



## Cognitive Technology

Artificial intelligence (AI) can enhance audit quality by analyzing vast amounts of data effectively by using algorithms to enable software to absorb information, reason and think similar to humans. It encompasses machine learning (ML), where computers can correct in mid-course and try new strategies as obstacles or unknowns are faced in the work processes.

Cognitive technology can be used by auditors to redesign the workflow to analyze structured and unstructured data efficiently. The auditor can combine data from non-traditional sources (social media, TV, radio, Internet, etc.) with traditional sources like client's financial records and use advanced analytics to improve the quality of the audits by diving deeper into the data to provide a clear picture about the client's risk profile, financial reporting controls and the operating environment.

AI and ML are becoming increasingly embedded in applications and processes. The accounting profession is utilizing AI (ro)bots in their professional routines and streamlining processes. Data categorization is affected by AI bots to automatically categorize information into different accounts. When a monthly subscription phone bill and a purchased phone bill are sent by the same phone carrier, bots can automatically classify them under different chart of accounts.

The potential of ML can be observed when bots learn from human input to make better judgments and adapt to the human behavior patterns. ML can provide the tools for processing and standardizing the data. Large data sets, including contracts and other complex transactions, can be analyzed quickly and accurately, helping to free up the auditor to focus on the areas that require human judgment.

Auditors can examine the client's entire general ledger data using automated tools that perform a variety of analyses and provide lists of exceptions for the auditors to evaluate instead of using traditional sampling. Once the auditor confirms or invalidates that exception, the machine learns to derive patterns from the auditor's conclusions and attempts to identify additional data points about the positives and negatives to apply to additional exceptions. It helps the auditors to increase their efficiency by accelerating and automating the audit process, and achieve higher quality and efficiency. Please see Table 1.

## Opportunities in ML

ML applies statistical models and algorithms that mirror cognitive strengths like pattern recognition and contextual learning. The power of ML is derived from its ability to process large datasets, adaptability in learning from complex and constantly changing patterns,

## Table 1. Benefits of Disruptive Technologies for Smaller Firms

**The benefits of disruptive technologies are trickling down to smaller firms as shown by the following two ventures.**

### AuditFile

AuditFile, a cloud-based audit automation platform, incorporates analytics and ML to help CPA firms improve efficiency and process visibility in audits by recognizing patterns and applying those rules to analyzing a data set. The software uses AI to classify accounts to lead sheets on the trial balance and frees up auditors to focus on the interpretation of the results. By processing extensive amounts of data very quickly, it helps the auditors perform a more efficient audit.

In the near term, ML can be used for analyzing cash receipts and disbursements for irregularities based on the client's historical trends, as well as for a broad range of analytical procedures. Over a period of time, these tools could be expanded to analyze industry-wide data, allowing auditors to refine risks of material misstatements and identify anomalies.

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### Auvenir

Auvenir, a Deloitte venture, is trying to develop auditing technology that could be offered to small firms to help level the playing field. They are looking at emerging technologies, such as AI, ML, data analytics, smart contracts and all of the components to be brought into the engagement platform, and bring that technology to small firms in a seamless, cost-effective way.

Such an integration of emerging technologies will allow auditors to test entire populations of data, and confirm information to be able to do a continuous audit and help in catching fraudulent transactions efficiently. Cognitive technology empowers and enables auditors to make key judgments and deliver audits efficiently, and provides auditors with access to richer, more detailed audit evidence and valuable insight.

## DISRUPTING TECHNOLOGIES

consistency, and lack of bias, making it a scalable technology in many industries.

ML supports decision making, and offers auditors referential data-driven insights and combined financial and non-financial analysis. It equips them with tools to solve current issues, and frees up their time for problem-solving, advising and strategy.

### Challenges in ML

ML algorithms and processes depend on the quality of data used. If the data used by the models are incomplete, insufficient or biased, the ML results will be tainted and cannot be used with a high degree of confidence. ML can execute tasks with a degree of repeatability, allowing the platform to recognize patterns, generalize its learnings and apply them accordingly, but may not be the solution for all problems.

The outputs of ML algorithms are predictive and suggestive in nature, which may make this framework unsuitable for some tasks.

### Predictive Analytics

Predictive analytics uses advanced data analysis techniques to make predictions based on probabilities about the future, and improve the audit quality by using AI and ML to refine those predictions. It brings together statistical analysis, data modeling and ML to observe trends and project into the future to help with judgments on likely outcomes.

Auditors can extract data from an organization's systems, combine it with industry and market data, and use predictive analytics to identify anomalies in patterns and alignment with anticipated outcomes and trends to get deeper insight into a client's business and financial risks.

Predictive analytics can assess if the client's data conform to the expectations based on the client's own historical trends and peers' performance data. The focus of predictive analytics is on providing probabilities for potential outcomes, providing auditors a powerful tool to judge the accuracy of reported data and improve audit quality by benchmarking to peers.

### Blockchain Technology

Blockchain is a data structure that uses a distributed system of databases (ledgers). Every user is a "node" and has a copy of the ledger. Nodes are connected by networks, and all ledger records are visible to everyone, verified and cannot be changed once the transaction is done. (Source: PwC Governance in the age of Blockchain, 2018)

Blockchain is a database that holds data and programs in heavily encrypted "blocks" of individual transactions as results of executable files. The programs and codes can only be added and cannot be edited or deleted, with each block linked to the previous one making a "blockchain."

The digital ledger shares and tracks information related to contracts and transactions. The records are permanent, verifiable and secure. In summary, blockchain is a distributed database consisting of blocks of items that are timestamped, verifiable, permanent, and hashed and linked to other blocks, with these properties: synchronized, unalterable, deterministic, non-cancelable and fast.

To use blockchain as a credible data source, an audit of the process to ensure system confidence and the integrity of the data is essential, thereby creating the need for more auditors and different skills.

Due to the increase in adoption, PwC introduced a blockchain validation solution to help authenticate transactions for clients. The solution combines continuous auditing software and a blockchain framework to give internal audit teams and executives real-time access to test transactions on their blockchains.

As this technology is adopted by more businesses using their private blockchains, concerns around risks and controls are evolving. Blockchains are mostly tamper proof with several valuable benefits, but similar to any solution built around a new technology, it is subject to unanticipated risks, requiring a new audit approach that leverages technology, accommodates increased transaction volume and provides real-time data.

A blockchain can fill key roles, including:

- Establishing identity;
- Recording transactions; and
- Establishing contracts.

According to a white paper sponsored by the Chartered Professional Accountants of Canada, the American Institute of CPAs and the University of Waterloo Centre for Information Integrity and Information System Assurance, "With blockchain-enabled digitization, auditors could deploy more automation, analytics and machine-learning capabilities, such as automatically alerting relevant parties about unusual transactions on a near real-time basis. Supporting documentation, such as contracts, agreements, purchase orders and invoices, could be encrypted and securely stored or linked to a blockchain. By giving CPA auditors access to unalterable audit evidence, the pace of financial reporting and auditing could be improved."

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## Benefits of Blockchain

Both sides of the transaction are recorded in a shared single set of books, creating a triple entry system using a consensus process to validate the transaction and create a new entry to be posted in a shared ledger with a cryptographically sealed receipt with a unique digital signature. The transparency combined with the continuous updating provides real-time information to users and increases the trust level in the data.

The advantages of the technology are:

- Transparency due to cryptography and public/private keys;
- Resiliency due to distributed network; and
- Immutability due to algorithms that mathematically link data blocks without a third party.

The above characteristics make it a network of trust and enhance the ability to perform analytics and forecasting. The blockchain process offers auditors the ability to test the whole population across multiple entities in a short time and generate an exception report, as opposed to the sampling techniques in use today. Confirmations may not be needed because of the distributed ledger verification of transactions at inception.

Forgeries and alterations to transactions can be detected immediately, due to the alerts to all members in the chain. Using blockchain will allow auditors to reduce time spent on redundant tasks and increase value by devoting more time to internal controls, analytics and strategic initiatives.

## Table 2. Potential New Careers as a Result of Blockchain

**AICPA has identified four potential new careers for auditors as a result of blockchain.**

### **Auditor of smart contracts and oracles:**

Auditors will be needed to verify the smart contracts that are embedded in a blockchain to automate business processes and provide assurance for contracting parties.

### **Service auditor of consortium blockchains:**

Users may want independent assurance as to the stability of the existing or new blockchain architecture before launching a new application or subscribing to an existing blockchain product and to the effectiveness of controls over the private blockchain.

**Administrator function:** This function can validate the enforcement and monitoring of the blockchain's protocols and be responsible for the verification of identity before a participant is granted access to a blockchain.

**Arbitration function:** For a permissioned blockchain, an arbitrator function might be needed to settle disputes among consortium-blockchain participants.

See Table 2 above for potential new careers for auditors as a result of blockchain.

## Challenges of Blockchain

Auditors will be asked to provide assurance that internal controls are in place to monitor the new risks due to the new technologies and mitigate them. Similar to AI and ML, blockchain will require auditors to learn about new technologies involving algorithms and digital signatures, and understanding global regulations and cybersecurity threats.

### Robotic Process Automation (RPA)

Auditing processes have traditionally consisted of computer dependent tools and processes linked with manual steps. RPA takes these disparate actions into a single integrated automated process, allowing the auditors to operate at higher efficiency levels. It can automate repetitive tasks in taxation, advisory and assurance areas. Some real-life projects include preparation of tax returns and reconciliations by public audit firms.

Due to emerging technologies, the role of the auditor will be shifting from a standard role to a more strategic business advisory role in the future.

Software robots can be deployed to perform rule-based functions such as reconciliations and analytical procedures in revenue audits. Ever increasing amounts of data ("big data") makes the audit data preparation, file organization, integration and audit tests quite time consuming and prone to error.

RPA software can interact with other application software and automate processes that are structured, rule based and repetitive, and automate tasks that span across different software processes.

While RPA's potential to disrupt the traditional audit processes and audit fees are recognized by professionals, it is still in the preliminary stages of adoption. It can lead to cost savings by increasing efficiencies, but combining RPA with auditors' professional skepticism needs to be explored to provide a value-added service to clients.

### Smart Digital Hubs

Advances in communication and internet connectivity have led to mobile technology enabling auditors to use vital data from the field and could evolve into digital hubs that serve as "smart platforms," allowing auditors to work remotely in real time using big data, analytics, automation and data visualization. Such smart hubs will

need to be agile and work in a cloud-based environment, configured to support integration into future innovations, and avoid additional complexity into audit work to add maximum benefit to the audit process.

### Turning Data Into Insights

With robust tools at their fingertips and the ability to efficiently provide in-depth data analysis, auditors are positioned to take on a greater strategic role and deliver higher-value insights to clients and employers. The traditional audit of today is changing due to emerging technologies. The role of the auditor will be shifting from a standard role to a more strategic business advisory role in the future.

Technology will help auditors identify risks and create more value for all stakeholders using the audit opinion and do so more efficiently. Innovative technologies like the cloud, AI, ML, blockchain and RPA will give auditors better access to a range of real-time data from many sources, reduce manual data entry and improve efficiency.

Blockchain and smart contracts can be used to exchange secure information between businesses and lenders. AI can be used to verify the information and ensure that both parties see the information in real time. RPA can streamline audit evidence collection by standardizing data and automating repetitive tasks.

KPMG's Future of Finance report outlines how organizations will increasingly use "Centers of Excellence (COE)" consisting of data scientists, financial analysts and automation that will analyze large blocks of internal and external data with specialists supported by ML and create in-depth reports. Auditors can benefit from the improved flexibility, risk management and innovation provided by the COEs.

These emerging disruptive and innovative technologies can attract the next generation of auditors with the necessary technical skills. These professionals can serve as trusted, value-added advisors to their clients and employers by turning data into actionable insights and using technology to address business risks to enhance audit quality.

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