

# MARKET INSIGHTS REPORT

FUTUREWEI TECHNOLOGIES

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## COVID-19 RELATED TOPICS

Apple & Google Team-up on Tech for Tracing COVID-19.....	2
Examples of How AI is Being Used in the COVID-19 Pandemic .....	3
Stanford Expert on Herd Immunity & Social Distancing .....	3
Comcast Report on Network Readiness.....	3
WHO, IBM & Microsoft Launch Blockchain Hub to Track COVID-19 .....	4
AT&T Takes A Big Hit from COVID-19.....	4
Coronavirus Stunts IoT Insurgence.....	4
Global Financial Markets Policy Responses to COVID-19.....	5
US consumer financial services: How COVID-19 is shaping attitudes.....	5
The shape of the recovery .....	5
Re-energizing through the epidemic: Stories from China.....	5
Stanford Research Relating to COVID-19.....	5
Big Tech Signs Rare Open Source Pledge to Boost Supplies During COVID-19 .....	6

## HOT TOPICS

Conversational AI.....	6
Hostile Takeover Bid for NOKIA.....	7
Zoom Security: Are Zoom Meetings Safe? .....	8

## POLICY (PUBLIC AND REGULATORY)

Secure 5G and Beyond Becomes Law .....	9
DoT Issues Strategic Plan 2020-2025 .....	9
CSMAC Considering New Super Spectrum Agency.....	10
FCC Begins Action Against China Controlled Companies .....	10
NIST Launches Innovation Contests in IoT & AR.....	10

## ECONOMIC

2030 Thematic Roadmap: 150 Trends .....	11
Microsoft Buys 'corp.com' to Protect Active Directory Customers.....	12
Apple Plans to Sell Computers Based on its Own Chipset by 2021 .....	13
World Economic Forum (WEF) Survey on IoT .....	13

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## SOCIAL

IBM's New CEO Takes Over .....	13
The Necessity of Fixed Access .....	13

## TECHNOLOGY

Cloud Platforms Taking IT to the Edge .....	14
TECH FLASH .....	15
IoT and AR to Become Industry Standard Within Five Years .....	15
IBM Ethical Mineral Sourcing Blockchain to Debut in Spring.....	16
2020 Top 10 High Tech-Cars.....	16

## COVID-19 RELATED TOPICS

### Apple & Google Team-up on Tech for Tracing COVID-19

Contributor: Chuck Adams

In a recent [report](#) by the World Economic Forum, Apple Inc and Alphabet Inc's Google will work together to create contact tracing technology that aims to slow the spread of the coronavirus by allowing users to opt into logging other phones they have been near. This approach could accelerate usage of apps that aim to get potentially infected individuals into testing or quarantine more quickly and reliably, than existing systems in much of the world. Such tracing will play a vital role in managing the virus once lockdown orders end, health experts say.

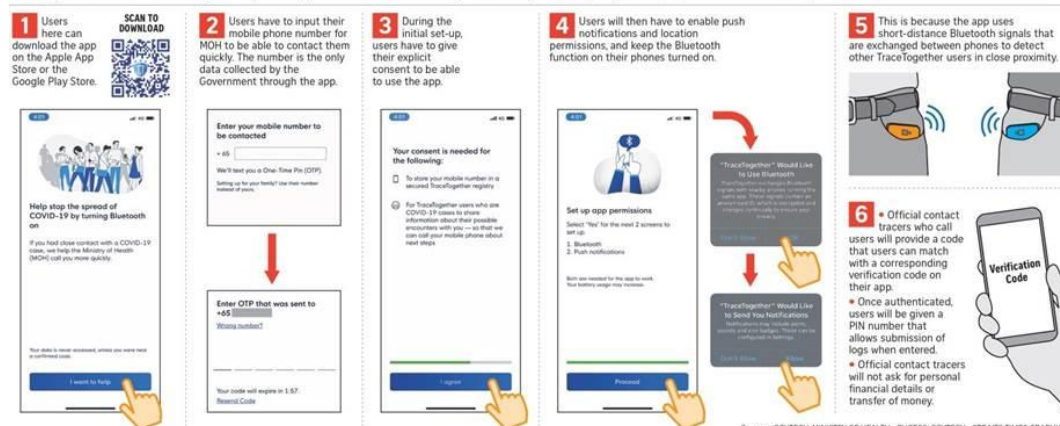
The Silicon Valley system would require millions of people to opt in the system, trusting the technology companies' safeguards, as well as smooth oversight by public health systems.

Phones with the technology will emit unique Bluetooth signals. Phones within about six feet can record anonymous information about encounters. Apple and Google have announced an approach that appears to mitigate the worst privacy and centralization risks.

Apple and Google plan to release software tools in mid-May to contact tracing apps that they and public health authorities approve.

### What is TraceTogether and how does it work?

TraceTogether is a contact-tracing smartphone app that enables the Ministry of Health (MOH) to quickly track people who have been exposed to confirmed coronavirus cases.



## Examples of How AI is Being Used in the COVID-19 Pandemic

Contributor: John Strassner

### Generic COVID-19 Stories

- Mike Pompeo issues a [statement](#) saying that the US is concerned by the threat of cyber-attacks against the Czech Republic's healthcare sector.
- A federal judge in Florida [ordered](#) the leaders of a self-described church to cease selling a bleaching agent it falsely claims will treat and prevent COVID-19.

### AI Related COVID-19 Uses

The following is a collection of resources that demonstrate how AI is being used during the COVID-19 pandemic.

#### *Google Protecting Against Cyberthreats*

A dramatic rise in different types of attacks has been reported during this crisis. Chief among these threats is phishing (an attempt to obtain sensitive and/or personal information from one entity by email, text, phone, or other similar means by another entity posing as a legitimate source). These attacks have targeted both the innocent public as well as health organizations.

Google reported that Gmail blocks more than 100 million phishing emails per day. During the week of 4/5 – 4/11, over 18 million malware and phishing emails related to COVID-19 were blocked, along with over 240 million COVID-19 related daily spam messages. Google is handling these astounding rates using machine learning tools that augment and further inspect analysis by traditional malware scanning software. For example, machine learning found malware deeply embedded in emails that were trying to impersonate the World Health Organization (who.int). Google worked with WHO to ensure that DMARC (Domain-based Message Authentication, Reporting, and Conformance) was better implemented. Other attacks are been found embedded in URLs, various types of documents (e.g., Word and Excel), as well as the typical .png and .jpg files. The set of AI tools also aid in implementing sandboxes to protect against zero-day threats.

A link to Google's advanced phishing and malware protection page is [here](#)

A link to Google's security sandbox is [here](#)

[Additional examples, information and links are available here....](#)

## Stanford Expert on Herd Immunity & Social Distancing

Contributor: Wael Diab

The Guardian recently reported on herd immunity and social distancing. It is based on an interview with a Stanford faculty member. The key messages are that based on the limited initial data, California is not yet close to herd immunity. On the other hand, while social distancing may be needed in some form for a while, there may be ways to relax it from where we are today. Read the article [here](#).

## Comcast Report on Network Readiness

Contributor: Wael Diab

Comcast has issued a report related to network traffic impact because of COVID-19. The [report](#) covers their network in response to what has been going on.

According to the report, Comcast is seeing an “unprecedented shift in network usage” while also reporting that “traffic is beginning to plateau in most places including early work-from-home markets like Seattle and California.”

## WHO, IBM, Microsoft Launch Blockchain Hub to Track COVID-19

Contributor: Chuck Adams

The World Health Organization has teamed up with tech giants IBM, Oracle, and Microsoft, as well as decentralized platform Hacera, to create an open-data blockchain hub that lets people check whether they have been near anyone who's been infected with COVID-19.

The project, called [MiPasa](#), is based on enterprise-grade blockchain Hyperledger Fabric. It comprises various analytics tools and data sources that help citizens and public health officials detect coronavirus infection hotspots. It uses data analytics and privacy tools "that were previously only available to elite financial institutions,"

Given its inherent immutability, blockchain technology is a popular choice for projects creating verifiable databases—that information integrity is sustained is especially important when lives are at stake. Read the related story [here](#)

## AT&T Takes A Big Hit from COVID-19

Contributor: Timothy Jeffries

In a AT&T recent [Investor Briefing](#), the major wireless carrier reported a \$605 million hit to Q1 revenue and \$433 million to EBITDA and have stated Q2 will likely see the "full effect" of the pandemic. AT&T noted that bad debt, cutting some customers a break on payments and production shutdown costs has meant lower earnings. Overall, the carrier reported revenues were down 2.6% to \$34.2 billion, year over year due to declines in Entertainment Group, wireless equipment and Business Wireline.

With the downturn and challenges, the carrier continues to target nationwide 5G deployment this summer but will most certainly face construction and permitting delays by state and local officials due to COVID-19.

New Street's Jonathan Chaplin emailed investors after the briefing noting that the report is a sign of what's to come among the major communications players. "Wireless and broadband are resilient, while pay-tv and media have been hit hard," the analyst wrote. "The prognosis for the rest of the year is grim: some of the benefits in Wireless will likely unwind, while revenue trends and margins in Entertainment and Warner Media will likely get worse."

## Coronavirus Stunts IoT Insurgence

Contributor: Chuck Adams

[ABI Research](#): Delayed insurgence of [IoT](#) will have to wait as a global pandemic crushes many of the industries that could benefit from increased connectivity. The rapid reversal is significant because the convergence of [5G](#), networks especially suited for IoT, and device proliferation was expected to bolster the technology before the pandemic hit.

COVID-19 has had an impact, and in the short term primarily related to manufacturing delays both in the semiconductor industry and the industries those devices serve, Markets such as automotive, [industrial IoT](#), as well as 5G equipment will [continue to suffer](#) a little bit longer during the predicted recession even when manufacturing is 100%.

The eSIM (electronic, or embedded, SIM) market, for example, which is heavily dominated by the automotive industry, will likely suffer the greatest short-term impacts. Car manufacturing has declined considerably since the pandemic began. ABI Research remains confident in the long-term opportunities for "end-to-end chip-to-[cloud security](#) and the combination of cellular enablement paired with a secure chipset alongside a platform, which will form the basis from which security at the design phase will and can be implemented,

COVID-19 has forced most enterprise IoT engagements into mitigation mode. This has resulted in a temporary shift in terms of development roadmaps and budgets, but this will be a shorter term impact. Post pandemic IoT will play an important role in transforming the supply chain, per ABI Research. The evolving supply chain, the demand for IoT and [artificial intelligence](#) to enable cross supply chain asset visibility will become increasingly important. ABI Research

anticipates supply chain process diversification to accelerate to limit business risk and the impact of future supply chain disruptions. IoT technologies enable trust and reliability for engaging and integrating new partners and suppliers.

## Global Financial Markets Policy Responses to COVID-19

Contributor: Wael Diab

OECD (Organization of Economic Cooperation and Development) released a report on the state of the global financial markets. The report highlights:

- Turbulence in global financial markets: The economic impact of the global spread of COVID-19 has heightened market risk aversion in ways not seen since the global financial crisis
- Corporate sector indebtedness and market vulnerabilities: In many countries, businesses have become highly indebted, and are now vulnerable to deteriorating economic and market conditions.
- Policy considerations
  - o Expand central bank liquidity support
  - o Urgent fiscal support to viable businesses
  - o Other fiscal support to small businesses and households
  - o Market regulatory approaches

Find out more at: <http://www.oecd.org/finance/>

## US consumer financial services: How COVID-19 is shaping attitudes

Contributor: Wael Diab

At the heart of any economic outlook is consumer confidence. This [article](#) looks at a survey of US financial decision makers. It presents the data from the survey such as the time horizon, confidence, projected impact to savings, income etc.

## The shape of the recovery

Contributor: Wael Diab

This [article](#) is an economic analysis on what the shape of the recovery may look like from a financial perspective. While everything is pretty fluid, different scenarios are considered and contrast relative to the great depression is shown. Key takeaways include:

- Shift from a rapid recovery to a moderated one. “expect GDP to contract by -3.2% in 2020 and not to return to its prior peak until 2022.”
- Recovery anticipated to be faster than the great depression
- Markets may be a leading indicator rebounding well ahead of the economy’s rebound

## Re-energizing through the epidemic: Stories from China

Contributor: Wael Diab

A [survey](#) of China-based executives sheds light on the personal impact of working through the COVID-19 crisis with key takeaways and recommendations.

## Stanford Research Relating to COVID-19

Contributor: Wael Diab

Stanford has been very active and leading on COVID 19. Below are various perspectives on some of their activities.

### *Summary of Stanford Medical Research on COVID-19*

This list includes a curated summary of the work in the areas of testing, transmission, treatment and vaccinations, epidemiology, data science and modeling, immunology, cardiovascular and coping amongst others. The research on AI is covered by the next insight below with the podcast.

***Artificial intelligence takes on COVID-19***

“Podcast: In this episode of Stanford Engineering’s The Future of Everything, guest host Howard Wolf, Stanford’s vice president for alumni affairs and host of the Stanford Pathfinders podcast, turns the tables on Altman — a medical doctor, an expert in bioinformatics and the HAI associate director who helped lead the conference — and digs deep on AI’s response to COVID-19.”

<https://engineering.stanford.edu/magazine/article/russ-altman-artificial-intelligence-takes-covid-19>

“Altman and his group have used artificial intelligence to computationally predict six drugs that could inhibit TMPRSS2, a protein that plays a key role in SARS-CoV-2 infections. Altman and his collaborators outside of Stanford Medicine plan to conduct experimental follow-up studies to explore the efficacy of two of the drugs in blocking SARS-CoV-2 from causing infection. While promising, the potential drugs are still part of a preliminary computational analysis and would be dangerous to use clinically at this time.”

***Meet the Stanford researchers mobilizing to understand, fight COVID-19***

A look at some of the researchers, their work and collaboration.

<https://news.stanford.edu/2020/04/14/covid-19-research-roundup/>

**Big Tech Signs Rare Open Source Pledge to Boost Supplies During COVID-19**

Contributor: Chuck Adams

A bottleneck to the mass production of critical goods, from antibody (or serology) tests to face masks, necessary to keep the public safe is copyright law.

The [Open COVID Pledge](#) is an initiative to open source patents held by universities, companies and others to support the development of medicines, test kits, vaccines and contact tracing tools.

Those that sign the pledge are asked to give free license to their intellectual property, which otherwise would stymie independent development of potentially lifesaving goods. Amazon, Facebook, Hewlett Packard Enterprise, IBM, Microsoft and Sandia National Laboratories have announced participation, along with Mozilla and Creative Commons. Intel has freed up over 72,000 patents for public use. The pledgers have committed hundreds of thousands of patents that are now available on a temporary basis. A draft licensing agreement, the Open COVID License 1.0, is available as a template, though companies can create a custom legal arrangement.

The terms of the license will be effective retroactively from Dec. 1, 2019, and sunset one year after the World Health Organization calls the end of the pandemic.

## **HOT TOPICS**

**Conversational AI**

Contributor: John Strassner

***Definition***

Conversational AI is a set of technologies that enable computers to understand and respond to voice or text input in a way similar to how humans converse.

***Typical Use***

Conversational AI is typically deployed using agents (also referred to as chatbots). This enables the agent to help people interact quickly and naturally. It also enables businesses to provide more customization and support for their products.

It also is sparking use as a simpler interface to complex applications that have interaction patterns (e.g., complex, cascaded menus) that are hard for novice computer users to navigate. In some cases, it has even started replacing the



application with a set of dialogs that enable the user to tell the system what the user wants to do. This has been helped by continuing advances in linguistics and related language technologies, providing for richer conversations than simple linear dialogs.

### ***Implementation and the Use of AI Technologies***

The foundation of Conversational AI is, of course, Natural Language Understanding (NLU) (i.e., the comprehension by computers of the structure and meaning of human language). NLU is a subset of the more generic Natural Language Processing (NLP) genre, which is a set of technologies that take spoken and/or written human input, analyze and comprehend what was ingested, and then interact with the human providing answers or suggestions. Machine learning plays a critical role in NLU and NLP. Think of machine learning as enabling a computer to recognize patterns of words and phrases that indicate special elements of a conversation, such as people, types of actions (e.g., purchase a gift), special occasions (e.g., anniversary), or even broader meaning, such as the intent of what a person wants to do. Machine learning platforms are experiential, meaning that they learn with experience. This enables them to not only understand slang, but also differentiate between homonyms and even understand intent when there are spelling or spoken errors in the dialog.

A critical mechanism provided by NLP is the automatic expansion and correction of the language understood by the agent. However, NLP itself is only one component. Forrester, in a 2019 report, stated that most conversational AI platforms “lack the critical capabilities and business-friendly usability necessary, leaving CX teams struggling and customers unsatisfied”. This brings to light the addition of context and profiles to offer more engaging conversational AI agents.

[Read more: Conversational AI](#)

## **Hostile Takeover Bid for NOKIA**

Contributor: Chuck Adams

The beleaguered company, is now on the verge of a hostile takeover by an anonymous private equity firm,

Nokia has not been able to keep pace with the likes of Ericsson ERIC and Huawei. Markedly, the gradual dominance of Huawei proved to be considerably distressful for the Nokia as it apparently dreaded losing its competitive edge in the 5G race.

In February 2020, Nokia was reportedly mulling to explore a couple of strategic options like investment shift, asset sale or a potential merger with Ericsson in the face of intense 5G competition. Impressively, the merger, which is anticipated to aid both the companies, will not only tackle aggressive pricing structure adopted by China-based counterpart, Huawei, but will also help Nokia to emerge as a dominant player in the realm of next-gen mobile networks.

The arch-rivals share complementary strengths with each other owing to their geographic proximity. Such a combination is likely to be mutual rather than hostile as Nokia does not envision any fit with Samsung or Huawei.

Nokia has been undertaking efforts on the product and service development front. It accelerated its position in IoT with a new managed service platform backed by 5G and edge computing.

Nokia believes its end-to-end capabilities are a key differentiator in the 5G equipment space. At a time, when the telecom companies are resorting to a multi-vendor approach, the Finland-based company insists that procuring equipment and services from a single vendor can reduce total cost of ownership by more than 20% as well as reduce time to market by at least 30%. See the related article [here](#).

## Zoom Security: Are Zoom Meetings Safe?

Contributor: Barry Leiba

A few months ago, FutureWei switched to Zoom for its teleconferences and set us all up with Zoom accounts. The purpose was to deal with export regulations, but perhaps there was a bit of prescience involved as well: with COVID-19 confinement measures, everyone is now using Zoom. We have more teleconferences than ever because of meeting/travel cancellations, but beyond that, we're using Zoom for virtual happy hour, video-conferenced dinner with friends, family gatherings... my wife plays canasta just as always, using an iPad app to play the game and Zoom to connect the four players to socialize. As the advertisements for long-distance telephone service used to say, "It's the next best thing to being there."

And, as with any technology that becomes widely used, we find that hackers have gotten their feet in the Zoom door as well: media reports abound of Zoom security and privacy issues. Unwanted intruders are joining Zoom calls, and there are various reports of vulnerabilities and other bugs – some are even advising people to stop using Zoom.

What's the story? Do we need to worry about this? **Should** we stop using Zoom?

We should not worry too much, and we should definitely **not** stop using Zoom. But, as with COVID-19 itself, we should take reasonable precautions.

A number of the issues that have been raised about Zoom have to do with configuration:

- meetings that have no passwords assigned and are subject to brute-force guessing of the meeting number
- configuration settings that allow too much access to non-host participants
- configurations that allow people to distribute malware through file transfers

For those sorts of issues, the solutions are to change the meeting configuration to limit exposure. Put passwords on meetings that should be private. As host, monitor who joins the meeting and watch for interlopers. Don't give participants full access: control it yourself, as host. Disable file transfer, which is rarely necessary. If you need to use it, temporarily make a specific participant a co-host, and then revoke that after the file transfer is done.

Other issues come from Zoom implementation choices (using Facebook's single-sign-on, which quietly gives information to Facebook; unvetted "roll-your-own" crypto and "end-to-end encryption" that really isn't) and software bugs. And what software doesn't have bugs? The key point here is how Zoom is responding to these sorts of issues, and the answer is "Quite well, really." Bugs are acknowledged, fixes are developed quickly, features that now appear to be bad choices are being re-thought.

In the end, it's important to remember that any teleconference system will have vulnerabilities and other bugs, and that whatever is most popular at any given time will be heavily targeted by both hackers and critics. Last year, after ICANN's Security and Stability Advisory Committee (SSAC) uncovered severe security and privacy issues with Adobe Connect, ICANN stopped its use in the middle of a major meeting, and soon settled on Zoom going forward, after some concentrated investigation. Now, ICANN stands by that choice and continues with Zoom, happy with their service and their responses to the issues that are being raised.

The rest of us should do the same, making sure that we set our configurations and manage our meetings responsibly.

References:

[Move Fast and Roll Your Own Crypto](#)

[Security and Privacy Implications of Zoom](#)

[Dispelling Zoom Bugbears: What You Need to Know About the Latest Zoom Vulnerabilities](#)



## POLICY (PUBLIC AND REGULATORY)

### Secure 5G and Beyond Becomes Law

Contributor: Timothy Jeffries

Originally introduced in the U.S. Senate mid-2019, [S.893, Secure 5G and Beyond Act of 2020](#) became law in late March 2020, less than one year after its introduction gaining strong bipartisan support.

In the law, Congress calls on the Administrative to “*develop a strategy to ensure the security of next generation mobile telecommunications systems and infrastructure in the United States and to assist allies and strategic partners in maximizing the security of next generation mobile telecommunications systems, infrastructure, and software, and for other purposes.*” To this end, Congress proposes a two-prong approach.

First, an inter-governmental group comprised of key agencies will be formed including the FCC, Dept. of Commerce, Homeland Security, National Intelligence, Attorney General, the Dept. of State, the Dept. of Energy, and the Dept. of Defense to assist the White House in developing a strategy addressing the provisions of the law related to the security of next generation network. The strategy is to be called the “**National Strategy to Secure 5G and Next Generation Wireless Communications.**” In addition, the group will: (1) assess options to protect the competitiveness of U.S. companies; (2) to assist U.S. allies with technical expertise to maximize security; (3) to develop plans to promote “responsible global development and deployment” of 5G and next generations wireless networks; and (4) in the promotion of “responsible development,” consider efforts to enable robust international engagement and leadership in the development of international standards.

Second, in parallel to the abovementioned network security, the law instructs the White House to develop and submit to Congress an implementation plan for strategies to address a whole host of related items. Some of the issues named in the law include: (1) a detailed assessment of potential threats and vulnerabilities posed by 5G networks and methods to address these vulnerabilities; (2) the identification and assessment of the global competitiveness and vulnerabilities of U.S. manufacturers and suppliers of (5G and beyond wireless) communications equipment; (3) the development of a plan for engaging with communications equipment providers (and other) to encourage maximizing their participation in standards setting organizations; and (4) a plan for research and development by the Federal Government, in partnership with trusted suppliers and allies, to reach and maintain U.S. leadership in 5G and beyond (wireless) systems.

The recommendations and findings stemming from both of these efforts (“the reports”) are due back to Congress around the September 2020 timeframe for further consideration. At that time, we will either learn how the USG proposes to implement these actions or we’ll see a request for additional time. Only time will tell at this point. The 180-days given by Congress to complete these actions is considered aggressive.

### DoT Issues Strategic Plan 2020-2025

Contributor: Timothy Jeffries

In March 2020, the Department of Transportation (DoT) released its Intelligent Transportation System (ITS), Joint Program Office (JPO) strategic plan for 2020 through 2025. The plan describes the vision, mission, strategies, and research goals that will guide the ITS JPO in meeting key priorities.

The five broad strategies outlined in the plan include: (1) identifying and assessing emerging technologies; (2) coordinating and leading R&D programs; (3) evaluating and documenting demonstrations and developing models; (4) providing tools that educate the public and transport experts; and (5) working with standards development organizations to develop standards and guidance on interoperability for national and international ITS users.

Public comments are welcomed on the plan.



## CSMAC Considering New Super Spectrum Agency

Contributor: Timothy Jeffries

The Commerce Spectrum Management Advisory Committee (CSMAC), an advisory group under the National Telecommunications and Information Administration (NTIA), has for the past few months been looking at some radical changes for future spectrum regulation, including [creating](#) a new spectrum agency to address existing and future spectrum strategies, allocations, and management.

In their most recent [update](#) to the full CSMAC, Working Group #1 (WG1), who is looking at the various options, advanced discussion on three possible options: (1) standing up an new independent super agency combining all (i.e., an “Unity Agency”) or parts (i.e., a “Spectrum Resource Agency”) of existing FCC and NTIA functions into one entity; (2) shifting more control of spectrum decisions to either just the FCC or the NTIA - at present, each serve a role in spectrum policies; or (3) a hybrid of the above options with an enhanced inter-government MOU between the FCC and NTIA.

WG1 will be meeting again in the next few weeks to finalize their proposal to the full CSMAC for vote. Of the options presented, creating a “Unity Agency,” in which the FCC and NTIA would be combined, is the most challenging followed by identifying a single agency to assume all spectrum responsibilities since each serve a unique and separate function. The most likely outcome will likely align under option #3 resulting in an enhanced MOU, although the specifics under this option are a bit harder to nail down at this time.

## FCC Begins Actions Against China Controlled Companies

Contributor: Timothy Jeffries

In the U.S. Governments (USG) latest volley of relentless attacks on China, the FCC is gearing-up to act against four companies it alleges are controlled by China's government. The agency issued a “[Show Cause Orders](#)” to China Telecom Americas, China Unicom Americas, ComNet and Pacific Networks. The companies are asked to explain why the commission should not “start the process of revoking their domestic and international section authorizations enabling them to operate” in the U.S.

Last fall (2019), the FCC rejected a China Mobile USA application and announced it would pursue additional actions against other such companies. According to the FCC Chairman, “[t]he *Show Cause Orders* reflect our deep concern by the U.S. Departments of Commerce, Defense, Homeland Security, Justice, and State and the U.S. Trade Representative -- about these companies’ vulnerability to the exploitation, influence, and control of the Chinese Communist Party, given that they are subsidiaries of Chinese state-owned entities.”

With this action by the FCC, the USG certainly appears committed to its cause to isolate the USA from China, and by extension, most of the countries outside their direct influence. The only remaining question is to what extent. Their current direction and strategy seem to be leading them straight for the preverbal cliff.

## NIST Launches Innovation Contests in IoT & AR

Contributor: Chuck Adams

The National Institute of Standards and Technology (NIST) has [announced](#) will soon kick off two national innovation contests that aim to strategically leverage augmented reality and internet of things technologies to transform public safety officials’ abilities to respond to emergencies.

The IoT contest focuses on the production of smart city data streams to simulate disaster scenarios. The AR contest seeks to create AR interfaces for first responders.

Each contest envelops research and development phases leading up to a final fourth phase of competition—NIST’s CHARIoT Challenge—which will ultimately integrate the IoT data streams into AR headsets to demonstrate how the wearable and sensor technologies can ultimately help public safety officials to make quicker, more informed decisions.

Researchers on the AR path will explore how holographic and AR information will be used and presented in public safety in the future, both to personnel on the ground and those behind the scenes directing them

IoT comes in because a great deal of that information will likely be streamed through sensor networks, so researchers must ensure that the information is streamlined and doesn't result in a sort of cognitive overload for the users leveraging them.

The contest will bring together public safety innovators, communication technology experts, and really kind of test and advance the state of both the IoT data streams and augmented reality

## 2030 Thematic Roadmap: 150 Trends

Contributor: Chuck Adams

Barclays' Sustainable & Thematic Investing Research team developed a 2030 thematic roadmap outlining 150 trends across six thematic paradigms that are likely to dominate discussions with investors over the next decade.



## Microsoft Buys “corp.com” to Protect Active Directory Customers

Contributor: Barry Leiba

In February it was reported that the owner of the domain name <corp.com> had announced that he’s selling that domain name. Why should anyone care about that? Of course, if he were selling <mycompany.com>, no one would.

But <corp.com> is different, and the reason it’s different has to do with how Microsoft Active Directory works: companies using Active Directory that didn’t set their configuration properly are likely using an old default “domain” of <corp> – something that used to be benign back in the days when the number of top-level domains (TLDs) were limited, and things like <example.corp> couldn’t happen. That’s not a wise thing to do now with widespread use of Generic TLDs, but it’s still OK at the moment because the <corp> TLD has not been assigned to anyone and is not delegated in the Domain Name System (DNS). Someone using their Active Directory client from outside the company, on the open Internet, would be trying to resolve <corp> through the DNS and would get an NXDOMAIN (non-existent domain) response.

But there’s another wrinkle: in order to make life easier, network stacks, including the one in Microsoft Windows, respond to situations such as this by “guessing” what domain you might actually be looking for, appending certain known suffixes. Can’t find <corp>? Maybe that was a typo: let me try <corp.com> and see if I can find that.

In comes Mike O’Connor, owner of <corp.com>. O’Connor has set things up so that when you **do** try a DNS query on <corp.com>, you get a harmless response – nothing bad happens. Because O’Connor is a Good Guy. A Bad Guy might send you to a computer he owns, one which is set up to steal everything on your computer that Active Directory will let him access – and, in fact, O’Connor and others tested this, years ago, and quickly shut down tests when they realized how much access this provided. And he’s kept that domain name sheltered ever since.

On Microsoft’s side, they have released a number of Active Directory updates to mitigate this situation, but those updates are not widely installed because of the impracticability of shutting down an entire Active Directory network for a significant period of time while the updates are installed and tested, and because the updates are likely to be incompatible with other older, out-of-service software that many companies continue to use and depend upon.

Once O’Connor announced that he’s selling the domain name, for a starting bid of \$1.7 million, the security community became rightfully concerned that it not be bought by a Bad Guy. An immediate call came out to Microsoft, on the “You broke it, you bought it,” principle: Microsoft created the mess with their choice of using <corp> in the first place, so they should pony up the money to buy the domain name and protect it themselves.

Well, now they have: in mid-April, Microsoft announced that they will buy <corp.com> from O’Connor (who clearly had been holding out, unwilling to sell it to the wrong parties), specifically to protect their customers. Microsoft will then become the steward for the domain name, and will themselves become responsible for keeping users of their Active Directory software clear of this exposure.

There is still an impending problem with the use of <corp> in Active Directory: should another round of TLD sales from ICANN result in the sale and delegation of <corp> itself (as opposed to <corp.com>), we would see the same exposure – a general issue called namespace collision, where a name that had been used for one purpose (in this case, private, unauthorized use by Active Directory) starts being used for another (authorized delegation as a public domain name). The ICANN Security and Stability Advisory Committee (SSAC) is working on a multi-year effort, the Name Collision Analysis Project (NCAP), to identify issues, mitigations, and recommendations with respect to the more general name collision problem.

### References:

[Corp.com is up for sale – check your Active Directory settings!](#)

[Microsoft Buys Corp.com So Bad Guys Can’t](#)

[Name Collision Analysis Project \(NCAP\) Study 1](#)

## Apple Plans to Sell Computers Based on its Own Chipset by 2021

Contributor: Wael Diab

Bloomberg [reports](#) that Apple plans to build on its chipset for iPhones and iPads for its computer lineup beginning in 2021.

## World Economic Forum (WEF) Survey on IoT

Contributor: Wael Diab

The World Economic Forum has issued a “[Global State of Internet of Things \(IoT\) Governance Survey](#)”. The responses are meant to inform a global outlook report that will be used to shape the year-to-year priorities of governments, industry, startups, academia and civil society active in technology governance around the globe.

# SOCIAL

## IBM's New CEO Takes Over

Contributor: Chuck Adams

Arvind Krishna has officially taken over as CEO of IBM. In a [report](#) by CNBC, Krishna said he will focus on artificial intelligence and hybrid cloud as key technologies for the future.

Rounding out the top leadership spots, Jim Whitehurst, previously the CEO of Red Hat, will become IBM president; Bridget van Kralingen, who had led IBM's blockchain efforts, will become senior vice president of global markets, and; Howard Boville, a longtime finance and telecom executive, will join IBM next month to lead the cloud business.

## The Necessity of Fixed Access

Contributor: Frank Effenberger

The recent stay-at-home orders have served to focus consumers on their residential access solution.

It has been observed that the problem with optical access is that it has excessive capacity. This arises from fact that replacing copper access with fiber produces an immediate quantum leap in capacity, while the bandwidth usage behavior of the customer generally changes gradually. Many operators around the world have taken a forward looking approach and have upgraded their networks to fiber; however, they have found that they cannot charge a significantly higher premium for this vastly superior network, simply because their customers don't properly value the resource.

We have long known that many of the pressing problems of society today could be reduced if we really used communications effectively to every home. Energy usage and its concomitant resource exhaustion and environmental pollution could be greatly reduced if people didn't have to commute to work every day. It would also reduce traffic congestion on the road, and in the longer term it would allow the population to be more evenly distributed over the country, reducing overcrowding and improving quality of life. In terms of resources, fewer office buildings and automobiles will be needed. Despite all these obvious advantages, we have not seen a large-scale adoption of the work-from-home model. This, again, has to do with the slow change of people's behavior and value system.

This is why the Covid19 pandemic could be a game changer for networking. The entire society is now forced to adopt the new model of remote working. The use of video teleconferencing is now a standard daily occurrence, and one can expect this to begin a progression to even better forms of work environment simulation (virtual reality, continuous telepresence, and so on). By the same token, the fundamental attraction of wireless communication (mobility) will be of reduced importance. We shouldn't expect people to drop their smart-phones, but we should see a larger proportion of smartphone traffic being carried over WiFi (and then fixed access) rather than cellular networks.



Moreover, the pandemic is providing the world with an example of a low emissions world. Levels of air pollution (NOx) are vastly lower than they were just a couple of months ago. The travel infrastructure is less heavily loaded, and this can reduce both repair and construction costs. These positive effects may be noticed by governments around the world and give a live example of what is possible if needless commuting and travel are reduced.

Of course, we hope that the virus will soon run its course, and the shelter-in-place orders will be lifted. However, even then it can be expected that a fraction of our workforce will continue to work from home, at least to a larger extent than they do today. And when they do, they will develop a new-found perception of value from fixed broadband services. This will make the market more receptive to value-add service offerings, and thus the network should become more profitable. This should in turn make the entire ecosystem healthier. So, in summary, the current pandemic may cause temporary economic problems, but in the long run we expect that it will benefit the telecom industry, and in particular fixed access.

## TECHNOLOGY

### Cloud Platforms Taking IT to the Edge

Contributor: Chuck Adams

Cloud computing vendors Amazon Web Services (AWS), Microsoft Azure and Google Cloud Platform (GCP) are increasingly taking their services to the edge in the era of IoT.

Modern edge computing significantly extends this approach through virtualization technology that make it easier to deploy and run a wider range of applications on the edge servers.

Public mega-cloud providers, telecommunication companies, platform software providers, content delivery networks, and data center colocation providers are innovating to provide basic infrastructure-as-a-service (IaaS) and advanced cloud-native programming services on distributed edge computing infrastructure. The goal is to offer IaaS and platform-as-a-service (PaaS) services that run independently of or with only intermittent connectivity to public cloud and data center assets.

Google Cloud has unveiled a Global Mobile Edge Cloud (GMEC) strategy tied to 5G. That strategy involves a pact with AT&T and its 5G transformation, supporting software-defined wide-area-networks (SD-WAN). Google Cloud and AT&T will **collaborate** to help enterprises leverage Google Cloud's technologies and capabilities using AT&T 5G network connectivity at the edge.

Microsoft announced its industry pact "to unlock new 5G scenarios with Azure Edge Zones: distributed applications across cloud, on-premises and edge using the Azure Portal, APIs and security tools; local data processing for latency critical industrial IoT and media services workloads; acceleration of IoT, AI, and real-time analytics by optimizing, building, and innovating for robotics, mixed reality, and automation tools; and high-density graphics and real-time operations.

AWS has services documented on its [AWS IoT for the Edge](#) site.

AWS IoT Greengrass, extending AWS to edge devices so they can act locally on the data they generate, while still using the cloud for management, analytics, and durable storage.

FreeRTOS, an open-source, real-time OS for microcontrollers that makes small, low-power edge devices easy to program, deploy, secure, connect, and manage.

AWS IoT Device Tester, a test automation tool for IoT devices used to easily determine if your device will run FreeRTOS or AWS IoT Greengrass and interoperate with AWS IoT services.



AWS announced capabilities for its edgy serverless computing offering, Lambda@Edge, part of the CloudFront family, to improve performance and reduce latency. AWS has also announcing edge optimization enhancements through its Snowball storage appliance.

See the related article [here](#)

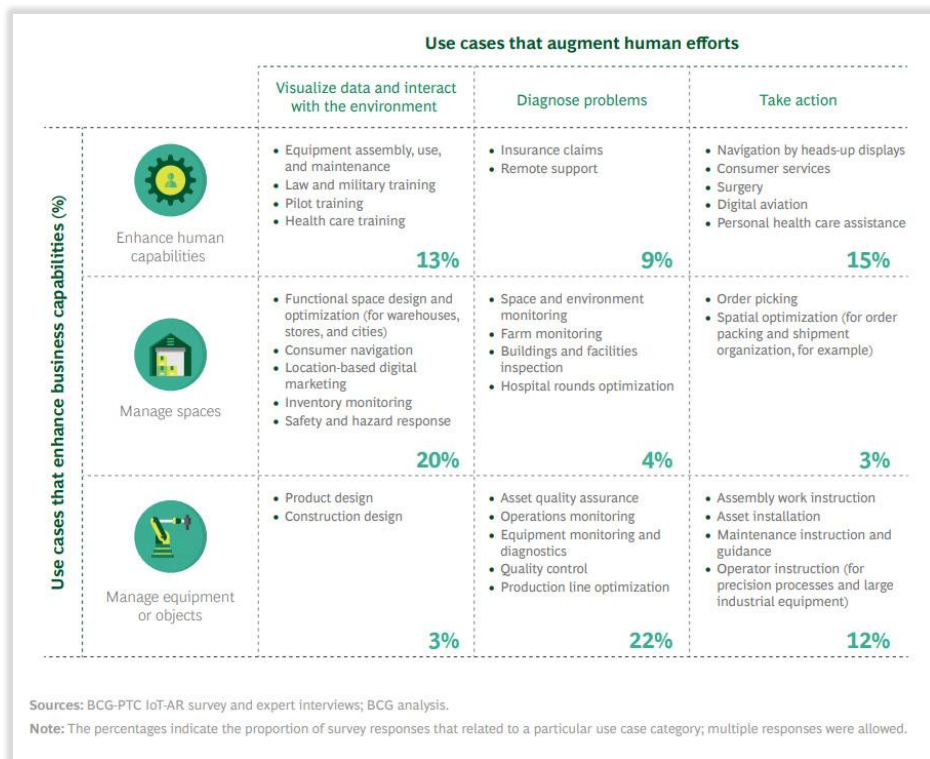
## IoT & AR to Become Industry Standard Within Five Years

Contributor: Chuck Adams

PTC and Boston Consulting Group (BCG) surveyed more than 200 executives from companies using Internet of Things (IoT) and/or augmented reality (AR) solutions. Fifty percent of survey respondents have currently demonstrated the value of using IoT and AR, while more than eighty percent of the companies surveyed believe the technology will become the standard in their industry within five years.

Connectivity and remote collaboration have become critical during the COVID-19 crisis, when industrial companies must enable offsite and on-site employees to collaborate and maintain business continuity. IoT and AR are viewed as augmenting those efforts.

Case study value propositions / scenarios identified by BCG-PTC included in following chart.



## TECH FLASH

### FCC Approves 6GHz Report & Order

As we have reported over the past few months, as expected and despite significant pushback, the FCC has approved its [Report & Order \(R&O\)](#) governing the 6GHz band in which the FCC will authorize the use of the entire 1200 MHz band (5925 – 7125MHz) for secondary unlicensed (WiFi) services.

The release of the R&O however, does not end the debate. It is widely expected that the FCC will either receive a submission for Reconsideration (RECON) or face legal actions against the ruling prolonging the conclusion. Stay tuned.

### IEEE ICASSP 2020 Conference, May 4-8

ICASSP is the world's largest and most comprehensive technical conference focused on signal processing and its applications. This year they are holding a virtual conference with FREE registration. On the agenda for this year, Dr. Peiying Zhu, IEEE Fellow, Senior Vice President of Wireless Research, Huawei Canada will be speaking on [6G: From Connected Everything to Connected Intelligence](#) on May 6th. Set the date!

### SAE Global Ground Vehicle Standards

SAE has published a detailed chart outlining the various standards groups working on ground vehicles. The chart is available [here](#)

## IBM Ethical Mineral Sourcing Blockchain to Debut in Spring

Contributor: Chuck Adams

Ford, Volkswagen, LG and Volvo plan to take a pilot challenge monitoring cobalt throughout its refining course of dwell in manufacturing subsequent 12 months.

The Accountable Sourcing Blockchain Community (RSBN), a global consortium constructed on Hyperledger Material, introduced Wednesday it had efficiently accomplished a pilot challenge to defend towards exploitative mining practices.

The businesses dispatched 1.5 tons of Congolese cobalt throughout three completely different continents over 5 months of refinement, clearing the way in which for the challenge to change into operational in spring 2020. See related article [here](#)

## 2020 Top 10 High-Tech Cars

Contributor: Lei Wang

The IEEE Spectrum has an [article](#) in the April 2020 print issue, “2020 Top 10 Tech Cars: This year, carmakers get serious about electric cars.” It starts with the announcements that the car makers have made on their investment plans to develop electric vehicles (EVs), e.g., GM with US \$20 billion over five years, Volkswagen Group with \$66 billion over five years, and Ford with \$11.5 billion. Then, based on cars that are already in showrooms or will be within the next few months, the author lists the following Top 10 Tech cars:

- 1) **Chevrolet Corvette Stingray C8:** adopts a mid-engine design for the first time in its 67-year history. Yes, an electrified version! Plus advanced ECUs, e.g., on-board Performance Data Recorder works like a real-life video game capturing point-of-view video and granular data on any drive, overlaying the video with telemetry readouts, and allowing drivers to analyze lap times and performance with Cosworth racing software.
- 2) **Polestar 1:** hybrid tuned for performance, the first of several planned Polestars, a Volvo sub-brand that aims to expand the company’s electric reach around the globe.
- 3) **Hyundai Sonata:** packed with luxury-level tech and alluring design at a mainstream price, e.g., the list of features includes Hyundai’s SmartSense package of forward-collision avoidance, automated emergency braking, lane-keeping assist, automatic high-beam assist, adaptive cruise control, and a drowsy-driver attention warning, and they’re all standard, even in the base model. Additional features include blind-spot monitor, smart park, etc.
- 4) **Porsche Taycan:** is all-electric and outperforms Tesla Model S—for a price (sup to double the Tesla’s price); Fast off the mark and fast to charge, the Taycan inherits tech from Porsche’s LeMans-winning 919 Hybrid racers, including the 800-volt architecture.
- 5) **Audi RS Q8:** a mild-hybrid version of the Q8. The RS Q8’s pulsing heart is a 4-liter, 441-kilowatt (591-horsepower) twin-turbo V8, augmented by a mild-hybrid system based on a 48-volt electrical architecture that sends up to 12 kW to charge a lithium-ion battery. A mammoth braking system, largely shared with the Lamborghini Urus, the Audi’s corporate cousin, includes insane 10-piston calipers up front. Audi’s digital Virtual Cockpit and MMI Touch center screens are smoothly integrated in a flat panel. The Audi Connect is an optional Android app that can be used by up to five people.
- 6) **Mini Cooper SE:** offers all-electric sprightliness. This Mini squeezes 32.6 kilowatt-hours worth of batteries into a T-shaped pack below its floor without impinging on cargo space, adding only about 110 kg to a base gasoline Cooper. The Mini’s has less than one-third the capacity of the top Tesla Model S. That’s only enough for a mini-size range of 177 km (110 miles).
- 7) **Fiat 124 Spider:** A drop-in electric-drive system gives new life to an old car—like the 1982 Spider; The California company, Electric GT, has developed an ingenious plug-and-play “crate motor” that transplants an electric heart into most any vintage gasoline car. The system is designed to integrate exclusively with manual-transmission cars, including the Fiat’s charming wood-topped shifter and five forward gears.

- 8) **Toyota RAV4 Hybrid:** A redesigned hybrid system optimizes fuel economy; Testing shows 41 miles per gallon (5.7 liters per 100 kilometers) in combined city and highway driving, 1 mpg better than the EPA rating. Toyota's new Predictive Efficient Drive collects data on its driver's habits and combines that with GPS route and traffic info to optimize both battery use and charging. Toyota's Safety Sense gear includes adaptive cruise control, lane-keeping assist, and automatic emergency braking.
- 9) **Ford Escape Hybrid:** an SUV with carlike efficiency; with its class-topping EPA rating of 5.7 liters per 100 kilometers (41 miles per gallon) in combined city and highway driving. Tech features include a nifty automated self-parking function, evasive-steering assist, and wireless smartphone charging. A head-up display available on the Titanium—Ford's first ever in North America—projects speed, navigation info, driver-assist status, and other data onto the windshield. FordPass Connect, a smartphone app, lets owners use a smartphone to lock, unlock, start, or locate their vehicle, and a standard 4G LTE Wi-Fi system links up to 10 mobile devices.
- 10) **Aston Martin Vantage AMR:** Best of Old and New, the AMR blends an actual manual transmission integrated into an adaptive power train and suspension; Take an Aston Martin Vantage, among the world's most purely beautiful sports cars. Add a 375-kilowatt (503-horsepower) hand-assembled V8 from AMG, the performance arm of Mercedes-Benz, with its official 195-mph top speed.

## ***Conversational AI***

*Dr. John Strassner*

### ***Definition***

Conversational AI is a set of technologies that enable computers to understand and respond to voice or text input in a way similar to how humans converse.

### ***Typical Use***

Conversational AI is typically deployed using agents (also referred to as chatbots). This enables the agent to help people interact quickly and naturally. It also enables businesses to provide more customization and support for their products.

It also is sparking use as a simpler interface to complex applications that have interaction patterns (e.g., complex, cascaded menus) that are hard for novice computer users to navigate. In some cases, it has even started replacing the application with a set of dialogs that enable the user to tell the system what the user wants to do. This has been helped by continuing advances in linguistics and related language technologies, providing for richer conversations than simple linear dialogs.

### ***Implementation and the Use of AI Technologies***

The foundation of Conversational AI is, of course, Natural Language Understanding (NLU) (i.e., the comprehension by computers of the structure and meaning of human language). NLU is a subset of the more generic Natural Language Processing (NLP) genre, which is a set of technologies that take spoken and/or written human input, analyze and comprehend what was ingested, and then interact with the human providing answers or suggestions. Machine learning plays a critical role in NLU and NLP. Think of machine learning as enabling a computer to recognize patterns of words and phrases that indicate special elements of a conversation, such as people, types of actions (e.g., purchase a gift), special occasions (e.g., anniversary), or even broader meaning, such as the intent of what a person wants to do. Machine learning platforms are experiential, meaning that they learn with experience. This enables them to not only understand slang, but also differentiate between homonyms and even understand intent when there are spelling or spoken errors in the dialog.

A critical mechanism provided by NLP is the automatic expansion and correction of the language understood by the agent. However, NLP itself is only one component. Forrester, in a 2019 report, stated that most conversational AI platforms “lack the critical capabilities and business-friendly usability necessary, leaving CX teams struggling and customers unsatisfied”. This brings to light the addition of context and profiles to offer more engaging conversational AI agents.

### ***Maturity Level of Conversational AIs***

- Level 1: answer using pre-defined responses
- Level 2: answer using linked information
- Level 3: answer using simple contextual information
- Level 4: answer using personalized, context-aware recommendations
- Level 5: answer by directing additional agents to perform related tasks

Level 1 implementations interact using pre-defined responses. While limited, they can still be useful. For example, simple tasks, such as sending event reminders and suggest URLs to visit to answer specific questions (e.g., point to an FAQ).

Level 2 implementations interact using pre-defined information. They build on Level 1 implementations by understanding what has been answered and can either respond to or offer additional related information (e.g., providing a list of tourist sites near a hotel that was booked).

Level 3 implementations interact by being aware of simple context. For example, continuing the hotel booking example above, this type of agent can also book airfare, tourist excursions, and even suggest travel destinations given a small amount of information (e.g., time desired, amount to spend).

Level 4 implementations interact using knowledge of the user in addition to the other abilities of Level 3. For example, continuing the hotel booking example above, this type of agent knows that you prefer Uber to taxi rides when you land at the airport, and asks if you want it to book one without being prompted. As another example, it can suggest people to

invite for different types of meetings that the user asks for, and differentiate between close friends and others, or work colleagues vs. social friends.

Level 5 implementations interact using a set of additional agents that they direct. For example, continuing the hotel booking example above, this type of agent knows that you want to travel because your anniversary is coming up in your calendar, your wife loves to travel on your anniversary, and you haven't booked a trip yet. It asks a set of other agents to research the best travel deals to past and related spots that you like based on your personal preferences. It corresponds with other agents at travel companies to research best deals for likely destinations, and with a set of other agents that do the same for airlines. It correlates best prices for hotels and airlines and suggests different lengths for you and your wife to stay based on price, type of hotel, and other factors.

Levels 3, 4, and 5 rely on more and more NLP tools to perform their tasks. Those NLP tools enable them to provide successively richer and more robust conversations.

### ***Companies***

There are a variety of established and startup companies that provide conversational AI. Here is a short list of some of the more impressive:

Amazon sponsored the Alexa Prize, a competition for building the best Conversational AI

Finastra, a UK based financial services company, uses a startup (Active.ai) to provide cloud-based banking services using voice and text conversational AI

Google deployed Meena in January, 2020, its answer to Siri, Alexa, etc.

IBM designed Watson Assistant, a cloud-based conversational AI for business

Interactions LLC (NY), virtual assistant and conversational AI solutions

LivePerson, a cloud-based platform that integrates advanced conversational AI

Microsoft, provides the Azure Bot Service for Bot development (including support for virtual assistants)

NVIDIA, which is using GPUs for developing conversational AI solutions

Oracle has its own Digital Assistant platform that supports chatbots and virtual assistants

Reliance Jio Infocomm (India), a 4G network and mobile Internet company in India, acquired Haptik, a conversational AI company, for \$100M

SAP, which provides the ability to integrate chatbots into your business

ServiceNow, which has bought several startups to enhance its deep learning and conversational AI capabilities for its ServiceNow Virtual Agent and other products

### ***Startups that were Acquired***

Semantic Machines, acquired by Microsoft, 2014

Apple acquired Voysis (Ireland), a conversational AI platform

API.a, acquired by Google, 2016

Dialogflow, acquired by Google, 2016

Reliance Jio Infocomm (India), a 4G network and mobile Internet company in India, acquired Haptik, a conversational AI company, for \$100M

Voicebox, acquired by Nuance Communications, 2018

### ***Startups***

Artificial Solutional International AB (Sweden) (\$34.5M)

Avaamo (CA) (\$23.5M, series A)

Dixa (Denmark) (\$52.9M, series B)

Kasisto (NY) (\$72.5M, series B)

Mya (CA) (\$51.2M, series C)

Pypestream (NY) (\$37.5M, series A)

## ***Open Source***

Botframework, a customizable web0based client for Azure Bot Services

DeepPavlov, a conversational AI framework supporting deep learning and dialog management

MindMeld, a conversational AI platform supporting voice interface

Nlp.js, a library for building bots using entity extraction and even sentiment analysis

Rasa provides contextual assistant platform, including dialog management that uses machine learning; consists of Rasa\_core, a framework for automating text- and voice-based conversations, and Rasatalk, a chatbot framework

[\*Return to Insights Report...\*](#)



## ***Examples of How AI is Being Used in the COVID-19 Pandemic***

**Dr. John Strassner**

### **Generic COVID-19 Stories**

Mike Pompeo issues a statement saying that the US is concerned by the threat of cyber attacks against the Czech Republic's healthcare sector.

<https://www.msn.com/en-us/news/world/us-says-concerned-by-threat-of-cyber-attack-against-czech-republic-healthcare/ar-BB12O0q9>

A federal judge in Florida ordered the leaders of a self-described church to cease selling a bleaching agent it falsely claims will treat and prevent COVID-19.

<https://www.msn.com/en-us/news/us/feds-go-after-self-described-florida-church-claiming-to-sell-covid-19-cure/ar-BB12NtqoAI> and

### **AI Related COVID-19 Uses**

The following is a collection of resources that demonstrate how AI is being used during the COVID-19 pandemic.

#### **Google Protecting Against Cyberthreats**

A dramatic rise in different types of attacks has been reported during this crisis. Chief among these threats is phishing (an attempt to obtain sensitive and/or personal information from one entity by email, text, phone, or other similar means by another entity posing as a legitimate source). These attacks have targeted both the innocent public as well as health organizations.

Google reported that Gmail blocks more than 100 million phishing emails per day. During the week of 4/5 – 4/11, over 18 million malware and phishing emails related to COVID-19 were blocked, along with over 240 million COVID-19 related daily spam messages. Google is handling these astounding rates using machine learning tools that augment and further inspect analysis by traditional malware scanning software. For example, machine learning found malware deeply embedded in emails that were trying to impersonate the World Health Organization (who.int). Google worked with WHO to ensure that DMARC (Domain-based Message Authentication, Reporting, and Conformance) was better implemented. Other attacks are been found embedded in URLs, various types of documents (e.g., Word and Excel), as well as the typical .png and .jpg files. The set of AI tools also aid in implementing sandboxes to protect against zero-day threats.

A link to Google's advanced phishing and malware protection page is here:

[https://support.google.com/a/answer/9157861?visit\\_id=637228315310120791-2195605275&rd=1](https://support.google.com/a/answer/9157861?visit_id=637228315310120791-2195605275&rd=1)

A link to Google's security sandbox is here:

<https://support.google.com/a/answer/7676854?hl=en>

**AI Firms in the UK Trying to Find a Cure**

<https://www.bbc.com/news/technology-52120747>

<https://www.wired.com/story/ai-uncovers-potential-treatment-covid-19-patients/>

**Industry Involvement**

<https://www.geekwire.com/2020/microsoft-dedicates-20m-ai-health-program-coronavirus-data-analysis/>

<https://www.janes.com/article/95463/covid-19-microsoft-c3-ai-lead-effort-to-leverage-ai-for-battling-pandemic>

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<https://www.enterpriseai.news/2020/04/09/tom-siebels-unified-ai-big-data-front-to-fight-covid-19/>

<https://www.globenewswire.com/news-release/2020/04/16/2017741/0/en/Pony-ai-Launches-Autonomous-Delivery-Service-to-Address-Heightened-Demand-During-COVID-19.html>

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<https://www.healthcareitnews.com/news/vendors-debut-ai-x-ray-system-covid-19-give-it-away-free>

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<https://www.unite.ai/mits-ai-makes-predictions-about-covid-19/>

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<https://www.beckershospitalreview.com/artificial-intelligence/microsoft-princeton-u-of-illinois-more-launch-covid-19-ai-initiative.html>

<https://www.itnonline.com/content/quareai-launches-solutions-help-tackle-covid19>

### **Other Uses of AI in Trying to Find a Cure**

<https://www.innovatorsmag.com/covid-19-global-ai-hackathon/>

<https://www.informationweek.com/big-data/ai-machine-learning/kaggle-competition-aims-ai-at-covid-19/d/d-id/1337426>

<https://venturebeat.com/2020/04/17/ai-weekly-when-to-ship-or-shelve-a-coronavirus-solution/>

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