

: How might AI, Blockchain and Decision Support impact Accounting and Auditing?

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Historically, bookkeepers, accountants, and auditors have maintained financial records and created decision-relevant reports and analyses for managers. Accountants and accounting software regularly process invoices, expenses, payroll, receipts and other financial data. Since the adoption of computers and accounting software, the number of "clerks" needed to record financial data has declined steadily as a percentage of the population and the rate of that trend is increasing. Bookkeeping and accounting have been disrupted by technology for more than 135 years. For example, in 1880, men were primarily the bookkeepers, cashiers, and accountants. As more machines and technology were used for these tasks more women entered those occupations [1]. Now Artificial Intelligence and other technologies may further change the accounting profession.

The U.S. Department of Labor, Bureau of Labor Statistics, Occupational Outlook Handbook states "Employment of bookkeeping, accounting, and auditing clerks is projected to show little or no change from 2016 to 2026. Technological change is expected to reduce demand for these workers. Software innovations, such as cloud computing, have automated many of the tasks performed by bookkeepers. As a result, the same amount of bookkeeping work can be done with fewer employees, which is expected to lead to job losses for bookkeepers over the next 10 years." The number of Accountants and Auditors is projected to increase by 10% (faster than average) from 2016-2026 (BLS, 2016).

Oussenbec (2018) examines the decline in jobs in Oregon and notes "The decline of bookkeeping jobs is projected for all regions in the state and is the result of profound changes happening in this field because of technology. There are not hundreds, but thousands of programs and applications available today, making bookkeeping processes automated or greatly simplified. Increasingly, bookkeeping duties get outsourced to specialized bookkeeping firms, and sometimes they can even be outsourced to other countries. In addition, it has been a common practice to combine bookkeeping duties with other duties, such as payroll and general office duties."

From a United Kingdom perspective, Thomas (N.D.) noted "Now, bookkeeping is apparently in decline, with many clients electing to do their books themselves. What has brought this about? One factor is the growth in the use of IT in both the home and in the office. Most people, even some senior citizens, are now competent in using the basic home computing packages ..."

In addition to tax and bookkeeping software, three technology trends are part of the digital disruption of Accounting and Auditing. These trends are AI, Blockchain and Decision Support.

Page 1/5

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The Accenture website defines Artificial Intelligence (AI) as "a constellation of technologies—from machine learning to natural language processing—that allows machines to sense, comprehend, act and learn." The same website notes "Blockchain is a new way of storing data in a distributed ledger that allows multiple stakeholders to confidently and securely share access to the same information."

For example, Rozario and Vasarhelyi (2018) note "Blockchain-based smart contracts are emerging as a disruptive force that may change the way financial statement audits are performed and delivered. With their potential ability to autonomously execute audit procedures on behalf of the auditor and disclose the results of these audit procedures, blockchain-based smart contracts have the potential to improve audit quality and meet the information demands of various vested parties for more timely and transparent audit reporting. (p. 1)"

At the end of the second decade of the 21st Century, Artificial Intelligence (AI) has begun to realize some of the potential envisioned for thinking machines. Contemporary AI is not a single technology, but many. The potential for cognitive computing and ambient intelligence is transformative with current technology. Despite progress, the AI vision from the science fiction drama film *Artificial Intelligence* (2001), directed by Steven Spielberg and based on the 1969 short story *Supertoys Last All Summer Long* by Brian Aldiss, is **not** yet possible. Lieutenant Commander Data, an android in the television series *Star Trek: The Next Generation*, is far from reality. The HAL 9000 from the novel and film titled *2001: A Space Odyssey* remains a fictional creation of Arthur Clark and Stanley Kubrick. The invention of an artificial super intelligence is not imminent, a technological singularity if it occurs may be hundreds, if not thousands of years in the future.

Decision support and cognitive augmentation are however increasingly sophisticated. Decision Support is a broad, high-level concept that includes any use of a model, tool or technique, usually computer-based, to help identify and solve problems, make decisions and in general assist and support decision making. Analytics, artificial intelligence, business intelligence, data warehouses, decision support systems (DSS), machine learning, optimization models, and other systems and technologies can and do provide decision support.

So what can we anticipate?

1. Blockchain will decentralize financial data and the greater transparency will reduce the need for auditing transactions.

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2. Increased sophistication of Artificial Intelligence (AI) will improve the quality of tax preparation, financial statements and financial projections. Professionals in Accounting and Finance will need more technology knowledge and skills.
3. AI applications will monitor compliance, improve data quality, reduce fraud, and reduce staffing needs.
4. Together AI and Blockchain will increase the speed of payments and reduce the number of electronic or paper documents and human-computer interactions. Transactions will contain self-executing algorithms and AI to make and verify payments.
5. All three of these evolving technology developments, AI, Blockchain and Decision Support, will significantly alter the practice and scope of Accounting and Auditing. Accounting tasks will expand to increase the focus of practitioners on decision support. Auditing tasks will include more broadly examining algorithms, decision aids, DSS, AI applications, Blockchain implementations, transaction software and all aspects of decision support.
6. The traditional mix of jobs and needed skills in accounting firms will change substantially, cf., Zhang et al, 2018.
7. The increasing amounts and varieties of data will create more demand for decision support and managerial accountants will be expected to provide new, more sophisticated decision support analyses.
8. Artificial intelligence, big data, blockchain and decision support technologies will have a disruptive impact and will transform how auditing is performed, cf., Shimamoto (2018).

The impact of these emerging technologies likely will be significant, cf., Majika et al, 2017; Zhang et al, 2018. The possibilities are becoming clearer as these technologies develop and mature. Accounting professionals and accounting firms will need to adapt. Business models for accountants are likely to change because the historical intermediary roles will not be needed. The composition of the workforce will also change as low skilled employees are replaced by technology and direct input of data at the source and analysis by software systems.

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Notes

[1] According to Strom (1987) "By 1930 the Census showed that more than half of all bookkeepers were women." The 1930 percentage compares to 5.7% in 1880 and 38.5% by 1910. Other social factors also created this shift in employee gender.

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Page 4/5

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: How might AI, Blockchain and Decision Support impact Accounting and Auditing?

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