

# **Innovation in the Audit Profession and How it is Changing the World of Accounting**

## **Introduction**

Innovation is a large part of what drives the world forward and helps society to grow. It is revolutionizing the world and allowing it to change rapidly, but there are still some professions that you would expect to be slower to change. One of those is the age-old accounting profession, specifically auditing, which, until recently, has been rather slow to accept new technologies. However, as the world around the accounting profession changes and develops, audit firms are becoming increasingly aware of the need to innovate the profession. Many of the larger public accounting firms are trying to improve their auditing processes as a means to stay ahead of the competition and to attract new clients and keep existing clients. These changes are supposed to reduce billable hours, change how the firms charge their clients, and increase the quality and efficiency of the audits to provide the best services possible.

The world's four largest public accounting firms are the leaders of their industry and tend to set the standards of the profession. Because of their size, they have the resources, both monetary and man-power, to devote time and effort to audit innovation. The auditing practices of the world's leading accounting firms such as KPMG, PwC, Deloitte, and EY, have all recently begun to emphasize the importance of developing and harnessing new technologies to put themselves above the competition. However, each firm has taken a different approach to audit innovation.

At Deloitte, "Technological innovation in the audit process starts at Deloitte with questions for the firm's engagement teams" (Tysiac). The leaders of their innovation groups ask auditors what they tend to have the most difficulty with while on engagements and what tasks tend to be the most tedious or time consuming. From there, the innovators try to find a way to

develop a better, faster way to complete these tasks to ultimately reduce stress on the engagement and allow auditors to focus on more important tasks than things such as data entry. In comparison, PwC has chosen to focus its innovation process on improving data analytics and developing as many applications as possible to aid in the completion of the audit. In 2016, the public accounting firm won the Audit Innovation of the Year award for its “revolutionary data-auditing tool, Halo,” (PwC Wins Prestigious 'Audit Innovation of the Year'). EY’s, or Ernst & Young’s, innovation has chosen to emphasize connecting the client to the auditor with its EY Canvas and EY Canvas Client Portal, as well as EY Atlas. These are tools for both the auditors and their clients to connect confidentially, to improve the accuracy and efficiency of communication in the audit, and to help further innovation between the two groups (Ernst & Young). Lastly, KPMG has focused its innovation efforts in cognitive technology, otherwise known as artificial intelligence. Their goal with this technology is to enhance audit quality by “offer[ing] insights and identify[ing] risks that may have been missed before,” says Senior Vice President and general auditor Karl Erhardt of KPMG in their report on “Harnessing the power of cognitive technology to transform the audit.”

These are just some of the ways that the auditing profession is trying to introduce innovative technologies into the auditing and accounting profession. The following pages will further discuss the efforts made to innovate in the auditing profession which is set heavily in tradition and rules. They will also discuss the implications and effects of innovation in the auditing practice and how these innovations will change the future of the accounting profession.

### **History of the Auditing Profession and the Importance of Audit Innovation**

The auditing profession increased in prominence in the United States after the stock market crash of 1929. At the time, the stock market and companies’ financial reporting practices

were not well regulated. After the 1929 crash, the Securities and Exchange Commission (SEC) was created through the Securities and Exchange Act of 1934, and all companies traded on public exchanges were now required to have a financial statement audit (Byrnes).

Although the auditing profession adapted and changed over the years with their clients and with changes in accounting and auditing regulations, the profession was forced to change considerably in the early 2000s when a series of accounting and fraud scandals occurred. At the time, several large companies, including Enron and Worldcom, announced that their financial statements were incorrect due to mistakes in accounting or fraudulent events. These events resulted in the loss of many people's investments and retirement funds, a loss of trust in the auditing profession, and the dissolution of one of the five largest public accounting firms in the nation at the time (i.e., Arthur Andersen). These scandals led to the passing of the Sarbanes Oxley Act in 2002, and the creation of the Public Company Accountancy Oversight Board (PCAOB), which is overseen by the SEC. The PCAOB was put in place to set standards for the auditing profession and to review the work of external auditors to ensure that the auditors are operating ethically and according to the standards for accounting and auditing (Byrnes).

These events marked big changes in the auditing profession and resulted from internal deficiencies within the audit firms and audit process. However, more recently, the auditing profession is being forced to change once again. This time, the changes are driven by technological advances and innovation that are making data and information more readily accessible and understandable to audit clients, regulators, and the general public. As a result, audit firms are putting forth time and resources to develop innovations in the audit process, which will hopefully lead to improvements in audit quality.

### **What is Audit Quality and Audit Innovation?**

Through the audit opinion, auditors provide reasonable assurance that management's financial statements fairly represent the financial results of the company. Therefore, audit quality means providing an opinion over management's financial statement assertions that is correct and accurate. Due to competition within the audit industry for new and existing clients, audit firms are continually looking for ways to improve audit quality and the audit process but do so without significantly increasing the amount of time or effort spent on the audit engagement.

Audit innovation is the push from auditing firms to add new technologies, ideas, and other innovations to the audit process and profession to improve audit quality and add value to the audit, the client, and the general public. As the world progresses and innovates, auditing needs to do so as well. Auditors are using technologies, such as global communication platforms, mobile apps, blockchain, artificial intelligence and robotics process automation (RPA) to improve audit quality.

### **Why Innovate the Audit?**

Currently, auditors compete against each other for clients by offering services with the lowest number of billable hours (i.e., the lowest cost), by providing the highest quality audit, or by doing both. Although clients expect the number of billable hours to decrease each year as the auditor gains familiarity with the client, the amount of work in the audit process rarely goes down. At some point there is a tradeoff between the amount of hours worked and the quality of service provided. Quality could only improve so much and hours could only decrease by so much before the tradeoffs in this balance are too high, that could result in work not getting reported in a timely manner or an increase in audit errors and loss of quality. To solve this conundrum, auditors are implementing technology to save time and better catch errors or automate some of the more tedious tasks associated with the audit process in order to leave room

for the decision and judgment making steps. Auditors are currently researching and developing emerging technologies to apply them to the audit process in order to save time and resources, improve communication with clients and stakeholders, shift more of the man hours worked to the decision and judgment portion of the audit, and catch more errors than ever before to provide the highest quality audit possible.

### **What are the Big 4 Firms Doing?**

The following discussion highlights specific activities and examples in the area of audit innovation for each of the four largest accounting firms. A summary of this discussion and examples is provided in a table at the end of the paper.

#### *Deloitte*

Currently, Deloitte is one of the leaders in the audit innovation field. They have a separate practice within the firm devoted solely to creating new, innovative ideas and ways for completing the audit. Additionally, the firm holds an audit innovation competition annually for all employees with incentives for the winning team. This is to help foster innovative ideas from people who may not be on the audit innovation team but who may be able to give a new perspective to implementing innovative ways to make the audit easier, faster, and more efficient. This audit case competition for employees is really similar to another annual audit innovation case competition that the company has created for college students. This year was only the second year of the competition. The competition is meant to either create new ideas for performing current audits or for expanding the assurance practice and services, and the point is to use emerging technologies such as block chain or artificial intelligence to make the audit smoother, faster, and more cost effective or to use technology to target a new field for assurance.

While touring the Tulsa offices, the Deloitte staff presented about the firm's many tools that have been developed and are currently utilized to make the audit as painless as possible for both the clients and the staff of the firm. One of Deloitte's newest and most helpful tools is called Argus. This tool is an artificial intelligence program that has the capability to analyze hundreds, even thousands, of pages of legal documents and contracts to find key terms. Currently, this artificial intelligence (AI) program saves hundreds of hours that would be spent pouring over oil and gas contracts for Deloitte clients, and it could be applied to cover many more types of documents and contracts, such as terms and conditions and privacy policy agreements. Deloitte has also made the audit process easier for clients by creating Deloitte Connect which is a place where clients can upload documents necessary for an audit and the auditors are able to view the necessary information quicker and less redundant without having to continually email back and forth every time a new document is needed. It also made the audit simpler because it became a place where all the audit workpapers can be centralized and where requests can be more easily sent out without repetition on requests or document names. All names and requests are standardized in this new tool, so that everything is easily accessible and readable.

Additionally, Deloitte has developed a software program called iCount. This program has made one of the most tedious jobs as an auditor (inventory) much quicker and more precise. It is accessible on a phone or computer, so it can be used remotely, and it can scan barcodes, upload account information, email and check statuses, leave notes, and it even populates the workpaper for the staff using the program. This revolutionary program shaves long, tedious hours off of the normal audit. Reveal, another audit innovation development, is able to do an analytics review between production volumes and revenue produced to develop an expectation of revenue to help

make predictions about how the financial statements should look to determine if something might be amiss. Signal is a product that is similar to disclosure analytics and is able to do risk assessments, aggregate news about the community around a client and can give risk ratings of the client compared to other entities in the industry. The program is also able to populate accounting and fraud risks needed to perform the audit so that auditors are aware of which areas to watch for and give ideas on which areas may need more work in the audit. This tool is very helpful in assessing new clients, so the firm will know if the client's risk is too high for the firm to take on.

Not only has Deloitte created audit innovation tools related to the financial statement audit, but the firm has also created Cortex. This is one of their newest tools that is able to link directly into the client's information technology (IT) system. It is similar to Deloitte's Connect program mentioned above, but it focuses more on the ICFR (internal control over financial reporting) audit. With this program and with the client's permission, Deloitte has direct access into the system to see how effectively the internal controls relating to financial reporting are operating which saves time for both the auditors and the client.

### *PricewaterhouseCoopers*

While there are so many tools and programs that Deloitte has in place to help progress innovation throughout the audit, they are not the only ones contributing to the evolution of the audit. PricewaterhouseCoopers (PwC) is also making its own strides towards utilizing current technologies as well as developing technologies to improve the quality of the audit. Much like Deloitte's audit innovation team, PricewaterhouseCoopers has a "center for technology and innovation" or "CTI team" to facilitate innovation throughout the firm (Center for Technology and Innovation). PwC utilizes "new technologies like mobile applications, advanced data

analytics, digital communication and collaboration platforms ... to transform the audit” (How PwC is Simplifying the Audit). In 2016, PwC’s tool Halo won the “Audit Innovation of the Year” award “at the International Accounting Bulletin Form & Awards” in October of 2016 for its tool Halo (PwC Wins Prestigious 'Audit Innovation of the Year'). As described in the video accompanying the announcement of the award, Halo allows PwC to analyze data on a much larger scale and to present the data in a way that is meaningful to auditors and clients. The tool is also a platform for technologies such as artificial intelligence and augmented reality that help improve the audit. Halo is able to track and analyze all of the client’s transactions throughout the fiscal year and turn the information gleaned from the data into a data visualization that is simple to read, understand, and make decisions upon. As of 2016, the program has analyzed over 80 billion journal entries and was being used by over 14,000 employees to aid in the completion of over 9,000 audits.

At the beginning of this year, PwC, released a new application “designed to accelerate the way employees learn, interact and solve problems in a digital-first world” (PwC Introduces Digital Workforce Transformation). The goal of the new application is to help create a more digital society that more readily “embraces change and drives innovation” (PwC Introduces Digital Workforce Transformation). The application helps businesses to measure their “digital fluency” or how easily the employees of the company can read, understand, and use technology. It then creates a program of training sessions catered to the assessment of the user’s “digital fluency” to teach the user about emerging technologies such as “cybersecurity, blockchain,” which is used to big data analytics, “user experience, artificial intelligence and design thinking.” The goal of this application is to help PwC’s own employees become more comfortable with



using and aware of the new technologies driving the audit and the accounting profession forward.

Not only looking toward the audit and assurance services, PwC has turned its attention toward a large market of consulting services to help clients become leaders of innovation to help drive progress and increase bottom line results. The firm holds “FinTech Innovation Workshops” aimed at helping executives of clients formulate a business strategy for implementing and driving innovation throughout the whole company (Raneri). These workshops focus on the relation between the financial and technology aspects of business to make each company more competitive in their individual industries. While this does not pertain to the auditing profession, it seems that the trend of innovation in the auditing profession has led to innovation in other accounting services such as consulting, opening new markets for public accounting firms.

#### *Ernst & Young*

While PricewaterhouseCoopers has chosen to focus its innovation mostly on Halo and the consulting services to drive progress in the accounting industry, Ernst & Young has developed many tools to create a more “quality and value” driven audit (Ernst & Young). EY’s Canvas is similar to Deloitte’s Connect in that it has a “client portal” to more directly connect EY employees on the audit with the client. Like Connect, the tool is able to monitor requests and alleviate potential miscommunications. Not only does EY Canvas connect auditors with the client, but it also connects auditors within the firm working on the same audit around the world. This is especially important with global audit clients for which there might be tests around the world to verify the accuracy of the financial statements.

EY Canvas is also similar to PwC’s Halo in that it is the base platform on which the rest of EY’s audit innovation is built. EY canvas contains several mobile applications used to

“connect [their] people around the globe and allow them to support [their] clients on the go” (Ernst & Young). Canvas is an aesthetically pleasing platform that is able to take data analytics and present the information in data visualizations that are easy for the auditors and the clients to read. Like Deloitte’s Connect, the client portal helps to streamline any communication with the client and is customizable for the users so that data is presented in a more user-friendly format. Additionally, there is a visualization that tracks the progress of the audit in “real-time” and it has the “ability to monitor key milestones in the audit” (Ernst & Young). According to the firm’s video displaying the tool, the goal is to “gain enhanced confidence, transparency, and perspective” on the audit (Ernst & Young). Like Deloitte’s Signal, Canvas can also help auditors to assess risk for a client based on the company and its industry, and the tool uses color coding to bring attention to the level of risk for each part of the audit. The Findings Hub within EY canvas can be used to report findings in the audit globally which not only aids in the completion of the audit but can also be utilized by the clients to track risks and potential room for growth in their industries to become more competitive. EY strives to be a global firm, so the tool offers settings for “10 languages”, so that information can be communicated to just about anyone anywhere in the world. This is most helpful on the aforementioned global audits.

EY’s client portal also offers secure uploading for clients to upload documents and fulfill requests necessary for the completion of the audit in a manner that is safe and secure for the client’s data and information. This improves the quality of the audit and the information produces as well as the confidence that clients have in EY’s audit. The portal also includes a dashboard for clients to monitor requests that have been sent, received, and fulfilled. The tool also makes uploading documents hassle-free with the enhanced security and almost instantaneous delivery to the auditors via the enhanced uploading capabilities (Ernst & Young).

EY also has numerous mobile apps that help make the audit more efficient and effective. EY Canvas Pulse gives “real-time status updates” of the audits to clients that can be viewed anywhere. EY Canvas Inventory makes it faster for members of the audit engagement team to upload “inventory counts on their mobile device and upload them directly into EY Canvas” (Ernst & Young). This makes it easier to populate workpapers used to complete the audit and keeps all of the information pertinent to the audit in a centralized, easy to access, location. EY Canvas Engage helps the auditors and clients save time by providing an easy to read interface with updates on tasks left to be completed and allows for clients to submit pictures of audit evidence into the Canvas Client Portal using the camera on their cell phones in a way that keeps the data safe and secure.

EY Helix focuses directly on customer transactions for clients. It utilizes “analytics to look at sales invoicing activity throughout the year, the impact of credit memos and, ultimately, how the invoices are settled” (Ernst & Young). This program essentially looks at how revenues and receivables are recorded and how often customers are paying the client back. This information is good for helping auditors determine if the estimates for uncollectible or doubtful accounts are reasonable given the client’s customer history. It is also helpful for the clients to see so that they can better track outstanding invoices and find trends with customers who are either not paying at all or who are not paying promptly. EY Helix also has the capabilities to analyze inventory to better determine an accurate valuation of inventory as it ages which is an important estimate in the audit. The mortgage analyzer can assess the risks associated with the client’s mortgage portfolio “by assigning thresholds and weights to the main risk factors” which can help in calculating a company’s risk associated with debts. Helix also has a GL (General Ledger) Analyzer that can analyze of the transactions entered into the company’s general ledger and help

the audit engagement team determine risk associated with the company, glean a better understanding of how the company operates throughout the year without having to sift through thousands of journal entries, and can help with planning and setting the scope of the audit. The Group Scope Analyzer does just what its name implies and helps the audit team determine the scope of the audit and how much work needs to be done and in which areas by looking at the aggregate data of the client. Finally, the Purchases & Trade Payables Analyzer “examines and evaluates purchases and payables activities to perform detailed analysis of key aspects of the purchase-to-pay cycle” (Ernst & Young). This tool is helpful in determining the company’s position in paying back suppliers and other short-term debts associated with business operations.

EY’s final platform, EY Atlas is a cloud-based platform used to get quicker, more accurate results from a search, as well as display “technical insights relating to accounting, financial reporting and regulatory filing matters with EY Atlas Client Edition” in one easy to access location (Ernst & Young). EY Atlas also incorporates artificial intelligence and voice recognition technologies to improve searches in the platform. The information provided by EY Atlas is useful to clients wanting to understand more about an accounting position taken or about filing with the SEC, and it is useful to auditors needing to find the “most relevant up-to-date accounting, auditing and industry information” (Ernst & Young).

In addition to EY’s platforms used by clients and auditors alike, EY has begun integrating innovative technologies such as drones, blockchain, artificial intelligence, and robotic process automation to improve the quality and efficiency of the audits. Currently, EY uses drones to aid with inventory observations and integrate the drone observations with some of EY’s current audit innovation mobile apps. EY uses artificial intelligence and machine learning to research how AI can improve the audit process and enhance research findings. Similar to Deloitte’s

Argus, EY is trying to utilize AI to “digitaliz[e] large volumes of unstructured contract data and incorporate[e] machine learning to assist with revenue and leases contract reviews” (Ernst & Young). This saves enormous amounts of time reading through hundreds of pages in a large contract and can pull key information from the contracts to understand the most important pieces of information from the contract without the risk of getting lost in the legal jargon. EY is working on blockchain to create “a distributed database/ledger that maintains a continuously growing list of data records (public and private) put together in encrypted blocks” (Ernst & Young). The firm also plans to develop a way to audit block chains and assess their risks. Lastly, EY has used EY Canvas and EY Helix to implement “robotics process automation (RPA)” to help the audit run quicker and more smoothly by taking out as much of the tedious, time-consuming aspects of the audit leaving more room for the judgment and analysis pertaining to the audit, thus helping produce the better-quality audits that they hope to achieve (Ernst & Young). Additionally, EY has created the Automation Center of Excellence which is “a dedicated team of highly qualified Automation engineers and Process consultants, to enhance the RPA opportunity across” the firm (Ernst & Young). In conjunction with their Automation Center of Excellence, EY has numerous “Wavespace centers around the world” which are designed to foster innovation and are set up in the same way that you would see an emerging tech or internet company in Silicone Valley so that they can foster innovation and new ideas (Rogers).

EY is so focused on innovation that they have written several articles about fostering innovation in the workplace and have even created an executive position titled Global Chief Innovation Officer. This position is held by Jeff Wong whose job is not only to foster innovation in the company, but also to find new services for the firm to explore, think of new ways to deliver services that the firm already provides and to examine old services and find new ways to

think about and approach the old services in a brand-new way. His job is also to determine “how people and processes and business models need to change within the context of the environment” (Rogers). While EY does have many tools in place to foster innovation and quality in the audit, these tools are also used to drive progress in the advisory practice to help other companies create environments for innovation and technology, just as PwC does.

### *KPMG*

KPMG starts innovation at the earliest possible point in its employees’ careers by offering a Masters in Accounting with Data and Analytics Program for incoming interns and new hires (Mauer). This new program is designed to give new accountants the tools and skills necessary to understand the changing world around them that has seen an increased focus in using data and analytics to solve accountants’ problems of today and tomorrow. Now, data and analytics are the most commonly used tools for driving innovation in the accounting profession, especially within the audit. To provide this program to new hires, KPMG has paired with Arizona State University, the University of Georgia, the University of Mississippi, the University of Missouri, the University of Southern California, Virginia Tech, Villanova University, the Ohio State University, and Baylor University (Frequently Asked Questions). This is just where KPMG starts, by encouraging innovation in all aspects of the firm, starting with bringing the most qualified people into the company to support and foster innovation.

To create an environment where innovation can thrive, KPMG has paired with IBM Watson which “is the computer program that in 2011 defeated the two all-time champions on the game show *Jeopardy!*”; KPMG is using IBM Watson to analyze bigger data than ever before to get a more holistic view of the audit and the client’s financial data (Harnessing the Power of Cognitive Technology to Transform the Audit). Not only can IBM Watson deliver results and

insights regarding the client's financial data on a much larger scale, but it can also do so in a much timelier manner than the audit team would be able to. This allows more time for auditors to focus on the very important aspects of judgment and decision-making that relate to the audit. KPMG has taken a focus on data and analytics as well as artificial intelligence and the use of cognitive technology for driving modernization in audit and the accounting profession as well as in their client's companies.

In 2017, KPMG announced plans to build a "state-of-the-art learning, development, and innovation facility in Orlando, Florida" which is where all of the interns and new hires are sent for training before beginning a job or internship at KPMG (KPMG Building State-Of-The-Art). The project is scheduled to be completed in 2019. In the innovation center, trainees are able to immerse themselves in scenarios and situations that they might see while on an audit to better learn how to respond and what actions to take. This is designed to equip staff members with all the knowledge, tools, and skills necessary to be successful on an audit. In addition to this innovative training center, KPMG has also created KPMG Ignition hubs where innovation can thrive, and clients and staff alike can utilize KPMG's partnerships with companies "such as IBM, Appian, and Oracle" to drive audit advancements. The goal of these Ignition hubs that are currently located in Atlanta, Denver, Grand Rapids, New York City, and San Francisco is to create "a collaborative, creative environment and deliver innovative solutions to [their] clients from ideation through implementation" (KPMG Opens 'Ignition').

Along with KPMG's partnerships and innovation hubs, KPMG has also developed KPMG Lighthouse. KPMG Lighthouse is similar to Deloitte's Connect, EY Canvas, and PwC's Halo, in that it is the main platform upon which most of the company's innovation and collaboration is built. Lighthouse "provides an integrated data and analytics platform that

leverages expertise in software and data engineering, data science, advanced visualization, artificial intelligence and robotics” and allows for data and documents to be shared all across the globe to ensure that the firm can “bring the right services and talent to clients” no matter the staff member’s or client’s geographic location (Innovation and creativity). KPMG also created KPMG Insights Centers which are “collaborative, next-generation working environments” that allow employees “to help clients interact with their data in ways they never imagined, as they anticipate and plan for disruption” by technology (Innovation and creativity). With these centers and tools, KPMG is in one of the best positions to help clients revolutionize their industries and affect change in technology and cause new developments in artificial intelligence, cognitive thinking, RPA, and big data and analytics.

Between the Big 4 firms, each start their audit innovations with a global communication platform designed to consolidate all communication, documents, and information related to the audit in one easy to use and access location for both clients and auditors. From there, each firm built any other applications such as artificial intelligence tools and mobile applications to aid the audit process; each of these applications was made to be integrated with the central platforms so that communication can be streamlined and accessed in a real-time manner. In addition to the advancements made using drones, artificial intelligence, robotics process automation, Deloitte and EY have begun to consolidate their tools and information into the cloud so that it can be accessed from anywhere in the world and does not have to be stored by the firms. There is also a beginning trend of the firms seeking to innovate other accounting services such as advisory and tax as evidenced by KPMG sending the Masters of Accounting with Data and Analytics to all new hires, not just auditing new hires and interns, and by Deloitte’s challenge statement for the college Audit Innovation Case Competition that asked students to explore new assurance



services that can integrate some of the emerging technologies and platforms that the firm has created or can utilize. There is also a trend amongst the firms for innovation centers or teams where innovation can be honed and focused year-round by employees and clients of the firm. Lastly there is an increased focus among the firms on big data analytics to increase test sample sizes of data to glean a broader, more accurate picture of a company to analyze trends with greater precision, and the firms are utilizing data visualizations to turn the mass amounts of data coming in into meaningful visuals that auditors and clients can use as information to make decisions and form opinions.

### **Implications of Innovation in the Audit and Accounting Professions**

As previously discussed, audit innovations as well as other accounting innovations are making the more tedious parts of fulfilling engagements much faster, easier, and accurate adding value and quality to the services that accounting firms are able to provide. What does this mean for the audit, and what drove these changes? Audit firms have always competed against each other for clients, with the contract usually going to the audit firm who could complete the highest quality audit in the shortest amount of time, so that the client was paying less, since audits are billed based on billable hours. This brought a stigma of working long, tedious hours late into the night and over the weekends to complete an audit even faster than it was done the year before with no more resources than they had before. Accountants were getting overworked and exhausted, and at some point, an accountant can only perform a task so quickly before losing quality and accuracy associated with the audit. People could only work so fast, but machines and computers can do the same work much faster without losing quality of the audit work completed. Furthermore, as technology develops in companies, “clients are expecting more from their accountants today” which “means moving away from traditional compliance services, and

developing a methodology to better understand your client's businesses" (Wolters Kluwer Central). These reasons are what drove accountants to bring auditing into the 21<sup>st</sup> century and to seek alternatives to help make the audit more efficient and effective than ever before. One by one, accounting firms began to realize that innovating was the only way forward, unless they wanted to risk being squeezed out of the market.

As new discoveries are made and technology develops, the more time-consuming tasks such as inventory counting and testing, invoice tracking, journal entry verification, and contract reviews are better than ever before thanks to technologies such as drones, artificial intelligence programs and data and analytics tools. The countless hours saved allows accountants to give more attention to decision making regarding the audit, and with the enhanced amount of information provided from these platforms, programs, and tools, accountants are able to deliver the audit in a way that is more useful to both the shareholders of the client as well as the client's upper management. The developments in auditors' abilities to analyze big data using data and analytics applications means that the scope that auditors are able to reach while performing the audit will change. Already, auditors are able to analyze bigger data sets to increase the accuracy of the findings, so that it is even more likely that mistakes or fraudulent activities can be found within the accounting records. This increases the credibility of the audit report produced as well as the financial statements upon which shareholders make decisions about the company. Furthermore, "powered by innovative technologies and supported by a risk-based methodology, auditors now have more resources, tools, and time to strategically apply their most important skills—professional skepticism and judgment—to business issues, controls, and risks" (Raphael). This means that auditors are able to give more accurate estimations to compare with those of the

client and to spend more time evaluating the meaning behind the numbers rather than verifying simply verifying that what actually happened matches up with what the books show.

With these changes to the way the audit is performed, auditors “need practical knowledge, experience, and a high level of comfort using cutting-edge, rapidly evolving technology to manipulate and analyze data” to stay ahead of the curve and on top of what is new and now in the audit profession and the accounting world (Raphael). Thankfully, as the world becomes more tech savvy, students do too, so the incoming students into accounting and audit positions are in an even better position to leverage their tech knowledge and skills to enhance the audit and invent new ways to tweak and refine the auditing process (Raphael).

### **Possible Negative Implications of Audit Innovation**

As with any drastic changes, there are some potential threats to the existing model, and there are those weary of these new changes. In 2017, Jeanette Franzel of the PCAOB said that these innovative technologies “such as robotics, artificial intelligence, and distributed ledger technologies, also known as blockchain or distributed database technology, have the potential to disrupt markets and information sharing, which could also cause disruption to financial reporting and auditing processes” (Franzel). She goes on to say that these technologies are disruptive to financial reporting and can present threats to the audit process and profession. She argues that there will be greater communication risks associated with the audit as risks to the quality of the audit.

This raises the question: are these technological advancements benefiting the audit and producing a higher quality of service provided, or are they a danger to the auditing profession if audit firms lose sight of the importance of actually executing the audit with the utmost due care? Franzel makes the important point that “throughout the course of these technological changes,

[auditors] cannot forget that [the] focus should remain on the critical role of auditors to provide assurance over management's financial reporting and related controls for the protection of investors” (Franzel). By this she means that auditors cannot forget that the heart of their purpose is to deliver a quality audit to instill confidence in the auditing profession in both the minds of the clients and the minds of investors. However, it does seem that there might be a correlation between the “significant improvement in audit quality and a reduction in the number and severity of part I findings over the past several years” (Franzel). Part I findings are those errors found that demonstrate a lack of due care on the auditor’s part in the completion of the audit. Change of any kind can be terrifying, especially when it regards auditing which is a profession known for being stable and unchanging, surviving the test of time. However, change can be good, especially in this case, when innovation and change regarding how the audit is done has been stagnant until recent years, and Deloitte’s Chief Innovation Officer, Jon Raphael would whole-heartedly agree. He believes that “it's critical that people learn [...] and continue to evolve” (Tysiac).

### **The Dangers of Information Overload**

Another possible pitfall of these advancements in audit innovation is information overload. Information overload is a phenomenon caused by the inflow of too much information. Having too much information can overload the brain and make situations and decisions much more complicated than they need to be. The presence of too much information and too many unnecessary factors can make decision making impossible. The whole point of audit innovation is to make the jobs of auditors a little easier by allowing for better decision making and for more time to analyze the information provided to make better, more informed decisions. However, information overload can cause auditors, and managers, to get too bogged down in the details and all of the extra information provided by these enhanced data analytics tools. This could

present challenges in keeping focused with the ultimate goals of the audit. Some of these challenges include too much information relating to the timing of receivables or too much information relating to accounting errors or unusual transactions. While it is important to keep track of accounting errors and unusual transactions, focusing too much on those things rather than the audit and the audit client's operations as a whole can make it hard to be aware of materiality and can cause auditors to forget the important principle that correlation does not necessarily mean causation. Not every error is tied to another, however they can be, but having the information on all errors or unusual transactions can cause an auditor to spend too much time looking for causation relating to correlations, thus, when developing and working with new innovations, auditors need to be aware of the challenges associated with information overload. Those creators of new innovations need to also keep this in mind so that auditors using these new tools are not being overloaded with unnecessary details to the audit. As data analytics tools and artificial intelligence platforms are created, auditors still need to keep in mind the importance of considering only the most relevant information for each decision and estimation when conducting the audit. Auditors need to bear in mind that the point of audit innovation is to utilize this extra information to improve quality and value provided by the audit, not lower the quality of the audit due to an inability to make a decision.

### **The Future of the Audit as a Result of Audit Innovation**

Looking forward, the efficiency, value, and quality added to the audit product could result in even less grunt work needed, meaning less employees needed per audit. This does not necessarily mean that there will be a lower demand for auditors or accounting majors in general, it just means that there is more room for the decision and judgment steps of the audit and that auditors are now able to spread their services to new audit and assurance engagements. It also

means that audit firms will need to look elsewhere to provide assurance services. Also, while technology may make many tedious tasks easier or faster, it does not mean that audit firms or companies will be able to erase the human component from the audit process because technology lacks that human ability to rationalize, make judgments, and develop opinions which are the biggest value added and the ultimate point or result of the audit. This belief is evidenced by Deloitte's Audit Innovation Case Competition challenge statement to college student participants where it challenges students to think outside the box about creating new assurance services that auditors and assurance advisors can provide utilizing the developing and existing technologies. Some of these ideas include providing assurance of the MD&A which is currently not part of the Financial Statement and ICFR audits. Additionally, as the world becomes more aware and knowledgeable about emerging technologies, people become more and more interested in how companies are impacting the environment and communities in which they operate. This could open a new market for assuring the information from the environmental statements and press releases that companies issue. These are just a couple examples of ways that the assurance services can be expanded to fill the gaps in profits, time, and jobs available that are left by the innovative strides made in the audits of the financial statements and internal controls related to financial reporting.

While some may not see the value of adding technologies to make the audit faster, these advancements have increased the scope of the audits allowing all of the data to be analyzed rather than just small samples of the data. It means that auditors are more likely to find irregular entries and transactions that would otherwise go undetected if they did not fall within the sample that is tested. Additionally, as auditors are able to test all the data provided rather than only a small section given by a sample, the audit team is able to produce a more reliable audit report,

making the results of the audit even more trustworthy to investors than ever before; this trend of increased trust helps to build confidence in the profession, improving the world's perception of the audit profession, and, thus, the general accounting profession. This increased reliability is what the world's largest four public accounting firms are referring to when they discuss increased quality and value associated with audit engagements that integrate emerging technologies for increased communication and efficiency.

### **Conclusions About Audit Innovations**

The goal of all of these developments and innovations is to stay at the forefront of the industry and to maintain their client-base as well as reputation among the public as reliable auditors providing a necessary service that adds value to companies. The goal of increased data analytics is also to add value to the businesses that the accounting firms serve, so they are able to make better, more informed decisions regarding their operations. Additionally, the applications that help firms assess a client's risk add value to the firm internally because they help prevent audit firms from taking on clients that bear too much risk. This is important because a client with too much risk could mean added time and work, past what the client has been quoted for cost of the audit, or it could mean that there is too much risk that mistakes and fraud could be missed. The tools that have been and are being developed to detect client risk are saving dollars that would be spent working on a high-risk client and are adding revenues that were previously missed from unknowingly taking higher risk clients over lower risk clients.

One focus that seems to be common among the four accounting firms discussed previously is the goal to find a platform upon which other applications, programs, and platforms can be built so that all audit workpapers and related documents can be found in one centralized location that can also enhance and include client-auditor communications, so that requests for

documents are not repeated and can be fulfilled promptly, which is a big part of what takes the audit field work so long to complete. The public accounting firms and their audit practices are becoming increasingly aware of the need for accountants who are not only skilled in their field but who are also knowledgeable about these new technologies and who are able to think creatively to apply these technologies to continually improve the audit and be pioneers in the audit profession.

While there might be some who are weary of the changes made to the ways that auditors perform their work, these technological developments in the field have made the lives of accountants easier, provided important insights to accounting firms and their clients and have led to a higher quality audit for all parties involved. In the end, the audit work is no worse, it is actually better, clients are more satisfied with results of the audit and are able to make better decisions moving forward after the audit, and investors have even more assurance and confidence in the validity and accuracy of the numbers presented in the financial statement and how they are calculated and gathered.

The advancements made in the last five years with the big push toward audit innovation are just the beginning. As more technological advancements are made, they will be applied to the other accounting services to improve the quality of those services and products as well, as some of them have already begun to be implemented. The accounting profession will continue to evolve as time goes on, just as it has, and like with legal and regulatory changes that have happened over time, the audit and accounting professions will continually adapt to their changing environments and will continue to provide the best services possible, given the technology available. These changes are not the end of the audit as we know it, but they are simply a new beginning of how we see and approach the audit in the future. It is the job of accountants now as



well as incoming accountants to continue to foster environments that emphasize enhancing the services offered rather than letting the profession stagnate and become irrelevant and unhelpful.

As long as auditors can continue to provide value to clients and their investors, as they have done by developing these audit innovations, the audit practices will continue to operate and flourish for many years to come. The importance is to constantly find new improvements that can be made to the work completed and to never be fully satisfied with the processes as they exist. With this mindset, accountants can even lead the world into a technological revolution and become catalysts for positive change. It is important that firms like Deloitte, PwC, EY, and KPMG continue to strive towards excellence in their field and lead the rest of the auditing and accounting firms into a new age where technology and new ideas are encouraged to create a better, more open business world. As these four are the global leaders, they are in an excellent position to encourage changes in smaller firms world-wide so that innovation becomes a daily part of the audit engagement and other accounting services provided.

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Deloitte	PwC	EY	KPMG
<p><u>Connect</u>: A centralized database like google drive or dropbox where there are standardized names of documents in one central location. The platform centralizes requests and connects with other Deloitte applications. Client can upload requests directly to platform. All workpapers are ultimately populated and stored here.</p>	<p><u>Halo</u>: Collaboration tool that allows PwC to analyze data on a much larger scale and to present the data in a way that is meaningful to auditors and clients utilizing tools such as data visualizations; also is a platform for technologies such as artificial intelligence and augmented reality; able to track and analyze all of the client's transactions throughout the fiscal year and turn the information gleaned from the data into a data visualization for decision making; has analyzed over 80 billion journal entries and was being used by over 14,000 employees to aid in the completion of over 9,000 audits by 2016</p>	<p><u>Canvas</u>: Global communication platform upon which the company's other technologies to improve the audit are built; contains a client portal to more directly connect EY employees on the audit with the client; monitors document requests to reduce redundancy; contains a user customization tool for ease of use; also connects auditors within the firm working on the same audit around the world for maximum efficiency and more expertise along each step of the audit; presents the information using data visualizations; tracks the progress of the audit in "real-time and monitors key milestones; assesses risk for a client based on the company and its industry uses color coding to bring attention to the level of risk for each part of the audit; settings in 10 different languages</p>	<p><u>Lighthouse</u>: main platform upon which most of the company's innovation and collaboration is built; "provides an integrated data and analytics platform that leverages expertise in software and data engineering, data science, advanced visualization, artificial intelligence, and robotics"; allows for data and documents to be shared all across the globe to ensure that the firm can "bring the right services and talent to clients" no matter the staff member's or client's geographic location; centralized location for all audit related information, documents, and communication</p>
<p><u>Argus</u>: Artificial intelligence application that tracks text recognition. Used for contracts especially for oil and gas contracts and can pull out key terms or phrases of the contract or document. "Learns" after about 20 uses and Deloitte staff claim it saves them hundreds of hours that would normally be spent reading through the contracts.</p>	<p><u>CTI Team</u>: Facilitates innovation throughout the firm; similar to Deloitte's Audit innovation team</p>	<p><u>Findings Hub</u>: Tool located in Canvas where report findings can be input globally; centralizes findings throughout the audit</p>	<p><u>Masters in Accounting with Data and Analytics</u>: program designed to give new accountants the tools and skills necessary to understand the increasingly digital world; opportunity sent to all incoming interns and new hires; paired with Arizona State University, the University of Georgia, the University of Mississippi, the University of Missouri, the University of Southern California, Virginia Tech, Villanova University, the Ohio State University, and Baylor University to provide the program across the country</p>

Deloitte	PwC	EY	KPMG
<p><u>iCount:</u> Application used for inventory testing. Works on phone or computer and can scan bar codes, upload accounting information, can be used to email and check statuses on requests, can leave notes in app that will directly populate into the workpaper that the application also immediately populates. Link to Connect.</p>	<p><u>Digital Workforce Transformation Application:</u> Launched beginning of 2018; accelerates the way employees learn, interact and solve problems in a digital-first world by measuring the user’s “digital fluency” (how easily the employees of the company can read, understand, and use technology) and creating a program of training sessions catered to the assessment of the user’s “digital fluency” to teach the user about emerging technologies such as cybersecurity, blockchain which is used for big data analytics, user experience, artificial intelligence and design thinking; ultimate goal is to make PwC’s employees more aware and knowledgeable about the emerging technologies and how they can be applied to accounting practices and the audit</p>	<p><u>Canvas Pulse:</u> Mobile application that sends real-time status updates of the audits to clients</p>	<p><u>IBM Watson:</u> used to analyze bigger data than ever before to get a more holistic view of the audit and the client’s financial data by analyzing much larger sets of data in a much timelier fashion</p>
<p><u>Optix:</u> Application that is able to pull all Journal entries from a client's books and find unusual entries that raise flags for fraud or errors.</p>		<p><u>Wavespace Centers:</u> Centers around the world which are designed to foster innovation and are set up in the same way as an emerging tech or internet company in Silicone Valley to foster innovation and creative thinking</p>	

Deloitte	PwC	EY	KPMG
<p><u>Reveal:</u> Application that can run linear projections for revenues, other analytics reviews, can link production volumes to revenue produced to develop expectation of revenue, and can link where things are made to profit margin</p>		<p><u>Atlas:</u> Cloud-based platform used to get quicker, more accurate results from a search; display “technical insights relating to accounting, financial reporting and regulatory filing matters with EY Atlas Client Edition” in one easy to access location; incorporates artificial intelligence and voice recognition technologies to improve searches; includes the most recent information relating to accounting standards and principles</p>	<p><u>Ignition Hubs:</u> Ignition hubs where innovation can thrive, and clients and staff alike can utilize KPMG’s partnerships with companies “such as IBM, Appian, and Oracle” to drive innovative thinking; located in Atlanta, Denver, Grand Rapids, New York City, and San Francisco</p>
<p><u>iConfirm:</u> Application used for legal confirmations.</p>	<p><u>FinTech Workshops:</u> Workshops that help executives of clients formulate a business strategy for implementing and driving innovation throughout the whole company; workshops focus on the relation between the financial and technology aspects of business to make each company more competitive in their individual industries (more applicable to Consulting services)</p>	<p><u>Helix:</u> Application that focuses directly on customer transactions for clients; utilizes “analytics to look at sales invoicing activity throughout the year, the impact of credit memos and, ultimately, how the invoices are settled”; looks at how revenues and receivables are recorded and how often customers are paying the client back; analyzes inventory to better determine an accurate valuation of inventory as it ages; contains a mortgage analyzer can assess the risks associated with the client’s mortgage portfolio “by assigning thresholds and weights to the main risk factors” which can aid in calculating the risk associated with the client’s debt; includes a GL (General Ledger) Analyzer that can analyze of the transactions entered into the company’s general ledger to determine risk associated with the company, to glean a better understanding of how the company operates throughout the year, and to help with planning and setting the scope of the audit; group scope analyzer tool helps the audit team determine the scope of the audit; Purchases &amp; Trade Payables Analyzer “examines and evaluates purchases and payables activities to perform detailed analysis of key aspects of the purchase-to-pay cycle” to determine the company’s position in paying back suppliers and other short-term debts associated with business operations</p>	<p><u>State-of-the-art Facility:</u> “learning, development, and innovation facility in Orlando, Florida” to be completed in 2019; location where all of the interns and new hires will train before beginning a job or internship at the firm; designed to equip staff members with all the knowledge, tools, and skills necessary to be successful on an audit</p>

Deloitte	PwC	EY	KPMG
<p><u>Cortex:</u> Application that taps into the client's information technology system and can track usage to verify that transactions are not being made when they shouldn't be (i.e. non-operating hours or weekends). Can run reports and is similar to connect but is useful on ICFR audits. Requests can be submitted through here and clients can choose to either accept or reject requests.</p>		<p><u>Client portal:</u> located in Canvas; offers secure uploading for clients to upload documents and fulfill requests necessary for the completion of the audit; allows clients to monitor requests in real-time rather than constantly having to check emails</p>	
<p><u>Signal:</u> Application that runs risk assessments for accounting and fraud risk. Can also aggregate news about the community in which a client operates to understand better the environment that surrounds the client. Application can also give a risk rating relative to other entities to help the auditors assess the company before taking them on as a client which helps protect the interests of the audit firm. Similar to disclosure analytics.</p>		<p><u>Use of drones, artificial intelligence and blockchain:</u> Drones used to aid with inventory observations; integrating observations with some of EY's current audit mobile apps. AI utilized to "digitaliz[e] large volumes of unstructured contract data and incorporate[e] machine learning to assist with revenue and leases contract reviews"; blockchain used to create "a distributed database/ledger that maintains a continuously growing list of data records (public and private) put together in encrypted blocks"; developing a way to audit blockchains and assess their risk</p>	<p><u>Insight Centers:</u> Centers created for "collaborative, next-generation working environments" that allow employees "to help clients interact with their data in ways they never imagined, as they anticipate and plan for disruption"</p>



Deloitte	PwC	EY	KPMG
<p><u>Employee Case Competition:</u> Case competition to crowd source innovative ideas from all staff at the firm. Winning teams get to present their idea and get prizes.</p>		<p><u>Canvas Inventory:</u> uploads inventory counts on mobile device directly into Canvas where a workpaper is populated and kept in one, centralized location with other audit-related documents for the completion of the audit</p>	
<p><u>College Audit Innovation Case Competition:</u> crowd sourcing college students from universities across the U.S. to glean new ideas for auditing innovation and assurance services. Offers scholarships to the winning team or teams. Just finished second annual competition.</p>		<p><u>Canvas Engage:</u> allows auditors and clients to view updates on tasks left to be completed; allows for clients to submit pictures of audit evidence into the Canvas Client Portal using the camera on their cell phones in a manner that is secure for the data</p>	
<p>** Deloitte is also working towards making all of their information and work compatible and stored in the Cloud through a project called Symphony.</p>		<p><u>Automation Center of Excellence:</u> “Team of highly qualified Automation engineers and Process consultants, to enhance the RPA opportunity across” the firm;</p>	