Splunk
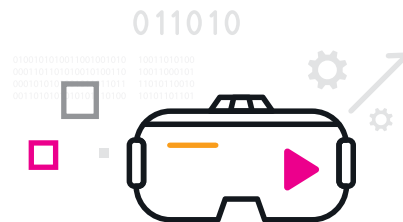# Emerging Tech Predictions 2020

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What the future holds for AI, IoT, blockchain and more in a world in which everything is truly connected.

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Emerging Technologies

What the future holds for AI, IoT, blockchain and more in a world in which everything is truly connected.

The next decade will bring many global changes. Markets are shifting focus as technology and the data it produces continue to take over all industries — remaining analog isn't even a consideration anymore. But how we're transitioning into the latest evolution of the digital frontier is still being worked out.

Emerging technologies are being used, often experimentally, in a variety of ways. Artificial intelligence (AI) and machine learning (ML) are being applied to everything from IT to industrial operations. Virtual reality and augmented reality are breaking out of niche gaming uses into healthcare and manufacturing. Natural language processing (NLP) is going beyond smart assistants. Similarly, blockchain is now coming into its own, beyond cryptocurrency. And IoT and 5G are coming together to enable a lot of the above and much more.

We're at an inflection point that will manifest in transformative changes to how we work and live, driven by data technologies.

Natural Language Processing
Machines will have a bigger voice in our lives

**Our jobs, financial markets and more will be affected by machines that read.**

Natural language processing makes communication between human and machine easier than ever. Not only does NLP let us speak to our smart devices and get uncanny human-like responses — beyond trading jokes with Alexa and Siri, NLP today helps people with disabilities communicate, translates languages on the fly, parses through tons of unstructured data (in the form of the written word) for previously unnoticed insights, and more.

But are you ready for it to decide whether you get your next job? Beyond parsing resumes for keywords, NLP is being used to judge video of job applicants, with consumer goods giant Unilever saying it delivers six-figure savings annually. And AI is already grading college entrance exams (with mixed results). In the next five years, look for NLP to routinely assess creditworthiness, even without financial data. One company has potential borrowers download its app so that it can assess their entire "digital footprint" as a means of deciding whether you'd repay a loan on time.

At the business level, AI will increasingly make decisions that may be inscrutable to human observers, whether by analyzing stock data to make investment decisions, or parsing mountains of unstructured social media for broad sentiment analysis around a brand, or specific intelligence on whom to target for which product pitch.

But relying too heavily on technology in important decision-making is misguided. A Motherboard investigation points out: "[R]esearch from psychometricians — professionals who study testing — and AI experts, as well as documents obtained by Motherboard, show that these tools are susceptible to a flaw that has repeatedly sprung up in the AI world: bias against certain demographic groups. And as a Motherboard experiment demonstrated, some of the systems can be fooled by nonsense essays with sophisticated vocabulary."

The implications could be even worse than faulty grading. When artificial intelligence was used in criminal justice, computer algorithms that influenced sentencing decisions and defendants' freedom in general were twice as likely to wrongly flag black defendants as future criminals as they were to inaccurately label white defendants.
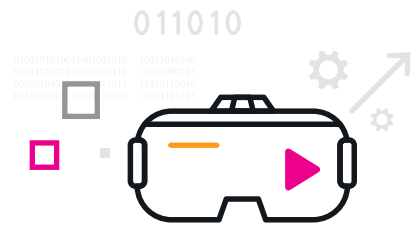
"Training is everything," says Eric Sammer, distinguished engineer at Splunk. "A lot of these algorithms are being trained on existing human practices that are inherently biased and problematic. It'd be naive to assume we can eliminate that from NLP algorithms at the outset."

NLP should never be seen as the final decision maker, but it can and should help humans make better decisions. Augmenting human capacity, with strong attention to ethical considerations, will be the right approach for this developing technology.

AI/ML
Attackers will attack AI while it's still learning

As we empower our algorithms, the first "poisoned well" incident will shake our faith.

As artificial intelligence and machine learning drive more of our decisions, bad actors will focus on it as a new attack vector — sabotaging training data to disrupt decision-making.

We often don't think about how the algorithms around us are generating their insights or making their decisions. Today it's Amazon recommending an author we've never heard of, and tomorrow we'll doze while our cars self-navigate through rush-hour traffic — a level of technological sophistication long the stuff of fiction. But we can't just doze; we have to keep our eyes on how we train smart technology.

Algorithms learn from data. The algorithm will use a training dataset to identify patterns or predict outcomes. Sometimes it's trained with examples of target outcomes, and sometimes it's just directed to find patterns, without a desired result. This training process could present an enticing attack vector

for motivated and sophisticated attackers as smart technology becomes further ingrained in our daily lives and infrastructure. By manipulating data, someone could throw off or break down entire learning models, hijacking them or rendering them useless.

We've seen this already. Adversarial machine learning, the technique employed to fool models through malicious input, has tricked Google's AI into thinking a turtle was a rifle. That's funny, at least outside a security checkpoint. But imagine manipulating traffic signals so that smart vehicles don't realize they have to stop.

"Adversarial attacks have proven capable of tricking a machine learning model into incorrectly labelling a traffic stop sign as a speed sign, which could have disastrous effects in the real world," Richard Nock, a machine learning expert with the Australian government, told ZDNet in June.

Expect also to see attempts to poison the algorithm with specious data samples specifically designed to throw off the learning process of a machine learning algorithm. It's not just about duping smart technology, but making it so that the algorithm appears to work fine — while producing the wrong results.

"As we increasingly depend on smart technology, the door for sabotage keeps opening wider and wider," says Eric Sammer, distinguished engineer at Splunk. "The training needed to teach smart algorithms will be the perfect place for bad actors to take action against them. Data integrity has never been more important."

In 2020, we'll see more attempts at adversarial attacks that could lead to disastrous results. It could lead to industrial sabotage — think power stations or water treatment plants that depend on automated
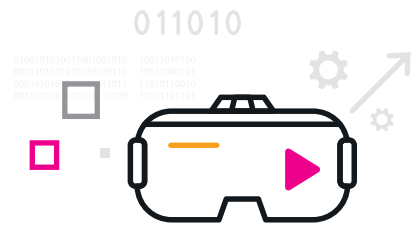
processes. It could affect the financial stability of organizations and individuals. In this changing landscape humans will have to verify outputs and not take for granted what AI/ML provides us.

If history is any lesson, we know that if the opportunity presents itself, someone will take it, even if it's "for the lulz." Remember the chatbot gleefully taught to be racist by random social media users?

Blockchain

Blockchain leaves Bitcoin behind

A new data era pushes us toward a blockchain infrastructure.

In the next five years, blockchain will finally evolve beyond cryptocurrency to change security, industrial environments, even governance.

The value of blockchain is often conflated with the public understanding of Bitcoin. Although Bitcoin was the first instantiation of blockchain (and usually dominates news cycles around blockchain), digital ledger technology itself has far-reaching uses and implications — from securing assets to maintaining data integrity.

When data is committed onto a blockchain, it's permanent and nearly impossible to manipulate or hack because it depends not on people, but on the network of machines it's built upon. Businesses that adopt blockchain can operate more leanly and efficiently, with greater trust in their data, because every change in the network is recorded and validated on a block in the blockchain. As such, organizations are looking to use the technology for a wide range of problems, including quality assurance, accounting, contract management, supply chain management, data protection and much more.

"Blockchain truly is a mechanism to bring everyone to the highest degree of accountability," as futurist Ian Khan put it. "No more missed transactions, human or machine errors, or even an exchange that was not done with the consent of the parties involved."

So how will we see blockchain used in the year to come?

Not surprisingly, finance is leading the charge on blockchain adoption. The financial sector has already started using blockchain — some testing it for cross-border remittances. Union Bank of the Philippines is making it easier for overseas Filipinos to send money back home. Blockchain also serves as a record of financial status for those receiving these funds — which normally fall outside the purview of traditional financial institutions.

But it doesn't stop there. It's also changing the construction industry. "Blockchain provides a platform for clearly cascading work products down the chain and holding everyone accountable for completing key tasks," according to Propulsion Consulting founder Marc Minnee. This is key, considering that 95% of building construction data gets lost on handover to the first owner.

What may be most interesting is that government bodies are not far behind. Estonia has gone all in on being a digital society. From filing taxes to purchasing vehicles, it can all be done digitally. The security underpinning the integrity of the system? Blockchain. Dubai is another place betting big on blockchain, aiming to become the first blockchain-powered government.

"Blockchain is one of the most promising technologies to appear on the world stage in recent years," says Aisha Bint Butti Bin Bishr, director general of the
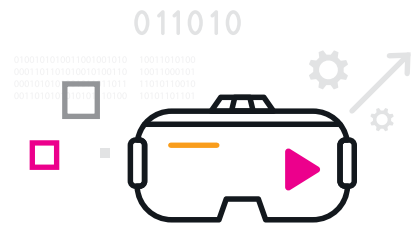
Smart Dubai Office, noting that Dubai's interest has included "launching a blockchain strategy and hosting international blockchain conferences that bring together influential international experts."

In the next year, expect Dubai and others to keep moving forward. Soon visa applications, bill payments, license renewals and more, will take place digitally using blockchain. And as governments and regions, like the United States, China and the European Union, continue to become more involved, it is likely to take an even more central role in terms of identity. Voting, government benefits and other systems may hinge on the security offered by blockchains.

Blockchain will also be big for the Internet of Things: The blockchain IoT market is expected to be worth more than $3 billion by 2024. Blockchain will let smart devices conduct automated microtransactions more quickly and cheaply — and more securely. Though the market will continue to grow in 2020, regulatory uncertainty will be a short-term drag.

"Blockchain will revolutionize how we leverage technology, on a par with the effects of mobile technology and the Internet itself," said Nate McKervey, head of blockchain at Splunk. "We're just starting, but once blockchain becomes well-organized in financial settings, the industrial and public sector applications will skyrocket."

### IoT/5G
5G's IoT push previews the post-smartphone era
5G's impact will first be felt through the Internet of Things.

Already available in some cities, 5G is setting new standards for speed and bandwidth. Imagine downloading a movie in seconds — on your phone.

But 5G will bring more than super-fast phones. It will expand to encompass all sorts of "things," from autonomous cars to augmented reality glasses, as 5G's greater capacity and reduced latency enable a seamless, more efficient end-user experience. In 5G's wake, the IoT era will truly come into its own, having as big an impact on the daily world as the smartphone has in the 4G era.

Healthcare will be transformed by 5G. Machine-type communications will be used to monitor patients via massive sensor networks, to power smart pills that can record drug ingestion, and to monitor care for insurers. Ultra-reliable low latency communications (URLLC) will power telemedicine, remote recovery, augmented reality physical therapy and even remote surgery. The world's first 5G remote operation occurred when a surgeon in China used 5G technology to operate from 30 miles away on a laboratory test animal.

Remote surgery won't become widespread in 2020, but medical students are already practicing surgical operations on virtual models. Augmented reality and virtual reality will also be used for training in other fields, and will increasingly be used in shopping and retail, letting customers view properties and try on clothes virtually.
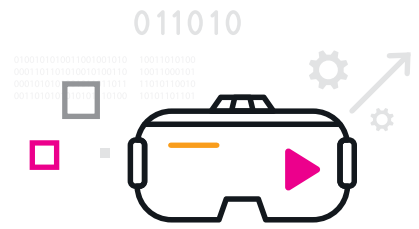
In 2020, 5G will take hold in the industrial space, providing more efficient services, better safety and new use cases. Low latency will improve remote control of heavy machinery, reducing risks and expanding the types of environments in which machinery can operate. In an early example, Ericsson's first 5G smart manufacturing factory in the United States will begin operations in early 2020 and feature automated assembly, packing and product handling. Estimates that 5G will enable $12.3 trillion of global economic output by 2035 expect manufacturing to account for more than $3.3 billion.

All the benefits won't come without some risk. IoT devices often lack solid security design, and there's an inherent risk in creating new, connected 5G networks that could expose sensitive information. Organizations will need to take a layered approach to security that covers these gaps. End-to-end security will be critical in protecting communication paths between devices, users and the core network. DNS intelligence will also be important.
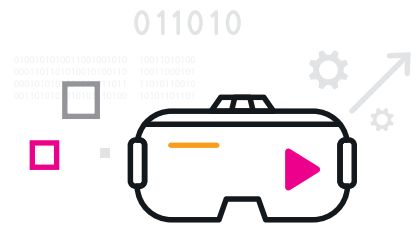
Dark Data

2020 will be the year of dark data

If you think you've joined the data revolution, you may only be half right.

With the advent of AI, augmented reality, 5G networks and other new, transformative technologies, organizations must prioritize bringing their data to bear. These technologies will drive leading companies to prioritize the proper management and use of all their data. Which brings up an essential problem — companies aren't doing a good job of that.

A 2019 dark data study commissioned by Splunk showed that 55% of an organization's total data is dark, meaning the organization either doesn't know the data exists or doesn't know how to find, analyze and use it. Various published estimates that try to calculate the value of dark data in a particular vertical (the travel industry, for instance, or marketing technology) put the figure in the billions of dollars. Not surprising, when you realize that learning how to use dark data would nearly double the amount of information for the average organization.

An interesting finding in Splunk's dark data report was that respondents in China, a hypercompetitive and fast-changing economy, were the only ones who voiced a strong understanding of dark data, and claimed to be ready to deal with it. The more data you have, and use, the more effective your organization; cutting-edge organizations already know this.

When you declare a year of something, you can't say that every single company will embrace the rallying cry. 2020 will not be every company's year

of dark data, but every company will need to have a year of dark data, and soon. If it's not 2020 or 2021, they'll be playing catchup in 2022 as competitors making better uses of data-fueled technologies find innovative ways to understand their customers and improve products and services.

Dawn of a connected decade

The next few years will bring massive steps toward a more fully connected and immersive world. With smarter algorithms, rampant connectivity and networked devices we'll be able to achieve feats ranging from remote surgery to digitally contextualized real-world experiences (i.e., imagine historical facts overlayed old buildings).

The new decade will be the one in which AI/ML, NLP, augmented reality, IoT and 5G mature and become both commonplace and transformative. There are still uncertainties, and the one that's most in your control is whether you and your organization will be ready.

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