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EXECUTIVE SUMMARY

Artificial intelligence. Blockchain. Chatbots. Cybersecurity. Each of these technology topics is transforming society and having a significant influence on the accounting profession. Combined, they are going to clearly continue to drive technology's transformation of the role of the CPA in public accounting and business and industry.

CPA.com's mission is to help accountants leverage these technologies to thrive in the digital age. The company's key goals are to drive transformation of the core accounting practice areas, advance the technology ecosystem for the profession, and lead technology research and innovation for practitioners.

Two significant events to help accomplish these goals are the Executive Roundtable[1] and Digital CPA Conference.[2] At the Executive Roundtable, an invitation-only, two-day conference, executives at top technology companies and accounting firms gather to discuss the challenges and opportunities created by the technological change sweeping the profession. At Digital CPA, an annual event for practitioners, the focus is on empowering CPAs to become strategic advisors to their clients, in part by leveraging new technologies.

Each year, these events generate a flood of valuable information, ranging from big-picture predictions to tips for upgrading existing systems and processes. For the first time, CPA.com has collected and distilled these insights into a series of reports. In this introductory report generated primarily from the January 2018 Executive Roundtable, we discuss a few of the technologies poised to transform the role of the CPA.

Forthcoming reports will expand on each of these key technologies. Based on research, case studies, and interviews with executives, technology advocates, and experts in the field, each subsequent report in the series will provide an overview of an emerging technology's potential impact, a discussion of the ways firms are currently using the technology and a look ahead at future applications.

Many forward-thinking CPAs have already embraced innovation to strengthen their role as trusted advisors to clients. As advances in technology continue to automate the manual aspects of the profession, this metamorphosis will only accelerate. To survive in this evolving landscape, CPAs must anticipate and respond to the changes taking place within their own profession. To thrive, they must understand how emerging technologies will impact their *clients'* businesses, and actively help them plan for the future.

ABOUT DIGITAL CPA

The Digital CPA Conference was launched by CPA.com and the AICPA in December 2012. The conference is designed to guide CPAs with their firm's technology decisions, offer cloud-based strategies, solutions and adoption advice, and help firms use technology to make the shift from transactional to advisory services. Digital CPA focuses on building competencies in three key areas: technical knowledge, progressive business skills, and strong leadership.

ABOUT THE AICPA & CPA.COM EXECUTIVE ROUNDTABLE

Held in New York City, the Executive Roundtable is an annual, invitation-only conference that facilitates conversation and communication between practitioners, consultants, CPA.com and AICPA executives, and technology companies. More than 70 of these top thought leaders gather to discuss the emerging technologies poised to reshape the profession. This year, presenters included Erik Asgeirsson, president and CEO of CPA.com, Barry Melancon, president and CEO of the American Institute of CPAs, Tomer Dicturel, artificial intelligence expert and co-founder of Crane.Ai, Ted Ross, CEO and co-founder of cybersecurity firm SpyCloud, and event organizer Gregory LaFollette, a strategic advisor to CPA.com.

THE ROUNDTABLE'S VIEW: THREE TRENDS DRIVING CHANGE

In 2018, powerful forces are reshaping the role of the CPA. With digitization and cloud computing established as standards within the profession. Here are some of the key trends driving change that were discussed at the January 2018 Executive Roundtable.

TREND 1

TECHNOLOGY

Thanks to advances in cloud computing and artificial intelligence (AI), many jobs once performed by humans have been automated.[3] The transition is happening across industries and professions, with 'Accountant' frequently included in roundups[4] of the top jobs that will be eliminated by technology.

Too simplistic to be accurate, the proclamation nonetheless contains grains of truth. Computers are optimized to perform predictable, routine-based tasks. Compliance services, such as basic tax preparation, financial reporting, and bookkeeping, fall directly into this sweet spot of a predictable, rules-driven task. As a result, many of these transactional, technical, and process-driven elements of the job are now being automated.

Technology companies that offer AI and machine learning-powered capabilities are accelerating the pace of this transformation. On a panel at the Executive Roundtable entitled 'Artificial Intelligence and the Audit of the Future,' Jeff Brown, chief risk officer and director of assurance services at Moss Adams, spoke about how his firm is experimenting with using aggregate data synthesizers to complete tasks currently conducted by employees.

As the automation wave gains momentum, the role of the CPA will continue to change, in small ways and in large ones. But as we've seen with other industries that have been disrupted by technology, sticking our heads in the sand is not a viable option.[5] As more tasks are automated, workers must develop new skills if they want to keep their jobs, while firms must provide added value if they want to keep their clients.

TREND
2

CLIENT EXPECTATIONS

Barring a major business event, some accountants are used to engaging with their clients once a year. These annual sessions are no longer enough, Aaron Berson, a manager at EisnerAmper, said on a panel at the Executive Roundtable. Clients are accustomed to conducting business from anywhere at any time and, as a result, expect the lines of communication to remain open.

"I get text messages at 11 p.m. from many of my clients," he said. This back-and-forth is a departure from traditional operations, but it creates an opening for firms to assume an advisory role. Instead of re-

acting to a year's worth of financial information, accountants can collect data in real-time and provide strategic feedback and insights throughout the year.

The ability to provide forward-looking guidance will grow more important as technological advances disrupt other industries. Take driverless cars. At first blush, the technology isn't poised to impact the accounting profession. Barry Melancon, CEO of the AICPA, urged practitioners to consider its implications for their clients' businesses. Trucking companies, parking garage operators, hospitals, insurance providers, grocery and fast food chains – all will be affected by the rollout of automated vehicles.[6] Accountants who anticipate and help clients prepare for the rollout of driverless cars are in a far better position than CPAs who simply provide compliance services.

Finally, as millennials move up the professional ladder, expect to encounter younger, digital-savvy executives ready to embrace new technologies and services. That said, it's a mistake to assume older leaders won't be receptive to these solutions. Berson recounted overhearing a partner at his firm say that a client, who was in his 60s, wouldn't be interested in learning how to pay his bills online. When Berson spoke to the client directly, however, the response he got was very different: "This is great," he recalled the client saying. "Where has this been all along?"

TREND 3

SKILLS & EXPERTISE

A third trend is a shift in who is entering the profession and the skills required to thrive within it. While U.S. accounting firms hired around the same number of employees as in 2016 as they did the year before, they hired 19.5% fewer workers with accounting degrees. According to Melancon, this dip indicates firms are hiring for non-traditional skills, such as data analytics.

As firms expand their services, existing employees will need to adapt. Melancon said that in his experience, younger workers at the beginning of their careers and senior executives responsible for driving overall strategy understand this. Where he sees the most resistance is from mid-career workers who have invested years building skills that are becoming obsolete.

Middle management is typically the most resistant to incorporating technological advances, agreed Larry Kammerer, partner at Moss Adams, on a panel at the Executive Roundtable. He's sympathetic to this reaction: these are workers who have spent decades building a playbook and don't want to jeopardize their relationships with clients by rewriting it. And yet, technological progress pushes relentlessly onward. For accountants who have decades left in the profession, ignoring new tools and strategies isn't a sustainable option.

Across the profession, there needs to be "an element of unlearning," Melancon said. "That's the hardest thing to do."

THE ROLE OF THE DIGITAL CPA

Back when cloud computing and artificial intelligence were little more than sci-fi constructs, accountants were responsible for performing a variety of routine, manual tasks such as taking data from one source and inputting it into another.

With the rise of cloud computing and machine learning, many of these transactional activities have been automated. Today's cloud accounting vendors such as Sage Intacct, Intuit, and Xero provide small to medium-sized businesses with automatic feeds for tracking invoices, expenses, claims, and purchase orders, among other features.

The development is double-edged: On one hand, a growing list of human jobs are being performed by computers. On the other, this allows accountants to focus on elements of the job that require creativity, strategy, and planning. As AI and machine learning capabilities improve, increasingly complex tasks will be automated, providing an opening for CPAs to move from compliance professionals who fill out forms and enter data, to business consultants capable of providing actionable insights, comparative benchmarks, industry trends, and financial advice.

"There is a huge opportunity to become elevated, trusted advisors by leveraging technology," CPA.com and CEO Erik Asgeirsson said at the Executive Roundtable.

Asgeirsson continued, "at the low end, we know that automation is going to win. If firms stay transactional based and do not specialize, that's going to be a dangerous spot for them."

Progress requires a radical shift in perspective. "The traditional accounting mindset is to look back at history, not forward," said Berson, speaking on the panel 'Exploring Large Firm Perspectives.' But to fulfill the role of trusted advisor, accountants must look ahead and make predictions about an uncertain future, a foreign exercise for many professionals trained to deal in the black-and-white clarity of the past. Offering advice puts a premium on non-traditional skills in the profession, such as analytics and forecasting. But it also requires a newfound tolerance for ambiguity.

The biggest challenge that we will have to overcome is getting our people to use new technologies in an effective manner," said Jeff Brown, of Moss Adams, speaking on the panel 'Artificial Intelligence and the Audit of the Future.' This requires more than developing new skill sets, he added. "We have to get people to change the way they think."

KEY TECHNOLOGIES TRANSFORMING THE PROFESSION

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

WHAT IT IS

Merriam Webster defines artificial intelligence as "the capability of a machine to imitate intelligent human behavior."[8] A more helpful way of thinking about AI is as a technology capable of analyzing vast amounts of data, drawing conclusions from said data, and using these insights to inform future processes. In other words, it's adaptable — it "learns" as it goes — which is why one subset of AI is referred to as machine learning.

"Machine learning is like a rocket engine and data is the rocket fuel," Leon Katsnelson, director and chief technology officer for strategic partnerships for data science at IBM, said in a keynote presentation at last year's Digital CPA conference.[9] "In traditional programming, we're teaching the machine how we do the job — we're telling it, 'Repeat what I do.' AI is about teaching the machine to learn how we learn — to learn from data."

This ability to not only parse huge quantities of data, but glean insights that affect future conclusions, makes AI and machine learning enormously powerful tools with a dizzying array of applications.[10]

HOW IT WORKS

Powered by artificial intelligence, machine learning is at the heart of many of AI's applications. On the surface, the concept is simple: machine learning is the process by which computers are taught to autonomously learn and make connections without the step-by-step guidance of human developers.

Built to mimic neural networks, AI systems can be programmed to extract rules and patterns from a vast amount of data in order to perform specific goals. If a system is shown enough pictures of cats, for example, it can uncover connections and patterns that enable it to determine whether a photo it has never seen before is of a cat or not.

This is a simple use case, but the underlying mechanics can be applied to a variety of tasks currently performed by humans.[11] When fed enough data, AI networks are able to make better, more consistent, and rigorously-considered decisions and recommendations than a human ever could.

Before it can perform a specific function, however, an AI network must be trained, a process that typically requires feeding it a massive amount of data. The process is "like training a child," AI expert and Crane.Ai founder Tomer Dicturel said during a keynote presentation on the future of artificial intelligence at the Executive Roundtable.

At first, progress is slow but as the computer begins to process information, the pace accelerates at an impressive clip. As with a child, "before you know it, they're running faster than you."

HOW IT'S BEING USED

Artificial intelligence is at an inflection point. Its capabilities, which have been fervently anticipated for years, are be-

ginning to come to fruition across industries. AI is being used to predict adverse health events before they happen, develop new recipes,[12] identify loan applicants, automatically recognize faces and objects, recommend movies, set temperature controls, make stock market predictions, translate text, and prepare sales reports, among many other applications.

Use cases extend to the accounting profession, where AI helps file tax returns, analyze contracts, and detect fraud. Today, some commercial tax preparation companies are using machine learning to assist with tax preparation.

FUTURE CAPABILITIES

As AI's capabilities improve and the technology becomes ubiquitous, more facets of the job will become automated. Looking ahead, the audit is an obvious target for automation. "Machines are much better than auditors at processing huge amounts of data," IBM's Katsnelson explained. "With AI and machines, you won't need to sample — the machine can check all the transactions, which human auditors couldn't. That's where the power of the machine is."

INDUSTRY IMPACT

At many firms, AI-based systems have already begun to automate rote tasks previously conducted by human employees, a trend that will only accelerate.

On its face, the creep of AI into realms once commanded by humans is unsettling. But beneath the unease, there is opportunity. "I don't believe for a second that the auditors will be replaced by machines — the human touch, and human thinking, are critical," Katsnelson said. "Human judgment is still paramount."

That said, the role of the CPA must evolve to survive. To remain competitive, firms need to be strategic about the division of labor between humans and machines, delegating data-heavy tasks to software systems. This frees up time and energy, which can be invested in the nuanced, human art of providing clients with advisory services. When leveraged in this fashion, artificial intelligence is a tool that augments a CPA's abilities, not replaces them.

"Auditors are going to become better with AI. They're going to provide more value," Erik Asgeirsson said at Digital CPA. "The firms that are leveraging technologies like AI are going to win in the end."

ITS WIDER IMPACT

The GDP of countries and governments that use AI is predicted to grow five times faster than those that don't, said Tomer Dicturel at the Executive Roundtable.

A driver of increased productivity and economic activity, AI is poised to transform the professional landscape, dramatically changing some jobs and eliminating others entirely. According to Gartner, by 2025 a third of all jobs will be done by robots and software.[15] Deloitte predicts that by 2020, 40% of transactional work in the accounting profession will be automated.[16]

Accountants, as is true for most professionals, must evolve to provide value-added services as transactional tasks become automated.

BOTTOM LINE

Save for the most tech savvy, AI can come across as offputtingly complex and opaque. But it doesn't have to be that way. When it comes to thinking about new technologies, "avoid getting caught up in minutia — remember to focus on the tool, rather than the code that powers the tool," CPA.com strategic advisor Greg LaFollette told the attendees at Digital CPA. "Most of us do not understand the computer code that makes spreadsheets work — nor should we. However, we do understand how to use the tool!"

It's important to remember that AI is not a catch-all solution that will replace human workers. It's a tool — a powerful one, with a dizzying array of applications — but a tool nonetheless. Firms that figure out how to leverage it to increase efficiency and augment human operations will win, while those that don't will have an increasingly hard time remaining competitive.

BLOCKCHAIN TECHNOLOGY

WHAT IT IS

Blockchain is a technology that creates digitized and decentralized transaction records.[17] For the most part, blockchain technology has been used for cryptocurrency transactions, but it is capable of tracking virtually any document, thereby creating an indestructible and unchangeable public record of all transactions.

If you've heard of blockchain, it was likely in connection with Bitcoin. The most popular and high-profile of cryptocurrencies, Bitcoin is an implementation of blockchain technology. Unlike traditional currencies, Bitcoin is encrypted and decentralized. Every time a Bitcoin is sent from one party to another, a digital record of the transaction is recorded and added to a public ledger, which is sent to every computer connected to the network. While only the user with an encrypted key can unlock and access the Bitcoin, the transaction itself is recorded in a public "block," which is added to a "chain" of previous blocks. In other words, it is added to the chronological, decentralized, unchangeable record of every Bitcoin that has ever been generated and transferred to date.

ITS CAPABILITIES

Bitcoin might be buzzy, but it is blockchain — the underlying technology that supports the cryptocurrency — that's poised to disrupt transaction-based industries.[18] It's important to understand that there isn't a single blockchain — there are multiple blockchains.

The technology enables the creation of any number of digital databases capable of recording all manner of transactions. Some blockchains are public, which means they do not have any access restrictions, but most will be private, which means access is permissioned and set by a company or individual. Bank of America, for example, is using the technology to track money around trade deals. The global shipping giant Maersk is using it to track the merchandise it carries on cargo ships, while Walmart is using it to track inventory.[19]

INDUSTRY IMPACT

We are still in the early stages of understanding the overall impact of blockchain. What its impact lacks in immediacy, however, it makes up in significance: blockchain is poised to transform multiple aspects of the profession. The most obvious target is the audit.[20]

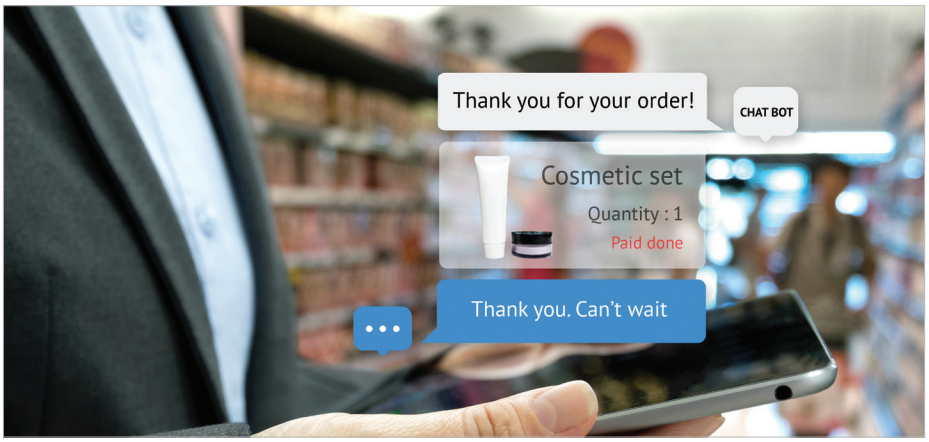
According to CPA.com's Asgeirsson, the audit won't die — it will evolve. "Blockchain does not mean that the audit will go away," he told attendees at Digital CPA. "There are going to be significant opportunities for auditors. For example, there are going to be assurance needs related to private blockchains and smart contracts. Over the next couple of years, you're going to see some really interesting assurance opportunities arising around blockchain."

The audit is far from the only area poised to be disrupted by blockchain. "Internal procedures will become streamlined as blockchain-enabled 'smart contracts' execute automatically," LaFollette said. "Both internal and external processes will be impacted as transpositions, coding errors and misclassifications fade into distant memories."

As with AI, blockchain technology has the potential to automate a number of time-consuming tasks. And just as with AI, it's important to remember that blockchain is a tool — and an opportunity. "CPAs in public practice will see huge time savings as the necessity of testing, authenti-

cation, verification and substantiation procedures are reduced," LaFollette continued. "That time will allow the profession to center more on becoming the 'trusted advisor' that our clients want and need."

CHATBOTS



WHAT THEY ARE

Simply put, chatbots are AI-powered computer programs designed to simulate conversation with human users. Recall that artificial intelligence is the process by which vast amounts of data are analyzed for connections and insights, which inform the computer's future operations. In the case of a chatbot, the data set is language. Every time the machine engages in or simulates conversation, it learns from the interaction, which, in turn, improves its future responses.

Chatbots show particular promise in service-oriented industries, thanks to their ability to answer users' questions and perform simple tasks. Already, they have begun to automate basic exchanges once performed by human operators.[21]

"We think that you should just be able to message a business in the same way you message a friend," Facebook CEO and co-founder Mark Zuckerberg said at the company's developer conference in 2016.[22] "You should get a quick response."

HOW THEY WORK

Natural language processing has advanced by leaps and bounds in recent years thanks to the growing sophistication of artificial intelligence. Instead of relying on a contained list of answers, today's chatbots are capable of teaching themselves how to converse by analyzing and identifying patterns in large sets of human dialogue.

And yet, conversational systems are staggeringly complex. Despite the power of their algorithms, chatbots have run into some developmental snags. Microsoft hit a high-profile one in 2016 when its experimental chatbot Tay, which was programmed to engage with users on Twitter, debuted on the social media platform. The launch quickly soured: Within hours, Tay was spouting off offensive, racist, xenophobic missives[23] and trading in conspiracy theories. Microsoft responded by taking her offline for good.

Tay is a good example of what can go wrong when you don't supervise bot learning, Crane.AI's Tomer Dicturel said at the Executive Roundtable. It also underscores a larger truth about the difficulties inherent in training chatbots. Designing a conversation system truly capable of picking up on and expressing the full range of human responses remains an elusive pursuit — and likely will remain that way for some time. Detecting sarcasm, colloquialisms, and humor remain beyond the grasp of most chatbots. "There is a huge technical barrier here," Adam Coates, a partner at the venture capital firm Khosla Ventures and an AI veteran, told the *New York Times*.[24] "It may not be simply a matter of more data. We may be missing a big idea."

In other words, chatbots aren't yet equipped to serve as all-encompassing virtual assistants, a sci-fi scenario outlined in the movie *Her*. Instead, they are being used in more limited and structured scenarios. Today, chatbots deliver news,[25] facilitate online orders, answer customers' frequently asked questions, and schedule messages.

INDUSTRY IMPACT

For CPAs, chatbots are a useful technology. The profession contains a

variety of structured, clearly-defined areas that are fertile ground for their deployment.

Multiple technology companies offer chatbot capabilities, including Intuit and Sage. In addition to these larger players, a number of startups — including botkeeper,[26] MyKai,[27] and Teampay[28] – offer chatbots specifically built to handle financial and accounting services.

In general, tax chatbots are good at answering general questions and helping clients get started on their returns.

WIDER IMPACT

Powered by artificial intelligence, chatbots are a tangible example of how the technology is beginning to automate operations at CPA firms. Capable of answering clients' questions and navigating them through basic returns, chatbots can improve a firm's customer service and eliminate routine work once performed by human operators.

As with artificial intelligence more generally, chatbots provide an opportunity for a firm to re-evaluate its core competencies. As emerging technologies mature, aspects of accounting work will unbundle: rote tasks will be automated, while higher-level, complex aspects, such as providing financial planning and CFO services, will be performed by partners. As a result, an increased premium will be placed on strategy, creativity, planning, and personal connections. Firms that anticipate and plan for this shift have much to gain. Those that don't have much to lose.

CYBERSECURITY

WHAT IT IS

Cybersecurity is the protection of computers, networks, programs, and data against unauthorized access or attack. In 2018, the threat of a data breach is an unpleasant reality for any business. Fortunately, there are a variety of tools and services that can be deployed to help keep data secure and out of the hands of bad actors.

WHY IT'S IMPORTANT

Every day in the U.S., businesses are breached and data is stolen or compromised. This should not come as a surprise -— news of hacks at large companies regularly make headlines. Equifax,[30] Uber, LinkedIn, Adobe, AOL, Yahoo, Deloitte, and CVS are just a few of the companies that have been hacked in the past few years, exposing millions of consumers' personal data. Troublingly, organizations often don't even realize their employees' or customers' data has been compromised until months, sometimes years, after the breach. By the time they detect it, it's likely the information has been sold on the dark web.

"Security is the number one issue facing accountant offices," John Sapp, vice president strategic development at Drake Software, said at the Executive Roundtable. "There were more hacks last year than the year before, and we'll likely see more this year than last year."

As a result, companies must remain ever vigilant. "When you hire an employee, you are hiring a weak link," Ted Ross, a cybersecurity expert, said during his keynote presentation at the event.

Businesses of all sizes are vulnerable to attack. According to a recent report, half of all small businesses were breached over the course of a year.[31] For CPA firms, which handle clients' sensitive financial data, the results can be especially devastating.

PROTECT YOUR FIRM

The process starts with educating employees. Remember: every person who works at the company represents a potential weak link in the security chain. The vast majority of security breaches are the result of human error.

The first, and arguably most important, step is educate and train employees on an annual basis, not just those who work in IT. These programs can be developed in-house; alternatively, a variety of security vendors offer ready-made presentations and training packages.

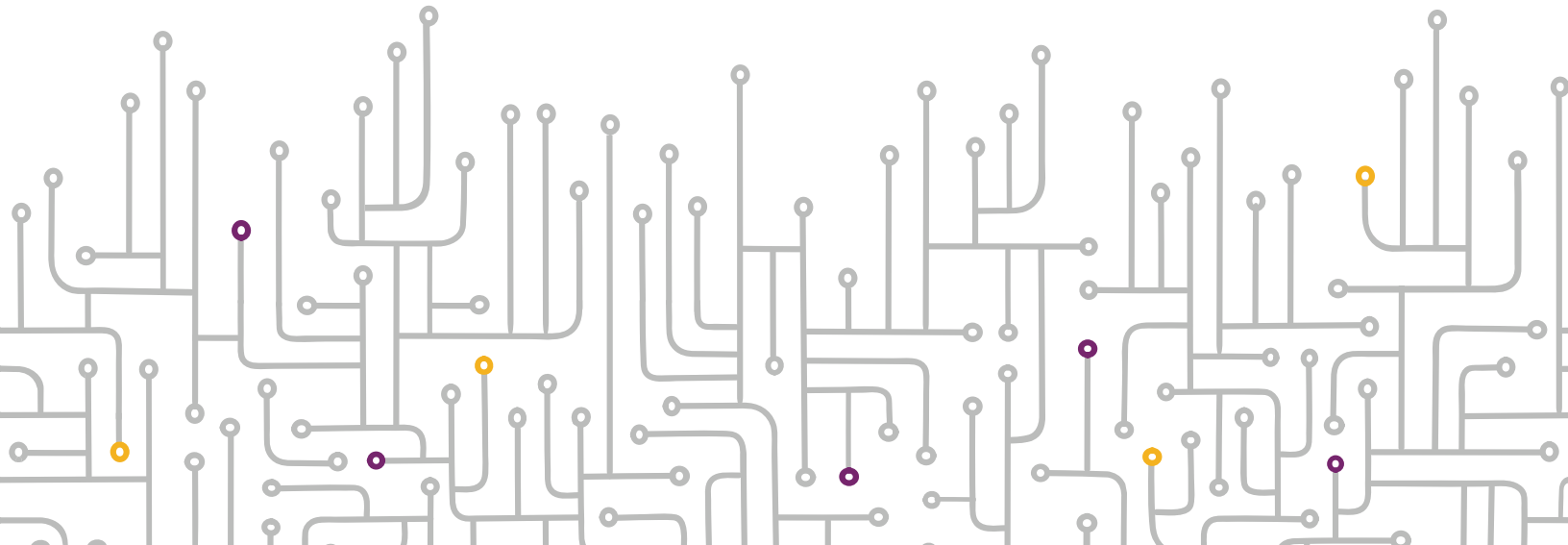
The best education defenses go beyond simply conveying information and setting expectations. They include mandatory requirements, such as having employees regularly reset their password, and practice exercises, such as sending mock phishing emails that serve as a warning to those who click on them.

All modern businesses need to take cybersecurity threats seriously. But as proprietors of sensitive financial information, accounting firms have an added layer of responsibility to make sure their clients' data is secure. The AICPA has developed a cybersecurity risk management reporting framework.[32] It includes the fundamental concepts of cybersecurity, as well as information on the effectiveness of multiple cybersecurity risk management programs.

The first step is setting up a system capable of implementing, monitoring, and updating network security controls. This will be addressed in-depth in a future paper, but central components[33] include perimeter security, endpoint security, network monitoring, and authentication controls.

BOTTOM LINE

Ignoring cybersecurity is an untenable position. If you don't have a plan in place, in all likelihood, you will be breached at some point in the future. Remember, every employee is a potential weak link. Without the proper defense systems in place, a well-intentioned click on a link or a response to phishing email could result in hackers gaining access to everything. (These are far from the only strategies used by cyber criminals.) When it comes to cybersecurity, the adage 'plan for the best but prepare for the worst' absolutely applies. Or in the words of Ross, "It's probably just a matter of time before they get to you." So be ready and have a plan of action in the unfortunate — but likely — case that your company is breached.



FOOTNOTES

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