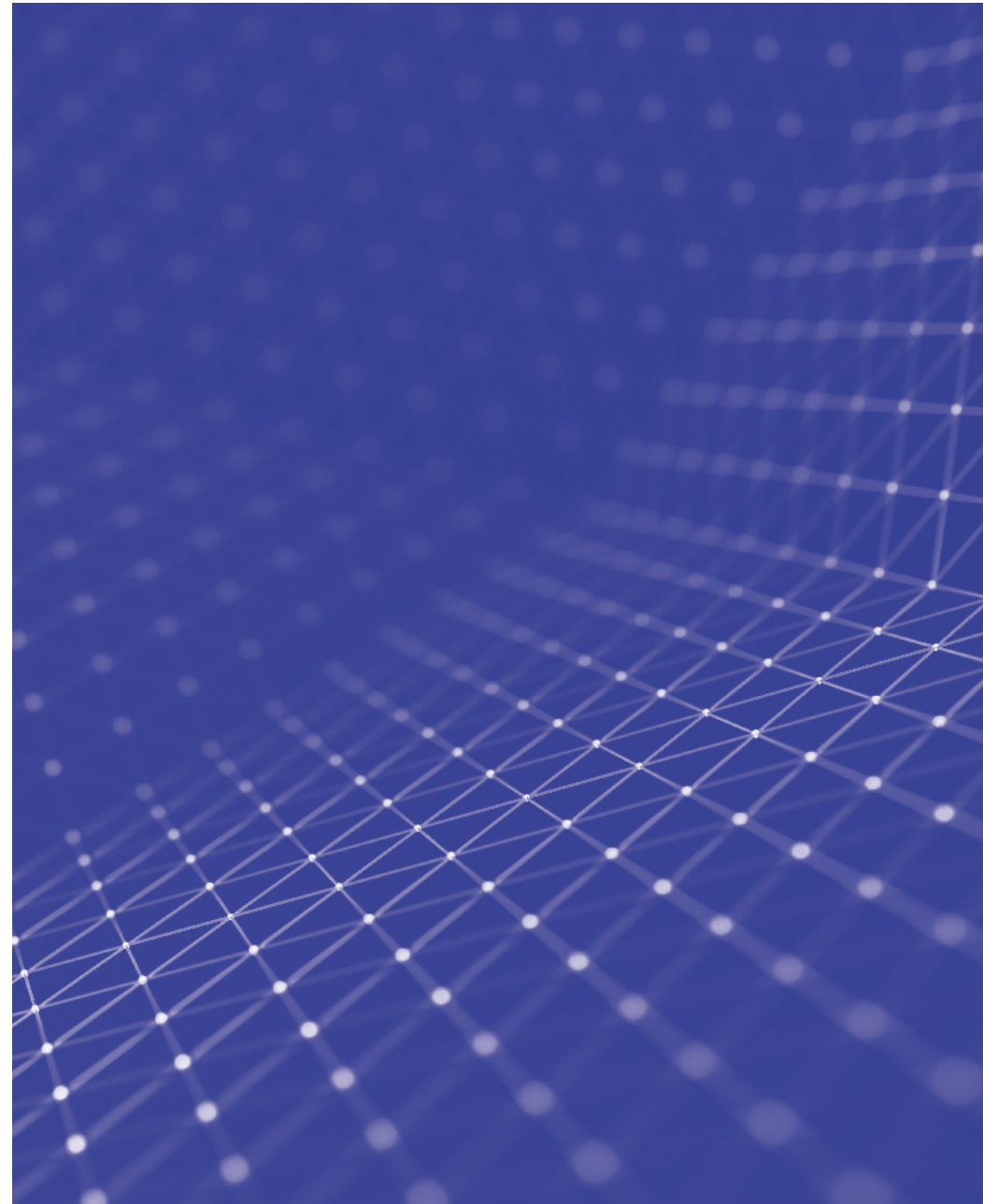
A technical paper outlining the governance, protocol, and features of a project.



CROSS-REFERENCED TRENDS FOR BLOCKCHAIN

Blockchain technology has the potential to impact many industries, but there is still plenty of uncertainty around the role that blockchain might play in the next five to ten years. We've cross-referenced distributed ledger technologies with some of the most relevant trends in this report to help you identify the biggest opportunity for blockchain technology within your organization.

- **Artificial Intelligence (especially Biases)**
- **Computational Journalism**
- **Digital Frailty**
- **Radical Transparency**
- **One-to-Few Publishing**
- **Real-Time Fact Checking**
- **Offline is the New Online**
- **Splinternets**
- **Blocking the Ad Blockers**
- **First Amendment in the Digital Age**
- **Virtual Reality**
- **Trolls**
- **Prize Hacks**
- **Glitches**
- **Ownership**





CROSS-REFERENCED TRENDS FOR BLOCKCHAIN

FTI Trend

Uncovering Hidden Bias

Connection to Blockchain

Biased algorithms have been a key issue in AI. Blockchains depend on algorithms and governance structures; and therefore are vulnerable to hidden biases as well.

Many of the consensus algorithms like proof of stake and proof of work, are based on majority vote decisions. What does it mean to be a minority voice on the blockchain? Hard forks, like Ethereum after the DAO hack, are perfect examples of how decisions are made at the protocol level.

From surface-level UX concerns, such as how blind users access their digital wallets, to more abstract concepts like the disproportionate influence of miners, the blockchain industry must stay vigilant to uncover hidden biases.

FTI Trends

Computational Journalism Radical Transparency

Connection to Blockchain

Blockchain can dramatically impact computer assisted reporting techniques, particularly with flexible data collection and multidimensional analysis of datasets.

Most blockchains are transparent by default; allowing any node to observe the flow of information from one address to the next through programs called block explorers. If large public datasets are put on the blockchain, it may be easier for reporters to mine these data for interesting stories and insights. Wyoming, Nevada, Illinois, and a handful of other states are pioneering efforts to put public databases on blockchains. Passive data on public blockchains can reveal a surprising amount about users on the network. Chainalysis is a company that helps banks, regulators and private corporations understand customer behavior and activity by observing various blockchains and exchanges. They help uncover illegal activity, bad actors as well as maintain KYC/ AML (know your customer, anti-money laundering) compliance.

With both of these trends, privacy concerns have led to industry-wide discussions on opt-in data-sharing policies, ethical collection of information, and whether or not privacy is a human right. A group of privacy-focused coins like ZCash and Monero have emerged and are growing in popularity.

FTI Trends

Digital Frailty Data Retention Policies

Connection to Blockchain

A permanent immutable ledger is one of the defining characteristics of a blockchain and one of the best ways to combat digital frailty. Decentralized systems more robust and a blockchain ledger will never completely go away so long as two nodes exist. Local media organizations and government agencies might consider using blockchain as a way to preserve news archives, legacy databases, studies and reports. Civil is a blockchain journalism startup focused on creating a sustainable business model for local news outlets.

FTI Trend

Transparency in Metrics

Connection to Blockchain

Whether it's transparency in digital advertising, IP management and royalty payments or reporting, blockchain can track and store data, allowing organizations to make public only information that is important without revealing more than they want to.

Companies such as MadHive have launched a suite of products to help

digital advertisers track their campaigns across platforms throughout the media landscape.

NBCU recently launched Blockgraph with a similar purpose. Anheuser Busch is experimenting with blockchain to measure the effectiveness of ads. AdLedger is a nonprofit consortium of industry leaders committed to establishing global technical standards and solutions for the digital media and blockchain industries.

FTI Trend

Real-time fact checking

The consensus algorithms that are part of all blockchains are basically real-time fact checkers. Miners work in real-time to validate pending transactions before adding them to the ledger. In the next five years, we are likely to see wider applications of blockchains as a way to validate or invalidate claims and stories.

FTI Trend

Offline is the New Online

Connection to Blockchain

As consumer behavior shifts in response to changing technology, we will have to redefine what we mean by "online" "offline." Similarly, as



CROSS-REFERENCED TRENDS FOR BLOCKCHAIN

blockchains grow in popularity, so will terms like “on-chain” and “off-chain,” which is to say, data stored on the ledger and data stored elsewhere.

Media companies need to think about designing applications when users have little to no Wi-Fi connection. They also need to consider situations in which data cannot be stored and tracked, therefore is it trusted?

FTI Trend

Blocking the Ad Blockers

Blockchain web browsers and web 3.0 decentralized applications (dapps) are a threat to incumbents like Google and Facebook. At the moment, these products is still very fringe but it is important to see how they develop.

Brave is an open-source web browser with a built-in ad blocker that uses a pay-to-surf business model. Blockstack takes it a step further than a browser by building a “new internet” where users own all their data and authorize usage to various dapps on the platform.

FTI Trend

First Amendment in the Digital Age

Connection to Blockchain

Freedom of speech in the digital age has far-reaching implications, beyond just what we can say and what we can write. Blockchains have been commonly referred to as “censorship resistant” networks meaning central authorities like banks or governments do not have the power to block or censor transactions.

Wikileaks began accepting bitcoin in 2011 following a banking blockade. Intimate.io offers financial services to workers in the adult entertainment industry. These are two of many examples of how blockchain can facilitate first amendment freedoms in the digital age.

FTI Trend

Mixed Reality

Connection to Blockchain

MR like blockchain, is still in its early days. However, if we take a moment to think about blockchains as digital governance models, self-regulating networks, and decentralized autonomous organizations, then it becomes easier to see where blockchain and MR can intersect. In Decentraland, users can purchase plots of digital land, and create, experience, and monetize applications within a virtual reality

environment. Neighborhoods can form self-governing districts similar to SecondLife or the scifi fantasy novels Ready Player One and Snow Crash.

FTI Trends

Prize Hacks

Gigware

Crowdsourcing

Connection to Blockchain

Aligning and optimizing incentives is a key characteristic of blockchains. Decentralized crowd-sourced projects are easier to monitor, execute and track through smart contracts. Start-ups PolySwarm, GitCoin, and Bounties Network are all using blockchain to fuel the gig-economy.

FTI Trends

Glitches

Connection to Blockchain

Any emerging tech will have the growing pains of glitches, blockchain is no exception. Most of the major exchanges have suffered embarrassing glitches resulting in significant loss of capital. Since blockchain is still relatively unregulated, all companies should proceed with caution in this “buyer beware” market.

FTI Trends

Splinternets

Connection to Blockchain

For better or worse, blockchains can be a powerful tool to enforce splinternets on behalf of governments maintaining political firewalls or corporations protecting content behind paywalls.



BLOCKCHAIN COMPANIES IN MEDIA AND JOURNALISM BY CATEGORY

This list was created during the summer of 2018. We expect M&A will impact the companies listed during the next year.

Peach indicates a blockchain media company, while Orange indicates a media company investing in blockchain technology.

Note: this list has been compiled for informational purposes only. It is not an endorsement of these companies or their services.

Company	Description	Category
AdEx	startup	Digital Advertising
AdLedger	nonprofit consortium of industry leaders	Digital Advertising
Ascribe.io		IP management
Asora	startup - privacy, ad blocking	Digital Advertising
Brave	startup - browser that uses BAT (Basic Attention Token) for ads	Web 3.0
CBS	Crypto Crow show in seven local markets (CBS and CW) and on Roku	Content creator
Cellarius		Content creator
CoinDesk	owned by DCG	Content creator
Comcast	Blockgraph and Blockdaemon	Digital Advertising
Current Media	streaming platform backed by Mark Cuban	Media Platform
Custos Media		IP management
Decentraland	VR social network	Social Network
Disney	incubated DragonChain, enterprise blockchain solution	Other

Company	Description	Category
Hicky	dating app	Social Network
Howdoo	social network	Social Network
IBM iX + MediaOcean	launch a blockchain ad transparency solution	Digital Advertising
Immvrse	VR content platform	Media Platform
Kind Ads	startup	Digital Advertising
Littlstar	IP rights management and reward system, Ara	IP/ royalty management
LivePeer		Media Platform
Luna	dating app	Social Network
MadHive		Digital Advertising
MetaX - ad		Digital Advertising
Microsoft + EY	using blockchain to pay game developers (run on Quorum)	IP/ royalty management
Otoy	RNDR	Web 3.0
PeerTracks	startup - music	Media Platform
Po.et	startup - media headed up by Washington Post's Jarrod Dicker	Media Platform
Ponder	dating app - friends pay if they set you up with a good match	Social Network
RAWG	IMDB for video games	Social Network
Salon	mining on people's sites who use ad blockers	Digital Advertising
SingularDTV	startup - video, music	Media Platform
Slate		Media Platform
Spotify	acquired Mediachain - a music rights/ compensation infrastructure	IP/ royalty management
Steem.it		Content creator
Ubisoft	game developer exploring blockchain	IP/ royalty management
Ujo	startup - music	Media Platform
Vaultitude		IP management
Vevue	startup - video	Media Platform
Video Coin	decentralized encoding and storage	Web 3.0
Yours		Social Network



Tokenomics



Tokenomics can revolutionize how media companies approach monetization and distribution.

Key Insight

Blockchain allows businesses to create tokens. A token is a unit of value that a business creates to self-govern its operations, incentivize its users, and distribute benefits to all stakeholders. Tokenomics refers to the different business models made possible by blockchain and DLT networks where a token can represent usage, utility, value or a combination of the three. Tokenomics can revolutionize how media companies approach monetization and distribution.

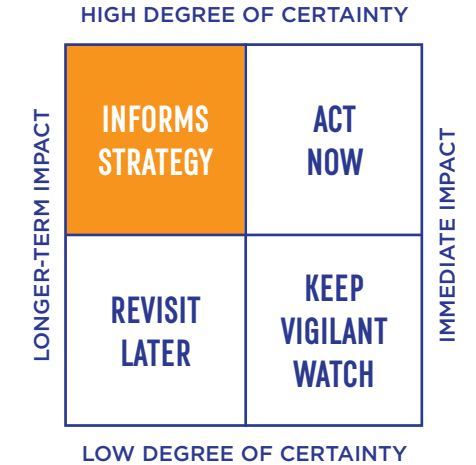
Examples

Historically, media companies and news organizations have relied on a mix of ad-based and subscription-based revenue models. Newspapers are a clear example of how rapidly these revenue models can be disrupted by digital entrants. Blockchain can facilitate micropayments

with virtually zero transaction costs or a rewards program that allows users to lower their monthly subscription by consuming more media.

Distribution channels are typically “winner-take-all” models where a handful of players dominate the market. **Comcast**, **AT&T**, **YouTube**, **Vimeo**, **Soundcloud**, and **Spotify** are just a few examples. While it’s difficult to imagine these companies ever going away, if the talent and the audience move en masse to other platforms with better features (pricing models, revenue share, IP protection), then those companies may lose their position as market leaders.

SingularDTV is a blockchain media company building out a variety of token models for artists, producers, and audiences. They have helped artists finance projects and they have launched peer-to-peer music festivals where audiences have a say in the



line up. **SingularDTV**’s soon-to-launch distribution platform is called **Ethervision**. **Simple Coin** has partnered with **Unsplash**, a photography website, to create a new business model and distribution network for photographers. **Unsplash** already has integrations with **Google Slides** and **Invision**. Realistically, the existing distribution models will be difficult to displace and disrupt. **Civil**, a blockchain media firm, is making a big bet on tokenomics to create a self-sustaining business model for journalism and local media outlets. **Steemit** is one of the oldest media-based blockchain tokenomics projects. Launched in 2016, **Steemit** is a social networking site that pays content creators and curators with over one million registered accounts.

What’s Next

Tokenomics as a concept was first introduced in late 2017. Currently, these



Tokenomics cont.

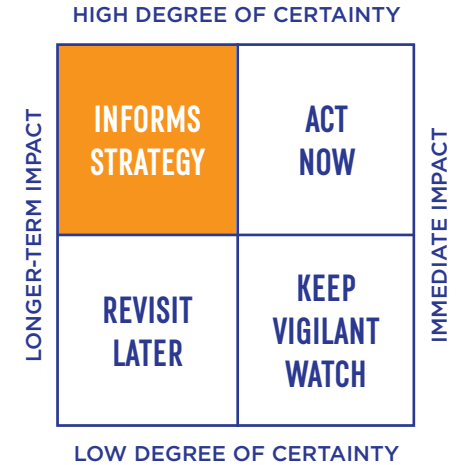
models are mostly theoretical and it will be a few years before we see how consumers behave with these models in practice.

Watchlist

Civil; ConsenSys; SingularDTV; Steem.io



Tokens For Smart Royalties and Freelancers



KODAKCoin is designed to help photographers be compensated and retain ownership of their digital property

Key Insight

Platforms like **Ethereum** enable micropayments for accessing intellectual property including content like news or music. The platforms enable this through smart contracts, which are basic contracts that are automatically executed. For example, every time a song is played, it sends a small amount of money from the listener to the artist.

Platforms will be created around giving the content creator the most ownership and rewards for the content produced. Content creators will drive adoption because they get the majority of revenues instead of giving the majority of the revenues to the distribution platforms. At the same time the creators will also retain more ownership control and direct interaction with the audience.

Examples

Ethereum and other decentralized application platforms are building infrastructure for content creators to receive micro transactions for access to their intellectual property. This is laying the foundation for new, low-friction ways to automate royalty payments for digital intellectual property.

Ryan Leslie's platform SuperPhone is an example of a content creator choosing to develop their own distribution model to cut out intermediaries. The platform SuperPhone is being developed into a platform for other artists to do the same.

KODAKOne and **Binded** are examples of platforms designed to help photographers manage the digital rights of images using blockchain technology. They primarily work by recording ownership and creation of the images

on a blockchain ledger and then using a web crawling service to scan websites to see if a copyrighted image is being used.

Smart contracts, digital intellectual property rights and micro payments advancements are creating an opportunity for news and media to revisit an economic model that was once adopted by the news services on **CompuServe** in the 1980s. This was a news structure where readers paid per view of articles, including paying extra for images. At the time this was possible because CompuServe offered higher quality journalism in a way that was easier to find, search and read. Ultimately this service failed due to increasing availability of free, high quality journalism and the advent of free search services such as **Google** and **AOL**.



Tokens For Smart Royalties and Freelancers cont.

What's Next

Artists with music will be first to publish content on a smart contract enabled platform where content creators must give less money to intermediaries. This type of content will be more successful as there is greater consumer demand and significant revenue for the artists to capture in disintermediating the record and distribution companies.

News platforms will be fast followers but will struggle to incentivize end users to migrate to new platforms as specific journalists have less market power and smaller follower base.

Ownership of digital assets are evolving with a movement for content creators to keep ownership rights of their content. **GDPR** rules in Europe where people have greater ownership rights over the data they create, no

matter what platform it is created on is an example. As such we expect that there will be increased demand for platforms that allow the content creator to retain ownership and be compensated for the engagement they drive. This is likely to affect the photography industry as historically photographers retained copyright ownership of their film photographs. But recent platforms have required photographers to sign over rights to the image purchaser.

The change in ownership rights would be the equivalent of **Instagram** paying popular content creators directly to retain them on their platform—it's a departure from the current model, where network effects mean that Instagram does not need to pay content creators. Instead, content creators are paid by brands who seek to get access to the creators' followers.

Watchlist

Civil; Ethereum; Cardano; EOS; NEO; IOTA; Monero; SuperPhone; Kodak Coin; Binded; Getty; Reuters



SCENARIO

Near-Futures Scenarios For Smart Royalties

In the next 10 years content creators will demand more control over their intellectual property and will begin to use platforms that provide increased intellectual property protection. As encryption, cryptography and digital identity technology evolve and become more mainstream, digital content will be managed and controlled in such a way that analog/physical ownership structures will be able to be applied to digital content. Examples include limiting the number of copies an image can be made and watermarking individual copies of photographs.

Optimistic Framing

Digital assets of all kinds adopt intellectual property protection rules and systems. This enables content creators to capture more of the value that they create downstream, leading to a change in the distribution of rewards in the value chain. This reduces the dominance of the delivery channel from information delivery. Consequently, ownership and copyright structures become much clearer and misappropriation of content becomes very rare. Additionally, as creators are more fairly compensated, they create more content that is both paid and unpaid.

Probability

30% because this would require that entire industries adopt a new technology format. The music industry tried this in the past using DRM but a lack of standards and a perception that consumers were being cheated, crippled adoption.

Pragmatic Framing

Creators migrate to platforms that provide greater intellectual property. First movers will be musical artists that already have established themselves in their industry. It will not be the standard way of operating for end consumers, but end consumers will be willing to use multiple platforms to get to the content they value or because of a strong personal connection with the content creator.

Probability

40% because there are strong financial incentives for specific players to increase their ability to defend their IP. As such they will create momentum for advances in technology to enable cost effective enablement of DRM. The network effects will likely be strong as huge scale is not needed to start.

Catastrophic Framing

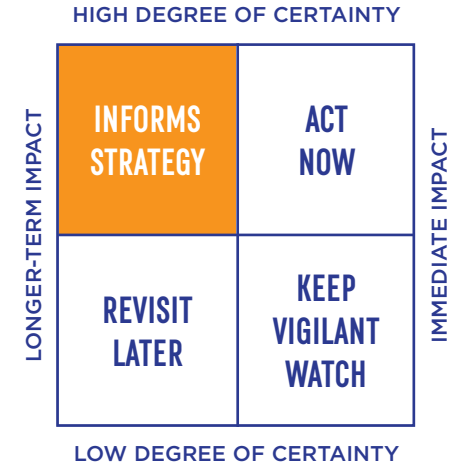
We have a patent troll problem—they're chasing IP and burdens for distribution channels. Patent trolls make the economics of creating content even more compressed—that winds up reducing creativity and shrinking the pool of people and brands creating new content. Only those who can afford the potential costs of defending their IP are willing to create new works.

Probability

30% because if the technology to track IP becomes cost effective for creators to use, it is quite likely that there will be companies seeking to copy the patent troll business model by taking large to medium sized corporations to court.



Immutable Journalism



Information can be permanent and accessible to all with blockchain technology.

Key Insight

Blockchain technology allows for the creation of a distributed immutable record of information (a record that can never be deleted or modified, essentially a ledger of records that can only be added to). This would enable information to be recorded and distributed in a way that is visible to all and cannot be changed without changing all records across most users. A distribution channel leveraging blockchain technology could make it more difficult to censor and limit access to information. Content creators could use distribution channels that can guarantee that their content does not get altered, filtered or blocked by a third party.

Examples

TRON and Civil are blockchain platforms designed to create decentralized sources of information. They allow anyone to create and distribute content freely and that cannot be easily censored. Decentralized platforms for news and information will give more control to publishers and will shift the power structure away from platform operators, who control or limit distribution and compensation. Think of this trend as a new way to build trust around critical information.

What's Next

Publishers will soon leverage blockchain-based platforms to guarantee that their content does not get modified or censored on route to its end consumers. Information archive companies or distribution companies—like WikiLeaks—would be able to distribute information using a distributed system by inserting the information within a blockchain ledger similar to Bitcoin's. Recording information in a blockchain would also ensure that it does not become inaccessible if the host servers are disconnected.

Watchlist

TRON; Civil; Decent; Ethereum; reddit; Twitter; WordPress; Wix.com; Quora; WikiLeaks; Internet Archive; Agora



SCENARIO

Mid-Futures Scenarios For the Future of Im- mutable Public Infor- mation

In the next 15 years, specific types of information will begin to be transferred into databases that use blockchain technology to ensure their immutability. The first data sets to be converted will be ones where there is significant distrust among the members and where a governing body's impartiality is questionable. Financial services will continue to be a driver of development, but interest in polling and election/governance systems will increase.

Optimistic Framing

Storage and transmission capabilities expand to support information systems that are never deleted and can handle each person having a copy of all information. The world adopts an ethos that all news and information is permanent and transparent.

News and elections are based on immutable and transparent record systems such as blockchain. This reduces confusion and conflict around governance transitions. It causes increased efforts on bridging the digital to analog divide, thus bringing more and more people into the digital environment, which will improve access and reduce social inequality.

Probability

10% some elections will use blockchain but will not be trusted nor executed in a 100% trustless way. Smaller and emerging economies will drive adoption, but their execution will be poor and have limited global relevance.

Pragmatic Framing

Specific actors and types of information will be valuable enough to merit the additional effort required to be put into a blockchain. Some will champion the technology, but the technology fails to create a change in how people think about information and access. Rather than creating a social revolution, we instead debate the politics of immutable records.

Probability

70% because blockchain requires development and changing of established practices only specific use cases will have enough benefit and self-interest for the players involved to pilot the technology.

Catastrophic Framing

Governments restrict information under the assumption that the public is deemed unable to act in the interest of the greater good. Consequently, information becomes increasingly confidential and distributed ledgers become outlawed from data ownership perspectives. Splinternets become increasingly common and trust is centralized in organizations with limited oversight. News and information is limited by editorial control from larger entities that are primarily driven by self-interest.

Probability

20% governments from developed markets are tending towards increasingly protectionist practices and limiting globalization which will likely also include freedom of information flow. Similar in approaches to China's supervision of information exchange.



Self-Sovereign Identity



Self-sovereign identity is a system where the user is central to the administration of her data and owns her data outright.

Key Insight

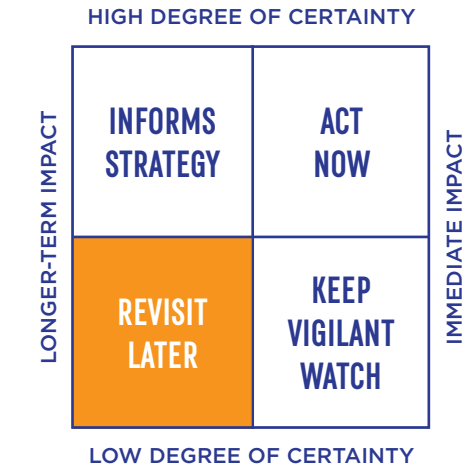
Identity management systems have seen a gradual evolution from government issued IDs to email providers and social media accounts. The average person now has dozens of unique online accounts. Companies like **Google, Yahoo, and Facebook** have built their business models on managing troves of data on behalf of their users, but users have suffered from large-scale security breaches—like the Yahoo hack that impacted every single one of its 3 billion accounts.

Blockchains and distributed ledger technologies have introduced a new approach to identity management: self-sovereign identity. Self-sovereign identity is a system where the user is central to the administration of her data and owns her data outright. It is interoperable and transportable across applications, devices, and platforms.

Self-sovereign identity has two primary benefits: increased security and increased control. Increased security because decentralized identity solutions in theory are much harder to hack. Increased control because when an individual manages her identity, she owns her data and can therefore decide how to monetize it. For media companies, self-sovereign identity is a trend that touches on paywalls, authentication, creative IP and royalty tracking, as well as digital advertising.

Examples

Identity systems help individuals validate reputation, manage risk and gain access to groups. Many systems rely on third-party “identity providers” like governments, Facebook, or Google. Digital identity management has been a central point of vulnerability for individuals and corporations alike with hackers using phishing emails and



personally identifiable information (PII) to reset passwords and break into accounts.

In the media industry, companies struggle with how to deal with digital identity and authentication. Streaming platforms like **Netflix** and **HBOGo** have multiple users sharing a single paid account. Online publishers have experimented with a myriad of paywalls and authentication systems to allow paid users to enjoy services across multiple devices and apps without threatening revenue or security. Content creators and advertisers, two crucial parts of the media ecosystem, also struggle with tracking and managing creative IP and campaigns. Self-sovereign identity would increase the transparency and efficiency of each of these processes.

For IP management and royalty tracking, if these processes were stored and recorded on a blockchain,



Self-Sovereign Identity cont.



each time a person wants to request permission to use creative IP (music in a TV commercial for example), a smart contract could automatically pay out the artist and grant permission for the IP. **Microsoft** and **Ubisoft** are experimenting with blockchain to pay game developers. **Custos Media Technologies** and **Vaultitude** are blockchain startups focused on anti-piracy solutions and IP protection. **Spotify** acquired blockchain startup **MediaChain** to build out its distributed music rights and compensation infrastructure.

In the world of digital advertising, there has been a rallying cry from advertisers and publishers for more transparency and accountability across the industry. Currently, it is a defacto duopoly with Google and Facebook driving the market. Between the advertisers and their target audience, the publishers and their ad dollars, there is a bevy of middlemen such as DSPs, SSPs, ad exchanges, yield optimization tools and analytics platforms. Blockchain could help track ads as they move through the ecosystem from advertiser to publisher to audience and prove if the end user was an authentic click or a spam bot. **Comcast** was one of the first large media players to enter this space with the **Blockchain Insights Platform** in 2017 and the **Blockgraph** product in 2018. **IBM iX** is partnering with **Me-**

diaOcean to launch a blockchain ad transparency solution. **AdLedger** is a nonprofit research consortium made up of leaders across the industry like **IAB** and **ComScore**. **Anheuser-Busch** announced a pilot this summer where it will be tracking ad units with blockchain. Finally, startups like **Kind Ads**, **Brave browser**, **AdEx** and **MetaX** are all making blockchain solutions for digital advertising.

What's Next

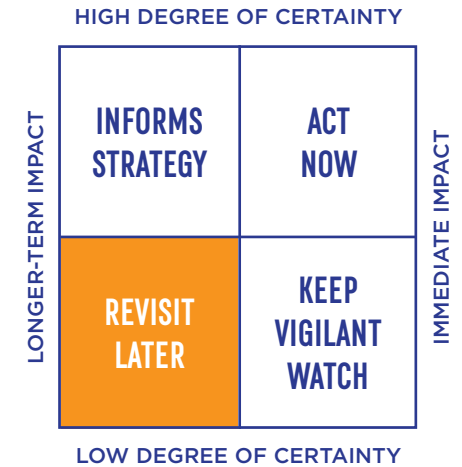
Self-sovereign identity will likely be adopted in phases. IBM and Microsoft are piloting projects and startups like **UPort** and **Sovrin** are making headlines. Since interoperability is a defining feature of decentralized identities, media companies should look for partners instead of attempting to launch an identity product on their own.

Watchlist

Po.et; IBM; Microsoft; UPort; Currency; Ubisoft; Custos Media Technologies; Vaultitude; Spotify; Comcast; MediaOcean; MetaX; AdEx; Kind Ads; Brave browser; Netflix; Google; Facebook.



Distributed Computing For a Cause



Key Insight

Key Insight: Distributed computing is a process where large computer problems are broken down into smaller segments that can be calculated on multiple regular computers, instead of on centralized super computers. Distributed computing technology enables idle processor time on personal laptops, cell phones and other digital devices to become a valuable resource. Idle processor time then becomes a valuable resource that can be used to not only solve socially important problems but the financial incentives for using your idle processing time can be used to fund important causes.

Examples

Honeycomb is a cryptocurrency-based project which crowdsources unused phone power to support quality journalism. The platform has

not yet been launched, but the intent is to use the idle processor in you phone to perform distributed computing calculations overnight to earn the cryptocurrency **Monero**. Monero will then be used to fund quality news organizations that the users select.

Folding@home is a distributed computing project for disease research that was launched on October 1st, 2000. The project used idle processing resources on personal computers, PlayStation 3s, and some Sony smartphones to for scientific research. People donated their idle computer processing time to the project.

Golem.network is a platform that proves that idle computer resources are a valuable asset that can be monetized. Golem is built upon the **Ethereum** blockchain where one can rent out idle computing resources like storage, processing power, or bandwidth. The platform is currently

designed to focus on rendering computer-generated images, DNA analysis, and machine learning. There are three roles in the ecosystem: providers of resources, users of resources, and software developers. **GridCoin** is another blockchain-based distributed computing platform providing resources to philanthropic scientific research.

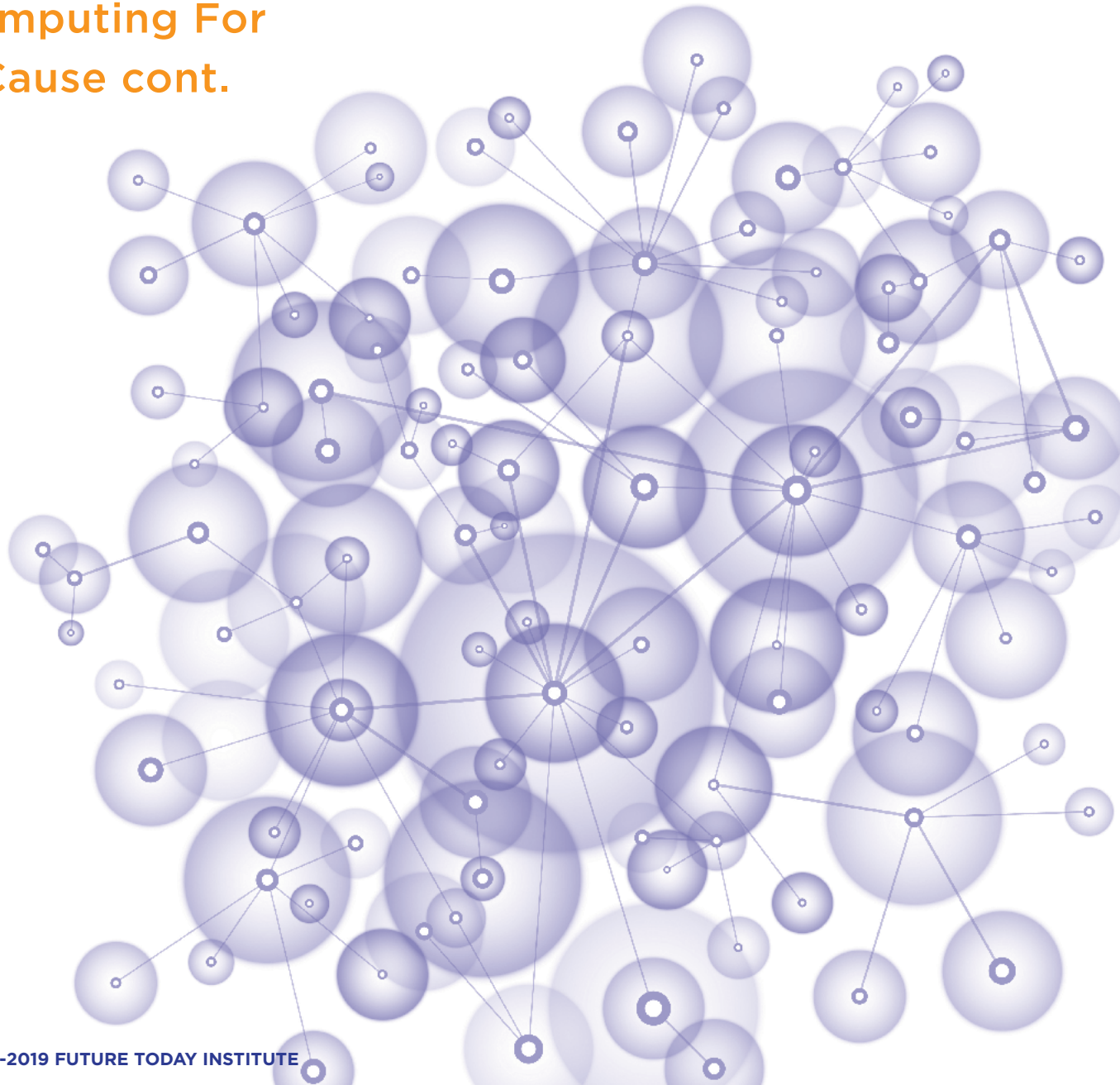
What's Next

There will be an increasing number of platforms that allow consumers to monetize their idle computer resources. This will enable people to earn new income from resources that they already own and are underutilized. For developers and people in need of computing resources, this will help drive down prices for computing resources and increase the diversity of options available. This will reduce the costs of digital distribution of news

The Golem.network is a distributed computing system that pools resources across many devices for shared projects and tasks.



Distributed Computing For a Cause cont.



and will facilitate donation of computing resources to social causes. Thus, decreasing the financial burden of information distribution and analysis borne by news providers.

Watchlist

Honeycomb; Monero; Golem.network; SONM; GridCoin; Microsoft; Intel; Apple; Android; Amazon Web Services; every single wireless carrier.



BY KRIFFY PEREZ

SCENARIO

Mid-Futures Scenarios For Distributed Computing.

Distributed computing technology advances to the point of being just as efficient and fast as centralized computing—but is also able to leverage idle computing resources in all kinds of internet connected devices.

Optimistic Framing

All computing resources can be shared and are automatically load-balanced across resources. This significantly increases the global computing resources available, improving access and reducing costs for all. Excess capacity is used to solve social problems, while access to information and technology start to become a universal human right that is distributed across the entire digital ecosystem.

Pragmatic Framing

Distributed computing technology continues to advance but is only for specific use cases and for specific kinds of computing tasks, instead of all general computing tasks. Load and resource balancing continues to be too complex to execute effectively at scale and reliably. Customers that do not require stringent privacy or ownership rights—or who don't care about bandwidth—are offered lower fees in exchange. The general public doesn't see the point.

Catastrophic Framing

New computer viruses hijack our devices, which are put to work mining for cryptocurrencies without our knowledge. Our devices leech electricity and computing resources, causing us all headaches. We'll see repeats of what happened in May 2018, when a Russian government page was hacked and sent visitors to a website that secretly installed cryptocurrency mining software on their computer. The frequency and pervasiveness of hijacking computing resources becomes so great that the general internet infrastructure becomes degraded and slows down as the majority of resources are used for mining cryptocurrencies.



SCENARIO

Gigware is on the horizon.

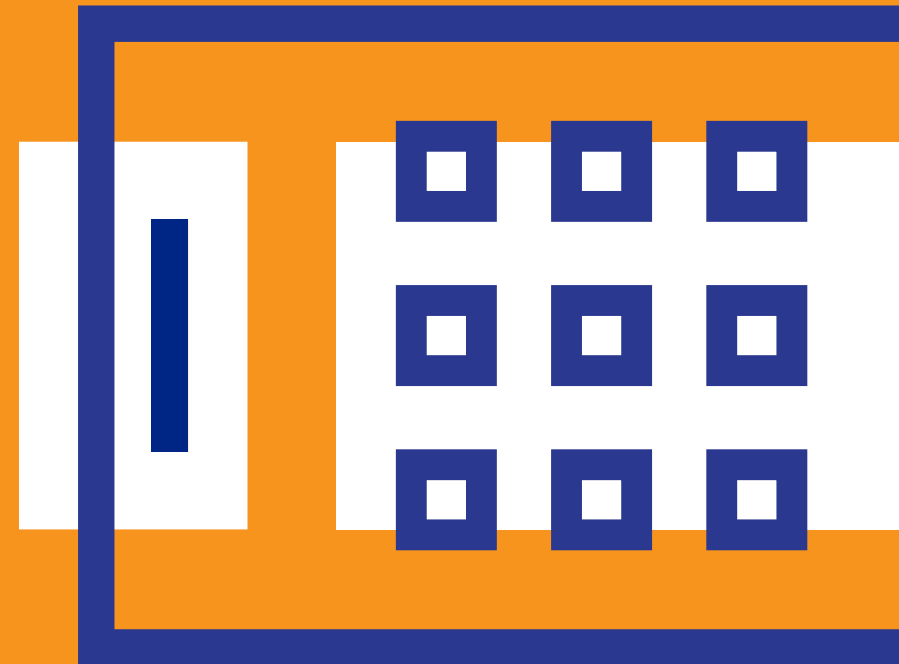
Imagine getting into bed tonight, docking your phone into its charger on your nightstand like always. You set the alarm, and just before closing your eyes to sleep, you start up a special app—one which invites hackers to take over your phone. It isn't a dream—but it isn't a nightmare either. It's the future of the gig economy.

In the coming years, you're going to hear a lot about our new decentralized sharing economy. It's a clever way of distributing computing power over a wide network for a variety of tasks, which range from performing mathematical computations to mining for cryptocurrencies. All you need to get started is to install what we call "gigware." It's a benevolent use for the same kind of malware a hacker relies on to break into your computers and phones, except that it generates a tangible benefit, whether you're a company or individual user. Think of it as the next evolution of the sharing economy powered by artificial intelligence.

At the moment, there are nearly four billion internet users spread around the world, and each of us owns three devices on average. That means there's a gigantic pool of processing power sitting dormant at any given time.

Gigware is like Airbnb for your computers and phones. It will someday allow third-party businesses to use your smartphones and computers in exchange for credits or real money you can spend elsewhere. Because the systems are distributed and decentralized, private data is safeguarded.

Gigware could be an alternative to traditional news subscriptions. A media organization might invite consumers to allow their mobile phones to be used for complex calculations overnight, and in return they can earn credits to pay for digital subscriptions to their favorite newspapers and magazines.





Decentralized Curation



Cryptocurrencies and application platforms can prove a model for decentralized curation/editorial of content.

Key Insight

Cryptocurrencies and application platforms can be a model for decentralized curation. This is because the platforms are exploring ways to govern themselves, without having a central authority or leader of the collective group. As a result, self-governance and incentive structures from blockchain/smart contract-based platforms create a proving ground for alternate forms editorial curation of information that is more resilient to the interests of specific stakeholders.

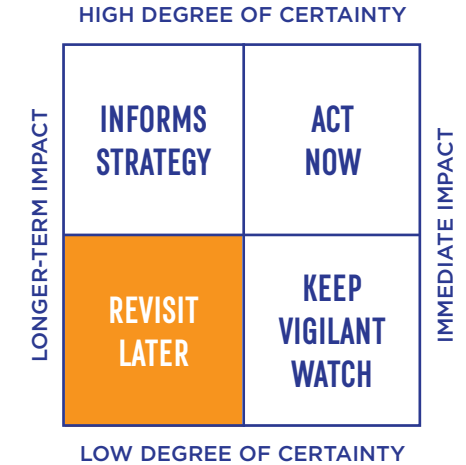
Trust can be constructed using new processes that are less reliant on central entities. Cryptocurrency self-governance technology additionally reduces the need for intermediaries and changes trust dynamics impacting the role of distributors of information and entities that edit and control information.

Examples

Steemit is a blogging community like **Reddit** where users are rewarded for creating, curating and interacting with content. Steemit uses a cryptocurrency-based points system to facilitate curation and engagement in content on the platform. Points are earned for creating content, upvoting and commenting on other posts. Users build reputations allowing them to have more impact on curating the content. Reputations can be built organically or bought. Points are issued in cryptocurrency, which can then be converted into dollars or other currencies.

What's Next

You will begin to see users demand that platforms place greater importance in trust and establishment of credibility. As such it is likely to start with content creators that are most accustomed to forum or blog struc-



tures like Reddit where the content is crowd sourced and historical posts on the same topic are relevant. Crowd-sourced “truths” will evolve past majority to rule into qualified majority rule structures. Cryptographic digital identities will increase in importance as trust becomes dependent on the historical merits of individual usernames/credentials.

Watchlist

Steemit; Decent; Ethereum; Reddit; Twitter; YouTube; Facebook; WordPress; Wix.com; Blogger; Tumblr; Quora; and digital identity providers such as Oberthur Technologies, NetIQ, Socure, Early Warning.



SCENARIO

Mid-Futures Scenarios For Decentralized Curation

End consumers will begin to demand certain indicators of trustworthiness as readers become more attuned to clickbait, intentional interference and become skeptical of robot created content specifically generated to influence them. In the next decade, Facebook, Reddit, YouTube and other user generated content platforms will begin to create trusted authorities and authenticate/validate content that is on their platforms as they seek to continue to deliver news as a form of relevant, timely and engaging content. User credentials will therefore become increasingly important and begin to require their own risk profiles based on historical data.

Optimistic Framing

User generated content platforms create systems for self-regulation, establishing clear structures for information quality and transparency around conflicts of interest or intent. In creating effective self-governance, centralized entities that bestow authority become decentralized, paving the way for freer transfer of information and reducing polarization and gamification of display algorithms. Individual journalists begin to create their own brands and reputation and generate followings that are less dependent on the platform or medium that distributes their content.

Probability

10% because cryptocurrency pioneers have yet to be proven. As such, until the principles are proven, platforms with many users will be hesitant to try such revolutionary change.

Pragmatic Framing

Content from verified and authentic sources are given increased importance on user generated platforms improving the trustworthiness of information. Verification is primarily driven by centralized entities resulting in partial fragmentation of information with a greater importance on pay-to-play. This provides a significant opportunity for players that have already established trust to become leaders in transparency and impartiality, ideally providing the opportunity to explore new monetization schemes leveraging this trust.

Probability

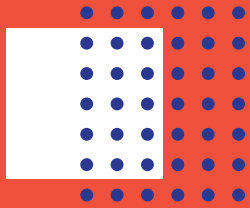
60% because the public and government are both requesting greater transparency and clarity from Facebook and other content providers that seek to distribute news. There will be increasing demand for editorial functions within those platforms.

Catastrophic Framing

Information will become completely separated into that which is trustworthy (from a trustworthy source) and information that is from an unproven source. Entities that bestow trustworthiness will control what type of information merits wider distribution and who is able to create content. This will effectively lay the foundation for systematized global censorship and control of information and its distribution.

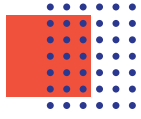
Probability

30% because China is creating a precedent for others to put systems in place at national levels, thus fragmenting information at global levels.



Interfaces

- 041 Voice Interfaces
- 042 Monetizing Chat-Based Journalism
- 043 New Video and Audio Story Formats



Voice Interfaces



Siri processes questions and requests using natural language processing.

Key Insight

We are in an era of conversational interfaces. You can be expected to talk to machines for the rest of your life. These systems use semantic and natural language processing, along with our data, in order to anticipate what we want or need to do next. What's new to consider for 2019: what happens when voice interfaces start to make up more and more of our internet searches?

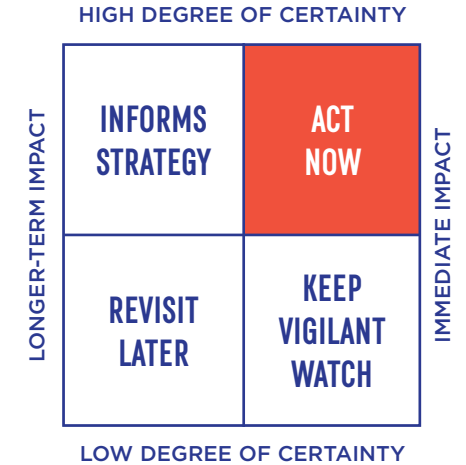
Examples

If you've ever used **Siri**, **Google Now**, **Amazon's Alexa** or even the microphone button on your **Comcast** remote control, you're familiar with voice interfaces. Soon, you will find yourself talking to a host of connected devices, such as your home thermostat, your car, your refrigerator, your earbuds, even your connected water bottle. By 2023, 50% of the in-

teractions North Americans have with machines will be using their voices.

Conversational interfaces can simulate the conversations that a reporter might have with her editor, as she talks through the facts of a story. **IBM Watson's** various APIs, including **Debater**, **Visual Recognition**, **AlchemyLanguage**, **Conversation** and **Tone Analyzer** can all be used to assist reporters with their work.

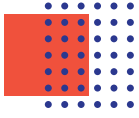
As the Internet of Things (IoT) continues to develop and improve, the number of devices people can communicate with will also increase. Voice interfaces will allow more users to ask about the weather, get assistance in making a grocery list, and have the news played to them. In the workplace voice technology is being used in the form of personal assistants, listening, transcribing and repeating information, and companies like IBM are at the forefront of using APIs that help analyze language and tone.



What's Next

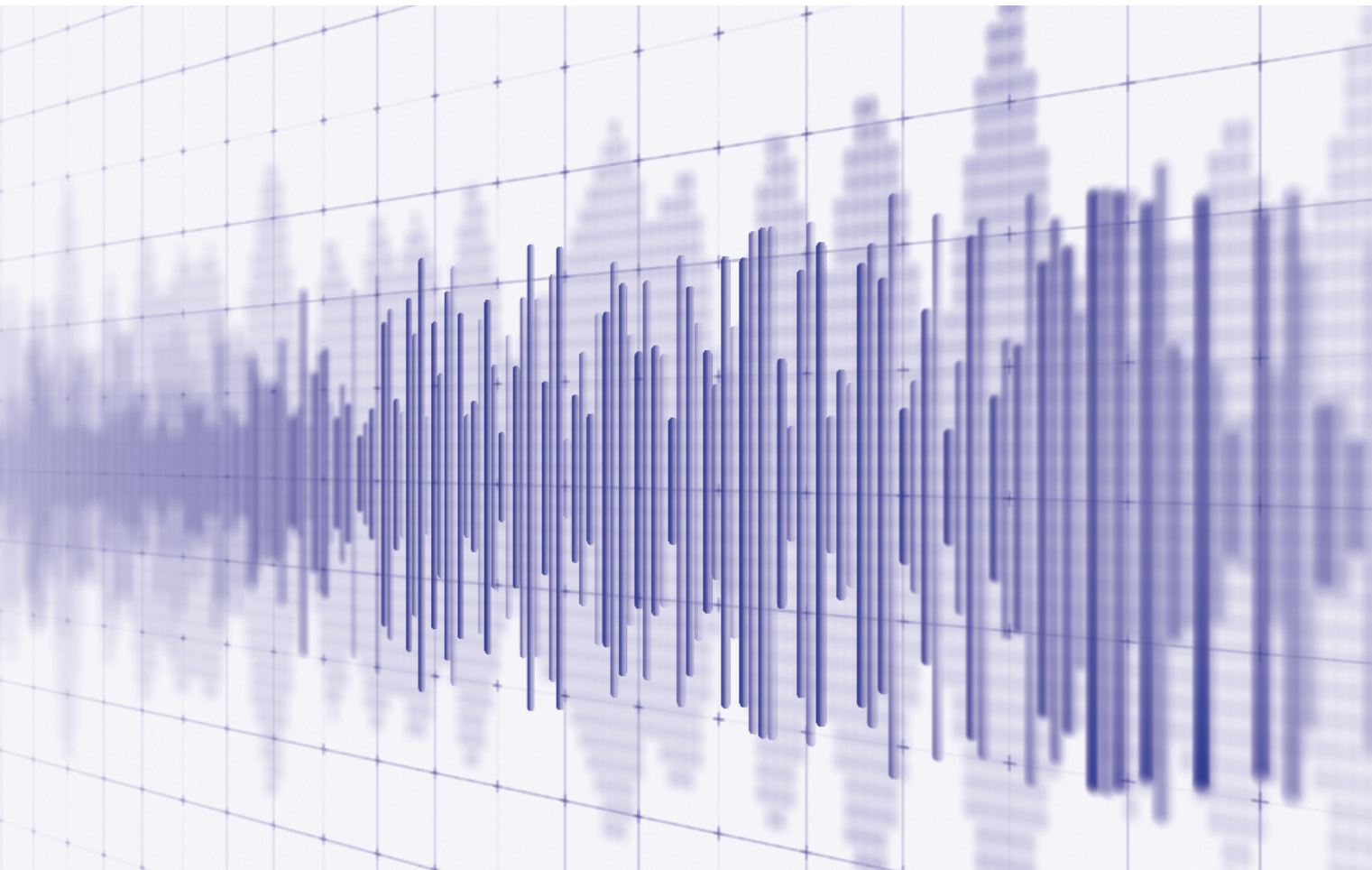
Voice technology has proven it is commercially viable and will likely continue to experience significant growth in the coming years. The biggest threat to the expansion of this industry will come from government regulation and privacy concerns. In May 2018, the **European Union's General Data Protection Regulation (GDPR)** took effect, these regulations are designed to place restrictions on the data companies can obtain and use from consumers. The effect these rules will have on voice technology is still unclear. There have already been numerous debates about whether Alexa and Google Home can meet GDPR compliance as they evolve.

We expect to see increased monetization of the voice ecosystem either through subscription offerings, partnerships with voice providers, or through paid advertisements. **CNBC**



TREND 041

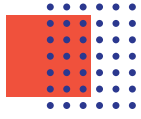
Voice Interfaces cont.



and other major networks are considering selling audio sponsorships (much like what we hear on podcasts) based on the platform's increased popularity. Media companies and journalists should also take note: if **Amazon** and **Google** control the means of our future conversations, how will news and media brands be included and prioritized?

Watchlist

Amazon; Google; Baidu; Tencent; Apple; Alibaba; IBM Research; Facebook; Stanford University; MIT CSAIL; MIT Media Lab; University of Texas at Austin.



Monetizing Chat-Based Journalism



WeChat is a popular social media app in China and a popular way to make payments.

Key Insight

Communication and messaging platforms are becoming the central hub for social interactions including the distribution of information and execution of financial transactions. This centralization of channels and access to services creates an opportunity for new channels to reach readers that have micropayment functionality enabled. In China, media organizations are incentivizing their audiences to make micropayments for content.

Examples

WeChat in China is the global marketleader in incorporating value added services into its messaging platform. WeChat offers a wide range of services and functionality but one of its most interesting services is the ability to pay friends (person to person) and pay merchants directly within the application, thereby merging a

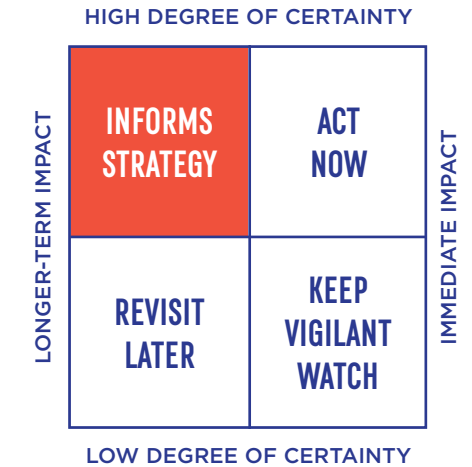
communication channel and transactional channel into one.

Additionally, WeChat is developing functionality that allows new monetization schemes for journalists. These functionalities include the ability to tip content creators and pay to read functionality. These kinds of functionalities stimulate journalists to move from established newsrooms into their own individual audiences and followers.

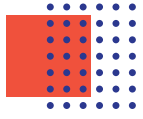
Other major platforms are also adding payments functionality although focusing initially on person-to-person transactions. These platforms include **Facebook messenger, iMessage, Snapcash, Gmail, Google Assistant** and **WhatsApp**.

What's Next

Messaging platforms continue to seek out new features and functionalities



that will keep users engaged on the platform including enabling seamless actionability. This could allow more people an avenue to discuss and perform actions all within the same channel, by making reservations, creating calendar events or executing payments. We expect further consolidation of communication and transaction channels in the next decade as messaging platforms seek to absorb other disparate functions using chat as the center point of a convenience driven ecosystem. This creates the opportunity for journalists to develop one-to-one relationships with their readers and drive much more engagement and interaction at a level more advanced than in the past. Using segmentation and extremely targeted content, organizations could offer interactions on specific topics that are timely, as well as contact with relevant experts where the interaction and the knowledge are paid for directly.



TREND 042

Monetizing Chat-Based Journalism cont.

Watchlist

Apple; Google; Amazon; Microsoft; Facebook; PayPal; WeChat; WeMedia; Weibo; Line; Alibaba; Venmo; Alibaba; Mastercard; Visa; Citibank; BBVA; Santander; ING; Slack; blogging platforms; Chinese internet authorities





BY KRIFFY PEREZ

SCENARIO

Scenarios For Monetizing Chat in the Year 2029

Chat programs become the browser for our person-to-person interactions in the next decade. Global messaging platforms follow WeChat's hub model and begin adding more and more features. News becomes a key feature of chat hubs that retain engagement.

Optimistic Framing

Global standards are set, and features and functionality are enabled for chat across countries and borders. This improves inclusivity and access for all. As platforms become multinational, we see less censorship. Algorithms ensure that we view multiple sides of issues that are relevant at a local scale as well as issues that are relevant at a global scale. The platforms create a strong demand for diverse journalism.

Probability

30% because local governments and regulations will try to limit a single entity having so much access over its communications, especially at a global level. Journalists will be pushed into creating one-to-one relationships with their audiences in order to monetize the content they create.

Pragmatic Framing

Regional players become market leaders and take advantage of large network effects by adding features that are easiest to implement. A select few journalists attain a strong and large enough following to monetize journalism without needing a larger distribution or trust-enabling partner.

Probability

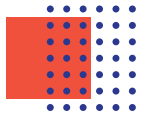
60% because this is the path of least resistance. Partners will come to messaging platforms hoping for access to users. Content creators that have reached critical mass using existing platforms (newsrooms or record labels) will seek to capture more of the financial pie.

Catastrophic Framing

Chat ecosystems become increasingly fragmented as partners and players seek to build walls around the features and functionality that they can provide. This results in platforms with functions that are only effective for specific situations. Divergent viewpoints are marginalized.

Probability

10% because walled gardens are hard to maintain, as we saw with BlackBerry Messenger. Network effects and critical mass are needed for many financial models to work at scale and support small players. With no clear platform to centralize around, people will have to find other ways to centralize and achieve efficiencies of scale.



New Video and Audio Story Formats



In interactive web series like *That Moment When*, users determine the actions of the main character, altering the storyline in real time.

Key Insight

Capitalizing on the proliferation of consumer tech featuring responsive visual, tactile and audio interfaces, storytellers are developing unconventional narratives to engage their audience in new ways. News media and entertainment organizations have begun exploring these innovative modes of storytelling, with areas of focus in personalization, interactivity and immersion.

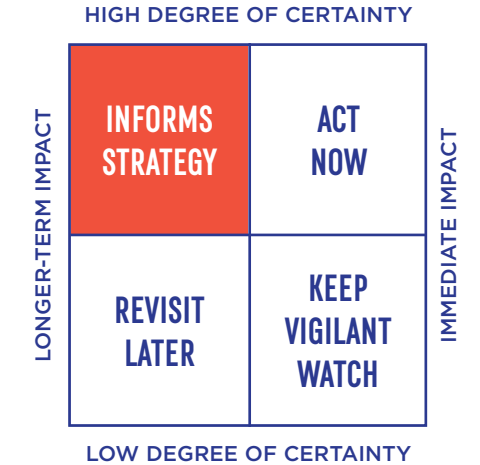
Examples

Pioneers in the storytelling space are making use of advancements in audiovisual tech to create content that immerses the audience and elicits interaction. Production house **Eko** creates interactive live-action video content where the viewer taps or clicks to decide the protagonist's actions, and **Netflix** has introduced similar user-influenced programming

for younger viewers. Last year the **BBC** released an audio play available on **Amazon's Echo** smart speaker in which the listener guides the narrative by speaking directly to the characters. Meanwhile, companies like **RYOT** have partnered with major news outlets including **The New York Times** and **NPR** to produce immersive documentary video segments, viewable in VR, in which audiences can freely explore environments in 360 degrees.

What's Next

Currently these new storytelling formats are in an experimental phase, with consumers yet to fully embrace them, and companies yet to fully master them. In the coming years, however, growth is expected in interactive and immersive audio and video, with major media brands looking to stake their claim in the space. **Eko** is building a video platform for **Walmart**,



presumably to compete with rival **Amazon's** robust video programming, and major networks like **ABC**, **Fox**, and **CNN** have dedicated digital channels for VR/360 video content spanning news, sports, and entertainment. As audiences flock to the new formats more often and in greater numbers, brands at the forefront of this trend will be positioned to perform enhanced data collection with which to target advertising and personalize content.

Watchlist

Eko; RYOT; BBC R&D; Spotify; Dolby; Melcher Media; Wolf 359; World Building Institute; Netflix; Magic Leap; Amazon; Google; Facebook; Nvidia; Sony; Imax; Microsoft; Samsung; Qualcomm; Intel; LG; Huawei; Zeiss; Xiaomi; HTC; Lenovo; HP; YouTube; Oculus.



BY KRIFFY PEREZ

SCENARIO

Near-Future Scenarios For Lip-Synched Videos

AI can generate lip-synched video that is indistinguishable from the real thing. Generative algorithms could be used to automatically create videos of CEOs reading their annual letters, or for analysts to explain their latest findings. However, hackers could also use this technology in real-time to manipulate company stock prices.

Optimistic Framing

Computer generated video standards are created so viewers have a clear understanding of when “improved” or “generated” video is being watched. The generated and improved videos are used to communicate messages more clearly and concisely at the level that is most appropriate for the end consumer. All entities have access to ability and expertise, ensuring that there is no unfair advantage to any specific entity. It saves time for CEOs and leaders, who wouldn’t have sat through recording sessions.

Pragmatic Framing

CEOs already tend to read from scripts that are heavily practiced and scrutinized. This would be an additional tool that the communications specialists could leverage. Only few large players become adept at using the technology and make personalized messages a competitive advantage to stimulate stock performance and growth. It’s clear that those companies are using generated video—however they make it impossible for smaller companies to use the same technology.

Catastrophic Framing

Misinformation becomes rampant as everyday people are unable to tell what is real and what is not. Competitors intentionally misappropriate the likeness of managers and CEOs at other companies, as well as analysis and investors, which splinters organizations and countries and generally wreaks havoc around the world.



Teaching and Newsroom Training

044 Adaptive Learning
For Newsrooms

045 Nanodegrees For
Journalists

Adaptive Learning For Newsrooms



New adaptive learning systems are being used for training.

Key Insight

An interactive teaching method powered by artificial intelligence that can be used by businesses and educational institutions to tailor curriculum for individuals based on correct and incorrect responses to questions. For newsrooms wanting to provide specific subject area training for reporters and editors, this technology offers big opportunities.

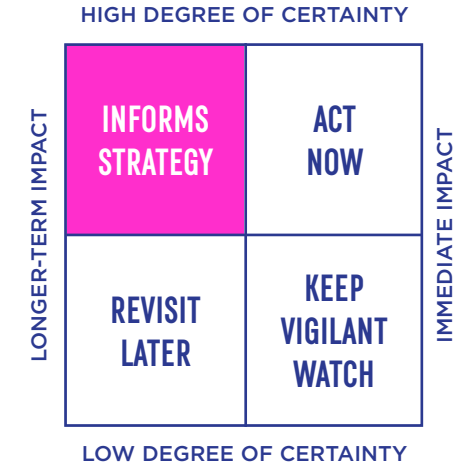
Examples

Imagine four different employees taking a multiple-choice quiz about best practices for publishing breaking news. One employee gets the question right, and the other three get the question wrong but all select three different choices. Traditionally the three who got the question wrong would not be treated any differently, a wrong answer is a wrong answer. That's where Adaptive Learning steps

in. Adaptive learning uses the information it collects on which wrong answer was chosen to help dictate where a student or employee needs additional focus and either provides that insight or lets the relevant supervisor know where the individual needs personalized attention. In the business setting, adaptive learning is being used by employers in on-ramping and employee training sessions to help hone specific skills and understand an individual's specific strength and weakness. In a 2017 course on **HarvardX** (an open online platform) students who were placed into the adaptive learning track outperformed the control group by 19% and across different key metrics.

What's Next

In the constantly-evolving journalism industry having a highly skilled team is essential to survival, and companies have begun to fully embrace this.



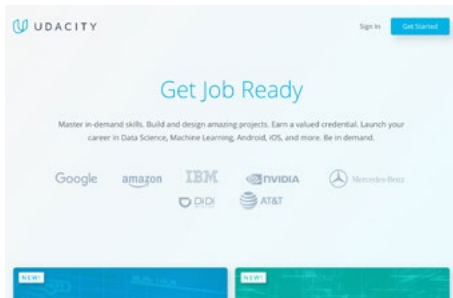
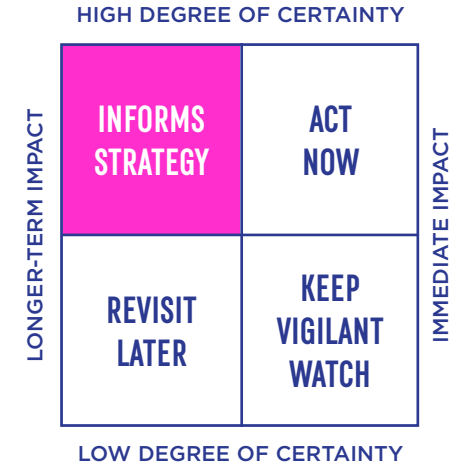
Already being used in banking and financial services, adaptive learning offers media organizations a new way to build capacity and expertise on a wide variety of subjects.

Professional development staff will need to be skilled and able to work with adaptive learning solution providers to develop and track career learning plans of employees. The result will be a better-educated workforce combined with better informed management about the specific strengths and weaknesses of their staff beyond the holistic level. Look to see adaptive learning used as a tool by managers to pick people for projects based on identified strengths and weaknesses.

Watchlist

NovoEd; Everwise; HarvardX; Pearson; Dreambox; IBM; Microsoft; Knewton; Axonify; Qstream; Intrepid; Geekie

Nanodegrees For Journalists



Udacity offers nanodegrees in myriad fields.

Key Insight

An alternative to traditional two or four year degree programs, Nanodegrees traditionally offered online, involve studying a specific topic area or industry with the goal of increased knowledge in the area and some form of certification of completion. Nanodegrees are an opportunity for universities to offer more specific learning opportunities for those working in media.

Examples

Nanodegrees are being pursued by individuals looking to receive a certified understanding of a topic while avoiding more expensive and time consuming traditional programs or to simply gain a greater understanding of a topic area. Platforms such as **Coursera** offer journalism specific courses such as ‘English for Journalism’ created by the **University of**

Pennsylvania, and numerous other courses created by institutions such as **Michigan State University**, **Wesleyan University**, and **Duke University** to name a few. **Udacity**, one of the most popular nanodegree platforms, now counts more than 50,000 students enrolled in various programs that take approximately 6-12 months to complete. These programs are either billed per term or as a monthly subscription. The degree offerings currently tend to be clustered around technology and topics vary from becoming a data scientist, learning developer skills, to digital marketing.

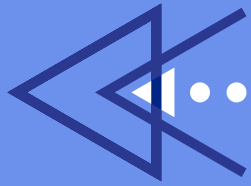
What’s Next

While nanodegree programs are likely here to stay for the foreseeable future, their widespread adoption will hinge on a couple of different factors. The most significant hurdle is awareness and consideration amongst HR

and hiring staff at major companies. As large corporations partner with nanodegree providers like Udacity, those certifications will gain more acceptance in the mainstream. Another key factor is the rising cost of education and crushing student loan debt. It is unlikely the current congress will pursue legislation that significantly eases the debt burden on students. The rising cost of education could force the hands of students to seek nanodegrees in place of a traditional four-year degree.

Watchlist

Udacity; Google; Amazon; Coursea; altMBA; Stanford; Harvard; AT&T; Coursea; Duke; Michigan State; University of Pennsylvania; Wesleyan



•• Publishing and Distribution

046 Web 3.0

047 Proximity News
and Information

048 Digital Frailty

049 The Case For Radical
Transparency

050 Pop-Up Newsrooms
and Limited-Edition
News Products

051 One-To-Few
Publishing

052 Abusing The
Notification Layer

053 Journalism as a
Service (JaaS)

054 Transparency in
Metrics

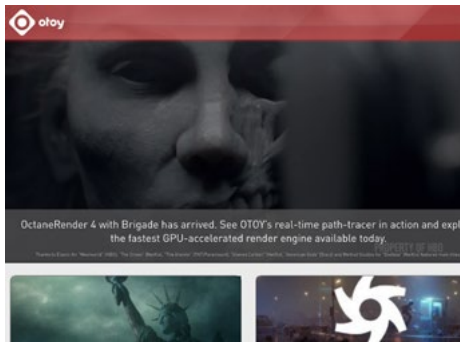
055 Real-Time Fact
Checking

056 Offline Connections

057 Audio Search Engines



Web 3.0



LA-based Otoy launched RNDR, which uses cloud, blockchain, and cryptocurrency technologies to quickly render images for the everyday content creator.

Key Insight

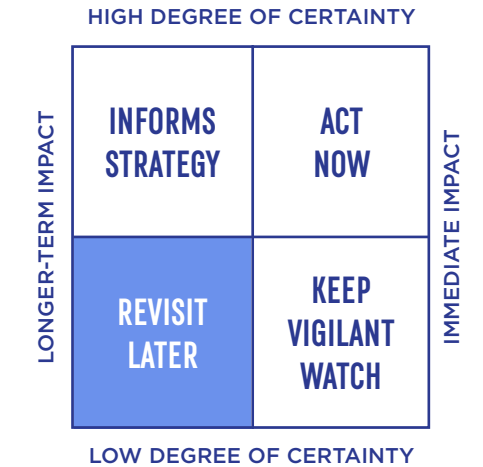
The internet is always evolving. Up until today, it has seen three major waves of innovation. Web 1.0, the beginning of the internet age, introduced static web pages, e-commerce and email. The Web 2.0 enabled decentralized collaboration and creativity by ushering in social networks, sharing economies, cloud computing and dynamic self-sustaining content repositories like **Wikipedia** and **GitHub**. Some collaborations have pushed our imagination beyond what we thought was possible, like **Reddit's** April Fools Day 2017 experiment or Google's 6 month Quick Draw Doodling game.,

Just as cloud computing revolutionized how businesses manage and store information, blockchain will usher in a new wave of innovation for information technology and databases. Distributed ledgers can encourage

massive collaboration on a larger scale and usher in Web 3.0.

With Web 3.0, collaboration and decentralized creation is accelerated for two reasons. First, gathering, mining, and understanding unstructured data will be much easier with advanced techniques such as data mining, natural language processing (NLP), and text analytics. Second, machines can collaborate directly with one another through artificial intelligence and machine learning. Eventually, machines will be able to teach one another.

There are already projects like this underway. In media, **Otoy** is lowering 3D/ visual effects production costs by creating a decentralized, distributed network of partners that can chip in spare processing power with RNDR tokens. **Cellarius** is a user-generated, transmedia franchise curated by artists and audiences through blockchain. The **Interplanetary File System**



is a peer-to-peer hypermedia protocol that facilitates decentralized file sharing and cloud computing.

All this is possible because blockchain technology enables something called the “fat protocol layer.” Web protocol layer is part of the full internet stack. “Full stack” refers to every stage of the computer programming/ web developers tool kit: front end (UX, design, HTML, Java, CSS) to back end (servers, databases, APIs, Python, Ruby). The internet stack has application layers and protocol layers.

In Web 2.0, most of the value captured was in the application layer with little variability in the protocol layer. Examples of the most common protocols are HTTP used by browsers and SMTP and IMAP is used by email-clients.

Examples

In Web 3.0, protocols and platforms

Web 3.0 cont.



may have much more potential for value creation, hence a larger protocol layer. Companies like **Blockstack**, **Lightning Labs**, and **RSK** are building layer 2 networking products. What does this mean for media companies? With Web 3.0, web browsers and mobile applications can perform more complex processes and enable transactions that were previously not possible. On Web 3.0, media companies might be able to set up micro-payment systems or enable users to have more control over their privacy and data.

What's Next

It is still really early days for Web 3.0 applications. Media companies should wait to see how this trend develops—but they should still be tracking this trend.

Watchlist

Blockstack; Lightning Labs; RSK



Proximity News and Information



The PulsePoint app uses proximity to help connect CPR-trained bystanders with people having a health crisis.

Key Insight

New technologies can be programmed to push or receive information to/ from our devices—and also our bodies—tethering us to an always-on information network.

Examples

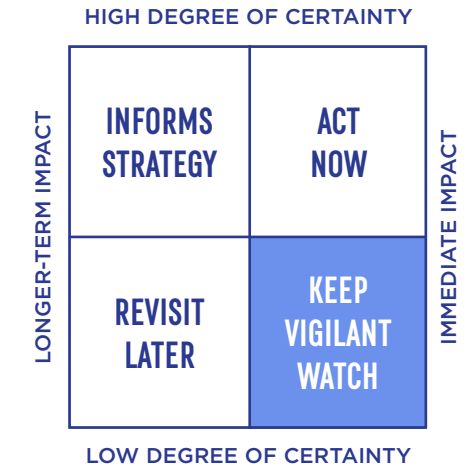
In the late 1980s, **Ericsson Mobile** experimented with short-link radio technology, but it would take a decade for mobile service providers to create the industry standard known as Bluetooth today. Our current **Bluetooth** standard was developed for the internet of things—which is why you’re hearing so much about beacons, which are tiny devices that broadcast a signal and trigger actions based on proximity. **Target** has outfitted hundreds of its stores with beacons, which track consumers as they move around various parts of the store. **The Guggen-**

heim uses beacons to help attendees learn about exhibits. Beacons are widely used in infrastructure and public transit systems. Some researchers estimate that 5 million new beacons will be installed around the U.S., for various purposes, during 2018.

Beyond Bluetooth, content producers can now create geofences within mobile apps to push notifications. For example, CPR-trained bystanders can receive an alert from the **PulsePoint** app if someone nearby is in need of help. PulsePoint also helps people find the nearest AED in times of emergency.

What’s Next

We anticipate that our personal data, combined with data from everyday items in the physical world, will entice developers to build new uses for ambient proximity in the coming years. This means a coming opportunity for



media organizations to pinpoint their content geographically for consumers.

Watchlist

Alphabet’s Eddystone; Apple’s iBeacon; Estimote; Kontakt.io; Gimbal; BlueCats; Gelo; BLIP Systems; Blue Sense Networks; Glimworm Beacon; Sensorberg GmbH; Accent Advanced Systems; Aruba; Amazon; Qualcomm; PayPal; Polytechnical University (China); MIT; University of New South Wales (Australia); Oxford University; National Emergency Address Database.



Digital Frailty



The Village Voice closed after a long and storied history of award-winning investigative reporting. What will become of its digital archive is still unknown.

Key Insight

In the past three years, we've seen the first widespread cases of important journalism being erased from the web because of media consolidation or because sites were no longer being maintained. **Digital Frailty** is the phenomenon in which those digital assets published to a news organization's website are impermanent or easily broken.

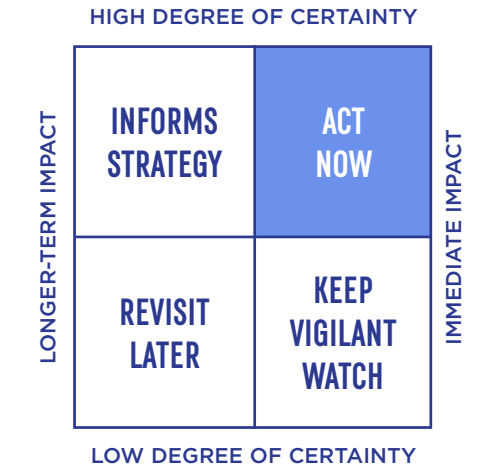
Digital Frailty in the News

The **Village Voice** closed after a long and storied history of award-winning investigative reporting. When investor **Peter Barbey** bought the Voice in 2015, he promised it would "survive and prosper." Barbey closed the print edition two years later, and in August 2018 he closed its doors entirely. There were no plans to preserve its digital archive, which means the

digital-only content published by the Voice could soon be gone forever.

The Voice is just the latest entry on a long list of news organizations that no longer exist. A Pulitzer Prize-winning investigative series about a collision that killed 20 children and devastated a Colorado community went offline when the **Rocky Mountain News** went out of business. **The Tampa Tribune**, whose motto was "Life. Printed Daily," kept its rival, The Tribune, hunting for important stories in the public interest, covering investigations into Tampa's judges, legislators and law enforcement.

Humanity operates on a continuum. After devastating Texas, Hurricane Harvey made landfall near New Orleans on the 12th anniversary of Katrina. **Rising From Ruin**, an award-winning project by **MSNBC**, told the Katrina's aftermath through the lenses of two small communities in Mississippi that



weren't covered by any other media outlet. It included a series of videos, maps, interactive elements, a forum for residents—and since it only existed as a website, there was no other way to see the stories. When **Microsoft** pulled out of its joint venture with **NBC**, the project went offline.

Digital Frailty and Personal Accountability

Perhaps not every **Facebook** post should be saved in perpetuity, but might we need to look back on this moment in time and reflect on how our language—how the very way we communicate—was shaped by our **Instas**, our **Snaps**, and our tweets? Will our future historians look back, marveling at the amount of anthropological data we were simultaneously creating—and destroying? If this past election season taught us anything, it's that **Twitter** helped to shape pub-

Digital Frailty cont.



The EPA scrubbed its educators website of climate change information.

lic opinion and the outcome of the election, even as many controversial tweets posted by candidates running for office, were deleted by their campaigns.

Digital Frailty in Government and Public Information

Under the **Trump Administration**, the **U.S. government agencies** removed studies, data and reports throughout 2016, 2017 and 2018. Most notably, the **Environmental Protection Agency** scrubbed its website of climate change information. This was an effort to support the Trump Administration's ideas and policies. A government website built to educate children, called "Energy Kids," also scrubbed mentions of climate change. The Trump Administration also removed LGBTQ content from federal websites, scrubbed a lot of civil rights information off of **WhiteHouse.gov** and scrubbed the **HHS.gov** website of healthcare data. Federal agencies instructed staff and grant recipients to avoid using certain phrases—"transgender," "fetus," "science-based," "evidence-based,"—citing concerns by the Trump Administration.

What's Next

Digital frailty is a phenomenon affecting journalists everywhere. Digital frailty isn't just about falling revenue—sometimes, new technology obviates the old, before anyone's had a chance to convert files or develop archives. News executive **Mario Tedeschini-Lalli** explains how Italy's largest news website, **Repubblica.it**, didn't originally use a content management system. When the site installed a CMS for the first time, everything published before it was lost forever. Tedeschini-Lalli, along with colleagues **Nicolas Kayser-Bril**, **Anne-Lise Bouyer**, **Pierre Romera** and **Defne Altioek**, launched the **Offshore Journalism Project**—they hope to preserve national and private archives and ensure that quality journalism lives on, even if political appointees and governments disagree. While some content can be retrieved via the **Internet Archive**, it is only taking snapshots of content at a time. Libraries archive printed material, but there is no central repository for all of the digital content we are now producing. Perhaps we don't need to save every listicle and quiz. What will a future society look like if our current media landscape goes dark? Do we have an obligation to preserve the digital conversations shaping society? Should we be working harder to ensure that digital archives aren't lost?

Watchlist

Axel Springer; Yahoo; Tumblr; Hearst Corporation; Time Inc; Yomiuri Shimbun Holdings; Tronc; Gannett; Viacom; Hubert Burda Media; Comcast; Alphabet; Asahi Shimbun Company; Microsoft; Grupo Globo; Advance Publications; News Corp; Univision; Baidu; Bertelsmann; Twitter; Snap; Instagram; General Electric; Bloomberg; Disney; Amazon; AT&T; Verizon; ESPN; Netflix; Hulu; The Onion; PRX; PRI; Internet Archive; news organizations everywhere.



The Case For Radical Transparency



Donald Trump has repeatedly made dangerous accusations that journalists publish what he calls “fake news.”

Key Insight

Cambridge Analytica, the influence Russia peddled during U.S. elections, and the continued spread of misinformation are making a strong case for radical transparency.

Examples

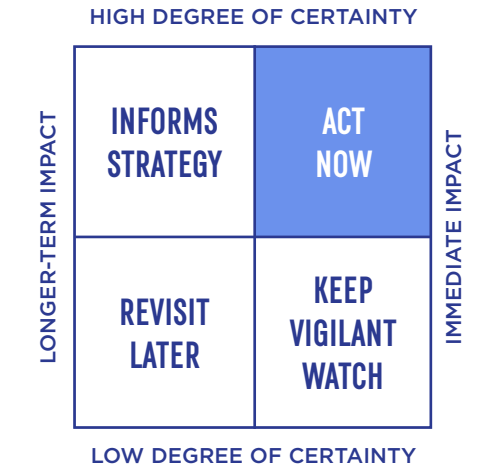
In 2018, the **U.S. Immigration and Customs Enforcement Agency** was discovered modifying a piece of software (its “Risk Classification Assessment” tool) they use to determine whether an immigrant should be detained or released on bond. The agency decided to remove the “re-release” recommendation, but it didn’t disclose to the public that ICE had altered the tool. It was yet another example of data and algorithms being used in ways that intentionally hid the whole truth from journalists. When this story did finally come out, it was

instantly politicized—many people argued on social media that it was “fake news” made up by journalists.

What’s Next

The only way to combat misinformation is to make the newsgathering process completely transparent. Just as consumers expect to see a byline on stories, because it creates a chain of accountability, they will soon expect to know how stories were built. Reporters aided and augmented by smart systems should explain what data sets and tools they used. Meanwhile, stories that were written in part or entirely by computers should reflect that an algorithm was responsible for the piece of content being read/ watched.

Professor Ahmed Elgammal at Rutgers University has developed an algorithm that looks for novelty in paintings and analyzes which artists



influenced that work. His research has inspired others to use similar network analysis, historical data and machine learning to look for similarities in literature, writing and news. A system like this could be deployed to look for explicit and hidden influencers on news stories. Now that news organizations are relying on data, algorithms, and machine learning for various aspects of news gathering and publishing, they should commit to radical transparency.

Watchlist

News organizations everywhere.



Pop-Up Newsrooms and Limited-Edition News Products



A sign from the recent Pop-Up Newsroom Riksdagsvalet.

Key Insight

Some organizations have begun to experiment with pop-up newsrooms for specific projects and with temporary products: limited-run newsletters, podcasts that only last a set number of episodes, live SMS offerings that happen only during events.

Examples

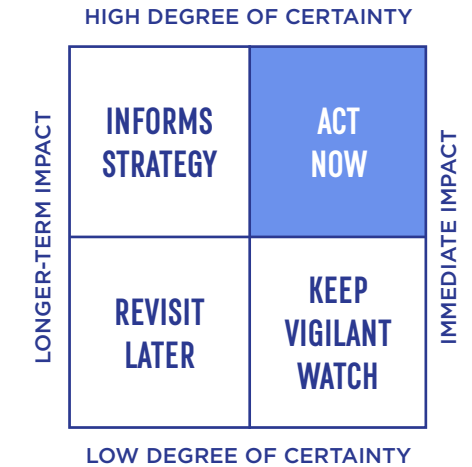
During Sweden’s 2018 election, more than a hundred journalists gathered together to create **Pop-Up Newsroom Riksdagsvalet** – a temporary newsroom designed to curb misinformation in the final days before voting. It was staffed by the next generation of Sweden’s journalists from three prestigious journalism schools. It was an extension of **Pop-Up Newsroom**, a joint initiative from **Meedan** and **Dig Deeper Media**, launched in June 2017 with the aim of setting up a frame-

work that encourages both editorial and technological innovation.

Meanwhile, news organizations are creating limited-edition news products that don’t require labor-intensive, one-off templates and workflows. Whether it’s a planned news event (such as local elections, festivals or races), an annual conference (**ONA**, **SXSW**, **PopTech**), a season (skiing, football, baseball), or a big story that has a defined beginning middle and end (such as a weather event), limited-edition news products are starting to be used by news organizations.

What’s Next

We anticipate seeing more popup newsrooms, temporary podcasts, newsletters and chatbots that are deployed specifically for just one event. Limited-edition news products are revenue and audience engagement



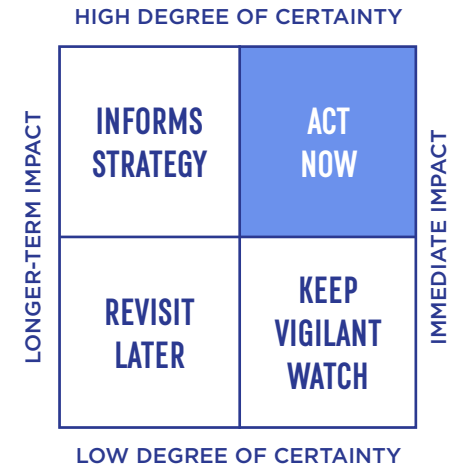
opportunities, as they are vehicles for data collection and targeted advertising.

Watchlist

News organizations everywhere.



One-To-Few Publishing



Key Insight

Newsletters, podcasts and niche networks that captivate smaller audiences made a huge comeback. What's next is an expansion to capture even more niche audiences.



The Latinx Collective is a newsletter published on Revue.

Examples

Suddenly, it seems like everyone—from world leaders, to your next-door neighbor—has a podcast or newsletter. The newest platforms allow content creators to build in a paid subscription model, and early indications are that people are willing to pay. **Revue** and **Substack** both offer tools to launch a subscription newsletter: software, analytics, payments service and templates. Meanwhile, **RadioPublic** guarantees payments to its podcasters. It bookends ads on each episode, and RadioPublic pays podcasters for every listen at an average rate of \$20 CPM, regardless of the show's audience size.

What's Next

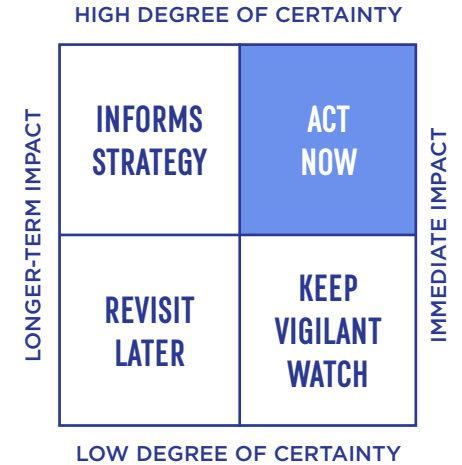
We anticipate seeing more and more niche networks launch, whether they are individual newsletters or podcasts. But we're also expecting to see more mixed reality applications and shows intended for small audiences. There is an opportunity here for media companies of all sizes to earn revenue at scale from a series of small audiences.

Watchlist

RadioPublic; Substack; Revue; PRX; TinyLetter; Mailchimp; Skype; Garage Band; SoundCloud; Libsyn; Stitcher; Auphonic; SpeakPipe; Twilio; PRI.



Abusing The Notification Layer



Notifications are a constant distraction for people who wear smartwatches.

Key Insight

Notifications show bits of information, including updates, reminders and messages from friends. They appear on the lock screens of mobile phones, wearables and connected devices.

Examples

Notifications are particularly attractive to news organizations because they capture attention when our attention is most vulnerable. Leveraging our FOMO, notifications tempt us to look at our screens and to click through. Users who opt-in to receive push notifications increase app retention rates by 2x or more, while opt-in users are twice as likely to engage with the content teased. Most major news organizations, as well as content-creators from other sectors, are now engaging notifications to pull users into content.

What's Next

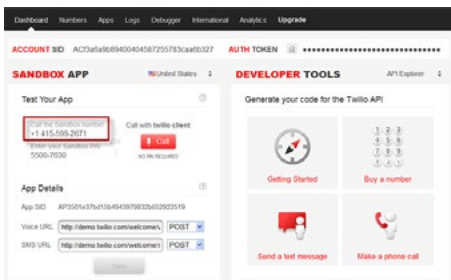
The problem is that notifications now come from everywhere—from the OS, government emergency services, weather apps, games, social networks, podcasts, and more. Notifications with photos and emoji perform better, which is a show of how cluttered the space has become. News organizations will need to develop new tactics and strategies to ensure that their notifications don't add to the existing notification layer of clutter—and so they do not alienate readers.

Watchlist

News organizations everywhere; Android; Apple; Amazon; Microsoft.



Journalism as a Service (JaaS)



Twilio is a service helping to connect and distribute content to consumers.

Key Insight

On the fringes, news organizations are beginning to provide journalism as a service, rather than traditional news products.

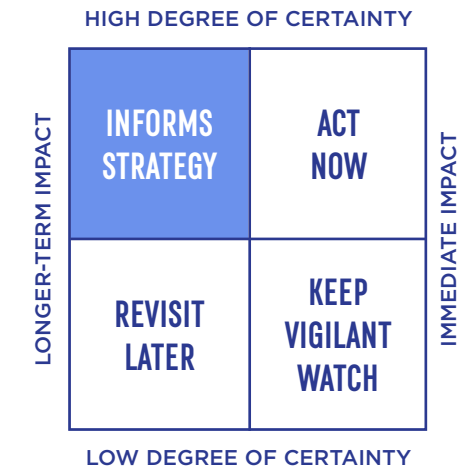
Examples

“Software as a Service” is a licensing and delivery model, where users pay for on-demand access. It’s a model that in the near-future might be an inevitability. The central challenge within news organizations is that there are immediate, acute problems—but reasonable solutions will require long-term investment in energy and capital. The tension between the two always results in short-term fixes, like swapping out micro-paywalls for site-wide paywalls. In a sense, this is analogous to making interest-only payments on a loan, without paying down the principal. Failing to pay

down the principal means that debt—that problem—sticks around longer. It doesn’t ever go away. Transitioning to “Journalism as a Service” enables news organizations to fully realize their value to everyone working in the knowledge economy—universities, legal startups, data science companies, businesses, hospitals, and even big tech giants. News organizations that archive their content are sitting on an enormous corpus—data that can be structured, cleaned and used by numerous other groups.

What’s Next

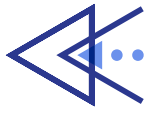
News deployed as a service includes different kinds of parcels: news stories; APIs; databases that can be used by both the newsroom and paying third parties; calendar plug-ins for upcoming news events; systems that can automatically generate reports using the news org’s archives and databases



and the like. Services work outside of the social media landscape, relieving news organizations of revenue sharing and allowing them to fully monetize their services.

Watchlist

PRX; Twilio; REDEF Group; The Information; The Coral Project; MIT Media Lab; ProPublica.



Transparency in Metrics



Chartbeat is a popular metrics tool used in newsrooms.

Key Insight

Social networks are under pressure to offer more transparency in the numbers they report back to news organizations. While most companies that publish content on the web are obsessed with metrics, historically they've kept audience data hidden from staff.

Examples

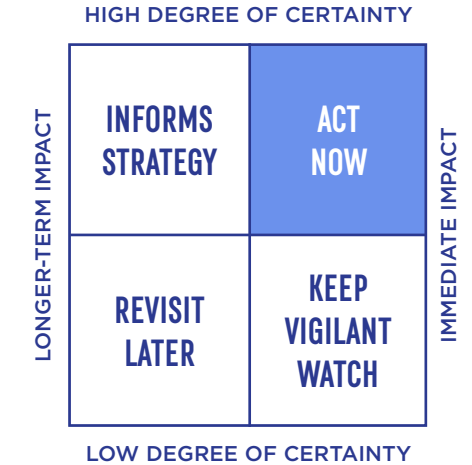
Metrics are neither easy to find nor easy to understand for many working inside of content organizations. **Facebook** has apologized for displaying incorrect numbers of video plays to advertisers and publishers, and said that it had been showing incorrect metrics for two years as it attempted to challenge YouTube. Earlier in the year, current and former Facebook staff alleged they were instructed to suppress conservative news from the

site's “**Trending Topics**” area. During the summer of 2017, Facebook offered new landing page views and page interaction metrics, which the company said would offer better insights for advertisers.

It goes without saying that metrics can influence editorial and business decisions, not to mention how the public interprets the popularity of a story. Most large news organizations have hired audience engagement and analytics managers as go-betweens.

What's Next

Now that **Facebook** has announced it's weighing personal posts over news stories from publishers, and **Google** is launching a native ad-blocking client in **Chrome**, everyone in the digital marketing and advertising space is wondering what's next for metrics. Already, publishers and advertisers will question the validity of metrics that



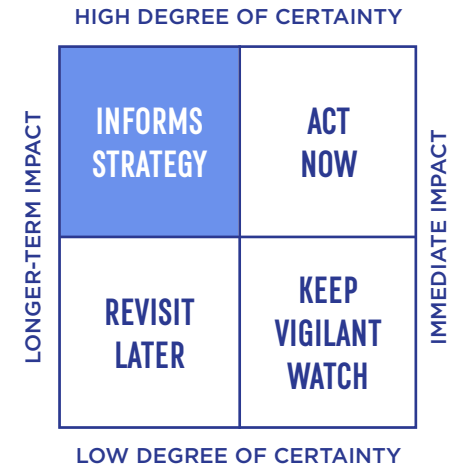
they, themselves, cannot verify. Anyone creating content needs to understand the ebb and flow of traffic and how one piece of content fits into the broader scope of the organization. We also expect to see news and other content as organizations develop new models to bring transparency in metrics to staff—without jeopardizing editorial integrity.

Watchlist

Nielsen; Chartbeat; YouTube; Google; Instagram; Snap; Facebook; Twitter; news organizations everywhere.



Real-Time Fact Checking



In a few years, AI systems will enable more sophisticated fact checking.

Key Insight

Buoyed by charges of “fake news,” real-time fact-checking—powered by both people and algorithm—will be a priority for journalists now and in the near future.

Examples

Digital tools have made it easy to report on a live event and publish in real time, but adding context—such as whether or not a source’s statement is factually accurate—usually happens after. Late in 2016, **Google** introduced a fact-check tag to its **Google News** service—readers can see fact checks next to trending stories. As we now see on a near-daily basis, inaccuracies and falsehoods quickly spread on social media masquerading as the truth. At least when it comes to citing numbers and data, artificial intelligence will soon allow news organizations to automate the fact checking process.

What’s Next

In a few years, AI systems will enable more sophisticated fact checking: explaining whether information was taken out of context, or exaggerated, or downplayed. Soon, we might be able to fact-check statements with the help of Augmented Reality. For example, during speeches and hearings, an AR app could show the relationship a person has to various funders and lobbyists every time they speak.

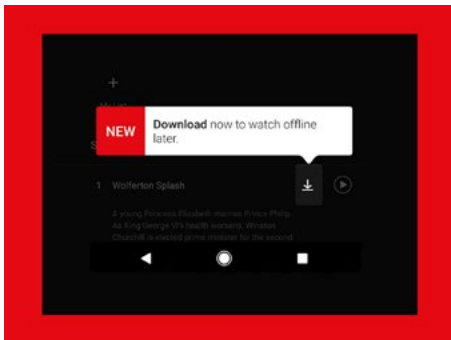
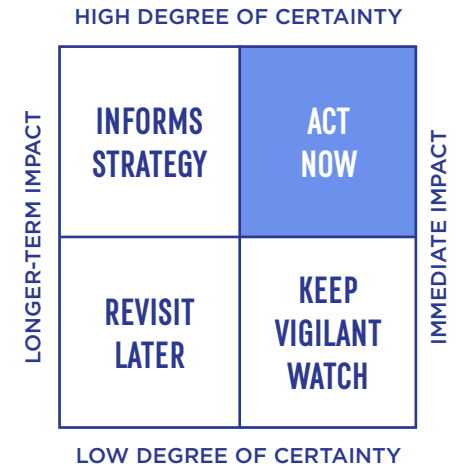
News organizations have a tremendous opportunity to use AR and AI along with social media data and their own article databases, to build tools for real-time fact checking, adding a critical editorial layer that’s both good for the public interest and good for building brand reputation.

Watchlist

IBM Watson; Tencent; Baidu; Google; Amazon; Facebook; Twitter; news organizations everywhere.



Offline Connections



Netflix now allows users to watch videos offline.

Key Insight

As consumers shift to their mobile devices, developers are making sure their apps work offline.

Examples

In the U.S., consumers now spend an average of five hours a day on their mobile devices. As consumers move about our days—commuting, walking around the office, or sitting through a Little League game—they still find themselves offline. **Netflix**, **YouTube** and **Amazon Prime** now feature offline viewing, allowing consumers to temporarily download videos to watch at their leisure.

A number of news aggregators—including **Google**, **Smartnews** and **Apple**—want to capitalize on the time consumers devote to their screens, even when the WiFi signal is weak. The **Washington Post's** progressive web app cuts mobile page load times from 4 seconds to 80 milliseconds and allows consumers to read news stories without a data or WiFi connection.

What's Next

Until news consumers have ubiquitous access to cheap, fast data, offline reading will be a necessity. News organizations that include seamless, offline experiences will find sticker audiences.

Watchlist

Tencent; Baidu; Google Play; Pocket; Amazon; news organizations everywhere.



Audio Search Engines



Audio search engines offer another way to find content.

Key Insight

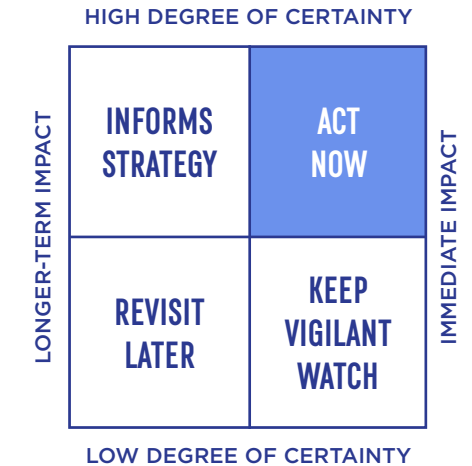
As news organizations venture into podcasts, new search tools allow the newsroom—as well as news consumers—to find exactly what information they’re looking for within audio-only content. However we’re also finding that speech recognition is vulnerable to new kinds of adversarial attacks.

Examples

While developers have learned how to quickly index and display web content, digital audio has always remained an unsolved challenge. Now, rather than searching for a topic and getting a bunch of hyperlinks to click through and listen to, consumers will instead receive a series of buttons that play the exact snippet of audio that’s related to their search. Spotify recently enabled audio search for its

content. Better than buttons, consumers can also speak their searches to a voice assistant and immediately get to the podcast they were trying to remember, to replay a news report they’d heard in the car, or to get a series of clips related to a subject they’re interested in.

Startup **Audioburst** uses artificial intelligence to index audio broadcasts and make them easier for consumers to find. Rather than searching for keywords, Audioburst uses natural language processing to automatically discover the meaning conveyed and to surface the right content. For example, if a consumer wants an update on the election, she can ask a voice-activated app (**Amazon’s Alexa**, **Google Home**), which will sift through audio information and deliver a set of clips.

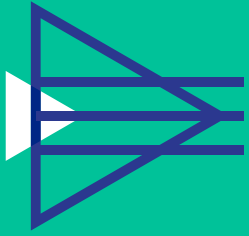


What’s Next

We’re starting to see novel attacks against speech recognition AIs. Attacks can trick speech recognition systems into recognizing a synthetic voice, or sounds that are imperceptible to human ears, or even common ambient noises in our homes (like the phone ringing). Any of these audio cues can trigger a smart system to do something we don’t want, like make a purchase, or crank the volume up to the maximum level. With our increased reliance on audio search, we’ll need to be more vigilant tracking possible vulnerabilities.

Watchlist

Audioburst; Amazon; Google; Apple; Advanced Media; Viacom.



Mixed Reality and Video

058 Streamers

059 Connected TVs

060 WebRTC

061 Streaming Social Video

062 Degree Video

063 Holograms

064 Virtual Reality

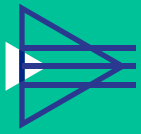
065 Augmented Reality

066 AR Face Filters to Protect Individual's identity

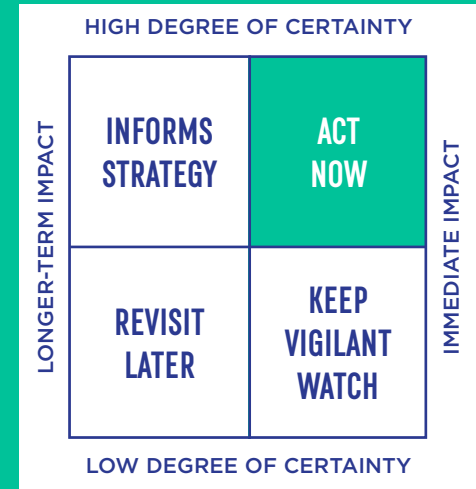
067 AR as a Tool to Enhance Print

068 Mixed Reality Arcades

069 VR For Marketing



Video



Streaming services will erode local broadcast news markets.

Key Insight

U.S. adults now spend close to an hour a day watching online video, and increasingly we're using our mobile phones to access that content. But not all adults prefer video. A **Pew Research Center** survey found that more Americans prefer to watch their news (46%) than to read it (35%) or listen to it (17%). But the demographics might surprise you: Americans age 50 or older prefer video, while the majority of 18 to 29-year-olds (42%) prefer reading the news.

058 Streamers

The 4th quarter of 2017 saw over 500,000 customers abandon their cable and satellite television packages. Best estimates show that approximately 13.5 million homes do not currently subscribe to traditional

television services. A recent survey from **Deloitte** paints an even worse picture for traditional cable and satellite providers. The two leading reasons individuals kept paying for television were the ability to watch live events and affordable cable along with internet bundles. These two factors do not represent a sustainable advantage for traditional cable and satellite providers. Affordable internet is available worldwide and prices should only continue to fall, and successful livestreaming of sports (either through the league or a social media provider) worldwide serves as an effective test case that live events can be successfully streamed through other platforms. We expect to see the continued rise in sales of devices such as the **Amazon Fire Stick**, **Google Chromecast**, and **Roku**, with a steady deterioration in cable and satellite subscriptions over the next couple of years.

Impact on media organizations

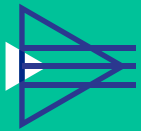
Streaming services will erode local broadcast news markets. These services will also disrupt longer-form television news broadcasts.

059 Connected TVs

TVs that connect to the internet certainly aren't new. What's changed is penetration in average households and the availability of streaming apps that bypass the standard list of cable and public broadcasting channels, such as **Amazon Prime Video**, **Roku**, **Hulu**, **YouTube**, **Showtime Anytime**, **iPlayer** (UK-only), **All 4** (UK only), **Playstation Now**, **HBO Now**, **Direct Now**, **iTunes**, and of course, **Netflix**.

Impact on news organizations

Media organizations can take advantage of connected TVs, offering richer content to maintain and grow audience.



Video cont.



A man holds a 360-degree camera.

060 WebRTC

WebRTC is the real-time communications technology supported by Google, Mozilla and Opera, and it powers **Google Hangouts**. WebRTC can be used to connect your smartphone to the articles you're reading on your desktop or tablet, displaying different components depending on what offers the best user experience. If a video won't display well on your current device, you could be offered a different version automatically. Because WebRTC works from the browser, it's also part of one of the other trends we're continuing to watch: connected machines.

Impact on news organizations

For news organizations, this means that rather than bridging computers to networks, which must route and relay information along various channels, WebRTC and similar peer-to-peer technologies could help computers talk to each other without obstruction. This may seem like a subtle change in Internet architecture, but consider the implications: you would no longer need a third-party operator, like **Skype**, to videoconference with a friend—or to broadcast live news to consumers. Videos would load and play faster and would have no need to buffer.

061 Streaming Social Video

You have likely already seen live coverage of breaking events through **Facebook Live**, **Twitter**, **YouTube** or Instagram livestream. According to **Cisco**, more than 13% of the video watched daily is live content, and that number is continuously growing. Less than a month after launching its 24-hour news service **TicToc**, **Bloomberg** was reporting greater than 750,000 daily viewers. With people increasingly watching content on their phones and computer screens, the desire to get information live, the low barrier of entry to streaming live, and platforms such as **Facebook Watch**, **Instagram**

TV, and **YouTube Live Streaming**, look to see news providers and the media increasingly providing around the clock coverage of main events. What will be interesting to see is whether companies institute paywalls for their content or use advertising to attempt to generate revenue. This also means that for the first time in history, no technical knowledge or specialty equipment is required to broadcast the news. As a result, we are seeing a number of newsworthy events now appearing, completely unfiltered, across social media channels: funerals, arrests, political rallies, conference speeches, encounters with public officials.

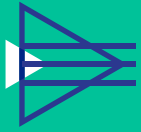
Impact on news organizations

While everyone can stream—and news organizations now have access to that content—we must ask whether everything *should* be broadcast. News organizations need a framework to determine whether rebroadcasting a murder, suicide or violent act streamed via social video is in the public's interest.

062 360-Degree Video

Many news outlets such as the **New York Times**, **CNN**, **Washington Post**, and **Associated Press** have begun using 360-degree video, and we expect to see the trend towards further im-

mersive journalism continue. Schools such as **Columbia University** and the **University of Southern California** are including 360-degree and VR based journalism in their curriculum. The next generation of upcoming journalists will be better versed into how to incorporate 360-degree and VR based approaches into both breaking news and longer form videos. Both 360-degree and VR video have the potential to enhance the user's experience in two distinct but important ways. In the context of breaking news, 360-degree video lets the user capture the full scene of the ongoing event and not just the view the person behind the camera shows you. In longer form videos, 360-degree videos can be used to allow the viewer to become an interactive detective looking for clues from the scene of a crime, or to tour the site of an area ravaged by a hurricane. 360-degree video has the potential to keep viewers increasingly engaged in a time where user's attention spans are seemingly at an all-time low.

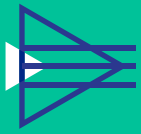


BY AMY WEBB

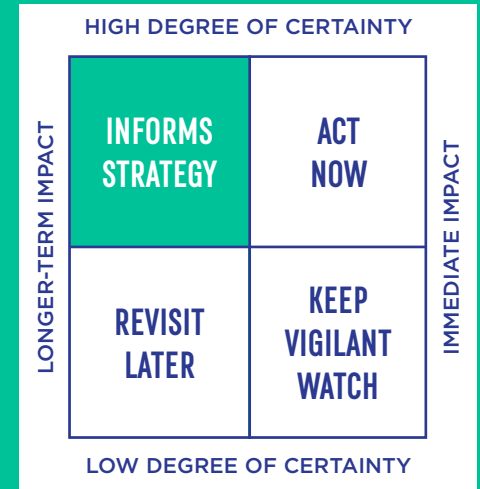
NEAR-FUTURE SCENARIO

We Were Wrong About Social Isolationism.

The idea that in we'd all be sitting alone in our homes, interacting via digital avatars as we completely lost touch with the outside world, turned out to be completely wrong. Instead, new platforms and hardware gave us fun ways to socialize in person. We're spending more time in mixed reality movie theaters, which offer immersive entertainment. There are now mixed reality arcades everywhere. It's the 1980s all over again, but with a twist: MR games, experiences, and meeting rooms are affordable, and they're also accessible for those with hearing and visual impairments. We're going to silent discos, where we wear color-coded wireless headsets connected to our favorite DJ's spinning all night long. Now everyone can dance together, in one shared experience, even if they hate each other's taste in music. We're more connected to each other—and to the real world—than we ever imagined.



Mixed Reality



VR is experienced wearing a pair of goggles and a connected earpiece.

Key Insight

Mixed Reality (MR), also referred to as Extended Reality (XR), combines the physical and digital realms and encompasses a number of technologies: augmented reality (AR), virtual reality (VR), 360-degree video and holograms. These technologies can be used by all media and journalists as a way of enhancing or improving storytelling.

What You Need To Know About MR

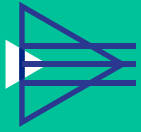
AR, VR, 360-degree video and holograms have been part of our cultural consciousness for many years now but have yet to establish themselves as indispensable, ubiquitous technologies. This coming year however, as the makers of MR devices including Head Mounted Displays and hologram projectors are able to decrease costs and improve ease of use, we will see more devices being made available to the average consumer, and a subsequent increase in the number of news and entertainment firms developing content and experiences for the platforms.

One of the most remarkable phenomena enabled by MR is the globalization of experience—where we once were awestruck at the ability of the internet to bring media, culture, and

goods from across the world into our households and workplaces, we will now begin to marvel at the ability of MR to transport and immerse us in distant environments without ever leaving our everyday surroundings. This presents a major opportunity for news organizations to provide transformational experiences for their audience, transporting them to otherwise unreachable sites from the outer reaches of space to the inner workings of the human body. Here is a prioritized summary, based on our research and analysis, of how news organizations should invest their time and money with regard to MR.

063 Holograms

Professional camera brand Red has sold out pre-orders and pushed back the release of their highly anticipated hologram-generating Hydrogen



Mixed Reality cont.



Smart glasses will soon bring AR to everyday people.

phone, but with a price tag over a thousand dollars the device will likely only attract serious tech enthusiasts for the time being. A second generation of **Microsoft's HoloLens** Mixed Reality headset, touting a lower price point, lighter weight construction, and greater ease of wear, is slated for launch in early 2019. In the entertainment space, startup **Eyellusion** recently raised a seed round of funding to grow their business, which produces concert tours featuring holographic versions of famous late musicians backed by live performers. In an industrial setting, hologram can be used by designers or engineers to save on training costs and give employees a truly immersive experience in their projects. There are numerous companies such as **Realfiction**, **Looking Glass Factory**, **Dell**, and **Google** who are betting that companies and individuals will be interested in hologram based technologies.

Bottom Line

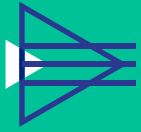
Due to high costs and limited applications, hologram devices for individuals are likely to be rolled out in professional contexts before becoming popular for personal use, at which point news organizations may want to consider producing custom content for holographic platforms. Holographic projections intended for public consumption are currently best suited for entertainment contexts.

064 Virtual Reality

Virtual Reality (VR) is a computer simulated environment. As a tethered experience, VR is experienced wearing a pair of goggles, and it can stimulate sensations of being physically present in the scenes a user is viewing. VR can be experienced untethered as well, by slipping a mobile phone into a special mask. Because the technology is in its early stages, with relatively little content available beyond gaming, the relative value of VR HMDs isn't yet attractive for average consumers.

Bottom Line

The VR marketplace isn't mature enough for widespread adoption, and because VR content production requires the creation of entire environments, cost-effective opportunities for news organizations are limited. Progress in entertainment and gaming applications of VR may pave the way for future adoption by other industries.



BY MARC PALATUCCI

SCENARIO

Plausible Scenarios for Virtual Reality in the next 15 Years

Globalization of Experience Leads to Increased Social and Environmental Activism

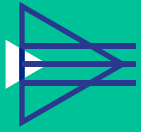
VR has been touted for its ability to heighten a user's ability to feel emotion based on immersive content, a quality that proves productive in raising awareness and action surrounding humanitarian and environmental causes. Users are able to witness firsthand site-specific environmental and social crises and are moved as a result, increasing compassion and motivation to take action.

VR Revolutionizes, Brings Together the Gaming and Entertainment Industries

With its non-exclusionary price tag and democratizing appeal for users of diverse backgrounds and interests, VR technology creates a new culture of fully absorptive social gaming and new styles of entertainment media content, all accessible from a single device, and from the comfort of one's own home. Gaming and video content as we know it are redefined entirely, with new hybrid forms emerging that blend narrative and interactive elements in sprawling immersive digital worlds.

Atrophy of the Human Being as a Physically Social Animal

Exponential advancements in VR and AI allow for the creation of a faithful and customizable digital verisimilitude of our reality. Humans recede into full-body VR suits, capable of producing a full range of sensorial stimuli, and real-life interactions become virtually non-existent. Our imaginations become our reality, at the expense of our physical form.



Mixed Reality cont.



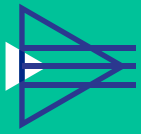
065

Augmented Reality

Augmented Reality (AR) doesn't simulate an entirely new environment, but rather overlays digital elements onto your natural field of vision. AR is often experienced with a Head Mounted Display or smart eyewear, with devices by leading brands like **Apple**, **Google**, and **Microsoft**, as well as the lesser known **Vuzix** and **Meta**, either in development or already on the market. **Magic Leap**, an AR startup that's generated tremendous buzz and billions in funding, is set to release their hotly anticipated **Magic Leap One** headset to the public by the start of 2019. Apart from the HMD market, **Sony** introduced a different sort of AR product with the **Xperia Touch** projector, which can transform into an interactive touch screen. AR can also be experienced on mobile devices, as in the case of **Niantic's Pokémon Go**, the popular gaming app in which virtual creatures, visible via one's smartphone camera, are scattered throughout buildings, landscapes, and city streets worldwide to be tracked down and "captured" by the players.

Bottom Line

AR offers significant market potential for news organizations in the near-future, with the potential to facilitate delivery of real-time reactive content based on recognizable elements in a user's field of vision.



BY MARC PALATUCCI

SCENARIO

Plausible Scenarios for Augmented Reality in the next 15 Years

AR Gaming and Education Leads to Improved Collective Health

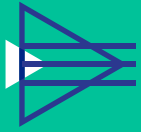
With games like Pokémon Go leading the way, AR significantly increases the amount of daily activity for the average individual, decreasing the health risks caused by a sedentary lifestyle. Encouraged by games and educational applications featuring digital elements distributed throughout cities and landscapes, people spend more time on their feet and out of doors. Mental health, fitness, and life expectancies improve.

Workplace Applications of AR Increase Productivity, Decrease Training Costs

Having adopted AR systems before the general public, and with significant resources and common goals supporting their efforts, companies make the most efficient and effective use of the technology by implementing it to improve infrastructure, operations, training, and scenario simulation. Everything from collective product design to workplace emergency drills become less costly and more effective, boosting overall productivity.

Dissolution of a Unified Collective Reality

AR comes to define the context in which the average person experiences their daily life, but as a result of over-customization, people lack a common perspective and become severely alienated from one another. Given the ability to define their sensory perception of other people, places and things based on personal preference, individuals become less able to align with one another through shared experience. The rate of real-life social interaction plummets and the human race becomes irreversibly fractured.



Mixed Reality cont.

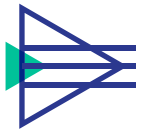


066 AR Face Filters to Protect Individual's identity

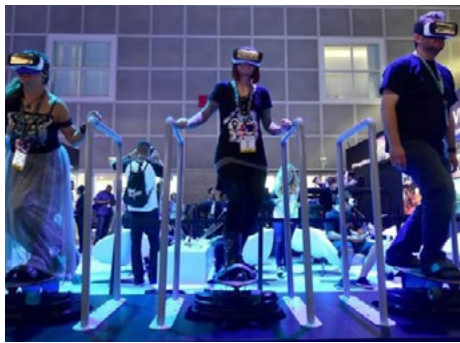
Some media outlets have begun using AR features like **Snapchat** face filters as a way of concealing the identity of the person speaking while still allowing the viewer to see the facial expressions of the person speaking. **The Hindustan Times** has used these face filters when talking to underage rape victims allowing them an opportunity to tell their story while protecting their privacy.

067 AR as a Tool to Enhance Print

One trend we expect to continue to see grow is the AR as a compliment to print. Media companies are using AR in print as a way to further engage consumers. AR is incorporated through two distinct channels: content and advertising. Services like **blippar** add animations, models, or images that can only be unlocked using a smartphone. Companies such as **Max Factor** and **Net-A-Porter** have used AR to allow users to scan the items they like and directly purchase them through their mobile phone. The success of AR driven ad campaigns represents a win-win for both the media company and the advertiser, and brands will continue to use this innovation due to the discounted price of print advertising.



Mixed Reality Arcades



Mixed Reality arcades are bringing games to everyone using new business models and cutting-edge equipment.

Key Insight

There are a host of fun, interactive mixed reality games on the market—but not everyone can afford the computer and gaming equipment necessary to play. As a result, a new kind of arcade for the next-generation of gamer is coming to a venue near you.

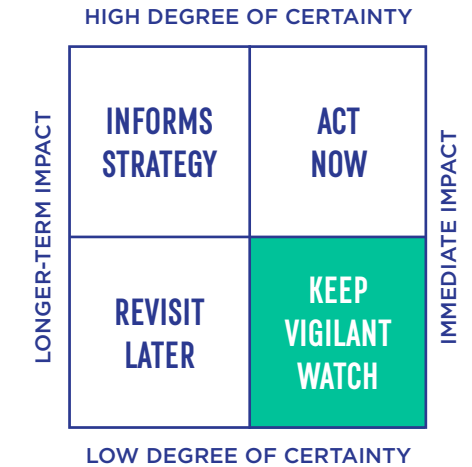
Examples

In the 1980s, video game arcades became popular—at first with geeky kids and then the mainstream masses, as Pac Man, Galaga and Space Invaders consoles popped up all around the world. They took off because kids and adults alike both loved playing them—and because early at-home consoles and computers were still too costly for the average person. We're in a similar transition now, as VR games move from the fringe to the mainstream. Mixed Reality gaming parks

are opening up everywhere, giving everyone the ability to strap in to a host of games—but this time around, they don't take quarters. Startup **Virtual World Arcade** offers a membership packages for unlimited VR time. In Tokyo, **VR Park** offers more than basic games—players can opt-in to swinging harnesses, flying platforms and platforms that simulate bungee jumping, flying and yes, even falling off skyscrapers.

What's Next

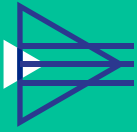
Mixed Reality arcades are proving to be a big business. We expect that as the MR market matures, we'll see additional arcades opening up everywhere. One distinction that might keep MR arcades from going the way of Pac Man—all the haptic interfaces. As games become more immersive, players will need to update more than their headsets and consoles. At some



point, it might be easier and more cost effective to buy a membership rather than a new flight suit every few months.

Watchlist

Intel; Grand View Research; HTC; Samsung; Viveland; Oculus; Facebook; Alphabet; VRNISH; Inception VR.



VIRTUAL VOCABULARY

A MINI-GLOSSARY FOR THE VIRTUAL REALITY TERMS YOU'LL NEED TO KNOW IN 2019.

Cinematic VR

VR created with video and images from the real world. (The alternative is computer-generated graphics.)

Extended Reality

Extended Reality (XR) is a catch-all describing every environment resulting from combinations of the real and the virtual, as well as every interaction between humans and machines in relation to those environments and the devices used to create them. XR encompasses VR, AR, and MR, and may come to supplant MR as the most inclusive term for digitally integrated realities.

Eye tracking

A system that can read the position of the user's eyes while using VR. Eye tracking software allows a user to aim correctly with her head while in a simulation.

Field of view (FoV)

What a user can see in her visual field while in a simulation. The viewing angle for an average, healthy human eye is about 200 degrees, so a field of view close to or greater than that is optimal, because it creates a true sense of being within an environment.

Haptics

In addition to a VR headset, hand-held controllers are often used. Some are equipped with haptic feedback, which gives the user the sensation of touching something in the simulated environment or receiving touch-back reactions.

Head mounted display (HMD)

This is the headset you've seen people wearing. It typically includes a strap both around and over the head, which secures the screen to your face. Some HMDs include built-in headphones as well as sensors for head tracking.

Head tracking

Some HMDs are equipped with special sensors that track the exact movements of the user's head. The sensors then send feedback to the system, which moves the images and audio a user experiences in her field of vision in real-time.

In-ear monitors (IEM)

These are earbuds that work with head mounted displays that don't offer built-in headphones.

Latency

Sometimes, the system isn't capable

of showing the images in exact synchronization with the user. When that happens, a user moves her head, but the images she's seeing lag behind a few fractions of a second. This lag is a reason why some people experience "simulation sickness."

Presence

When a user feels as though she's fully immersed within a simulation, like she's actually there, she's achieved "presence."

Refresh rate

How quickly the images are updated. Higher refresh rates cut down on latency and provide a more realistic simulation. Ideal refresh rates are above 60 frames per second.

Room scale

This is the tethered version of VR that offers users the capability of walking around a room and interacting with virtual items, as they walk around in the physical world. So if you take a step in the real world, you're also taking a step in the virtual simulation. For this to work, rooms need to be mapped in advance.

Simulator Sickness

A nauseated feeling experienced as

a result of simulated motion while wearing an HMD. The issue was well documented among earlier HMD users, but makers of headsets have since taken measures in an attempt to prevent this effect.

Social VR

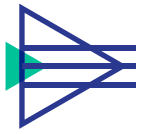
When two or more people are wired in to a VR simulation and able to share the experience by observing each other, interacting or participating in joint activities.

Stitching

The process of combining video from different cameras into one, spherical video suitable for VR. This typically requires a tremendous amount of editing to fill in gaps, reorient scenes and seamlessly meld video streams so that the simulation looks authentic.

VR face

When a user has been in a simulation, a few things happen: the head mounted display tends to leave a temporary imprint on the skin, not unlike a pair of swimming goggles. Users also tend to relax into a slack-jawed look, with their mouths slightly agape.



VR For Marketing



A woman wears a Samsung VR device to test drive a BMWi.

Key Insight

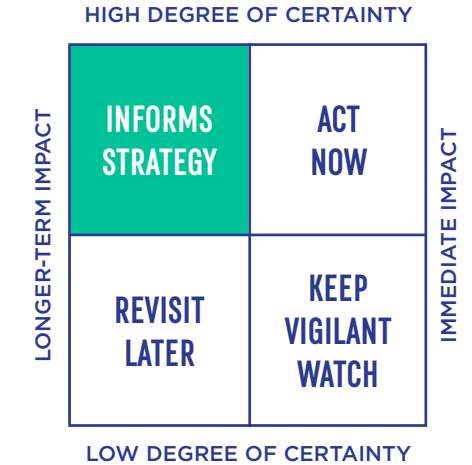
Emerging research suggests that virtual reality storytelling, when it's done well, rewires all of us—we are likely to develop new belief biases as a result.

Examples

For more than a decade, scientists have been studying “**virtual reality exposure therapy**,” which has been used extensively to treat veterans suffering from post-traumatic stress syndrome. Because VR is completely immersive, it can closely simulate nearly any scenario. Patients, guided by trained therapists, are embedded into VR stories that represent a trauma they’ve experienced. Over time, this therapy results in new neuropathways—beliefs, attitudes and reactions are changed, for better or for worse. This presents an interesting opportunity for marketers.

What’s Next

VR is being used for both B-to-B and B-to-C marketing. **Key Technology**, which manufactures food processing systems, built a VR marketing experience to help vendors see its digital food sorting platform in action. **Lowes** stores offers virtual skills training in VR, guiding DIYers through home improvement projects. Both **BMW** and **Volvo** have created apps allowing would-be buyers to test drive one of their cars. But unlike the usual test drive with a nagging salesperson trying to convince you to buy the upgraded sport mode package, you instead interact with the vehicle on gorgeous open roads, in the best possible weather, all by yourself. Spend enough time with the apps, and your belief bias will shove your logical mind into the back seat. You might start to think that inside one of those cars, every day is a traffic free



holiday where you have the driving skills of **Formula One** superstar **Lewis Hamilton**. This, of course, highlights an impending ethical challenge.

VR headset sales jumped 75% year over year in 2017, and we anticipate more growth in the coming year. In the near-future brands will have a unique opportunity to tap directly into our minds, persuading us through immersive storytelling.

Watchlist

HQSoftware; Deep VR; 360 Profilms; Light Sail VR; Perception Squared; TaKanto VR; Circos VR; Helios Interactive; Rewind; Reverage VR; BBH; Goodby Silverstein & Partners; VirtualSKY; Leo Burnett; BBDO; Facebook; Droga5; Ogilvy & Mather; Razorfish; Weiden+Kennedy; GSD&M; VML; Critical Mass; Three One Zero; Valve; Wevr; Alphabet; Innerspace VR; StartVR; Epic Games; Survios

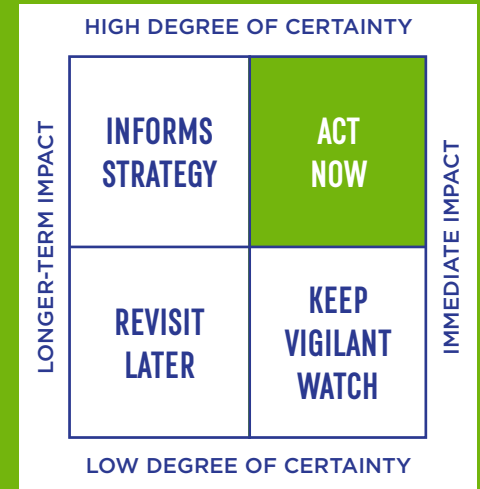


Wearables

- 070** Smart Glasses
- 071** Hearables / Earables
- 072** Head Mounted Displays
- 073** Haptics
- 074** Thinkables
- 075** Embedables
- 076** Smartwatches



Wearables



Neurable’s brain-computer interfaces enable hands-free control in virtual reality.

Key Insight

When it comes to wearables, expectations have long outweighed the reality, with early high-profile missteps from **Google** and **Intel**, slow sales growth for the **Apple Watch**, and little to speak of from the world of fashion, an industry many expected to excel at wearable tech.

However as of September 2018, the Future Today Institute is tracking **541 wearable devices**, in various stages of development—from fringe experimentation to mass-market sales. The **Future Today Institute** estimates that by the end of 2019, **360 million wearable devices will be sold worldwide**. More than half are dedicated to fitness or biometrics, while others are intended for gaming, work and medical monitoring. Global sales should generate revenue of \$39 billion in the coming year. As companies continue to learn what works and what doesn’t in wear-

ables, we’re seeing more successful products and features focused mainly on media, messaging, education, gaming, and health. Even the once-reviled **Google Glass** has found a new role in didactic applications, assisting with training and procedures in operating rooms and on factory floors.

As wearable tech begins to approach critical mass in the coming years, news and media firms that invest in content tailored for the portable products—think bite-size briefings for wrist-mounted displays, or POV how-to’s for smart eyewear—will be poised to capitalize on the trend. In addition, news organizations should consider wearable tech as a two-way street—not only a means of providing media to consumers, but also receiving information from them. Personal data ranging from sight lines and heart rates to sleep patterns and ambient weather conditions could be

transmitted instantaneously to businesses, providing key insights on user behavior and enabling highly targeted content distribution. Plus, wearable cameras like **Snapchat Spectacles** or the **GoPro Hero** could facilitate live citizen journalism video footage from vantage points otherwise inaccessible to news bureaus. Familiarity with wearables and their various applications could prove highly valuable in the foreseeable future.

Watchlist

Apple; Samsung; Fitbit; Google; Jabra; Garmin; GoPro; Huawei; Xiaomi; Snapchat; Nike; Under Armour; Facebook; Immersion; Neuralink; Neurable; Apple; Microsoft; Intel.



Wearables cont.



070 Smart Glasses

This will be the year that developers start experimenting with **Magic Leap**, whose smart glasses project light directly into the user's eye, making it seem as though digital objects exist in the real world. Don't force connections between **Google Glass** and what comes next. Glass was a successful technology in search of a market.

071 Hearables / Earables

In-ear computers, otherwise known as earables, are a burgeoning sector of wearables. Integrating features like voice commands, biometric tracking, selective noise-canceling, music and data storage, and software integration, these devices are essentially headphones with far more advanced levels of functionality. Future versions of **Apple's** popular wireless **EarPods** will be able to monitor temperature, perspiration and heart rate during exercise or sports—and those earbuds will be used to control devices such as our phones using only head gestures. The **Bragi Dash** earbuds double as a personal assistant, responding to gesture as well as voice, and multi-port earpieces from **KUAI** are waterproof for use while swimming. News organizations should begin experi-

menting with audio applications built for earable interfaces.

072 Head Mounted Displays

Head Mounted Displays or HMDs are most commonly applied in the contexts of VR, gaming, and immersive simulation. Though the devices have yet to truly take off with household consumers, possibly due to issues with discomfort and nausea, leading devices like the **HTC Vive** and **Oculus Rift** show potential to grow beyond a niche market of gamers and professionals. **Apple** hopes to make waves in the HMD space by combining AR and VR in a single ultra-high-resolution device, slated for release in 2020. For the time being, the main opportunity for news integration is via immersive 360 degree video.

073 Haptics

In the context of wearables, haptics describe devices that communicate with the user via tactile sensations—the vibration of a smart watch as a means of notification, for example. As wearables evolve, the mechanics of haptics will become more nuanced and complex, as will their applications. Swedish sportswear brand **POC** built a prototype cycling backpack integrated with GPS directions to indi-

cate right and left turns to the wearer through haptic vibrations, and **Facebook** has even tested a device worn on the forearm that can translate a limited lexicon of words into a series of patterned vibrations. This technology and the adoption of a haptic “language,” though far from imminent, could be of use to news organizations in communicating headlines or tweets to consumers without the need of an audiovisual interface.

074 Thinkables

No longer the stuff of science fiction, thinkables are the category of wearables that create an interface between the brain and technology, allowing the user to control designated devices using only their thoughts. Boston-based startup **Neurable** created a VR game controlled via thinkable interface, which helped them recently secure series A funding to continue research in the field, and **4DForce** makes a headset that converts brainwaves into signals a computer can understand, with gaming, wellness, and entertainment as the intended application. Most ambitious is **Neuralink**, a neuro-technology company founded by Elon Musk that is developing a bio-adaptive neural lace to be “worn” on the human brain, which Musk hopes will initially help to treat neurological diseases, and eventually allow for en-



Wearables cont.



hancement of the brain by connecting it directly with the internet. **Facebook** is also active in thinkables, working to develop a device that can deduce what word one is thinking of by reading their brainwaves.

075 Embeddables

At the extreme fringe of the wearables trend, groups of biotech and body-modification enthusiasts, sometimes referred to as “grinders,” seek to embed technology directly into their bodies. Implants range from decorative LED lights, to Bluetooth-enabled biometric devices, to RFID chips placed under the skin of the hand and used in place of keycards to unlock electronic doors. This is a highly niche trend, with no obvious opportunity for news organizations, though one popular practice in this subculture is to implant magnets in the ears that act as headphones, which could potentially be used to consume audio media. Due to the health risks associated with implanting technology into the human body, embeddables are unlikely to enter the mainstream in the near future.

076 Smartwatches

Smartwatches and smart wristbands represent one of the most approachable types of wearables, with the **Apple Watch** and **Samsung Gear** leading the market. Global sales of the wrist-mounted devices are accelerating, though they are still largely considered auxiliary devices to one’s mobile phone. As they gain in popularity, they stand to evolve into primary devices in their own right, with developers building more advanced apps and features tailored to the product, making use of location services, motion response, and hands-free functionality. The future of smart watches is promising, and news organizations should consider how best to adapt their content to these devices in order to gain a foothold in the wearables space.



BY MARC PALATUCCI

MID-FUTURE CATASTROPHIC SCENARIO FOR WEARABLES

Rise of Wearable Tech Leads To The Surrender of Personal Autonomy

We've already heard cautionary tales of betrayal by the devices we've welcomed into our homes—smart speakers eavesdropping on us, gaming consoles tracking our movements, laptop cameras surreptitiously peering into our private lives. Now imagine a future for wearable devices where we're willingly strapping those microphones, cameras, and trackers to our bodies, lured by the benefits they provide us but unaware that we are subjecting ourselves to extremely invasive levels of surveillance. Add to this premise the possibility of biometric devices that communicate directly with our neurological and bodily systems, and entire populations could be shockingly vulnerable to manipulation by forces beyond their control.

Take the United States, for example. You may remember the scandal surrounding the US National Security Agency's PRISM program, in which tech giants including Microsoft, Google, Facebook, Skype, and Apple reportedly made massive amounts of private user data available to the government in some capacity without informing their users. Revelations of the US government's violation of its citizens' privacy came about when Edward Snowden, a contractor for the NSA at the time, leaked classified documents pertaining to PRISM. A public outcry followed, but the program is still active, and calls for transparency did little to shed light on any continued alliances between the NSA and Silicon Valley.

Many of the tech companies in question are the very same firms that will be heavily involved in the hardware and software of the fast-growing wearables market, and knowing the access they secretively granted to the government, it is not far-fetched to think they might do the same for companies with whom they wanted to curry favor. With its tremendous influence on public opinion, the news media industry would be a likely candidate for collusive behavior. Given access to user data, news and media agencies could acquire exhaustive personal information about a large portion of the public. If a dishonest or nefarious media organization decided that the beliefs or behaviors of a particular subset of the population—defined along parameters of age, race, religion, sexual orientation, or political affiliation, for example—were detrimental to their interests, members of the subset could be easily identified, tracked, and targeted with content to exploit their psychological profile, disrupt their lives and influence their actions. Even—or perhaps especially—if implemented in subtle ways, manipulation of the populace via wearables could have devastating effects.

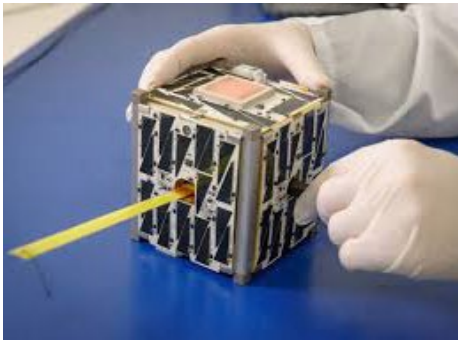


Hardware

- 077 CubeSats
- 078 Drone Delivery
- 079 Increasing Patents and Calls For New Regulation
- 080 Drone Lanes
- 081 Sense And Avoid Technology
- 082 Microdrones and Drones Used In Dangerous/ Hard-To-Reach Areas
- 083 Drone Swarms
- 084 Searching The Internet of Physical Things
- 085 Intelligent Cameras
- 086 Faster Connectivity With 5G



CubeSats



The PhoneSat 2.5, a CubeSat built at NASA's Ames Research Center.

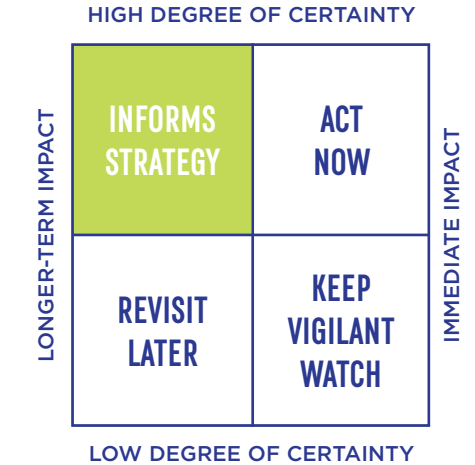
Key Insight

Entrepreneurs are building and preparing to launch thousands of low-cost, high-value satellites in the next three years. These satellites are small, capable of communicating with each other, and will photograph every inch of Earth's surface every day of the year.

Examples

Miniature satellites, otherwise known as **CubeSats**, aren't new technology. They've actually been in use by space agencies for years. What's changing is the launch technology that lifts CubeSats into orbit. Heavy investment into propulsion systems—not to mention significant advancements in technology and cheaper components—are making it easier to mass-produce tiny satellites in a factory and launch them for a variety of purposes. Fleets of CubeSats now take photos of farm-

land and beam them back down to earth to help farmers assess their crops. Image analysis software can tell big box retailers, such as **Walmart**, how many cars are parked in their lots and look for trends over time. They can then do the same with a competitor's parking lots to gather strategic intelligence. Mining companies can survey a swath of land to see who's started drilling and whether they've struck oil. Satellites monitor traffic, polar ice caps, and even us. Unlike a traditional, large satellite, when one CubeSat goes offline or gets damaged, the rest of the fleet still works. Near-real time images, coupled with machine learning and analysis tools, is big business. Governments, big agricultural corporations, intelligence agencies, shipping companies and logistics firms all want access, so they're willing to pay tens of millions of dollars a year for access. The com-



bined valuation of companies such as **Planet**, **Airbus D&S**, **MDA** and **DigitalGlobe** is well into the tens of billions.

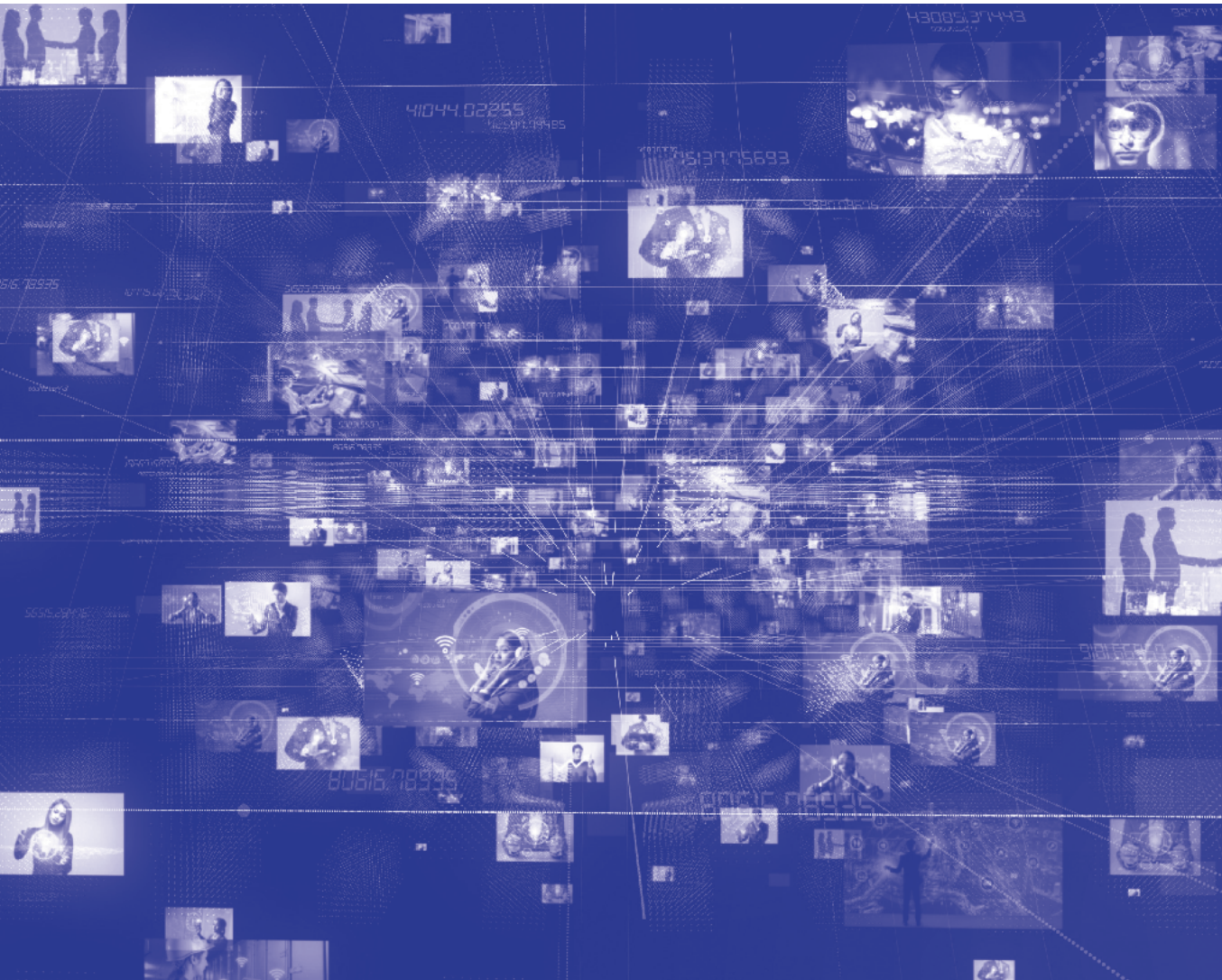
What's Next

The **Federal Aviation Administration** is projecting “an unprecedented number” of satellite launches between 2018-2020. This will allow journalists, companies, governments and private citizens to gain access to the images and tools for all sorts of purposes. CubeSats and image analysis will help us better understand the pulse of our cities, gain a deeper view into weather events and dive into criminal activity. But that goes both ways. CubeSats could become a national security liability.



TREND 077

CubeSats cont.

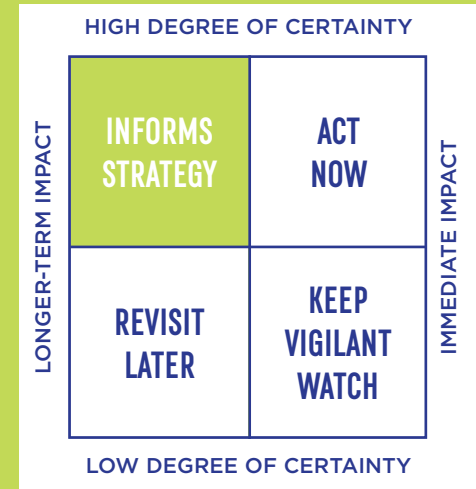


Watchlist

Space Systems Loral; MDA; Planet; Planetary Resources; Airbus D&S; DigitalGlobe; National Geospatial Intelligence Agency; 3 Gimbals; Space Exploration Technologies Corp; Orbital Insight; Google; Space-Know; Capella Space Inc; OneWeb; SpacePharma; Santa Clara University; Technische Universitat Berlin; Tokyo Institute of Technology; University of Tokyo; California Polytechnic University; Cornell University; Boeing; Delft University of Technology; NASA Ames Research Center; Transcelestial; NSLComm; Earthcube; Aerial & Maritime; Fleet Space; Astrocast; Kepler Communications; GeoOptics; Hera Systems; Sky and Space Global; Astro Digital; Kanagawa University; The Aerospace Corporation; Los Alamos National Laboratory; NRL Naval Center for Space; Space and Missile Defense Command; Satellogic; Spire; US Air Force; Lawrence Livermore National Laboratory; MIT; Shenzhen Aerospace Donganghong; National University of Defense Technology (China); Shanghai Engineering Center for Microsatellites (China); SRI International; Naval Postgraduate School.



Drones



A DJI Inspire 2 flown in Los Angeles. The camera hangs below and the landing gear rises up out of the frame.

Key Insight

Drones are now available in an array of sizes and form factors, from light-weight planes and coptors to tiny, machines no bigger (or louder) than a hummingbird. They now include powerful sense and avoid technology and the ability to fly on their own.

078 Drone Delivery

Towards the end of 2016, commercial drone deliveries launched. U.S.-based **Zipline** brought its drone delivery system to **Rwanda**, where it delivered vital blood supplies. **UPS**, **Amazon** and **DHL** all tested their own fleets of drones. Legislation will soon catch up with the technology. We anticipate that aviation authorities will start to act in 2019-2020, at which point commercial drone deliveries will finally take flight in earnest. This means lots

of new stories to cover, especially for reporters working logistics and business beats—and it potentially means the end of newspaper delivery by humans, forever.

079 Increasing Patents and Calls For New Regulation

Whether drone delivery services ever get off the ground largely hinges on legislation and corporate development. If the number of patents Amazon was awarded in 2017 for drone related technologies (43+) is any indication, retailers are anticipating government approval. **Amazon** was granted a patent for a self-destructing drone that can disassemble itself in case of emergency, while Walmart was granted a patent for a drone that delivers items off store shelves to people while they shop. In late 2017, the **Trump Administration** announced

it had authorized a three-pilot program to test drone traffic under different conditions in “innovation zones.” In **Europe**, the **E.U.** has tentatively agreed to regulations, which at publication date was still waiting for authorization from member countries. **Canada**, the **United Kingdom**, and the **International Civil Aviation Organization** are actively writing new regulations. The results of these pilot programs will dictate the likelihood of drone delivery in 2020 and beyond.

080 Drone Lanes

We’re about to have overhead congestion—which means soon, you can expect invisible drone lanes overhead. Amateur drone pilots continue to cause trouble for commercial and private airline pilots. Currently, the **FAA** does not allow drones to fly near the airspace of airports—but while



Drones cont.



there are no-fly zones, there aren't no-fly circumstances. In **Singapore**, researchers are considering the viability of different options including "air-lanes," the development of "air-blocks" and "air-fences" to manage traffic. **NASA** and the **FAA** are working on initiatives scheduled to end in 2019 and 2025 respectively, which could provide possible nation-wide solutions for managing drone traffic. As sky infrastructure gets designed and developed, look for a potential emerging market for companies in infrastructure management and for AI cloud-based monitoring of the friendly skies.

081 Sense And Avoid Technology

Robots harnessing neural networks and artificial intelligence can make inferences and decisions when programmed to do so. That's because of **sense and avoid technology**. This year, drones will be programmed to navigate along the path of GPS waypoints—and they'll make decisions midair about the best path to take and when to avoid objects like buildings, trees and mountains. Or other drones, for that matter.

082 Microdrones and Drones Used In Dangerous/ Hard-To-Reach Areas

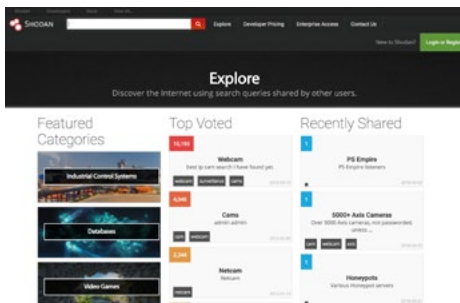
Industries are beginning to utilize smaller, rugged, AI-powered drones to access dangerous and hard-to-reach spaces. Drones are being used to survey the insides of underground mines, ballasts of tanks, and inside nuclear facilities. Home and building inspectors have also begun using drones to inspect rooftops and sides of buildings. Drone adoption for these purposes could result in reducing risk to human life, and cost savings associated with shortened downtimes. **Facebook's** launch of an **internet-providing drone** along with **AT&T's** successful use of a **cellular signal drone** in **Puerto Rico** also highlight additional signals that drones could become a useful and prevalent tool in providing basic services to disparaged areas or locations lacking basic forms of infrastructure.

083 Drone Swarms

Hundreds of micro-drones can be deployed at once and are now capable of moving as one, technological organism in the sky. They're so fast, that cameras have a difficult time capturing them in real-time. This technology was developed by the military, and it's been used for dazzling light shows at **Disney Parks** and during the **Super Bowl** halftime show. Of course, drone swarms aren't always benevolent. Early in 2018, a swarm carrying explosives, said to be controlled by **Syrian rebels**, attacked two **Russian military bases**.



Searching The Internet of Physical Things



Shodan is a searchable internet of things.

Key Insight

The Internet of Things—that massive interconnection between all of our smart devices and the internet—is growing at breakneck speed. We already have billions of physical devices connected to the internet, but what about also searching for real-world things?

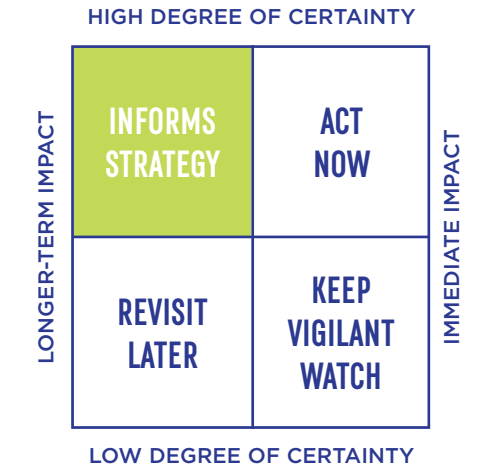
Examples

Several years ago, **Amazon** updated its mobile app to allow people to shop for real-world objects by scanning their barcodes. Its next iteration let users take and upload a photo. Now, you only need to wave your smartphone near an object you want to get more information on, or you can directly add it to your shopping cart. Online search giants like Google and Bing have made it easy to find just about any information in the digital realm. The idea is to let us search

real-world objects, as well as all of the devices connected to the Internet of Things.

What's Next

Shodan and **Thingful** are search engines for IoT devices. It was intended as a security tool to help IT professionals keep track of all the devices connected to a network—but hackers also found that they could remotely access baby cameras and garage doors. **German** lighting manufacturer **Osram** built a tiny chip that can scan a bar of chocolate to determine how much cacao is inside. Its chip helps power a consumer-grade molecular spectrometer built by Israeli start-up **Consumer Physics**, which allows anyone to extract information out of food and pills. This could enable you to scan a piece of chicken in order to search the fat and calories on your plate. Their research is also able to recognize prescription and over-the-



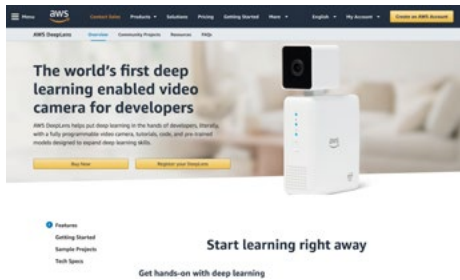
counter drugs in order to spot counterfeits. **Osram** expects that there will be consumer products able to search the physical world launching in the next few years. Meantime, **MatchMaker Exchange** is an “Internet of DNA,” matching the DNA from sick people around the world to help researchers discover rare genes. It’s not unrealistic to say that in the near future, everything you see (and even the things you can’t) will become searchable via a distributed network. But what if the real-world gets hacked? It’s possible that someone could re-label contaminated medication as pure. As the searchable physical IoT grows, we will need a new system to verify searches.

Watchlist

Shodan; Thingful; Qualcomm; Intel; Alphabet; Microsoft; Apple; Tencent; Alibaba; Baidu; Amazon; Osram; Consumer Physics; MatchMaker Exchange



Intelligent Cameras



Amazon's smart camera system includes pre-trained models for deep learning skills.

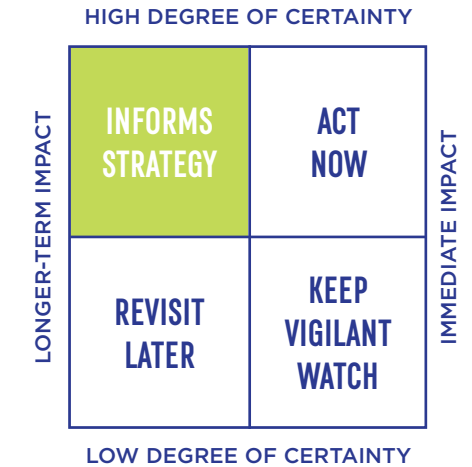
Key Insight

Cameras themselves are getting smarter, and they now have on-device AI capabilities. They are able to listen to and watch what's in the frame, then make decisions based on that information. That might include locking a door, recording a conversation, or following a robber as he runs down the street.

Examples

Late in 2017, **Amazon Web Services** announced a \$250 AI-powered camera called **DeepLens** that includes optical character recognition, as well as image and object recognition. A smart camera would enable companies to remotely count and monitor warehouse inventories. They could also let conference organizers and Hollywood movie studios gauge the level of enthusiasm during performances (no more focus groups or

having to beg attendees to fill out post-conference surveys!). **Google** launched **AIY Vision Kit**, a smart camera kit that works with **Raspberry Pi**—the company is hoping that DIY enthusiasts and developers will start building smart camera applications. **Yves Béhar**, who designed the August smart lock, created a new home security camera called the **Hive View**—it automatically sends smartphone notifications when it detects any unusual motion or sound. Engineers at the **University of Washington** have developed a system of networked cameras that can automatically track people as they move. Combined with **facial** and **object recognition** algorithms and **AI**, smart cameras will provide unprecedented security opportunities. They will be used in our cars, bringing us one big step closer to hybrid-autonomous vehicles, where drivers will choose to take control of the wheel or allow the car to drive itself during stop-and-go traffic.



What's Next

Advancements in smart camera technology are critical to the future of our future AI ecosystem. Soon, they will be able to see in the dark. Recognition algorithms will do more than spot people and pets. They'll connect with other IoT devices, making autonomous decisions—like when to lock the doors, whether to close off bridge access, and which roommate gets the last slice of pie.

Watchlist

Amazon; Alphabet; Microsoft; Qualcomm; Intel; Tencent; University of Washington; Microsoft; Camera Culture Research Group at the MIT Media Lab; Institute of Anthropomatics & Robotics at the Karlsruhe Institute of Technology; National Instruments; Electronic Frontier Foundation; Austrian Institute of Technology; University of Birmingham



Faster Connectivity With 5G



5G will help to power city infrastructure.

Key Insight

5G trials, supported by the **Federal Communications Commission** and the **European Union**, are underway around the world.

Examples

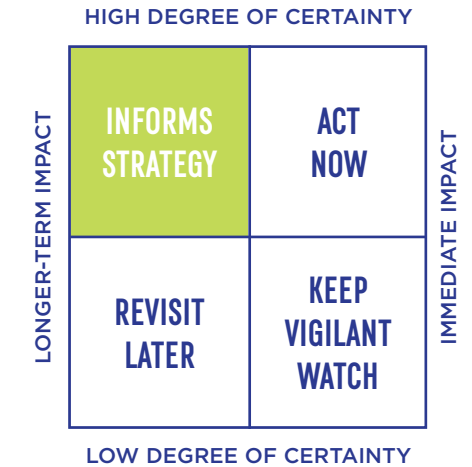
5G is the fifth generation of wireless technology. We had 1G in the early 1990s and 2G in the late 90s, which enabled us to send text messages between two mobile devices. 3G supported our ability to browse the internet. Now, with 4G, we're able to download and upload large videos. 5G will dramatically increase the speeds at which we connect—we'll be able to pull **HD** and **3D video** and use **VR** in the cloud, since download speeds will hover around 10 gigabits per second, which will be a boon for news organizations that distribute video content. But it isn't just our phones that will use the connection:

driverless cars, smart cities, and smart grids will all rely on 5G.

What's Next

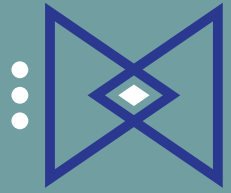
Local internet service providers have been reluctant to upgrade their networks, but that's starting to change. Already, some carriers are integrating **Gigabit LTE** into their existing networks, a sort of pre-5G upgrade. In the U.S., **AT&T** and **Verizon** have both announced limited-scale 5G, though it's more likely the networks will be ready in late 2019 or 2020. However, once the networks are ready, the changeover to 5G-enabled devices will be swift.

Hardware manufacturers like **Qualcomm** are readying 5G modems and advanced chipsets. Globally, there will be a new wave of spectrum auctions (and arguments).



Watchlist

Federal Communications Commission; European Union; Qualcomm; Intel; ISPs.



The Media Business

087 Media Consolidation

088 Ad Blockers





Media Consolidation



OpenAP is a consortium of TV publishers headed by Turner and Viacom.

Key Insight

Digital audiences increase as margins continue to shrink for traditional media companies. Ad-based revenue models are difficult to sustain, especially for local media outlets and many are shutting their doors. Deregulation from the FCC is paving the way for large media corporations to continue to consolidate through acquisitions and vertical integration.

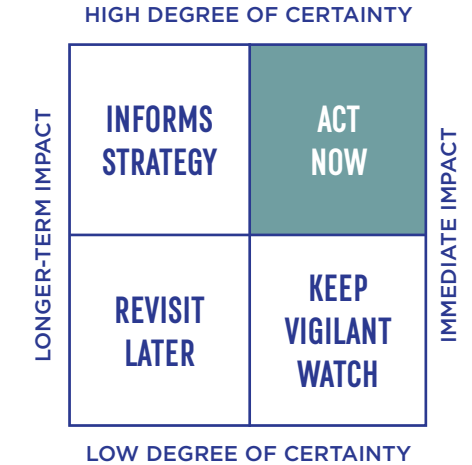
Examples

This year we saw the further consolidation of news and media companies, across all traditional distribution channels: television, radio and print. **IHeartMedia**, owner of the largest radio network in the US, filed for bankruptcy with \$20B in debt. Its next largest rival, **Cumulus** filed for bankruptcy a few months earlier. **Disney** and **Comcast** have been in a bidding war to buy the entertainment division

of **21st Century Fox** since the summer of 2018. **Discovery Communications** completed a merger with the **Scripps Networks** and **Time Magazine** was acquired by **Meredith Corporation** for \$2.8 billion only to be put up for sale again four months later. **NBCUniversal** has continued to make equity investments in **Buzzfeed** and **Snapchat** to grow its digital portfolio.

Niche digital outlets with substantial audiences have also been forced to close. The **Gothamist** and **DNAInfo** were shut down last year after employees voted to unionize; the **Hairpin** and the **Awl** ceased editorial operations in early 2018 due to lack of ad revenue. Media darlings like **Buzzfeed** and **Vice** both missed revenue targets by over \$60 million.

Media consolidation is a trend that matters because it directly impacts the quality and diversity of journalism. Researchers at **Harvard** and **Wash-**



ington State have suggested that rise in talk radio, expansion of cable TV, and the internet all coincided with increased elite polarization in the US. **The Columbia Journalism Review** has reported on the rise of news deserts, American towns with no local news coverage. **Politico** reported on the clear correlation between lack of local news outlets and Trump supporters in the 2016 presidential elections. Newsrooms are relying more and more on wire services like the **AP** and **Reuters** as they cut staff under budget pressures.

However, media consolidation does not mean lack of options. Large media corporations have an incentive to serve a wide and diverse audience so that they can offer more selection to advertisers. In order to secure and sustain audiences, some media outlets are adopting a market segmentation and content differentiation strategy

Media Consolidation cont.

by scheduling shows with stronger positions, louder personalities, and more polarized political stances. **Fox News** and **MSNBC**, often seen as polar opposites on the political spectrum, both dominated the May 2018 cable news rankings.

In March 2018, a viral video showed dozens of local news anchors reading a politically-charged script warning against fake news and biased media. All of the stations are owned by **Sinclair**, the largest owner of local TV stations in the US. **Sinclair** has strong connections to the Trump administration and regularly pushes “must-run” political segments to its network of stations. This instance was widely criticized by journalists and publishers.

From a workforce perspective, writers and content creators have a low switching costs when it comes to publishing their work on one or more outlets. According to **UpWork**, a freelance marketplace and research group, the majority of the workforce will be freelancers by 2027. Reporting from the Columbia Journalism Review and other sources show that freelancing journalism comes at a cost. Freelance journalists are earning less, are more vulnerable to cyber attacks, and do not have bargaining power for benefits such as health insurance and setting rates.

What's Next

The repeal of net neutrality and continued deregulation of the **FCC** under **Ajit Pai** will likely mean that large media corporations, especially telecoms like **AT&T** and **Comcast**, can increase profits by prioritizing internet traffic and sharing data with their subsidiaries. This trend started in 2015, when **NBC** announced its **Audience Targeting Platform** using among other data sources, set-top box data from parent-company **Comcast**. **OpenAP**, a consortium of TV publishers headed by **Turner** and **Viacom**, offers ad-targeting products that integrate set-top box data from **ComScore** and consumer data from **Nielsen**. Last year, **Congress** and **President Trump** repealed US broadband privacy rules which gives more freedom to ISPs to monetize data. Additionally, many ISPs have an opt-out privacy policy which means that customers data is collected by default unless they indicate otherwise.

Consumers will not protest at first, seeing lower bills and more perks (such as zero-rating Netflix on mobile streaming devices). These media conglomerates will continue a strategy of vertical integration and will own every piece of the media supply chain. This vertical integration strategy has helped media corporations manage

the revenue losses from trends like cord-cutting, skinny-bundling and internet TV streaming packages. With traditional media corporations owning the majority of ISPs in the US, it is unlikely that these corporations will create internet-only packages that give more power and revenue over to tech giants like **Google** and **Facebook**. Google has attempted and ultimately failed to break into the ISP business with experiments such as **Google Fiber**.

Watchlist

The FCC; Comcast NBC Universal; Amazon; Axel Springer; Viacom; Baidu; Bertelsmann; Time Warner; News Corp; Discovery; Disney; SoftBank Capital; AT&T; Vox; Vice; Netflix; Hearst Ventures; Facebook; Twitter; Alphabet; Yomiuri Shimbun Holdings; Tronc; Sinclair Broadcast Group; CBS Television; Nextar Broadcasting Group; Raycom Media; E.W. Scripps; Univision; Cox Media Group; Meredith Corp; Hubert Burda Media; Asahi Shimbun Company; Microsoft; Grupo Globo; News Corp; Univision; news organizations everywhere.

SCENARIO



Optimistic Framing

Large media companies will find new revenue models that satisfy their customers and advertisers alike. International regulation around digital privacy is standardizing (thanks in part to European laws like GDPR), and here in the US, the FCC and FTC are deregulating under President Trump's pro-big business administration.

Customers will enjoy hyper-personalization as improved audience targeting and analytics inform better content-recommendations, localized news coverage and context, real-time fact-checking, personal data analytics, and better integrations across IoT connected devices. Large companies have the capital to invest in state-of-the-art privacy solutions, which will create a perception that smaller media organizations are less secure and less trustworthy and give customers more confidence to share personal data across devices. Conceivably, a customer could get a basic package with 100 standard channels + 1 channel full of "discoverable" content that the user might like based on their viewing habits and preference data. This "discoverable" content will come

from ML algos that scan the entire library of digital content that might be enjoyable to the viewer. This idea is similar to Spotify's Discover Weekly but for TV or news articles. With this model, local news can be supported by a network of niche content creators and freelancers as opposed to fully staffed stations and newsrooms.

While cord-cutting trend continues, large media companies develop new products as they become fully "vertically integrated" across the media pipeline (from content creator to last-mile broadband provider) through acquisitions and continued consolidation. The subscription model evolves to include more advanced options. Bundled internet packages allow users the flexibility to choose the product that is best for them while improving market segmentation for advertisers. For example, users can pay more for ad-light ISP bundles. Users will not be able to opt for a bare-bones package with basic texting and GPS.

Advertisers enjoy the increased transparency that comes with more data and advanced targeting products. As

media consolidation increases, more companies can follow the example of Comcast which has its own ad exchange platform. Media companies have already formed ad consortium networks that pool inventory from the group to sell to advertisers. This will only increase in order to remain competitive against tech giants like Google and Facebook. Eventually, advertisers like CPG and Unilever form joint-ventures with the largest media properties to co-create content with product placement, native ads, and sponsored segments.

Netflix and other VOD services like Youtube loose leverage and negotiating power in a post-net neutrality world. Google abandons GoogleFiber completely and new data management laws/ compliance regulations increase the barriers to entry for new competitors in the ISP/ Telecom space.

SCENARIO cont.

Pragmatic

Large media companies will need to innovate their current product offerings. They will need to adapt existing revenue models to allow for more customization and flexibility otherwise they will lose market share (in terms of audiences and ad dollars) to new media players.

Traditional advertising units (pre-roll, banner ads, 30 spots) have a smaller impact with consumers and therefore command lower prices. Native advertising and product placement are workable alternatives but these forms of advertising are difficult to scale. Large media corporations have the advantage of cross-platform, cross-portfolio ad campaigns but Google and Facebook still have better access to customer data and advanced ad targeting. Large media corporations will see rising audiences overall (driven by growth on digital platforms) but with shrinking profit margins across the board.

Customers are getting more tech-savvy and begin to demand opt-in data-sharing policies. Large media companies and tech giants both struggle to strike a balance between

giving customers delightful, personalized experiences while also being responsible custodians of data and privacy. Tech and media corporations form an interdisciplinary consortium with privacy advocates to set standards and update policies governing data management and security. Applications with blockchain technology and improved data tracking systems will bring more transparency to the ad ecosystem. Customers' purchasing behavior will change in the US and western Europe as more people turn to subscription-based services like Amazon (prime, pantry, healthcare). People spend less time shopping and browsing through physical retailers. Retailers move to a "click-and-mortar" distribution model or abandon storefronts all together as e-commerce improves in speed, security, recommendation algorithms, and supply chain logistics. CPG leaders like Unilever and P&G rethink their marketing approach, abandoning festivals like Cannes Lions and acquiring direct-to-consumer startups. Unilever and P&G form exclusive relationships with Amazon, circumventing media outlets altogether.

Competition will be particularly fierce with tech giants such as Facebook, Google, Amazon, and Netflix. Joint ventures such as Hulu, NBC + Snapchat will become more commonplace but it will be challenging to measure the impact/ benefit of these projects. Joint ventures will push innovation and large media companies will need to increase their appetite for risk-taking. Tech giants, afraid of losing market share and profit margins, enter into the ISP/ telecom/ infrastructure market.

Finally, further consolidation will have a negative impact on news in local markets. Public perception as "news as a public good" results in friction and even the animosity of large media companies. To improve public perception, large media corporations and tech companies include "fake news" solutions and public media projects as part of their corporate social responsibility. The media market in the US and Europe is highly saturated leading some major media players to look to markets like India and Latin America for new ventures. These efforts are costly and ultimately unsuccessful.

Pessimistic

Large media corporations should anticipate volatile swings in regulation and the economy.

Trump will lose reelection and the next administration, united with support of a majority Democrat congress, seeks to undo much of the deregulation of FCC/FTC under Ajit Pai, promising to be tough on data breaches and increase consumer protections. This creates uncertainty, instability and cost as telcos and tech companies scramble to stay in compliance with changing regulations. Some of these regulations include troubling controls on "appropriate" content and speech.

GDPR makes its first landmark case against Facebook for cybersecurity vulnerabilities and successfully collects a fine of \$4B USD (15% of revenue). Chris Cox becomes the new CEO of Facebook after Zuckerberg's early retirement. Cox promises complete cooperation with government officials.

Simultaneously, advances in technology dramatically lower the barriers to entry for new players in the media industry. China tech giants like Baidu,

SCENARIO cont.

Tencent, Huawei enter the US market. Subscription-based models like Amazon Prime and Netflix become the norm. While they are convenient, they typically exclude or under-serve lower income levels or people with unstable income. Media companies that also own ISPs focus service in high-income neighborhoods increasing the digital divide. In addition to inconsistent coverage across the US, states begin to regulate the internet industry in a variety of ways. State-level net neutrality provisions, hate-speech laws, revenge porn punishments give rise to splinternets. Splinternets further the spread of regional truths, fake news, and alternative facts.

Independent local media outlets and newsrooms struggle to find talent and stay financially soluble.

Catastrophic

Given what we know about surveillance capitalism, xenophobia, and state-run media, governments, even liberal Western democracies will play a larger role in regulating media and free speech.

Larger audiences and shrinking margins force major media and tech companies to adopt increasingly invasive data-surveillance strategies in order to provide cutting-edge personalization and hyper-targeted advertising. Media companies continue to consolidate in order to stay competitive with tech giants. Surveillance capitalism, left unchecked, will lead to a world where corporations own detailed profiles on 90% of individuals in the US and 70% of Europeans. The government, in the name of national security, begins to purchase this data in mass quantities. While consumer advocacy groups, the ACLU, and privacy advocates protest this trend, companies argue that the data has been “anonymized” though reporters cannot verify this claim.

Social media and digital addiction increase cause a serious mental health crisis in the US; similar to

South Korea. (In South Korea, internet addiction mostly from online gaming, gambling, and social media has led to significant mental health issues) US government considers information regulation and digital censorship. The FCC and the Department of Health introduce Surgeon General warnings for “fake news” and issue guidelines for appropriate information consumption. The most famous guideline is the FCC Information Consumption Triangle similar to the Food Pyramid, that gives guidance on daily dose of appropriate information sources. The layers of the triangle from bottom to top are “real world experiences”, “news, school work and factual information”, “film and entertainment”, “social media”. In an effort to curb cyber-bullying, Facebook and Google cooperate with the government to censor inflammatory language. This rapidly escalates to modern day book burnings, where websites are pulled offline mysteriously for violating “appropriate language” guidelines. In higher education, Marketing and Journalism departments become interdisciplinary approaches to the same problem: attention capture.





Ad Blockers



The rates of ad blocking have plateaued but the loss of revenue to publishers is still a significant concern.

Key Insight

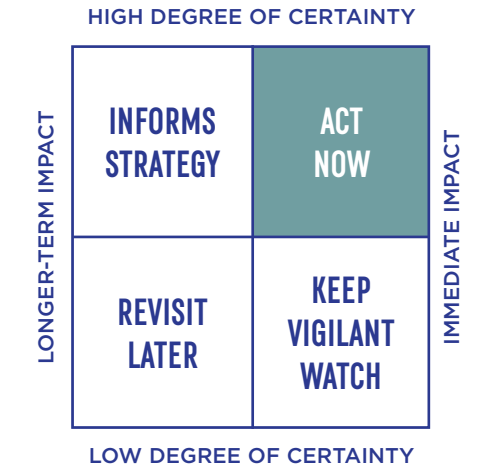
As ad block technology continues to improve, publishers have rallied together through trade groups to collectively address this existential threat to their business model. Better ad practices and improved mobile experiences (like AMP pages) seem to be working. According to a recent study from the **Association of Online Publishers**, rates of ad blocking have plateaued but the loss of revenue to publishers is still a significant concern.

Examples

Ad blocking is mostly a desktop phenomenon however rates of mobile ad blocking have seen modest increases. Ad blocking is much higher outside the US, particularly in Europe and Asia. 18% of US uses some form of ad blocking software, the vast majority on desktop devices. Ad block penetration is higher in other countries like

India (28%), Indonesia (58%), Germany (29%), and Canada (25%).

In 2017 and 2018, advertisers pushed back against giants like Google and Facebook for their “dirty digital” products. Advertisers like **Unilever** and **P&G** called out **Facebook** for ad fraud (clickbots) and **Google** was under pressure to improve brand safety measures on platforms like **YouTube** where ads were run against ISIS videos or on channels promoting Nazis, pedophilia, and white supremacy. In light of scandals like **Cambridge Analytica** and regulation like **GDPR**, consumers are growing increasingly sensitive about how their data is used and publishers have to be more thoughtful about how they track and store user data. Tech-savvy customers have every reason to be suspicious of spammy ads. Security firm **Confiant** found that fake ads containing malware and ransomware were on major



media sites such as **the New York Times** and the **BBC**. Publishers are blocking ad blockers with two main strategies: indirectly by improving quality of ads and user experience, and more directly by detecting blockers, disabling ad blocker scripts and obfuscating ads.

Publishers (Google, FB, Alexa top 100K sites) have adopted better ad practices such as **IAB/ LEAN** guidelines and **Coalition for Better Ads**. Both outline compliant formats restricting ad dimensions, CPU (central processing usage), and features (surprise: autoplay and pop ups are not on the list!). Trade groups like the **IAB Ad Blocking Working Group** and the **Acceptable Ads Committee** provide resources, best practices and research for publishers to deter ad blocking on their sites or get their sites whitelisted by ad blockers. Upon detecting ad blockers, many sites will ask users to

Ad Blockers cont.

whitelist their site. In the most extreme case, Salon.com gave visitors the option to whitelist their site or allow Salon to mine cryptocurrency using the users spare CPU.

In the past two years, Facebook has introduced features that allow users to give feedback on ads, report abusers and bad actors and increase transparency around sensitive issues such as political ads.

Projects like Accelerating Mobile Pages (AMP), have vastly improved the performance of pages and advertisements on mobile. Since its introduction in 2015, 31 million sites have adopted AMP including publishers like **Twitter**, **WordPress** and **LinkedIn**. Post-GDPR, Google has announced it will stop mining gmail for user data and non-personal data ad targeting products.

Traditionally, ad blockers work by using manually curated filter lists. These lists contain sets of rules that automatically remove unwanted content such as advertisements, trackers and malware while the page is loading. These lists are open-sourced and maintained by a decentralized army of volunteers.

Since 2016, Facebook has actively fought against ad blockers by obfuscating its ad units as regular content, this has led to a mini arms race with ad blockers developing more

sophisticated approaches to detect ads. One of the more sophisticated approaches, as described by a group of researchers at **Princeton University**, is perceptual ad blocking. Perceptual ad blocking relies on the regulatory disclosures/ disclaimers that are required by the **Federal Trade Commission** (FTC) endorsement guidelines. This includes using OCR to detect words like “Ad” or “Sponsored post”. Publishers are fighting back with ad reinsertion software like **PageFair** and **Sourcepoint**.

What’s Next

Historically, security and privacy concerns have been the top motive for ad blocking. Digital ads can spread viruses and malware and they can also store cookies to track and monitor activity across multiple webpages. Too many ads can also lead to slower load times, cluttered sites and higher data usage.

Most ad blocking software works at the browser level, with plugins such as ad blocker or special browsers such as **Brave**, **Firefox**, and **Chrome Canary**. **Pi-hole** is a network-based ad blocker that launched in 2014 and has amassed a cult following of devoted users and developers. Pi-hole blocks ads everywhere on the network: browsers, apps, IoT devices. As everyday consumers become more aware

of invasive and predatory advertising tactics, they may turn to projects like Pi-Hole for transparency and privacy. Leaked documents show Facebook targeting teens with low self-esteem for beauty and skin care products and new **Roomba** models can map out homes and floor plans.

Publishers are exploring alternatives to ad-based revenue streams and other ways to monetize content, but success has been slow. Google introduced **Google Contributor** in 2014 as a way for readers to pay microfees to publishers based on how often they visit.

Watchlist

Interactive Advertising Bureau (IAB); retargeting companies (Criteo; AdRoll); marketing automation software (Marketo, Eloqua, Hubspot, Oracle, IBM Unica), creative optimization companies (AdExtent; CPXi); agency trading desks (Cadreon, Xaxis); exchanges (OpenX, doubleclick); media planning; ad networks (Alphabet, Amazon, Facebook); targeted networks; mobile-specific networks.

SCENARIO

Near-Future Scenarios For Ad Blocking

Optimistic

Ad blockers will be a manageable threat for ad-supported media companies in the US. As media formats such as voice and video grow in popularity, publishers can make it harder to skip over or block out those ad units.

Ad blockers work best when detecting ad images and text from desktop devices. In the next five years, we will likely see a consolidation in the digital ad landscape, mainly with SSP, DSP, yield optimizations, and ad exchanges. Large media companies will own and operate the entire pipeline, ensuring better brand safety environments and targeting despite lower volume and inventory.

Ad blocking browsers like Brave will still be considered fringe. Mainstream audiences will be willing to share data and watch ads in exchange for their favorite services to stay free such as Instagram, Spotify, and Youtube. Industry leaders like IAB and Google are improving ad standards across the industry which means that customers will be less inclined to install ad blockers.

Pragmatic

Ad blocking will be one of several concerns that motivate radical changes in the industry. Standardized metrics in advertising has long been a debate but the next five years will finally see some results. Clicks, likes, views, impressions will all be compared with a standard unit that is accepted across platforms. Campaigns will be evaluated by third parties such as IAB, Nielsen, comScore or another start-up analytics company. Brand safety environments will mean that certain pages are downgraded or blacklisted altogether from the mainstream ad marketplace because of objectionable content or unsecure site management. When ad campaigns fail to run on TV or print, the publisher runs a “make good” campaign at no cost to ensure the advertisers’ ad units are shown. This is not common practice in the digital world but soon it will be as digital giants have to work hard to keep their business.

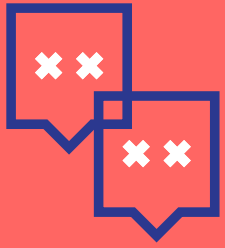
Despite all the industry changes, there are changes in the audience behavior as well. Millennials are less brand loyal and desensitized to ads. It will be more and more difficult to prove the effectiveness of campaigns

with this audience. Millennials do respond well to influencer marketing and peer to peer advertising. Advertisers should take advantage of these trends as social media, user generated content, and mobile device usage allow for more sophisticated ad products.

Catastrophic

Given what we know about national security concerns and viral content, the digital ad industry is a few scandals away from completely imploding. Cambridge Analytica and Russian bots were just the tip of the iceberg in terms of manipulation of public perception and the info-wars of the 21st century. As more scandals come to light, all confidence in the industry will erode. “Surveillance capitalism” will lose favor and a new wave of regulation will limit audience targeting and digital marketing practices that are commonplace today.

Companies realize it is not just their customer’s security at stake, but their businesses as well. Malware and ransomware delivered through fake ads will become more and more costly, more public, and more difficult to manage.



Policy and Regulation

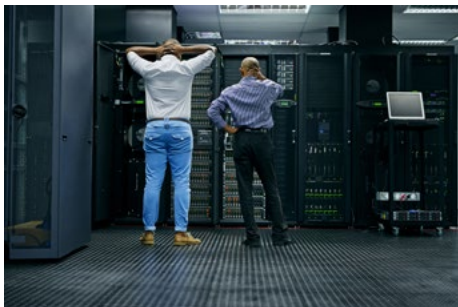
089 Splinternets

090 Leaking

091 The First Amendment
in a Digital Age



Splinternets



We are headed towards a fragmented “splinternet” in the very near future.

Key Insight

Twenty years ago, the internet emerged as a global space where information wanted to be free. Now, everyone has a different idea of how our global information superhighway ought to be regulated, and by whom. As a result, we are headed towards a fragmented “splinternet” in the very near future.

Examples

When the GDPR launched in May 2018, hundreds of legitimate news sites were blocked worldwide. We can already see that the internet looks and behaves differently depending on geography.

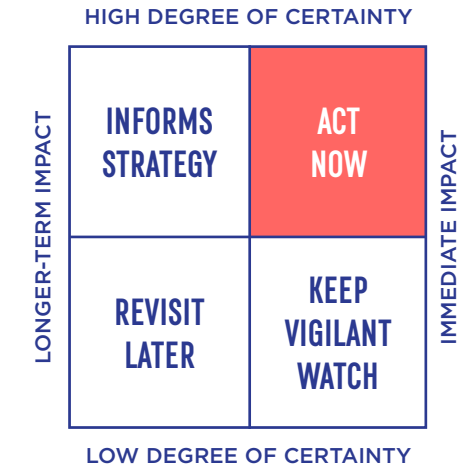
Search is controlled by a small number of American companies—there is no **United Nations** or other international organization with any power to establish standards, norms and

regulations that is recognized by everyone using the internet. In the past decade, countries in Europe fought ISPs and search providers such as **Google** and **Yahoo** in court and successfully banned content on a country by country basis. Citizens in countries where free speech isn’t valued could find their version of the internet without a digital outlet for watchdog journalism.

What’s Next

The companies involved have maintained that they’re “just technology companies,” however their strictly-defined roles as arbiters of information will be tested in courts in the coming years.

Without coordinated effort, splinternets will continue to proliferate in the years ahead. This could make disseminating quality journalism more difficult in regions around the world.



But it could also cause tremendous headaches for news organizations who distribute—and monetize—content for a global audience.

Watchlist

European Union; Google; Facebook; Baidu; Twitter; Amazon; Microsoft; Netflix; Apple; Federal Communications Commission.



Leaking



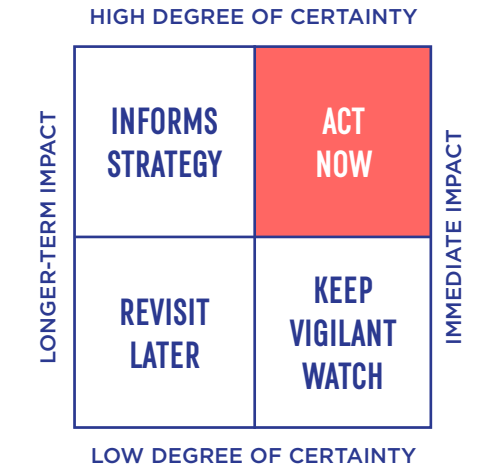
A man wearing a Guy Fawkes mask flashes a V sign while protesting the arrest and detention of Chelsea Manning.

Key Insight

Not to be outdone by 2017, 2018 saw a numerous number of major leaks from both the political and social world. With leaks making headlines on a consistent basis, it is important to remember that without leaks from government agencies to the media, the government would effectively control what information the public is aware of. The questions moving forward should be framed in terms of what kind of information is permissible to leak, are leaks happening solely for political and or nefarious reasons, and while technology can rapidly disseminate leaked information, what more can be done to protect privileged information from being leaked.

Examples

In June 2018 alone, **the New York Times** received and published a leaked confidential memo the President’s attorneys had sent to the special counsel; **Tesla** sued a former employee for allegedly hacking their systems and leaking false information; and the **FBI’s Office of the Inspector General** released its report on the **Hillary Clinton** e-mail investigation where it outlined a string of leaked information. The **Panama Papers** were still making news with an additional 1.2 million documents released which discussed the post-leak fallout amongst the Panamanian law firm involved and its clients. While these leaks generally lacked the massive scope that we had seen in the **Edward Snowden** and **Chelsea Manning** leaks, the partisan nature of many of the 2018 leaks represents a major challenge to media and journalism moving forward.



What’s Next

Have we reached peak leak? Who bears the obligation of ensuring the credibility of government institutions remains intact? In a world where “Fake news” has become an everyday term, do media outlets risk losing their own credibility by continuously publishing anonymously sourced leaked information? The next couple of years through 2020 will represent a crucial moment for journalism and leaks specifically. One obvious scenario is that we continue down the path we’re currently on, with some major outlets publishing ‘leaked’ information and accepting partisan flak from groups and individuals who disagree with the outlet’s perceived alignment. Another involves the government choosing to tighten the reigns on leaked information in which we could see a deepening rift between career government officials and a bureaucra-



TREND 090

Leaking cont.



cy that is either trying to protect itself or the institution's credibility. In previous years the major trends in leaks were geared towards protecting the leaker's anonymity while still getting the necessary information to publish the story. The major shift we see today is the media needing to ensure their credibility is not eroded by over publishing or incorrectly publishing leaked information.

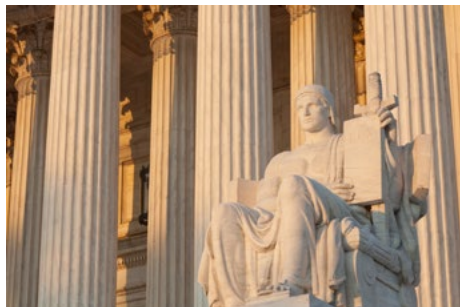
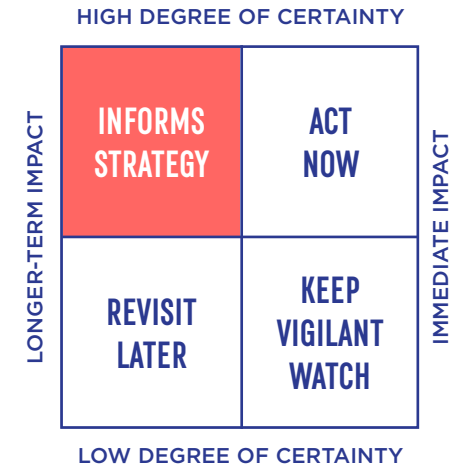
Watchlist

News organizations worldwide.

Have we reached
peak leak?



The First Amendment in a Digital Age



Key Insight

While the first amendment pre-dates the Cotton Gin (the most novel technological advance of its time!), today as much as ever, it plays an instrumental role in terms of design, development, and the legal protections afforded to creators and users of technology.

In the near future, we are certain to face thorny legal questions about free speech and AI.

Examples

It is important to make clear that the first amendment relates to government suppression of speech but not private entities. If Facebook or Twitter decided to block all politically related posts because it could not sufficiently weed out “fake” posts, they would be making a business decision to do so but not one that would raise first amendment issues. So, while we expect to see platforms tighten the rules on what they deem permissible, they are fully entitled to do so. The

larger first amendment issues as they relate to media involve questions of what (if any) rights are afforded to AI, and what liability (if any) can be imposed on the creators of technology, algorithms and code.

What’s Next

Moving forward, there are numerous scenarios for how governments choose to protect speech created by AI or automated devices. The most restrictive scenario would involve governments deciding that first amendment protections do not extend beyond human produced speech. This scenario is unlikely due to the fact that some human programming does go into bot creation, and would mean that a string of different technological advances (such as voice) could be afforded fewer protections.

A second scenario involves deciding that the human programmer would be

protected under the first amendment, while AI-created speech would not be afforded protections. This attempt to compromise makes sense at some level but could fall short when it comes to being able to fully give credit (or blame) to content created by a human vs AI technology.

Yet another scenario would be deciding that all AI-produced content is considered free speech. Supporters of this view contend that the first amendment does not limit speech to that created by humans hence any content produced by a voice interface or bot should be protected. While on one hand this opens the possibility to all content being considered speech, if AI-created content is protected as speech, the legal entities producing such content could be held liable if appropriate.

None of these three scenarios presents a perfect solution. We are likely



TREND 091

The First Amendment in a Digital Age cont.



to see some hybrids of these come about as legal questions arise. Look for media and journalism to be at the epicenter of numerous legal questions moving forward.

Watchlist

European Union; Federal Communications Commission; Google; Facebook; Microsoft; Apple; Amazon; Snap; Instagram; YouTube; Twitch; broadcasters; newspapers; radio stations; digital media organizations; Jack Balkin, Knight Professor of Constitutional Law and the First Amendment at Yale Law School; Margot Kaminski, Assistant Professor, Moritz College of Law, The Ohio State University.

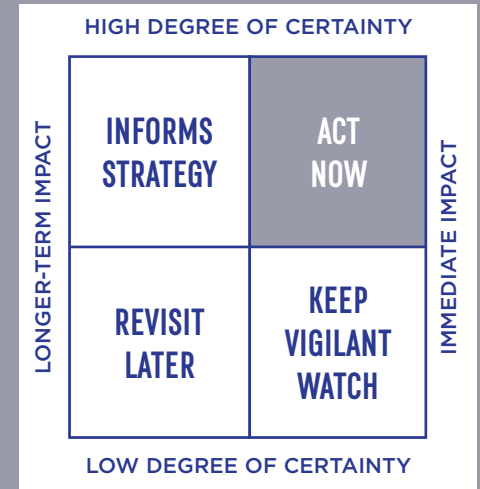


Security and Privacy

- 092** Compliance Challenges and Unrealistic Budgets
- 093** Differential Privacy
- 094** Ransomware As A Service
- 095** Hacktivism On The Rise
- 096** Targeted Attacks on Digital Assistants
- 097** Strange Computer Glitches Will Keep Happening
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- 105** Ownership
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Security, Privacy and Data



Hackers have launched DDoS attacks against governments, corporations and banks.

Key Insight

It is difficult to overstate the importance of security and privacy in today's ever-connected digital world. Tech giants, government regulators, and everyday citizens are weighing in on a variety of issues ranging from personalization to privacy, information security to censorship, transparency to national security. Larger media organizations have the resources to tackle security and privacy issues head on, while smaller newsrooms will have a bigger challenge protecting themselves and their customers against security threats.

It is important to note that data breaches and data hacks are not the same thing. Data breaches are often the result of bad data management

policies, negligence or simple human error. For example, company information on an insecure web server can result in a data breach. Hacks are the result of bad actors successfully exploiting a vulnerability in a system or stealing private information such as logins to break into a system. In 2017, ransomware was one of the most costly and widespread hacks, totaling over \$2B in ransom payments for attacks like **WannaCry** and **NotPetya**.

Companies have a responsibility to disclose breaches and hacks alike. If they fail to tell customers, companies can face fines of 4% of total revenue or \$20 M. **Yahoo** and **Uber** have both been heavily criticized for failing to fully disclose the extent of their security scandals.

The tech industry is having an existential crisis about the internet. Continue with its current business model, or begin to develop newer models that give users greater control over their own data.



Security, Privacy and Data cont.

092 Compliance Challenges and Unrealistic Budgets

The historical tension between security and privacy will unleash new challenges in the near future. Consumers are shedding more data each day, and as more connected devices enter the marketplace, the volume of available data will balloon. Yet those organizations creating devices and managing consumer data aren't planning future scenarios. Off-the-shelf compliance checklists won't cut it going forward. Managers will need to develop and to continually update their security policies—and they'll need to make the details transparent. Most organizations aren't devoting enough budget to securing their data and devices. Organizations that haven't carved out enough budget for IoT security will find themselves dealing with vast recalls, remediation and lawsuits. The **General Data Protection Regulation (GDPR)** promises a significant headache for compliance officers and risk managers, who must ensure that the policies and procedures for governments, companies, nonprofits and news organizations are current.

093 Differential Privacy

Differential privacy as a mathematical concept has been around for over

a decade. Only recently, has it been implemented by companies like **Apple** and **Google** as a way to analyze aggregate data without compromising user privacy. Differential privacy is achieved by strategically introducing random noise into the dataset. It is most useful when answering simple (low-sensitivity) queries. It's good for finding out traffic patterns in Google Maps, the most popular emoji for iPhone users, and ride sharing trends across **Uber's** global network while keeping individual user behavior anonymous. The **US Census Bureau** will be using differential privacy in the **2020 Population Census**.

Differential privacy is limited in what it can do, even for the handful of tech giants that have enough information to do it right. Apple has differentiated itself from its competitors by integrating differential privacy into its **Safari** browser and Google uses its own differential privacy tool called **RAPPOR**. It is important to remember this method is still evolving. Depending on applications and data sets, differential privacy is harder to maintain when variables are correlated.

094 Ransomware As A Service

We have recently seen the spread of ransomware like **WannaCry**, **Petya**

and **NotPetya**. In England, **WannaCry** shut down the computers in 80 medical centers, which resulted in hospitals diverting ambulances and 20,000 cancelled appointments. Hackers deploy malicious tools to hijack data, effectively locking out systems and devices, until a fee is paid. Since cash and online bank transfers are easy to track, the currency of choice is now bitcoin, which moves through an encrypted system and can't be traced. The emergence of the blockchain and cryptocurrencies have transformed ransomware into a lucrative business. Simply backing up your data probably won't be enough of a failsafe going forward. Researchers have already found "doxware" floating around the internet—rather than simply holding your data hostage until you pay up, they threaten to publish it all to the web, for everyone to see.

095 Hacktivism On The Rise

Hackers-turned-activists have had a busy few years, working for causes they believe in. They launched DDoS attacks against governments, corporations and banks. They infiltrated the **campaigns** of both **Hillary Clinton** and **Donald Trump**. Hacktivist organizations, including **Anonymous**, **WikiLeaks** and **DC Leaks**, see themselves as durable forces of change.



Security, Privacy and Data cont.

Glamourized by the TV show *Mr. Robot*, hacktivism is on the rise, and given heated political tensions during a year in which many elections are being held, we'll likely see more operations being carried out. Hacktivists will use their skills to help shape local, state, national and international politics, conversations and business practices.

096 Targeted Attacks on Digital Assistants

Now that digital assistants (DAs)—**Alexa**, **Siri**, **Cortana**, **Google**—have moved from the fringe to the mainstream, we can expect to see targeted attacks. Whether they target the assistants or their hardware (**Amazon Echo**, **Apple HomePod**, **Google Home**), it's clear that the next frontier in hacking are DAs, and this should be especially concerning to media companies.

097 Strange Computer Glitches Will Keep Happening

Glitches are problems that don't have an immediate, obvious cause but nonetheless can cause frustrating problems. When **Alexa** accidentally sent a recording a couple had in their

kitchen to a friend of theirs in another state, it was because of a glitch in its system. Intel, the second largest chipmaker in the world after Samsung, received a lot of criticism after a 22-year-old Google engineer discovered a massive security flaw in the chip design. The flaw was based on a "speculative execution" function and was soon patched. Recently, **Barclays**, **JPMorgan Chase**, **Bank of America** and **HSBC** all experienced technical glitches that prevented customers from accessing account information, and in some cases, wouldn't allow them to make deposits or withdraw money. Spaceflight startup **Rocket Lab** failed to launch during a 10-day window due to unforeseen technical glitches. Glitches often have to do with degraded network connectivity or a miscalculation of the bandwidth needed. But a lot of times, glitches result from newer technologies, which we are learning break in unexpected ways.

098 Proliferation of Darknets, Aided By Cryptocurrencies

Many people confuse the deep web—hidden parts of the Internet that aren't usually indexed by search engines—with darknets, which are niche spaces promising anonymity

often for illegal activities. People go there to sell and buy drugs, guns, ammunition, security exploits (malware, ransomware) and your hacked data (passwords, credit card numbers and more). Cryptocurrencies have fueled activity in the dark corners of the internet, since they're encrypted and make tracking transactions nearly impossible. You can't just hop on to a darknet the way you **Google** your high school sweetheart. To access the hidden crime bazaars, you need special software such as **Tor** or **Freenet**, you need to know where you're headed, and you do need a bit of technical knowledge. It isn't illegal to take a walk through dark marketplaces. But there's plenty of good activity that takes place: whistleblowers hoping to shine a light on wrongdoing, political dissidents looking for asylum, and investigative journalists hunting down leads. As cryptocurrencies gain popularity and as the ecosystem blossoms to include more than just **Bitcoin**, we're likely to see more activity in darknets. Activists with legitimate concerns will advocate for new layers of protection, while law enforcement will receive training on how to navigate the dark web. For government and law enforcement, the challenge of training is that it is static. Those accessing darknets are typically also the ones building them.



Security, Privacy and Data cont.

099 New Open Source App Vulnerabilities

In 2017, a data scientist revealed a new kind of malware capable of infecting **OpenAI Gym**, an open-source toolkit for machine learning algorithms. It's just one example of a booming market for malicious tools that exploit vulnerabilities in open source applications and software. As the AI ecosystem grows to incorporate more open source code and community-built tools, it will be especially important to spot problems in advance. Many organizations use open source tools, and in the coming years they will need to perform daily—not occasional—security checks.

100 The Right To Eavesdrop/ Be Eavesdropped On

As we connect more and more devices to the **Internet of Things**—fitness trackers, mobile phones, cars, coffee makers—those devices are having extended interactions with each other and the companies who make them. Our devices aren't just talking to each other anymore. They're talking to one another, learning about us, and starting to talk about us. Increasingly, consumers are being left out of the conversation, unable to listen in

and make sense of how their data is exchanging hands. A debate over **consumer rights** will heat in the near future: should consumers be given the right to eavesdrop on what their own devices are saying, and who else is listening in?

Should consumers be given the right to eavesdrop on what their own devices are saying, and who else is listening in?

101 Anonymity

Anonymity is one of the digital trends we've been tracking as it has evolved during the past decade. The world needs anonymity, as it enables whistleblowers to come forward, and it shields those who otherwise might be persecuted for their beliefs. Digital anonymity allows us to band together in times of need, whether that's to raise money for a good cause or to push back against injustices. However, just as the Future Today Institute forecast earlier, anonymity also means it's

easier to leak sensitive information, troll social media users, and leave disparaging or libelous comments all over the internet. In 2015, we forecast that most anonymous sharing apps won't survive—indeed, **Secret** shut down, while **Yik Yak** came under fire for allowing cyber-bullying and for failing to prove that users' real identities really are being protected. Our desire to post content anonymously won't abate, even as our desire for verification grows.

102 Trolls

Trolling is a specific type of cyber-bullying that often involves spamming, hate-speech, doxxing attacks, and other forms of harassment. Controlling trolls online has forced many media outlets to take a position on the line between freedom of speech and censorship. In the past year, **Twitter**, **Facebook**, and **Instagram** have all updated their community standards to limit hate-speech. **Facebook's AI algorithm DeepText** was first introduced in 2016. It has since been rolled out on Instagram and **Messenger** to detect and reduce offensive language. This year, Twitter acquired **Smyte**, a software startup that focuses on spam, abuse, and fraud. **Reddit** has banned groups like **r/incels** for violating the site's community standards.



Security, Privacy and Data cont.

And yet, neo-Nazi site Daily Stormer resurfaced in February 2018 after being effectively shut down by their domain host. State-sponsored trolling is most often linked to Russia but according to research from Oxford University, 28 countries and counting have cyber troops of humans and bots for the purpose of manipulating public opinion on social media. (For further reading, we recommend accessing Oxford's full report "Troops, Trolls, and Troublemakers.") Media organizations, especially news sites, strive to maintain an objective, unbiased position in moderating online conversation. Google's Perspective API has increased the comment moderation capacity of sites like Wikipedia, NYT, The Guardian, and the Economist with machine learning and AI.

103 Authenticity

Facebook has partnered with the **Poynter Institute's International Fact-Checking Network** to combat fake news on its platform. However, the partnership itself has been difficult to monitor and further illustrates Facebook's commanding influence over digital media.

Authenticity in the media has branched beyond fake news from

clickbait sites in Macedonia to a new type of fabricated media: videos. Deepfakes are computer-generated face-swap videos. The trend originated on **Reddit** in late 2017 and amassed over 80,000 subscribers before getting shut down. Authenticity startup **Trupic** has raised over \$10M in seed funding to combat manipulated images or videos.

104 Data Retention

The European Union law General Data Protection Regulation (GDPR) gave every global media organization a wake up call, and perhaps a much needed standard for data retention policies. As large tech giants are updating policies to comply with the regulation, smaller media organizations that depend on reporting and analytics are feeling the pinch. **YouTube** announced that starting in July 2018, it would delete analytics reports after 60 days.

105 Ownership

In the legal sense, data ownership has typically referred to IP or copyright data. The rise of wearable smart devices and IoT have made people more aware about how their behavior, health statistics, and online activity

is collected and monetized by large companies. You technically own the photos you post to **Facebook** and the videos you upload to **YouTube**. You do not own the site analytics that these tech giants make available to you. In a world where every device is smart and connected, surveillance is constant and ownership is unclear. Facebook, **Apple**, and **Amazon** have all introduced facial recognition features or stand-alone products. The **ACLU** publicly criticized **Amazon's Rekognition** software as being heavily marketed to national security clients.

106 Encryption Management

We've seen dozens of big attacks in the past 24 months, and yet many of the organizations we entrust with our data are either not using encryption or are using tools that are out of date. Hackers know this, so we should expect more attacks in the coming year. While encrypting data makes it harder to hack, encryption can also make it harder for staff or consumers to make legitimate use out of the data. In the near-future, companies will need to devote serious resources into shoring up their digital security, or risk losing millions of dollars cleaning up after a breach.



Security, Privacy and Data cont.



107 Constant Audio Surveillance

With new smart speaker technology and better machine learning systems, public areas are prime spots for surveillance. China has already deployed networks of speakers that eavesdrop on conversations to extract meaning. In 2018, **Walmart** patented technology to listen in on the interactions between store guests and employees, as well as ambient noise—clothing being moved on and off racks, items being selected from shelves, and the clicking sounds we make on our mobile devices. All of this noise can be used to hunt for insights. But it also raises questions about privacy.

108 Leaky Data

Consumers are growing weary of “open source” websites, especially those using their data. Open source genealogy website **GEDmatch** allows users to voluntarily share their genetic profiles for free, as a way to find relatives and trace their genealogies. GEDmatch was used by law enforcement to track down Joseph James DeAngelo, the suspected Golden State Killer who over a period of years brutally raped 45 women and killed more than dozen people. He himself never sent in a biological sample, but it turns out that someone connected to him did. That case reveals that if someone you know—or someone who might in some way be connected to you—submits their information to an open source website, it can be traced back to you.



HACKER TERMS AND LINGO YOU NEED TO KNOW FOR 2019

- Adware**
Software that automatically generates online ads; it can also include spyware that tracks your browsing habits. It's because of adware that many people are turning to ad blocking software. (see the earlier "Blocking the Ad Blockers" trend.)
- Anonymous**
A collective of hackers, best known for its use of the Guy Fawkes mask and distributed denial of service (DDoS) attacks. Anonymous typically uses the hashtag #Ops when announcing a new campaign. Past ops included a takedown of the Church of Scientology and the Westboro Baptist Church.
- Attribution**
Researching and tracking back the origins of an attack.
- Backdoor**
Developers intentionally install backdoors into firmware so that manufacturers can safely upgrade our devices and operating systems. The challenge is that backdoors can also be used surreptitiously to harness everything from our webcams to our personal data.
- Black hat**
A malicious hacker; someone who hacks for personal gain.
- Bot**
Bots are automated programs that performs a simple task. Some—simple chatbots, for example—are completely harmless. Other bots can be programmed to repeatedly guess passwords so that a hacker can break into a website.
- Botnet**
A botnet is a group of computers that are being controlled by a third party, and are being used for any number of nefarious purposes. For example, malware installed on your computer can run, undetected, in the background while hackers use your machine as part of a large spamming network.
- Brute force attack**
This type of attack is a laborious, methodical process where a hacker uses software to automatically guess every password it can to gain unauthorized entry into a network or computer.
- Bug**
A flaw or problem in a program that can be harmless or might allow hackers to exploit a system.
- Compiler**
A program that translates source code into executable machine language. Compilers are used to surreptitiously allow hackers into various systems without changing the source code, making it easier for them to get into a computer or network without being noticed.
- Cookie**
A small file sent from your computer's web browser to a server. Cookies help websites recognize you when you return, and they also help third parties track audience.
- Cracking**
A basic term that describes breaking into a security system. Anyone "cracking" a system is doing so maliciously.
- Crypto**
Cryptography (or "crypto") is the art and science of encrypting data—as well as breaking encryption.
- Deep web/net and Dark web/ net**
The deep and dark net/web are actually two different things, though they're often conflated. The deep net or deep web is the vast trove of data that isn't indexed by search engines. Spreadsheets, databases and more that are stored on servers make up this space. The dark web/ net is made up of sites that are invisible unless you know how to use a special network, such as Tor, which knows how to find the dark side. Once there, you'll find what you might expect: pirated software and content, job ads for hackers, illegal drugs, human trafficking, and worse.
- Denial of service attack (DoS)**
This is when a hacker sends so many requests to a website or network that the traffic temporarily overwhelms the servers, and the site or network goes down.
- Distributed denial of service attack (DDoS)**
This is a DoS using a battalion of machines.
- DEF CON**
This is a big, annual conference for hackers that attracts people from



HACKER TERMS AND LINGO YOU NEED TO KNOW FOR 2019

all over the world. Discussions range from highly technical and academic to those about policy. It takes place in Las Vegas every August.

Digital certificate

These authenticate and approve the identity of a person, organization or service.

Doxing

When hackers root out and publish personally-identifying information about someone online.

Dump

The term for a trove of data released by hackers.

Dumpster diving

Organizations and individuals who don't consistently use a shredder are opening themselves to dumpster diving, which is exactly what it sounds like: hackers go through garbage looking for any information that will help with an exploit.

Encryption

Using special code or software to scramble data so that it cannot be read by a third party, even if it is intercepted.

End-to-end encryption

When an encrypted message is scrambled on both ends, as it is sent and again as it is received.

Exploit

The general term for leveraging a vulnerability in a piece of code, software, hardware or computer network.

Firewall

A system of software and hardware that's designed to prevent unauthorized access to a computer or computer network.

Grey hat

Hackers are just like the rest of us. Some have malicious intent, others just want to fight the bad people, and some...have a certain tolerance for moral flexibility. Gray hats will use the tools and sensibilities of a black hat in the pursuit of justice.

Hacker

This term means different things to different people. People who tinker with code, to purposely manipulate it, are hackers. Some are good, and some are bad. In popular culture, "hacker" has taken on a distinctly negative connotation.

Hactivist

Someone who hacks for social or political reasons.

Honeypot

A system or network designed to look like a high-value target, but was instead built to watch hackers do their work and learn from their techniques.

InfoSec

This is an abbreviation for "information security." Companies and professions that work within cybersecurity are known as InfoSec.

IRC

Internet relay chat protocol (IRC) has been around forever. It's the communication system used to have conversations and share files, and it's still used by hackers.

Jailbreak

A way of removing the restrictive manufacturer's code from a device so that you can reprogram it to function as you desire.

Keys

The code that, just like a physical key, is used to lock or unlock a system, encrypted message or software.

Lulz

A play on "lol" or "laughing out loud," black hats often use the term "lulz" to justify malicious work. LulzSec ("lulz security") is yet another offshoot of Anonymous, and it was credited with the massive Sony Pictures hack.

Malware

Any software program that's been designed to manipulate a system, by stealing information, augmenting code or installing a rogue program. Rootkits, keyloggers, spyware and everyday viruses are examples of malware.

Man-in-the-middle (MitM) attacks

This occurs when a hacker impersonates a trusted connection in order to steal data or information or to alter communications between two or more people.

Metadata

This is the data that explains what's in another set of data, such as a jpeg photo, or an email, or a webpage.

Password managers

These are third-party tools that you entrust your passwords to. Just remember one master password,



HACKER TERMS AND LINGO YOU NEED TO KNOW FOR 2019

and use it to unlock a database of all your other passwords, which should allow you to use a completely different password for every site and service you use. While managers are a good idea in theory, many are cloud-based. If a hacker gains access to your password manager, you're in big trouble. If you do use one, make sure to use complicated password at least 36 characters long with lots of special characters, numbers and capital letters.

Patch

An after-market fix to address vulnerabilities.

Payload

The part of a computer virus that is responsible for the primary action, such as destroying data or stealing information.

Penetration testing

The practice of trying to break into your own computer or network, in order to test the strength of your security.

PGP

PGP stands for "Pretty Good Privacy," and you've probably seen a lot of PGP numbers showing up in Twitter

and Facebook bios lately. PGP is a basic method of encrypting email (and other data). In order to receive and read the message, your intended recipient must use a private key to decode it.

Phishing

We've all seen a phishing attack at least once. They usually come in the form of an email from a trusted contact. Once you open the message or attachment, your computer, your data and the network you're on become vulnerable to attack.

Plaintext

This is text without any formatting. In the context of cybersecurity, it also refers to text that isn't encrypted. Sony Pictures storing its passwords and email addresses in a basic Excel spreadsheet is an example of plaintext.

Pwned

South Park fans will remember Cartman using this word. It's geek speak for "dominate." If you've been hacked, you've been pwned.

RAT

RATs are Remote Access Tool. If you've used a remote login service

to access your office computer while away from work, you've used a RAT. But RATs can be malicious, too. Just imagine a hacker using a RAT to take over your workstation.

Ransomware

This is malware that allows a hacker to break into your computer or network and then take away your access until you pay a specified fee or perform a certain action.

Root

The root is the central nervous system of a computer or network. It can install new applications, create files, delete user accounts and the like. Anyone with root access has ubiquitous and unfettered access.

Rootkit

Rootkits are malware designed for root access. Often undetected, rootkits start running when you start your computer, and they stay running until you turn your machine off.

Shodan

In Japan, a "shodan" is considered the first degree (read: lowest level) of mastery. In cyberspace, Shodan is a search engine for connected devices, allowing hackers access

to baby monitors, medical devices, thermostats and any other connected device. It's intended to help people learn how to secure their devices, but obviously it can also be used against them. (see <http://shodan.io>)

Sniffing

When you were a kid, if you drove around your neighborhood looking for open WiFi networks, you probably used a little device or a special computer program. Those are examples of sniffers, which are designed to find signals and data without being detected.

Spearphishing

A more targeted form of phishing to smaller groups, typically within social networks or work environments.

Spoofing

In general, anytime data is changed to mimic a trusted source, it's being spoofed. Changing the "From" section or header of an email to make it look as though it was sent by someone else. Black hats spoof emails by impersonating people you know, and then launch phishing attacks.

Token

A small physical device that allows



HACKER TERMS AND LINGO YOU NEED TO KNOW FOR 2019

a trusted, authenticated user to use a service. Tokens are stronger than passwords alone, since they require both the password and the physical device to gain access.

Tor

The Onion Router, otherwise known as “Tor,” was originally developed by the U.S. Naval Research Laboratory to route traffic in random patterns so as to confuse anyone trying to trace individual users. The Tor Project is the nonprofit now in charge of maintaining Tor, which is used by both white and black hackers, as well as journalists and security experts.

Verification

Ensuring that data, and its originators, are authentic.

Virtual Private Networks

Virtual Private Networks, or “VPNs,” use encryption to create a private channel for accessing the internet. VPNs are necessary when connecting to public networks—even those at airports, hotels and coffee shops.

Virus

Malware intended to steal, delete or ransom your files. Mimicking the flu, this type of malware spreads like a

virus.

Vulnerability

A weakness in computer software the hackers can exploit for their own gain.

White hat

Not all hackers are bad. White hats work on highlighting vulnerabilities and bugs in order to fix them and protect us.

Worm

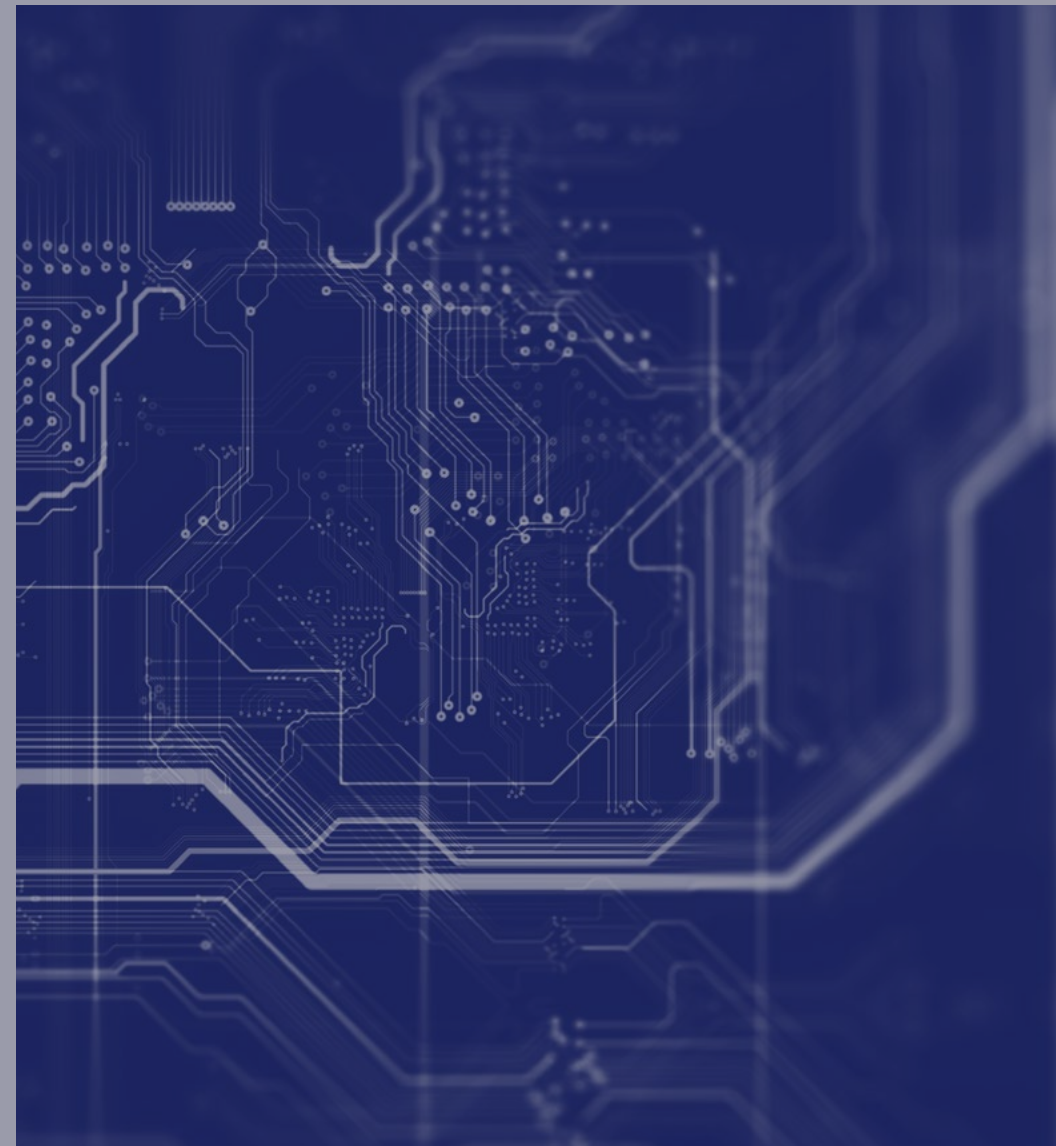
Worms are a certain kind of invasive malware that spreads like a virus.

Zero-day exploits

In the hacking community, zero days (also written as “Oday”) are prized tools because they are undisclosed vulnerabilities that can be exploited. Once the flaw is revealed, programmers have zero days to do anything about it.

Zombie

Just like the White Walkers in *Game of Thrones*, but machines! A computer, connected device or network that’s been infected by malware and is now being used by the hacker, probably without your knowledge.



About The Authors

Lead Author

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Amy Webb is a quantitative futurist. She is a professor of strategic foresight at New York University's Leonard N. Stern School of Business and the CEO of the Future Today Institute. Webb was named to the Thinkers50 Radar list of the 30 management thinkers most likely to shape the future of how organizations are managed and led and won the 2017 Thinkers50 RADAR Award. She is the bestselling, award-winning author of *The Signals Are Talking: Why Today's Fringe Is Tomorrow's Mainstream*, a book about how to find and track trends, and the upcoming book *The Big Nine: How The Tech Titans & Their Thinking Machines Will Change Humanity*.

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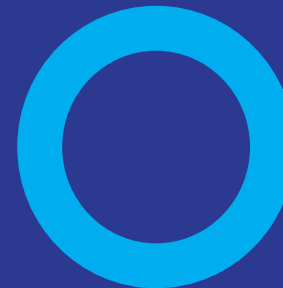
Cheryl Cooney

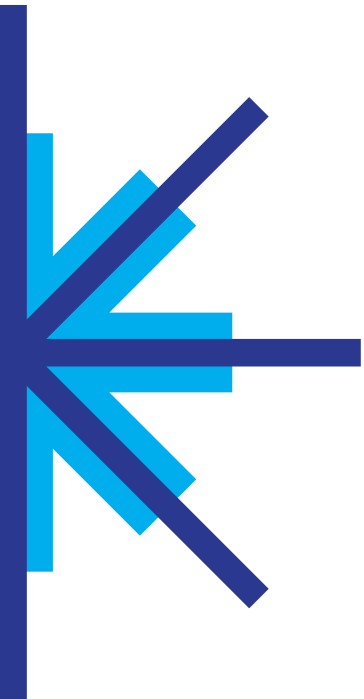
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Founded in 2006, the Future Today Institute helps leaders and their organizations prepare for complex futures. We focus exclusively on how emerging technology and science will disrupt business, transform the workforce and ignite geopolitical change. Our pioneering, data-driven forecasting methodology and tools empower leaders to make better decisions about the future, today.

Our forecasting methodology has been featured in the MIT Sloan Management Review and in the Harvard Business Review, and it is taught at universities around the world. FTI clients and partners include government agencies, Fortune 100 companies, investment firms, news and entertainment media organizations and associations. Our focus is technology, and we intentionally work with a wide variety of organizations to enable the transfer of knowledge and best practices across industries.

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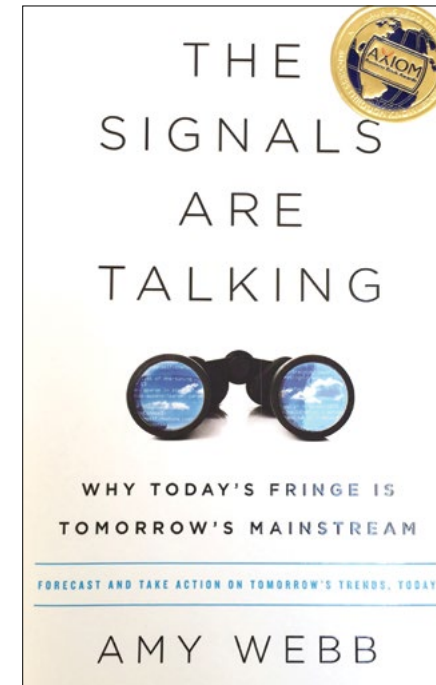
The Future Today Institute's 2019 Journalism, Media Industry Trends Report relies on data, analysis and modeling from a number of sources, which includes: sources within public and private companies, securities filings, patents, academic research, government agencies, market research firms, conference presentations and papers and news media stories. The content herein is curated in part from the Future Today Institute's annual Trends report, which is now in its 11th year of publication. Our reports are occasionally updated on the FTI website.

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Amy Webb's new book: **THE SIGNALS ARE TALKING: Why Today's Fringe is Tomorrow's Mainstream** arrives at a fortuitous moment, as it gives critical guidance on how to think like a futurist in order to most accurately answer pressing questions about the future of emerging technologies, science, our economy, political systems, and civil liberties.



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