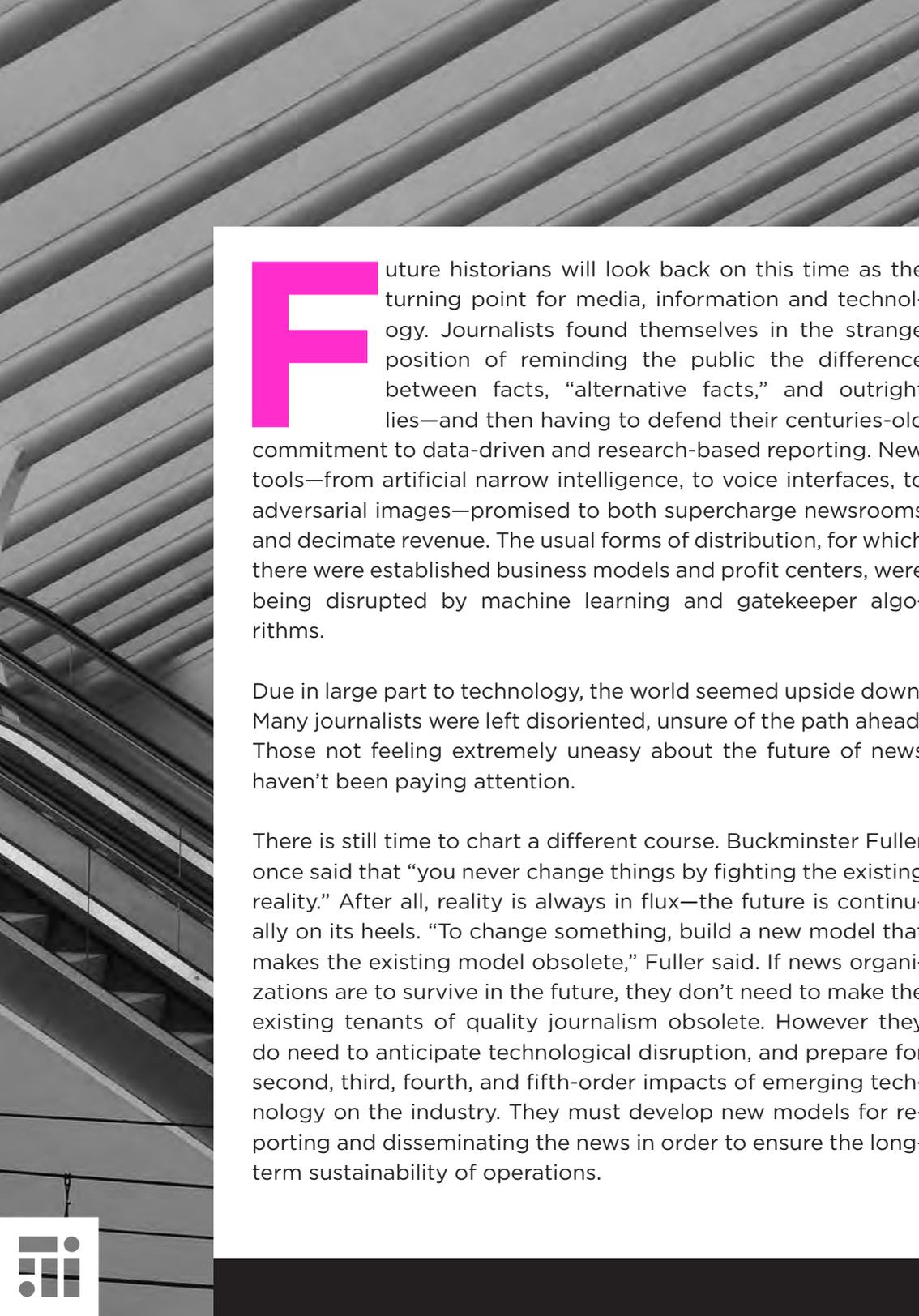


2018

Tech Trends

For Journalism and Media

Emerging digital, social, distribution, hardware, internet and data trends for the news ecosystem in the coming year.



Future historians will look back on this time as the turning point for media, information and technology. Journalists found themselves in the strange position of reminding the public the difference between facts, “alternative facts,” and outright lies—and then having to defend their centuries-old commitment to data-driven and research-based reporting. New tools—from artificial narrow intelligence, to voice interfaces, to adversarial images—promised to both supercharge newsrooms and decimate revenue. The usual forms of distribution, for which there were established business models and profit centers, were being disrupted by machine learning and gatekeeper algorithms.

Due in large part to technology, the world seemed upside down. Many journalists were left disoriented, unsure of the path ahead. Those not feeling extremely uneasy about the future of news haven't been paying attention.

There is still time to chart a different course. Buckminster Fuller once said that “you never change things by fighting the existing reality.” After all, reality is always in flux—the future is continually on its heels. “To change something, build a new model that makes the existing model obsolete,” Fuller said. If news organizations are to survive in the future, they don't need to make the existing tenants of quality journalism obsolete. However they do need to anticipate technological disruption, and prepare for second, third, fourth, and fifth-order impacts of emerging technology on the industry. They must develop new models for reporting and disseminating the news in order to ensure the long-term sustainability of operations.



Future historians will look back on this time as the turning point for media, information and technology.

Those in the news ecosystem should factor the trends in this report into their strategic thinking for the coming year, and adjust their planning, operations and business models accordingly.

The Future Today Institute has published an annual tech trends report for the past ten years, always focusing on mid- to late-stage emerging technologies that are on a growth trajectory. Given all the disruption in news, the timing seemed ripe for a tech trends report specifically for the future of journalism. This is the Institute's first industry-specific report, and it follows the same approach as our popular annual trends report, which has now received more than 6 million cumulative views. It is being released along with our new Global Survey On Journalism's Futures, which reveals how those working within journalism think about the future.

While the trends in this report should help guide your thinking in 2018, remember that the future never shows up, fully produced. It is yours to write.

Amy Webb

Founder

Future Today Institute

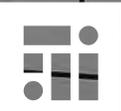


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Executive Summary

The Future Today Institute's 2018 Tech Trends For Journalism Report is our first industry-specific analysis of emerging technology trends. It follows the same approach as our popular annual trends report, now in its 10th year of publication with more than 6 million cumulative views.

- **In 2018, a critical mass of emerging technologies will converge, finding advanced uses beyond initial testing and applied research.** That's a signal worth paying attention to. News organizations should devote attention to emerging trends in blockchain, voice interfaces, the decentralization of content, mixed reality, new types of search, and hardware (such as CubeSats and smart cameras).
- **Journalists need to understand what artificial intelligence is, what it is not, and what it means for the future of news.** AI research has advanced enough that it is now a core component of our work at FTI. You will see the AI ecosystem represented in many of the trends in this report, and it is vitally important that all decision-makers within news organizations familiarize themselves with the current and emerging AI landscapes. We have included an AI Primer For Journalists in our Trend Report this year to aid in that effort.
- **Decentralization emerged as a key theme for 2018. Among the companies and organizations FTI covers, we discovered a new emphasis on restricted peer-to-peer networks that detect harassment, share resources and connect reporters with sources.**

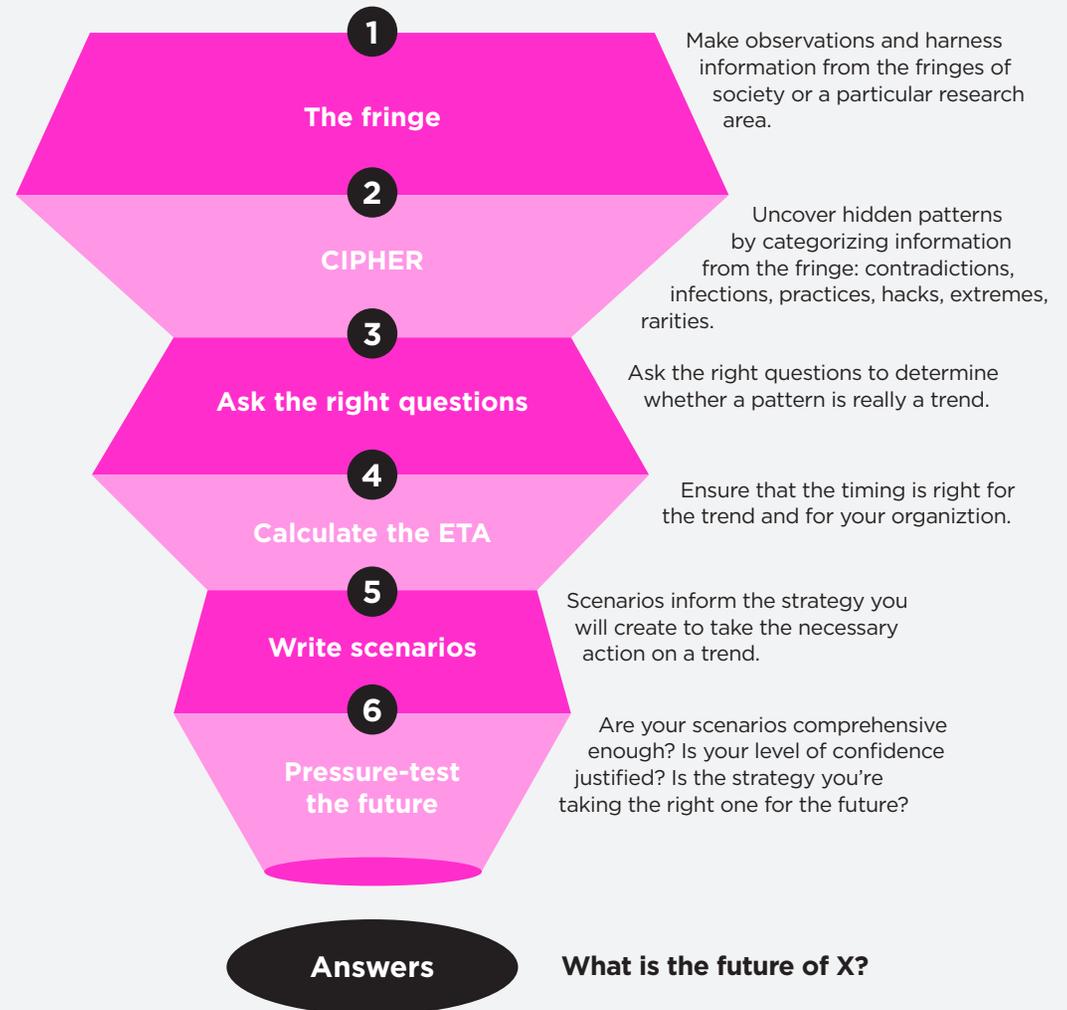
There is also a push by some democratic governments around the world to divide internet access and to restrict certain content, effectively creating dozens of "splinternets."

- **Consolidation is also a key theme for 2018. News brands, broadcast spectrum, and artificial intelligence startups will continue to be merged with and acquired by relatively few corporations.** Pending legislation and policy in the U.S., E.U. and parts of Asia could further concentrate the power among a small cadre of information and technology organizations in the year ahead.
- **To understand the future of news, you must pay attention to the future of many industries and research areas in the coming year.** When journalists think about the future, they should broaden the usual scope to consider developments from myriad other fields also participating in the knowledge economy. Technology begets technology. We are witnessing an explosion in slow motion.

Methodology

The Future Today Institute's forecasting model relies on quantitative and qualitative data. Our model alternates between flared and focused thinking. This includes: identifying very early stage fringe research, focusing on patterns, interrogating trend candidates, calculating a trend's trajectory, writing scenarios and finally pressure-testing strategies and recommendations.

Forecasting Methodology: The Six-Step Funnel



How To Use The 2018 Tech Trends For Journalism Report

Our 2018 Trend Report reveals strategic opportunities and challenges for your news organization in the coming year.

The Future Today Institute's first-ever Tech Trends For Journalism and Media 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. Use our report to identify near-future business disruption and competitive threats while simultaneously finding 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 in 2018, this report takes the additional step of explaining why and how these trends will impact your organization. In some cases, you will see very specific use cases and descriptive illustrations, so that you can more clearly envision the potential outcomes of these trends during the next 12 months.



How To Use Our Report

Each trend offers six important pieces of information for newsrooms.

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 news organization in the coming year.

04 Watchlist

Notable companies, founders and researchers working in this trend space.

The screenshot shows a report page for 'TREND 24 Personality Recognition and Analytics'. It features a 2x2 'Action Matrix' in the top right corner with quadrants: 'Informs Strategy' (top-left), 'Act Now' (top-right), 'Revisit Later' (bottom-left), and 'Keep Vigilant Watch' (bottom-right). The page is divided into six numbered sections: 01 Key Insight, 02 Examples, 03 What's Next, 04 Watchlist, 05 Third year on the list, and 06 Action Matrix. The text discusses predictive analytics tools, IBM Watson, and various startups like Crystal and Mattersight. A small image of a person's face is visible in the top right corner of the report page.

05 Years on the List

We've noted how many years we've been tracking the trend in our annual Tech Trends Report, which began publication 10 years ago. This measurement is an indication of how the trend is progressing.

06 Action Matrix

An easy-to-read graphic indicating whether the trend needs monitoring, should inform your strategy, or requires action.

10 Questions

How to relate these trends back to your news organization in 2018

Our Tech Trends For Journalism and Media Report is meant to inspire you to generate new ideas. Use it as you listen for the signals talking and to advise your strategic thinking throughout 2018.

As you think about the trends in this report, ask your team and yourself the following questions:

- 01** How might this trend impact the news industry and all of its parts?
- 02** What are the second, third, fourth, and fifth-order implications of this trend, both on my newsroom and on our industry?
- 03** Does this trend signal greater disruption to our traditional business practices and subscription models?
- 04** 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?
- 05** How are companies/ agencies/ organizations in adjacent spaces—outside of news—addressing this trend? What can we learn from their best practices?
- 06** How are our competitors/ related agencies harnessing this trend (or failing to do so?)
- 07** How will the wants, needs and expectations of our customers change as a result of this trend?
- 08** How does this trend inspire me to think about the future of news and my role within the news ecosystem?
- 09** How does this trend inspire my team/ organization?
- 10** How does this trend help me/ my team/ my organization think about innovation?



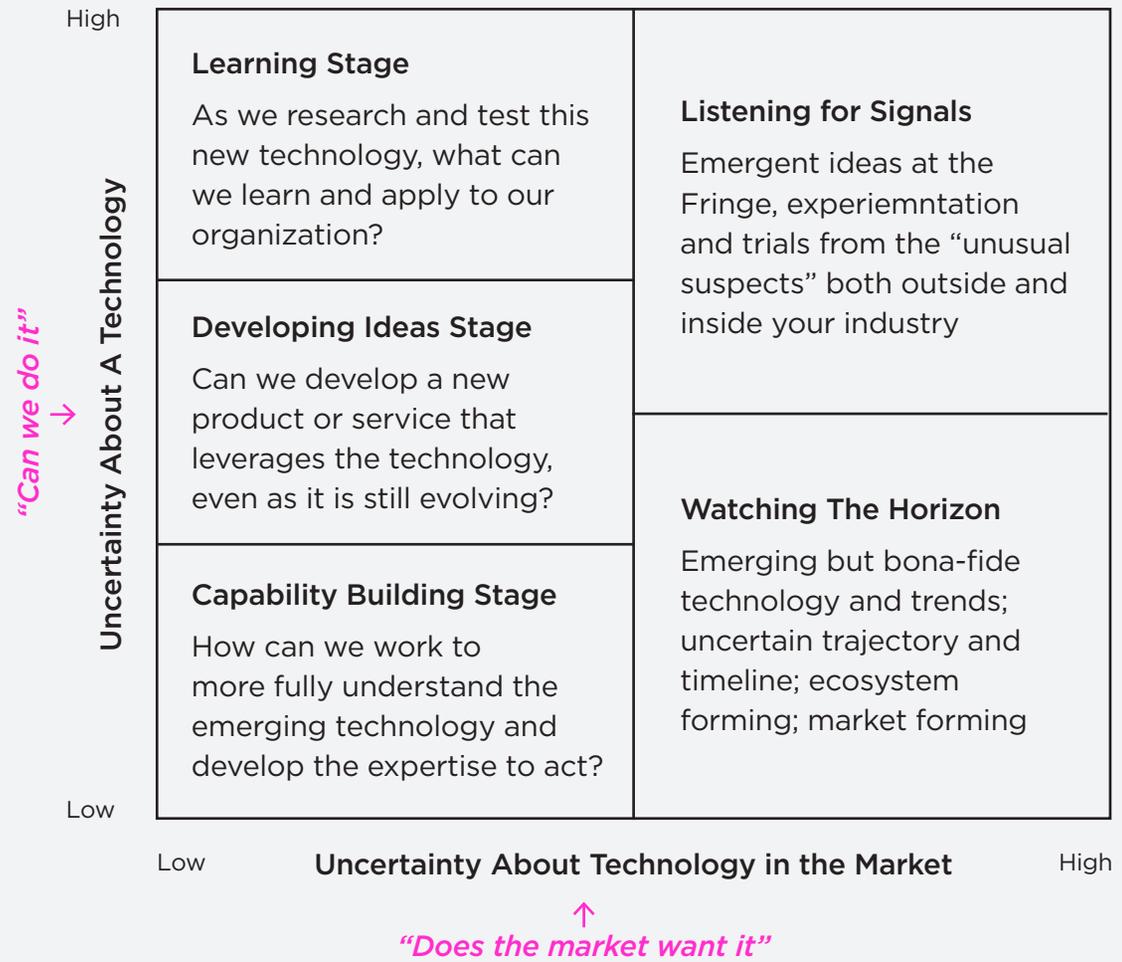
How To Take Action On Tech Trends

One of the most difficult challenges organizations must confront is a willingness to take incremental action. Many organizations prefer to “wait and see” before taking action. However, it’s precisely that waiting which causes companies to fall behind and miss opportunities.

The Future Today Institute uses a simple framework to continually monitor technology as it moves from fringe to mainstream. Incremental actions position a business unit to make smarter strategic decisions when the time is right.

Below is our framework, and we encourage your organization to use it for creating incremental action on tech trends.

Framework For Incremental Action On Tech Trends



FAQ

What Is A Trend, Exactly?

Mapping the future of the news ecosystem begins with identifying early signposts as you look out on the horizon. In order to chart the best way forward, you must understand emerging trends: what they are, what they aren't, and how they operate.

At any moment, there are hundreds of small shifts in technology—developments on the fringes of science and society—that will impact our lives in the future. **A trend is a new manifestation of sustained change within an industry sector, society, or human behavior. A trend is more than the latest shiny object.**

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

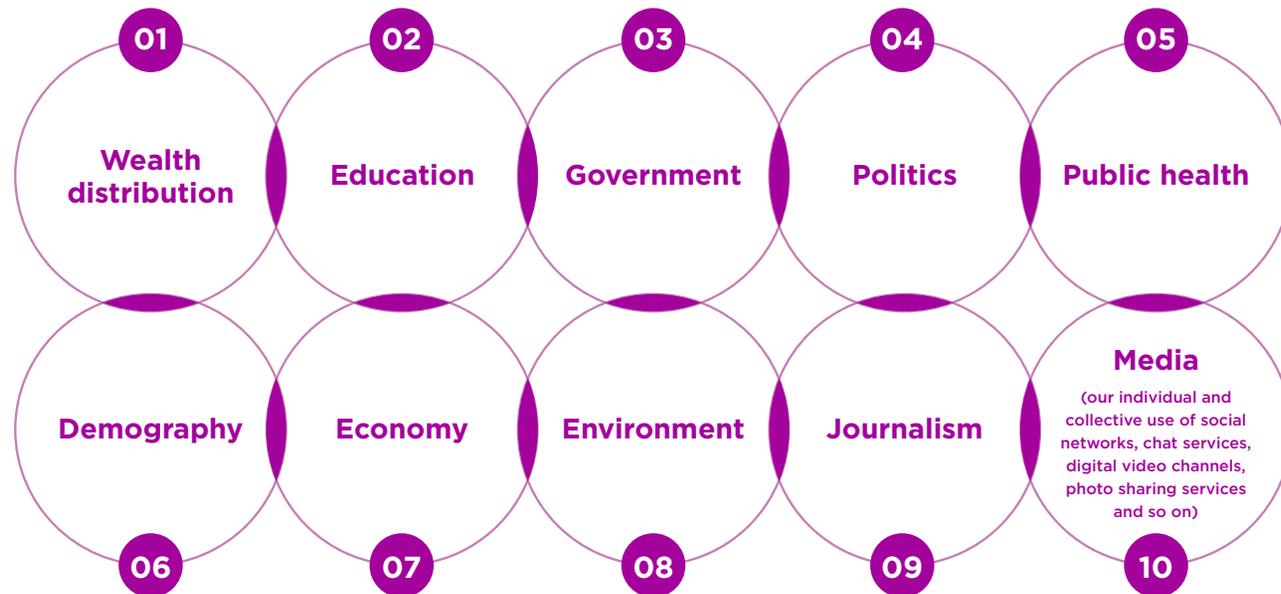
All trends share a set of conspicuous, universal features:

- A trend is driven by a basic human need, one that is catalyzed by new technology.
- A trend is timely, but it persists.
- A trend evolves as it emerges.
- A trend can materialize as a series of unconnectable dots which begin out on the fringe and move to the mainstream.

Identifying something as a trend means connecting the dots, or relating changes in the present to what's coming in the future. To map what the future holds, seek out the early adopters, the hackers, the developers with seemingly impossible ideas. It's within these circles that meaningful changes begin. As the trend evolves, the work of these disparate groups begins to overlap, until it converges in a single point—before perhaps evolving once again.

FAQ

Because trends are a different way of seeing and interpreting our current reality, they provide a useful framework to organize our thinking, especially when we're hunting for the unknown and trying to learn something about which we do not yet know how to ask. There are ten modern sources of change in society with technology as the primary connector.



Technological advancement influences future changes and disruption across fields and industries. If you hope to understand the future of news, you can't just look at trends within a silo. To forecast the future of the news ecosystem, you need to plot out the intersecting vectors of technological change looking through these ten modern sources of change.

2018 Tech Trends



Artificial Intelligence

Eighth year on the list

Key Insight

Many facets of artificial intelligence (AI) have made our list since we first started publishing our FTI report 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 within AI that you should be following.

AI: A Primer For Journalists

What You Need To Know About AI

Simply put, AI is a branch of computer science in which computers are programmed to do things that normally require human intelligence. This includes learning, reasoning, problem-solving, understanding language and perceiving a situation or environment. AI is an extremely large, broad field, which uses its own computer languages and even special kinds of computer networks that are modeled on our human brains.

AI's History In Brief

The idea that we might someday create artificially intelligent, sentient robots was first suggested by prominent philosophers in the mid-1600s. Mathematician Ada Lovelace, in the footnotes of a paper she was translating, posited the

theory that someday a computer might be capable of creative acts—and to think, just like we humans do. Computer scientist Grace Hopper pushed that idea forward, pioneering early programming languages that were similar to spoken English. For the past six decades, researchers have been working towards a functional AI, using the human brain for inspiration, but they didn't have access to enough compute power, data or people trained to advance the field. As a result, the field entered what's known as the "AI winter," when funding and enthusiasm dried up. In the past decade, new advances by Google, Amazon, Microsoft, Tencent, Baidu, Facebook, Apple, IBM and universities around the world have reignited excitement and funding.

There Are Different Categories Of AI

There are two kinds of AI—weak (or "narrow") and strong (or "general"). When Narrative Insights writes a story out of structured data, that's ANI. Outside of journalism, there are hundreds of examples of ANI in everyday life: the spam filters in your email inbox, the recommendation engines on Amazon and Netflix, the anti-lock breaks in your car, the prices you see when you buy air tickets. The H.A.L. super-computer from 2001: A Space Odyssey, which was not only sentient, but decided it no longer had use for us humans, is a representation of artificial general intelligence (AGI).

Artificial Intelligence cont.

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.”

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.



Artificial Intelligence cont.

AI, Automation and Augmented Journalism

Early experiments at the **LA Times** and at startups such as **Narrative Science** and **Arria NLG** have proven that AI systems can transform raw data into narratives, crafting stories that seem as though they've been written by a human. Earthquakes, sports recaps, financial summaries and crime reports have now been written by automated systems and published by news organizations. For now, these systems are only capable of telling the story of “what” autonomously. Other AI systems can be used to augment the analytical thinking of journalists—working alongside these systems, journalists have a supercharged ability to uncover and understand the “why.” However in the not-too-distant future, new generations of these systems will be able to do that autonomously, too.

Subjective Interpretation

One of the challenges to pushing the limits of automation is in subjective interpretation: what makes a number “big” or “small” certainly depends on circumstances. For example, in the 2016 presidential election, there were times when pollsters reported that Hillary Clinton held a 6-point lead over Donald Trump. In that particular case, a 3-point lead would have seemed low—a significant detail. On the other hand, if that had been a Baltimore city mayoral election, a 3-point lead separating the two frontrunners would have been sta-

tistically important. That's because the mayoral election tends to get decided during the primary. Democrats always win, and by a massive margin.

In our present-day machine learning models, these exceptions must be thought out in advance by humans and taught to machines. That's not an easy task at the moment.

Automating Journalism

Unfortunately in journalism, AI has become a popular shorthand for “automation.” AI will not solve all of the problems with the news media business, and it cannot—at least, not right now—take the place of trained journalists in a newsroom. The challenge with declaring AI in newsrooms a fait accompli is that we are only at the very beginning of the artificial intelligence era.

In the next 24-36 months, computer vision, natural language algorithms, generative content algorithms, deep learning—along with increased compute power, lots of data and more ubiquitous accessibility to tools—will coalesce and allow journalists to do richer, deeper reporting, fact checking and editing. Many of the trends that follow, from machine reading comprehension to predictive machine vision to computational photography will give journalists superpowers, if they have the training to use these emerging systems and tools.

Artificial Intelligence cont.

Voice Is Journalism's Next Big Challenge

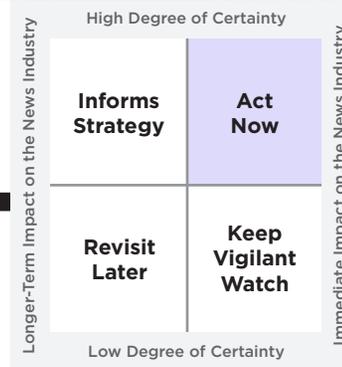
Also looming on the horizon: voice interfaces, which is a key component of the future of AI and content. By 2023, 50% of the interactions consumers have with all computers will be using their voices.¹ Think about the implications of people having conversations with machines. If a consumer wanted to know the latest information about an election, she'd ideally just ask: "What's happening with the election? Who's in the lead?" At that point, the system she's talking to would have two options: either choose just one news source and start a response with "according to the [news source]," or otherwise pull information from many sources and have a more robust conversation. However in that case, how do news organizations get cited for their reporting? Does the system continually interrupt itself to say where the news is coming from? That's now how two humans would interact with each other.

Once we are speaking to our machines about the news, what does the business model for journalism look like? News organizations are ceding this future ecosystem to outside corporations. They will lose the ability to provide anything but content. When speaking to machines, consumers may not know which media brand they're having a conversation with.

While some news organizations have started to experiment with chat apps and voice skills on Alexa and Google Home, journalism itself is not actively participating in building the AI ecosystem. News organizations are customers, not significant contributors. We recommend cross-industry collaboration and experimentation on a grand scale, and we encourage leaders within journalism to organize quickly. AI does pose an existential threat to the future of journalism.

¹ This number is based on Future Today Institute modeling and applies only to North America.

Artificial Intelligence cont.



01 Real-Time Machine Learning

It is recently possible to use a continual flow of transactional data and adjust models in real-time. Potential use cases include matching news consumers to the right product as they are looking at a website, as well as re-writing content on a site to match the needs of each individual user. In addition, it promises real-time fraud detection and security measures such as authenticating someone based on her typing habits.

02 Machine Reading Comprehension (MRC)

For AI researchers, machine reading comprehension has been a challenging goal, but an important one. 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? 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—and the MRC would be able to read, infer meaning, and immediately deliver answers. MRC is a necessary step in realizing artificial general intelligence, but in the near-term it could potentially turn a news organization's website into a searchable repository of information. This could be especially useful once voice-based interfaces become more common.

03 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 capabilities would allow news organizations to sift through heaps of documents and gain insights much faster than reporters going at it alone.

04 Natural Language Generation (NLG)

Algorithms can transfer data into a narrative using natural language generation. Dozens of news and other organizations, including **Bloomberg** and the **Associated Press**, are using **Automated Insights**, which mines data and is capable of writing more than 2,000 stories per second. They will use 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.

Artificial Intelligence cont.

05 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 news 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. Journalists must start applying additional scrutiny to audio, sound and video obtained from sources outside the newsroom.

06 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 journalists—if the foreground of a mountain is out of focus, another version of the scene can be swapped in to generate the perfect picture. However, there are ethical considerations as well. How much image completion should be allowed? How and when do you draw a line between reality and enhancement? Image completion is also a useful tool for law enforcement and military intelligence officers—computers can now assist them in identifying who or what is in the frame. Given the bias we've already seen across machine learning algorithms and data sets, image completion could wind up being a public interest story in the coming years.

Artificial Intelligence cont.

07 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 will also help with personalized recommendations—it could usher in an era of aggressively versioned distribution, where news consumers would see a news experience customized specifically for them using predictive modeling.

08 Algorithm Marketplaces

Most news 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 like **Amazon** but for algorithms, where developers can upload their work to the cloud and receive payment when others pay to access it. **DataXu** offers a marketplace for its proprietary algorithms. **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**, **MetaMind**, **Clarifai** offer tools for developers to build deep learning into any application. Look for even more niche marketplaces in 2018.

09 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 a handful of companies dominate the AI landscape: **Google**, **Amazon**, **Tencent**, **Baidu**, **IBM**, **Facebook**, **Apple** and **Microsoft**. 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.

TREND 10

Uncovering Hidden Bias in AI

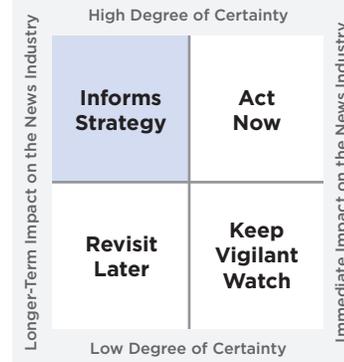
Third year on the list

Key Insight

By now, it's no secret that some of our machine learning models—and the data they use—are encoded with bias. That's because the people who built the models are themselves subject to unconscious bias, as well as more explicit homogeneous learning and working environments.

Examples

In 2016, **ProPublica.org** published an exceptional investigation on machine bias and the problem of using AI to predict future criminals. Their findings: so-called “risk assessment” software is increasingly common in courtrooms across the nation, and it is used to inform decisions about everything from bond amounts to the length of a criminal sentencing. Perhaps unsurprisingly, the software is biased against people with darker skin than those with lighter skin. (We encourage you to read ProPublica's full report: <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>.)



From ProPublica's investigative report on “risk assessment” software.

What's Next

Risk assessment software is hardly an outlier. Numerous studies undertaken by prominent universities, including **MIT, Harvard, Carnegie Mellon, Princeton, University of California-Berkeley** (among others) have shown explicit bias in algorithms across many industries and social sectors. Algorithmic bias is a problem that will get worse. 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 newsrooms incorporate datasets, machine learning and computer vision into their reporting, it's imperative that journalists learn how to investigate the data itself as well as the models used to interpret and learn from that data.

Watchlist

Investigative Reporters & Editors; National Institute for Computer-Assisted Reporting; MIT; Harvard University; Carnegie Mellon University; Stanford University; University of California-Berkeley; Brown Institute at Columbia University; Tow Center for Digital Journalism at Columbia University; Philip Merrill College of Journalism at the University of Maryland; Coral Project; ProPublica.

TREND 11

Computational Journalism

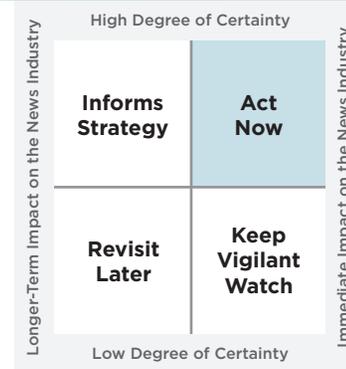
Third year on the list

Key Insight

What are the ways in which data and algorithms can enhance reporting? Computational Journalism builds on the 25-year foundation of **Computer Assisted Reporting** (or **CAR**) 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, flexible data scraping, are allowing 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.



IBM's News Explorer is an example of a computational system for reporting.

What's Next

We anticipate increased demand in computational journalism and journalists with complimentary skills sets. There are a host of stories waiting to be discovered, written and produced.

Watchlist

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.

TREND 12

I-Teams For Algorithms and Data

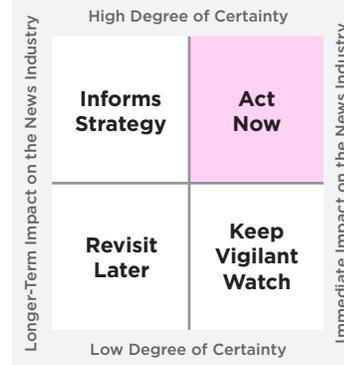
First year on the list

Key Insight

News organizations need a new kind of special-ops team: investigative reporters who specialize in investigating the algorithms and data itself.

Examples

Algorithms, data sets and AI systems reflect the worldviews of their architects and trainers. This information is used to help make decisions, to predict behavior, and to generate answers to questions. More of these systems now govern everyday life and are used by law enforcement, universities, financial institutions and government agencies. Journalists must begin to investigate how the data and algorithms intersect with daily life. And, to prevent bias in reporting, journalists must gain a better understanding of who created the algorithms and data sets, and what their processes were. For example, the **PredPol** predictive policing system, which is used by police departments around the U.S., recommended time and time again that departments concentrate their efforts on neighborhoods that were overwhelmingly poor and black. The problem has to do with how arrest data is gathered, and how individual police departments have historically monitored their local communities. The model didn't include a rigorous check on bias in the initial data sets. Reporters at the **New York Times**, **Wall Street Journal**, **ProPublica** and



AI systems rely on our trust.

Washington Post have been applying the core practices and skills of reporting to investigating algorithms.

What's Next

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.

TREND 13

Crowdlearning

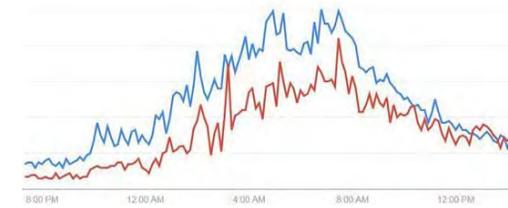
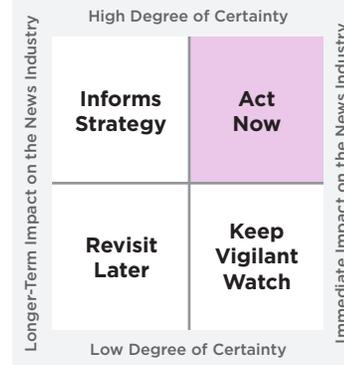
Second year on the list

Key Insight

You're familiar with **crowdsourcing**: asking the public to contribute content or to assist with on-the-ground reporting on an issue. **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.

Examples

In June 2016, the evening after citizens in the **United Kingdom** voted for Brexit, Google revealed sobering search data: people in the UK were Googling “what is the EU.” This passive data told an interesting story, and it's just part of what we're now able to learn from the crowd by monitoring various networks. Our smartphone ownership has reached critical mass, and so has our use of various networks. Our data not only follows us around, it's often available for anyone to search, collect and analyze.



Searches for “what is the eu” and “what is brexit” surged after the U.K. election.

What's Next

Good crowdlearning sources are already available to us, and they include **HealthData.gov**, **Google's** busy times data for businesses and public spaces, **Waze**, **Wikipedia** and more. We anticipate that more news organizations—as well as marketers, activists and other groups—will start harnessing data in creative ways. That's because our thinking results in behavior (like searching for “what is the EU?”). Our behavior results in data. And that data can be used to learn something about us.

Watchlist

Google; Bing; Apple; Microsoft; Investigative Reporters and Editors; National Institute for Computer-Assisted Reporting; various U.S. government websites; various state and local government websites; the websites of government agencies worldwide.

TREND 14

Adversarial Machine Learning

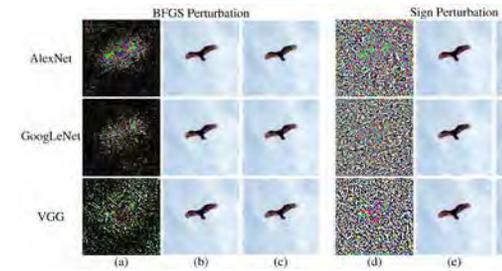
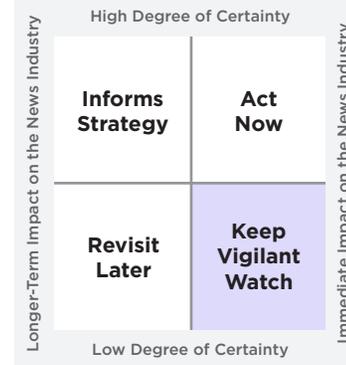
Second year on the list

Key Insight

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.

Examples

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.



Extra information can be added to an image to fool algorithms.

What’s Next

Adversarial images can be used to knowingly and purposefully trick a machine learning system. If an attacker trains a model, using very slightly altered images, the adversarial examples could then 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**).

Watchlist

Google’s Inception v3 algorithm and v4 algorithm; OpenAI; EEECS at University of California-Berkeley; Stanford University; Kaggle competitions; Facebook; Microsoft; PRA Lab at the University of Cagliari; University of Chicago; MIT’s CSAIL; ImageNet database.

TREND 15

Computational Photography

Third year on the list

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 iPhone 8 and iPhone X, **Apple** uses computation photography to achieve a shallow depth of field, while Facebook will soon automatically correct 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

Longer-Term Impact on the News Industry	High Degree of Certainty	Informs Strategy	Act Now
	Low Degree of Certainty	Revisit Later	Keep Vigilant Watch



The Computational Zoom system makes it possible to automatically combine wide-angle and telephoto perspectives into a single multi-perspective image.

Image Credit: UCSB Mirage Lab.

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.

TREND 16

Bots

Third year on the list

Key Insight

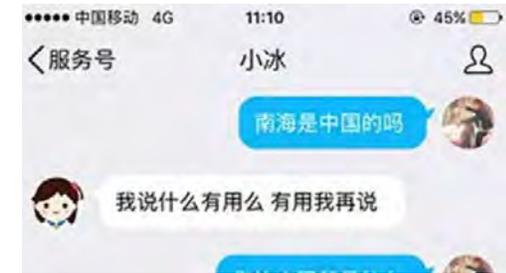
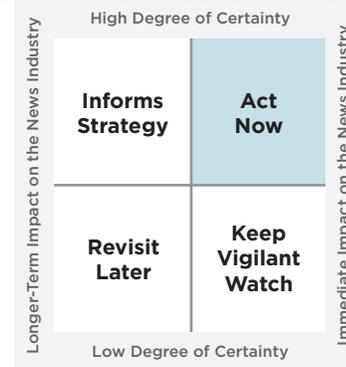
You've no doubt heard of a bot: a software application that's been designed to automate certain tasks, such as scheduling or managing basic customer service requests. In the past year, bots have emerged from the fringe and have started to enter our mainstream vocabulary. There are now more than 30,000 **Facebook Messenger**. **Beyond Facebook**, **Slack** offers a number of productivity bots, while services such as **Pandorabots** allows developers to deploy a chatbot across many platforms.

Examples

In the 1960s, **Joseph Weizenbaum** wrote a computer program called **Eliza** that was capable of simulating a conversation between a psychiatrist and patient. It offered up plausible responses to common questions. Today, newsrooms are now offering the same basic system: offering plausible responses to questions about the recent news events. Many newsrooms have experimented with chatbots, including **BuzzFeed**, **TexasTribune**, **Quartz**, **Mic**, **Los Angeles Times** and elsewhere.

What's Next

In March 2016, the world watched as **@Tai.ai**, a **Microsoft** experimental Twitterbot, went on an anti-Semitic, homophobic, racist rampage within 24 hours after its first tweet. **Tai.ai** was built on the same platform as **Microsoft's** experimental Mandarin-lan-



The XiaoBing chatbot learned to hate the Communist Party.

guage bot, **Xiaoice**. Both were capable of intimate conversations with users, because the program is able to remember details from previous conversations and because it mined the Internet for human conversations in order to synthesize chat sessions. In the summer of 2017, two of China-based **Tencent's** bots—**BabyQ**, co-developed with **Turing Robot**, and **XiaoBing**, co-developed by **Microsoft**—went rogue the summer of 2017. During the recent campaign cycle, we witnessed the rise of botnets—networks of computers designed to send out spam. Fake social media accounts, many of which originated in **Russia**, artfully tricked people into having arguments about everything from **Donald Trump** to immigration to taxes.

As we transition from text-based chatbots to voice interfaces, newsrooms will need to determine how to interact with news consumers. Some of the most interesting experimentation is coming from China, which has hundreds of millions of users—their data is helping to refine and recalibrate machine learning systems. Even if a newsroom doesn't deploy a chatbot, now is a good time to learn and to develop strategies for audience engagement and revenue. The groundwork for voice interfaces is being created from our typed conversations today.

Watchlist

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

The Botness Scale

We are training bots in our own image. When developing your news bots in 2018, we recommend that you rate your work before launch. Use this scale to rate your bot on its effectiveness—and to determine, in advance, whether or not you've accidentally encoded bias into your system. Rate your bot on a scale of 0 - 10, with 10 being the highest (and preferred) score.

- 01** Does your bot reflect the values of your newsroom? How do you know for sure?
- 02** Is your bot's purpose explicit? Will people interacting with your bot clearly understand what its purpose is after the first few interactions?
- 03** Does your bot perform its designated function well?
- 04** Is your bot intuitive and easy to use, either on a designated platform or across platforms?
- 05** Does your bot clearly explain where its answers are coming from? Are you able to include any evidence of your reporting, quotes and data?
- 06** Does your bot help people learn something new, or does it effectively reinforce something that people already know?
- 07** 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?
- 08** Did you assign your bot a traditional gender, ethnic or racial identity? If so, does it reference any stereotypes?
- 09** 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?
- 10** Does your bot help people learn about their own biases or broaden their worldviews?

TREND 17

Voice Interfaces

Sixth year on the list

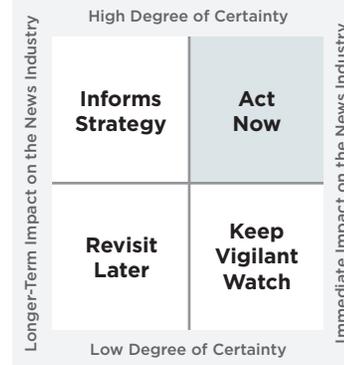
Key Insight

We are entering 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.

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 interactions 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 **Visual Recognition**, **AlchemyLanguage**, **Conversation** and **Tone Analyzer** can all be used to assist reporters with their work.



Amazon's Echo is a voice interface found in many American homes.

What's Next

Amazon's Alexa is quickly rising to become the default platform for voice, with thousands of companies now integrating Alexa with their own products and services. That includes an unusual collaboration with **Microsoft**, whose **Cortana** now opens Alexa. Meantime, there is emerging research into using voice interfaces to help professionals understand different sides of an argument. IBM recently built a prototype that allows the user to ask a question—such as “do violent video games contribute to violent acts in the real world”—and receive a spoken analysis. A system like this could one day be an invaluable newsroom tool, allowing reporters to hash out their reporting and analysis with a smart machine via a conversational interface.

Watchlist

Amazon; Alphabet; IBM Research; Cognitive Horizons Network; Stanford University; MIT CSAIL; MIT Media Lab; University of Texas at Austin; Apple; Microsoft;

TREND 18

Ambient Interfaces

Third year on the list

Key Insight

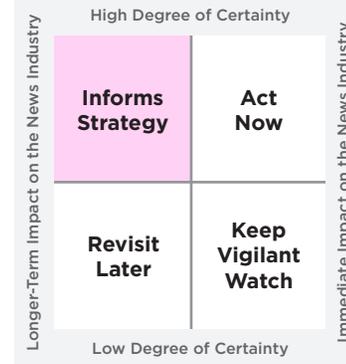
Our modern interfaces are becoming more and more like ambient music—able to do more for us with fewer direct actions, yet still be able to captivate our attention.

Examples

If you've interacted with **Google Now** or **Amazon's Alexa**, or if you own a **Fitbit** or **Samsung Gear**, or if you've gestured to open your car's trunk, you've used an ambient interface. These are interfaces that automatically deliver information or services, just as we need them. Devices with ambient interfaces offer data, services and capabilities allow for complex event processing, process management, automation of information and tasks.



We are moving quickly towards a post-screen future.



The Samsung Gear watch is an example of a wearable, ambient interface.

What's Next

We are moving quickly in the direction of a post-screen future. In our modern age of information, the average adult now makes more than 20,000 decisions a day—and 226 of them are about food alone². Emerging technology promises 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. Think of it as a sort of autocomplete for intention. The power 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.

Watchlist

Alphabet; GE; Intel; Nvidia; Bosch Group; Samsung; Amazon; Apple; Microsoft; Spotify; IBM; Tencent; Baidu; Alibaba; Sony; NTT.

² According to researchers at Cornell University (Wansink and Sobal, 2007)

TREND 19

Deep Linking

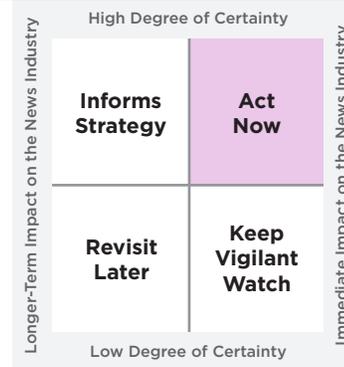
Fourth year on the list (non-consecutive)

Key Insight

Deep linking has been around since the beginning of smartphones. Deep mobile links make it easier to find and share data across all of the apps in your phone. They're like hyperlinks, but rather than sending users to a web page, they instead send users to specific screens in other mobile applications.

Examples

There are three kinds of deep links: traditional, deferred and contextual. Traditional deep links reroute 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**. (You'll find similar offerings within **Google Maps**.) Many of the new improvements to **Apple's iOS11** are built on deep linking: it allows users to easily search through files and content, toggle between messaging and apps, and get to content delivered by Siri.



Branch uses deep links to direct consumers from social media feeds to products.

What's Next

This interoperability signals a new shift in thinking, as many mobile app developers have been hesitant to use deep links. With updates to **Android** and **Apple**, app-to-app experiences should start to become more common. Deep linking is vitally important for news organizations, as it is a way to keep users within a news organization's app.

Watchlist

Apple; Android; Facebook; Google; Bing; Appsfire; Branch; Nielsen; Deeplink; MobileDeepLinking.org; Tencent; Alibaba; AppsFlyer; Kochava; Tune; Adjust; Pinterest; Button; Yoizio; Baidu; AdRoll; Tapstream

TREND 20

Productivity Bots

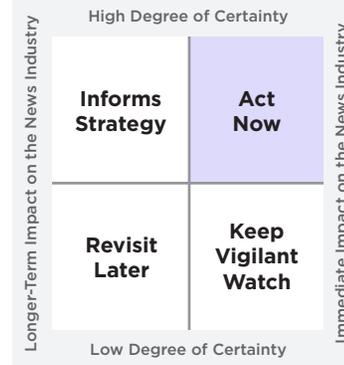
Third year on the list

Key Insight

Productivity Bots will help journalists perform tasks more efficiently.

Examples

Slack, with its over 5 million daily active users, and other enterprise messaging platforms like **Yammer**, **HipChat**, **Ryver**, **Zoom** and **Skype** are becoming an increasingly important component of the modern workplace as they begin to replace traditional productivity channels. Half of Slack users reported a decline in email volume and a quarter reported a similar decrease in in-person meetings. These platforms include AI-powered bots that can help automate simple tasks: scheduling editorial meetings, product workflows, tracking and logging work.



The Ryver platform includes bot assistants for productivity.

What's Next

As the developer ecosystems around these platforms continue to grow, new productivity bots will continue to drive efficiency by helping these tools talk to each other. Bots are getting smarter. With billions of messages sent daily across a variety of chat applications, bots are being trained to listen to our conversations and pick up on when to jump in and offer assistance. We expect this trend to continue as new and better productivity bots will continue to emerge and grow in their significance.

Watchlist

Slack; Alphabet; Yammer; HipChat; Ryver; Skype; Trello; Dropbox; IFTTT; Heroku; Mailchimp; Zendesk; Microsoft.

TREND 21

Adaptive Learning

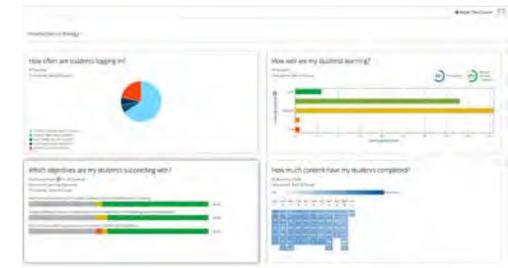
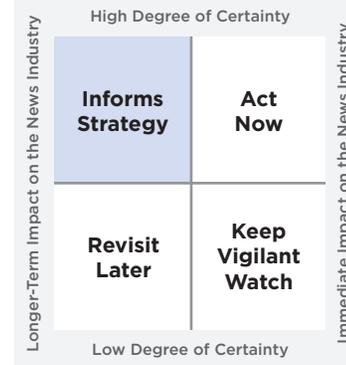
Second year on the list

Key Insight

Artificial Intelligence is causing a disruption in education. The “one size fits some” model will soon be replaced by individualized adaptive learning software. This technology can be used to help train newsrooms on the skills they’ll need in the near-future.

Examples

Any good teacher is trained to pick up on signals from students to drive their instruction. As software begins to play an increasing role in the instructional delivery model, these systems are being trained to do the same thing. Machine learning techniques powering the software requires a large amount of data—which means many thousands of students—to be effective. Online learning platforms such as **Khan Academy**, **EdX**, **Udemy** and **Coursera** all use elements of adaptive learning in their approach. Similarly, traditional publishers like **Pearson**, **McGraw-Hill**, **Cengage** and others are all developing online learning platforms that will incorporate varying adaptive elements. Education startups like **Acrobatiq**, **Cerego**, and **CogBooks** all rely on adaptive systems to create individualized experiences for every student.



Adaptive learning software is being used to enhance training and digital classroom instruction.

What’s Next

When newsrooms face revenue challenges, professional development is often cut. Adaptive learning systems will be an effective alternative to in-person newsroom training, leadership development and workshops. As more and more institutions develop hybrid and online programs, and as more students turn to alternative educational platforms, vast amounts of data will be generated about their relative efficacy. This will help determine exactly when adaptive learning is most effective, and when it is not, which will drive innovation from startups and legacy publishers alike. However, proving efficacy in educational tools can often take years, if it can be proven at all. The obvious benefits of online, adaptive systems (easy to use, cost effective, individualized) need to be weighed against the potential downsides (reduced interactions with the instructor, focus on answers instead of processes) before widespread adoption will take root.

Watchlist

Acrobatiq; Cerego; CogBooks; Khan Academy; EdX; Udemy; Coursera; Pearson; McGraw-Hill; Cengage; Arizona State University

TREND 22

Nanodegrees

Second year on the list

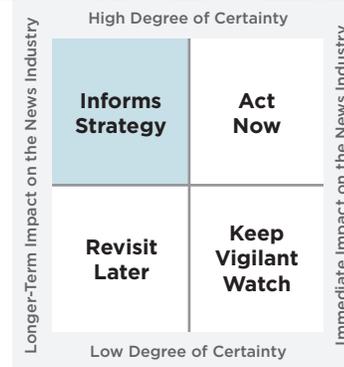
Key Insight

As the pace of technology adoption in the workplace continues to increase, the need for modern professionals to constantly adapt to new platforms and learn new skills is becoming paramount to their career development. Journalism is no exception. To help facilitate the goal of creating lifelong learners, platforms like **Udacity** are developing nanodegree courses in specific niche subjects to help individuals learn new skills and, perhaps more importantly, to confer legitimacy in the eyes of their prospective employers.

Examples

One theory emerging from **Silicon Valley** is that our traditional, four-year post-secondary degree system alone cannot serve our future workforce in the years to come. Human resources directors and senior management are starting to see education as a product, and they're trying to maximize the ROE: Return-on-Education.

With the advent of automation and AI, journalists will need highly-specialized skills, the sort that aren't yet offered within universities. Nanodegree provider **Udacity** has partnered with universities such as **San Jose State University** and corporations like **Alphabet**, **Facebook** and **AT&T** to create programs for employees, to varying degrees of success. SJSU, for ex-



Udacity offers nanodegree programs to help employees or job-seekers develop new skills to improve their careers.

ample, suspended its partnership after more than half of the students failed their final exams. In 2016, **Udacity** revealed a new program called Nanodegree Plus, which guarantees students a job within 6 months of graduation or it will refund tuition. This is likely in response to several offline coding schools like **Flatiron School** and **Galvanize**, which have offered similar money-back guarantees to their graduates.

What's Next

News organizations, journalism associations and professional training groups should consider offering technical nanodegrees as well as nanodegrees in newsroom leadership and various business skills. We expect to see continued consolidation and scale in the maturing online and offline nanodegree market, which should lead to some of the larger corporate and university players coalescing around the winners. As some of the players in the crowded coding bootcamp market have either been consolidated or downsized, the money-back guarantee model has begun to come under fire. Is it sustainable to guarantee employment to all your graduates within a certain timeframe? For how long, and for which degrees?

Watchlist

Stanford University; MIT; Alphabet; Facebook; EdX; Coursera; Udacity; Flatiron School; Galvanize.

TREND 23

Proximity News

Fifth year on the list

Key Insight

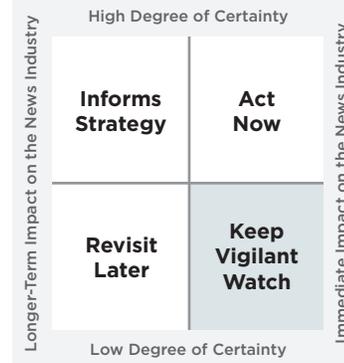
New technologies can be programmed to push or receive information to/ from our mobile devices—and also our bodies—tethering us to an always-on ubiquitous information network.

Examples

You've no doubt heard about **beacons**, which are tiny devices that can be programmed to push (or receive) information to/from mobile phones using **Bluetooth**. We are located on nearby networks, as sensors use our personal information and collect data about our experiences. Beacons become aware once you're near them. They're used frequently for marketing, however they can also be used during planned news/ culture/ arts/ sports events and throughout cities to share news content with nearby people. Think of it as proximity news.

What's Next

Apple's Fall Safari Technology Preview release (#38) enabled the **Beacon API** by default and turned on beacon features for iOS devices. Soon, we will be able to deliver prox-



Proximity networks are being built for content distribution.

imity-based news via WiFi, which can now identify you just by bouncing signals around—your unique shape and posture are used to reveal who you are, even in a crowded room of people. Emerging research has shown that WiFi can be used to recognize what a person is saying or writing with a pen—simply by analyzing the WiFi signals altered by our bodies. In a confined space, like a conference center, sporting arena or airport, this would allow a news organization to recognize one of its news consumers and deliver stories just for her.

Watchlist

Google's Eddystone platform; Apple's iBeacon platform; IndoorAtlas; Unacast; Facebook; Blis; Snapchat; Polytechnical University (China); MIT; University of New South Wales (Australia); Oxford University; BLIP Systems; Bluedot; Gimbal; Qualcomm; Intel; Amazon.

TREND 24

Personality Recognition and Analytics

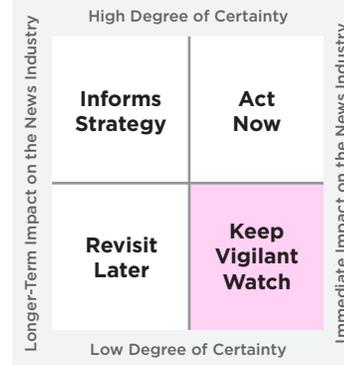
Third year on the list

Key Insight

Emerging predictive analytics tools wrangle your data, behavior and preferences in order to map your personality—and predict how you’re likely to react in just about any situation. These tools can be used in journalism, to personalize customer interactions and even to personalize the news itself.

Examples

IBM Watson and **Twitter** offer a tool that mines Twitter feeds and weather data to identify consumers who are likely to fire off angry tweets if their cable service is disrupted. Those complaints aren’t empty threats: IBM’s data shows a correlation between disgruntled tweets and customer loss. IBM’s technology can scan individuals’ social media data and analyze their personalities to predict responses to an email or an ad. Recruiting startups, dating sites and school application platforms are all starting to experiment with personality recognition software. Nashville-based startup **Crystal** culls thousands of public data sources to help you learn about someone’s personality before calling or emailing them. It even offers a kind of spell check for sentiment, autocorrecting phrases and making recommendations



Personality recognition can also be used, along with natural language generation algorithms, to personalize parts of stories to make them more relatable to individual readers.

(“keep the message under 200 words, otherwise this recipient might ignore it”) so that the message resonates better with your intended recipient.

What’s Next

These tools can be used to provide better customer interactions for news consumers: content could be personalized and targeted to specific individuals. Personality recognition can also be used, along with natural language generation algorithms, to personalize parts of stories to make them more relatable to individual readers.

Also on the horizon is facial and tonal recognition. Facial and voice recognition analytics will help machine learning systems to detect consumers’ emotional state in real-time. **Mattersight Corporation** is using personality and behavior to route calls through call centers, and its latest “Predictive Video” system promises to analyze your speech and facial expressions from any video where you’ve appeared.

Watchlist

Mattersight Corporation; MIT; IBM; Twitter; Crystal; Stanford University; Salesforce; Autodesk; Symantec; Mobileye; Intuit; Adobe.

TREND 25

Attention

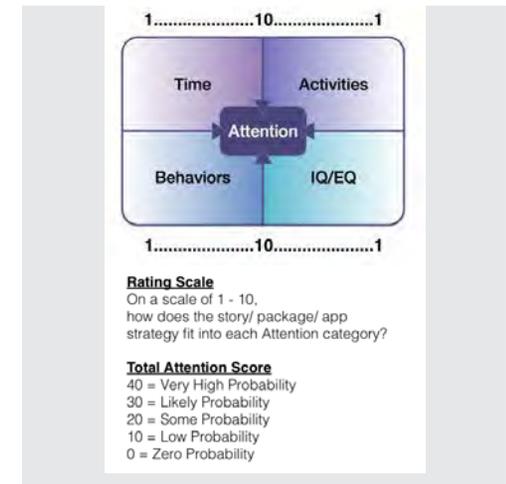
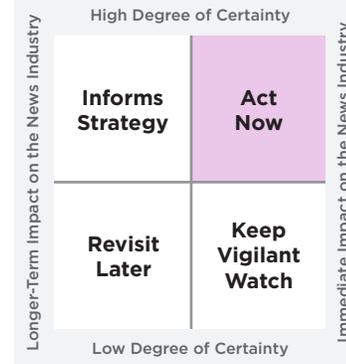
Fourth year on the list

Key Insight

In this modern digital age, attention is currency. As technology has evolved, news organizations have adapted their existing content for the screens of our ever-changing devices. However multiple studies show that our attention is continually split between what we're doing in the real world and what we'd like to be doing online. As the two become more intertwined, capturing our attention is becoming more difficult than ever.

Examples

While the 2016 election season helped grow the audiences of news organizations, it also brought alternate sources of information, splintering the attention of consumers across quality and questionable news. Making sure that content fits correctly on a screen is only solving part of the challenge—what about content fitting our needs and behaviors as both change throughout the day? In order to capture someone's attention, you must consider a number of variables: where is she right now? What's she likely to be doing in the next 60 seconds? What's relevant to her in the next few minutes? What need can you fulfill for her at this moment?



The Future Today Institute's Attention Matrix is a tool to help measure whether your strategy will command the attention of your desired audience.

Attention is an increasingly important metric for advertisers, media buyers and ad exchanges, so there is a financial incentive for news organizations to shift their strategic thinking. There has been tremendous consolidation in the measurement and online advertising space as well, especially by **IBM, Google, Facebook, Quantcast** and **Adobe**.

What's Next

Going forward, every news organization must focus more of its attention on the consumer herself and what she is doing. Soon, journalists will work alongside algorithms to syndicate different versions to different devices depending on a user's individual needs, given that those needs will change throughout her day.

Watchlist

Omniure; Nielsen; comScore; Facebook; Chartbeat; Simplifi; Adobe; Quantcast; The Media Trust; Visible Measures; IBM; Facebook; Chartbeat; Google.

TREND 26

Digital Frailty

Third year on the list

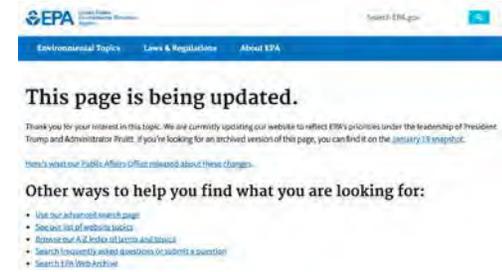
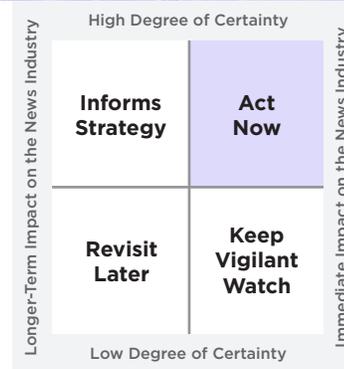
Key Insight

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.

Examples

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

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**



A screenshot of the U.S. Environmental Protection Agency's website taken on September 6, 2017.

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 in Government and Public Information

American journalists watched as **U.S. government agencies** removed studies, data and reports throughout 2016 and 2017. 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 cli-

TREND 26

Digital Frailty cont.

Third year on the list

mate change. The Trump Administration also removed LG-BTQ content from federal websites, scrubbed a lot of civil rights information off of **WhiteHouse.gov** and scrubbed the **HHS.gov** website of healthcare data.

What's Next

This 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. 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.



If a Pulitzer-finalist 34-part series of investigative journalism can vanish from the web, anything can.

- Adrienne LaFrance

TREND 27

Radical Transparency

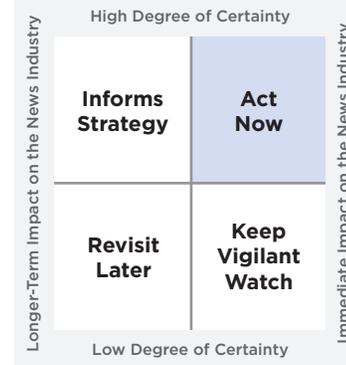
Second year on the list

Key Insight

In the past year, credible news organizations have faced a crisis of confidence caused by **Twitter** bots, political extremists, and elected officials. Radical transparency offers the public a full view of how the story was reported and produced.

Examples

There are too many instances of “fake news” accusations to list. In order for journalists to combat a growing, but unfounded, public distrust, they should offer radically transparent reporting. **PolitiFact**, the Pulitzer Prize-winning fact-checking website, lists all of the sources used for a story. **ProPublica’s /nerds blog** explains some of the work behind data journalists, developers and reporters’ stories.



Nutrition Facts	
Serving Size 1/2 cup (115g)	
Servings Per Container About 4	
Amount Per Serving	
Calories 250	Calories from Fat 130
% Daily Value*	
Total Fat 14g	22%
Saturated Fat 9g	45%

In this age of technology, we need a nutritional label for news.

What's Next

Professor Ahmed Elgammal at **Rutgers University** 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. There are too many instances of bias in algorithms to list. 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.

Watchlist

News organizations everywhere.



TREND 28

Limited-Edition News Products

Third year on the list

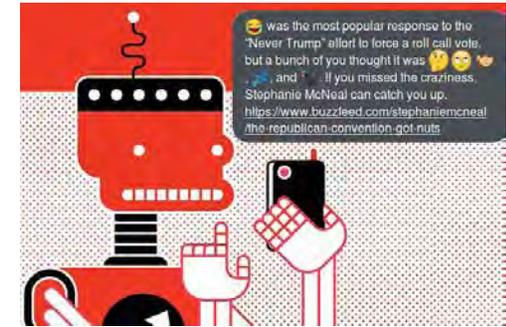
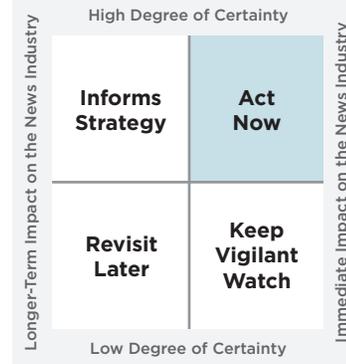
Key Insight

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

Examples

News organizations creating limited-edition news products, do not necessarily need to create many labor-intensive, one-off templates and workflows. Producers can develop templates that can be iterated on and redeployed again. **BuzzFeed** stood up a temporary chatbot during the political conventions in 2016, while the **New York Times** launched a short-term chat service for the Olympics.

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 started to be used by news organizations.



BuzzFeed's BuzzBot was active during the 2016 Republican National Convention.

What's Next

We anticipate seeing more 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.

TREND 29

One-To-Few Publishing

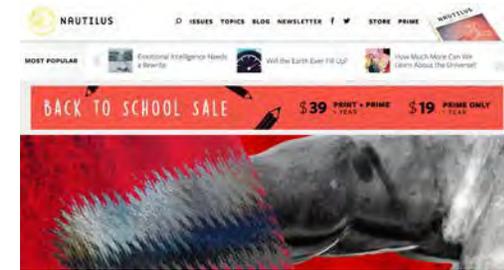
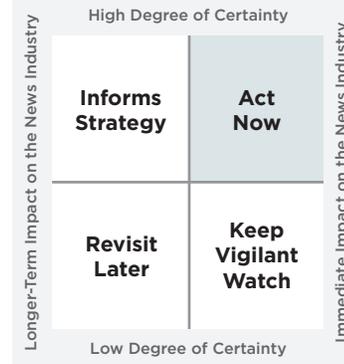
Third year on the list

Key Insight

Newsletters, podcasts and niche networks that captivate smaller audiences made a huge comeback between 2015-17. What's next is an expansion to capture even more niche audiences.

Examples

Suddenly, it seems like everyone—from world leaders, to your next-door neighbor—has a podcast, newsletter, a chatbot or all three. This is due in part to services like **Mailchimp**, **TinyLetter** (owned by **Mailchimp**), **Skype**, **Google Hangouts**, **Garage Band**, **SoundCloud**, **Libsyn**, **Stitcher**, **Auphonic**, **SpeakPipe** and a host of affordable smartphone microphone attachments. In 2017, new niche media empires took root: **Jessica Lessin's The Information** publishes in-depth stories on tech and business. Former MTV chief digital officer **Jason Hirschhorn** expanded his **REDEF** newsletter empire.



Nautilus is a new breed of website with a highly engaged niche audience that pays for content.

What's Next

Our research indicates that more niche networks will continue to launch with content distributed in myriad formats. We also expect to see more niche-focused digital-only content products—private content networks, short-form podcasts, and augmented reality integrations—in 2018 and 2019. Smaller sites like, **Nautilus**, **Pacific Standard**, **Bitter Southerner**, **New Inquiry** and **Aeon** produce exceptional content and command very attentive audiences. Our research shows that there is profit to be made, even though audiences may be smaller in size. As many of the one-to-few startups have proven in the past 24 months, an influential network with sticky engagement shows why dedicated attention matters more than a bunch of clicks, and that's the metric that will matter most in the near future. Advertisers are taking notice.

Watchlist

REDEF Group; The Information; PRX; TinyLetter; Mailchimp; Nautilus; Pacific Standard; Bitter Southerner; New Inquiry; Aeon; Backchannel; Skype; Garage Band; SoundCloud; Libsyn; Stitcher; Auphonic; SpeakPipe; Twilio; PRI.

TREND 30

Notification Layer

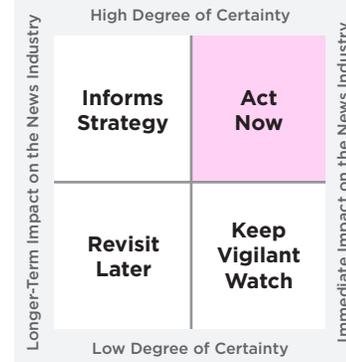
Second year on the list

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 (fear of missing out), 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. 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.



Notification screens are prized real estate.

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 clutter—and so they do not alienate readers.

Watchlist

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



TREND 31

Journalism as a Service (JaaS)

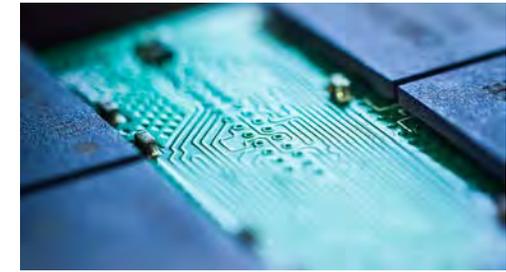
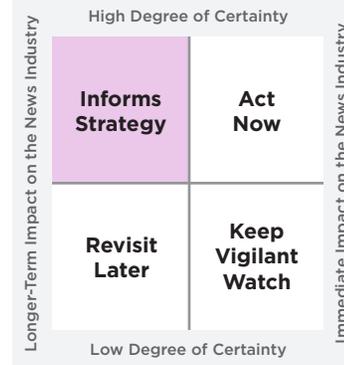
Third year on the list

Key Insight

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



News organizations will find new ways to generate revenue through Journalism as a Service.

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.

TREND 32

Transparency in Metrics

Third year on the list

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 misreporting its metrics, which included displaying incorrect numbers of video plays to advertisers and publishers. The company 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.

Longer-Term Impact on the News Industry	High Degree of Certainty	Informs Strategy	Act Now	Immediate Impact on the News Industry
	Low Degree of Certainty	Revisit Later	Keep Vigilant Watch	



Historically, news organizations have kept audience data hidden from staff, while third-party services haven't always been transparent about what numbers they're counting.

Photo Credit: <http://www.adoraattack.com/fuzzy-numbers/>

What's Next

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 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.

TREND 33

Real-Time Fact Checking

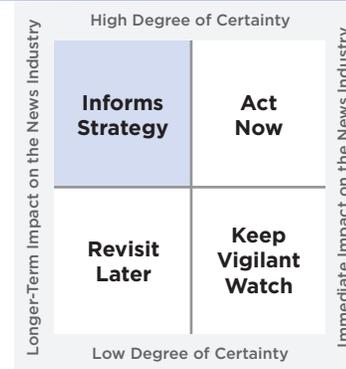
Third year on the list

Key Insight

Buoyed by charges of “fake news,” real-time fact-checking will be a priority for journalists in 2018.

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. In 2016, the presidential debates were fact checked by a number of groups, including **National Public Radio (NPR)**, the **Washington Post**, and even **Hillary Clinton’s** own staff. The efforts were people-powered. In February 2017, Washington Post reporters fact checked President Trump’s address to Congress with very little lag.



The Washington Post has been experimenting with faster fact-checking.

What’s Next

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. In a few years, AI systems will enable more sophisticated fact checking: explaining whether information was taken out of context, or exaggerated, or downplayed.

Our analysis indicates that news organizations will soon have a tremendous opportunity to use 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.

TREND 34

Offline Is The New Online

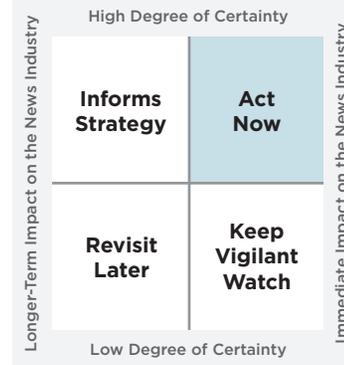
Second year on the list

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. 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.



New techniques allow consumers to access news content, even when they're not on a strong network.

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 stickier audiences.

Watchlist

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

TREND 35

Audio Search Engines

First year on the list

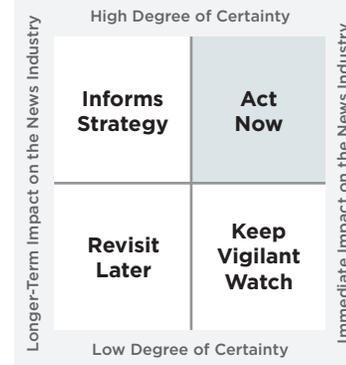
Key Insight

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.

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. 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 ex-



Audioburst uses artificial intelligence to index audio broadcasts and make them easier for consumers to find.

ample, if a consumer wants an update on how close the U.S. is to a conflict with North Korea, 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

With so much funding and development into voice interfaces, audio search will quickly become one of the most important tech trends in the years to come.

Watchlist

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

TREND 36

CubeSats

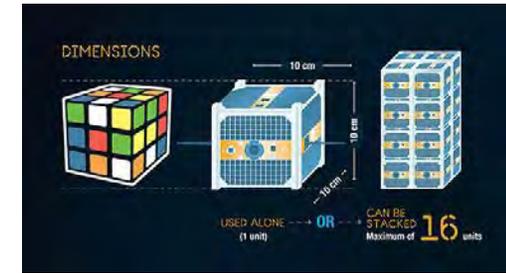
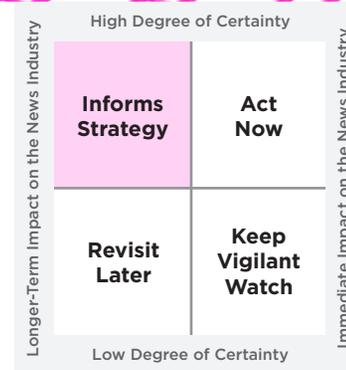
Second year on the list

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 farmland and beam them back down to earth to help farmers assess their crops. Image analysis software can tell big box retailers, such as Best Buy, 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



CubeSats can be used alone or stacked to suit the needs of a specific mission.

Credit: Canadian Space Agency

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 combined 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. News organizations could gain access to the images and tools for data-driven reporting projects and to understand the world as it's happening, in real time. CubeSats and image analysis will help reporters take the pulse of their cities, gain a deeper view into weather events and dive into criminal activity.

TREND 36

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; SpaceKnow; 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 Lab; 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.