DIGITAL TRENDS IN AUDIT

Ovidiu Dragoș Tofan[1]
[1)] *"Alexandru Ioan Cuza" University, Iași, Romania*
E-mail: dragos.tofan.2014@gmail.com

Please cite this paper as:

Tofan, O.D., 2020. Digital Trends in Audit. In: R. Pamfilie, V. Dinu, L. Tăchiciu, D. Pleșea, C. Vasiliu eds. *6th BASIQ International Conference on New Trends in Sustainable Business and Consumption.* Messina, Italy, 4-6 June 2020. Bucharest: ASE, pp. 349-356

Abstract
The digitization of the financial-accounting analysis is a process in progress with new approaches through the implementation of intelligent IT tools. The audit of the economic situations has already taken the step to another level by moving the specific processes in the online area, by eliminating the samples and by continuously monitoring the essential indicators from all levels of an organization. Audit reports have the primary role of reflecting the health of economic mechanisms by processing an extended volume of more or less standardized data; the evolutions of Big Data Analytics, Business Intelligence or Artificial Intelligence systems for economic analysis and reporting already come with practical solutions, but it also brings a series of ethical, adaptability or security dilemmas. The present article aims to analyze the main trends of the intelligent working tools adopted by the audit in the practice of the big cabinets as well as of those manifested in the field of information processing dedicated to the strategic organizational management. The research takes into account the influence of the contextual determinants given by the new institutional regulations and transformations at a global level for the supervision of the statutory audit, as well as the efforts to adapt the specific standards and legislation. The obtained results converge towards the idea of gradual adoption of the techniques of intelligent processing of the financial-accounting data in the conditions of respecting a rigorous discipline meant to confer the main role of the audit, namely, guardian of the correct and verifiable information.

Keywords:
Big Data Analytics, Business Intelligence, financial-accounting analysis, digitization.

JEL Classification
A1, A2

Introduction

From the perspective of financial-accounting analysis, the evolutions of the 21st century information technologies require a realistic approach from the factors involved in terms of maximizing the benefits but also minimizing the specific risks and shortcomings. At the

same time, the efforts of professional auditors to keep up with the digitalization of business processes are useless or with a drastically diminished effect if there are no resettlements of the legal framework as well as a reform of regulatory institutions in this field.
The term "digitization" is broad and covers most sectors of economic activity based on at least two major triggers: globalization and the Internet. Strictly related to the evolutions of the last decades, globalization can be seen as economic integration, exchange of ideas, population and goods (Donnan and Leatherby, 2019) process supported politically - through agreements, negotiations or alliances - or technologically. The Internet primarily ensures the facilitation of information exchange, access to resources and tools for working and processing knowledge. Large volumes of data and information have passed from the physical environment to digital format (electronic registers), stored in servers to which network access is allowed (Kamordzhanova and Selezneva, 2019). It is a simplified explanation of a broad process in which organizations organize their information systems, substantiate management processes and build their work strategies. Today's digital economy includes Big Data technologies, artificial intelligence, cryptocurrency, cloud computing, augmented reality, neuro-technologies, etc. which, transposed in the sphere of financial-accounting processing, lead to unique tools and procedures in the area of storage, processing, access and sharing of knowledge to users interested and authorized in this regard.
The professional auditor is forced to keep up with the pace of digital innovation. As audited clients implement intelligent information technologies to increase business efficiency, to focus on customers, to find new markets and to increase productivity, the auditor must understand the impact of digitalization on the business and apply such technologies in their own work missions (Meuldijk, 2017). Drawing future scenarios with total accuracy is almost impossible, but awareness of innovative technologies, the adoption of digitization in the sphere of own working tools or the resizing of professional training to the new scale of values can create new opportunities for the audit profession.

Innovative trends
The analysis of the literature dedicated to innovative technologies with a direct impact on the audit as well as the reports issued by the audit firms of the Big Four reveals a strong concern regarding the following trends: Data Analytics, Mobility / Smart Digital Hubs, Cognitive technologies / Artificial intelligence and Predictive Analytics.

Data analytics
The term of Data Analytics synthesizes the tools of extraction, validation and rapid analysis of large volumes of data, being applied to complete populations (as a percentage of 100% of transactions). Models are discovered and analyzed, anomalies are identified, useful information is extracted from the data being audited through analysis, modeling and visualization in order to plan or perform an audit (Byrnes et al., 2014). Thus, the use of automated analytical algorithms instead of sample-based testing leads to a clear improvement in the quality of audit processes due to the possibilities related to:
- identifying and assessing the risks associated with accepting or confirming an audit engagement;
- identifying and assessing the risks of material misstatement by analyzing the entity and the environment in which it operates;
- applying substantive analytical procedures in order to assess the auditor's risk of material misstatement;
- identifying and assessing risk of material misstatement of the financial statements due to fraud and testing for fraud in the light of the risks assessed;

- using analytical procedures, towards the end of the audit, in order to formulate the final conclusions regarding the correlation between the financial statements and the auditor's vision of the entity.

In a study conducted by Ernst & Young (2018) on a number of 745 respondents with leadership roles in organizations that have implemented Forensic Data Analytics tools in 19 countries between October and November 2017, the results show an overwhelming percentage in favor of the tools in Spreadsheet category (90%). The sophisticated tools from the RPA or Voice search and analysis category are expected to be adopted in much smaller shares by those interviewed, as can be seen in table no. 1. At the same time, a high percentage is registered by the instruments designed within the beneficiary entities, to the detriment of the solutions marketed by companies specialized in the area of data processing.

Table no. 1. Broader adoption of advanced technologies

Technologies	Percent
Spreadsheet and relational database	90%
Data warehouse	63%
Internally built tools	55%
Visualization and reporting	54%
Continuous monitoring	46%
Security incident and event management	43%
Statistical analysis and data mining	42%
Social media and web monitoring	40%
Forensic analytics	33%
Robotic process automation	14%
Voice searching and analysis	8%

Source: Ernst & Young, 2018. Global Forensic Data Analytics Survey

Important audit firms follow procedures and policies that, in terms of internationally acquired know-how, have adapted to the new Data Analytics challenges. The International Federation of Accountants recognizes current trends and seeks solutions to integrate analytics into audit procedures. The integration of Data Analytics in audit is done at a more conceptual level as the acceptance as audit evidence of the views or reports generated becomes quite difficult, even if they are based on a whole series of algorithms or rules (Ramlukan, 2015). At the time of their design, the standards did not predict the type and volume of data that auditors now face and did not include reports issued by analytics as audit evidence.

Mobility/Smart Digital Hubs

In the classic version, auditors work in an environment with landlines, faxes and desktop computers, being physically connected to an office. Mobile technologies have facilitated the detachment of such facilities and have placed professionals in the field, in a stronger connection with customers and, implicitly, with the required information. Basically, there are so-called "digital hubs" that function as smart platforms where auditors can work remotely and in real time, using data and tools for analysis, automation and visualization. According to a KPMG report - "Audit 2025" from 2018, to be effective, such platforms must have three characteristics (Forbes, 2018):

- have the ability to work in "cloud" storage environments;
- configured with future innovations, currently unavailable but forecast for the coming years;

- relieved of complex and unnecessary tasks for the auditor (loaded already with challenging tasks).

Such a working manner is associated with the notion of "remote auditing" (RA) defined as a process in which auditors combine information technologies with data analytics in order to remotely evaluate and report / formulate opinions on the accuracy of financial statements and efficiency of internal controls (Accorsi, 2011). A number of dilemmas are identified on which the auditor must apply the correct reasoning in accordance with professional ethics and the boundaries set by the specific standards:

- Authorization: ensuring that only authorized parties have access to the execution of certain operational processes;
- Separation of duty (SoD): has the role of reducing the risk of fraud and can take two forms: intra-work court (specified on a single process or court) and inter-court (on several operational phases);
- Binding of duties: the persons involved perform only the tasks outlined;
- Delegation: control over the extension of privileges from one executor to another;
- Conflict of interest: prevention of information leakage to competitors using the same cloud or RA system;
- Four eyes principle: ensures that certain phases or activities of the operational processes are deleted through two people with different roles within the organization.

Cloud computing raises a number of issues related primarily to data security, an aspect of interest for both the auditor and the client entity (Wu and Zhao, 2016). In general, the cloud storage service provider is a third party which can cause a number of challenges such as:

- Internal and external threats to data integrity;
- Motivated by their own interests, cloud service providers do not have an honest attitude towards customers regarding the state of outsourced data (for example, hiding incidents caused by data loss in order to maintain a certain reputation in the profile market);
- False perception that pay-as-you-go is "cheaper" than other IT resources;
- Difficult monitoring, control and analysis of IT costs (especially with infrastructure);
- Expectations regarding the 24/7 availability of IT systems.

Under these conditions, professional auditors must understand which services are best suited to specific work missions and that the implementation of appropriate mobile technologies at the right time is paramount (Chua, 2013).

Cognitive Technologies/Artificial Intelligence

Artificial intelligence (AI) changes the way a business operates and opens up new opportunities for auditing. Eloquent are IBM Watson systems capable of reading, listening to, and processing billions of documents per minute in accordance with accounting standards, such as United States Generally Accepted Accounting Principles (US GAAP), International Financial Reporting Standards (IFRS), Swiss Financial Market Supervisory Authority (FINMA) or the Public Company Accounting Oversight Board (PCAOB). AI can read and interpret the evidence received and even generate electronic audit files as the assertions are checked. In KPMG's view, although the evolution of such tools is uncertain in the near future, AI will influence the conduct of audit missions and, moreover, will be disruptive to the profession itself (Meuldijk, 2017).

In a study conducted in 2019 - "Internal Audit Insights 2019", Deloitte specialists bring recommendations for companies that have already engaged in the adoption of AI / cognitive intelligence tools to improve quality and expand the scope of procedures audit, to adopt a series of measures aimed at developing a clear vision and strategy for the automation of operations.

The reality in practice of companies engaged in the implementation of AI systems shows a growing interest in this field, even if the financial and professional challenges are major.

Thus, in 2018, 74% of a sample of CEOs selected globally by a study by Ernst & Young stated that they have no strategic planning regarding the adoption of such digital tools. A year later, the same study revealed that 73% of those interviewed already implemented AI or planned such investments.
A similar study conducted by World Economic Forum (2020) during the 2nd and 3rd quarters of 2019, applied to 151 respondents from 33 countries demonstrated the degree of adoption of AI tools within companies involved in financial services. The analysis of integrated or in-process components shows the lowest interest in autonomous decision-making compared to other applications:

Table no. 2. Overall state of implementation for selected AI application fields

AI application fields	Implemented	Currently implementing	Not implemented but planning within 2 yrs
Anomaly detection	42%	23%	22%
Natural language processing	39%	20%	23%
Data generation and interpolation	36%	25%	25%
Computer vision	36%	22%	20%
Time series forecasting	35%	30%	25%
Data de-noising	33%	20%	26%
Clustering	31%	29%	27%
Autonomous decision-making	27%	23%	28%

Source: World Economic Forum, 2020. Transforming Paradigms - A Global AI in Financial Services

Given that companies are investing in AI systems, there is a growing need to regulate the use of such tools. Thus, a bill proposed by the US state of Washington in 2019 calls into question the control over how the human factor influences algorithm-based decisions (including whether they are final, questionable or reversible), whether decisions are for or against groups, or individuals, as well as control over data management, storage and security. At the same time, auditors will have to face their own professional reasoning with at least two major challenges posed by cognitive technologies:
- Trust - is induced by the lack of sufficient explanations on how AI systems work, which can disrupt the development of investment programs; thus, the lowest percentage of the above study on the adoption of Autonomous decision-making components is explained.
- Technological limitations - if in closed environments, the capabilities of algorithms have reached impressive levels, in the real world (open environments) there are still many challenges; moreover, the application of meta-learning (patterns, procedures) in completely different environments still has many shortcomings (Wang et al., 2018).
Beyond the professional skepticism, that is required in the area of financial accounting analysis, and the technological and financial challenges, AI opens, indisputably, a series of opportunities for auditing mainly by automating routine and repetitive operations, replacing the human factor with software-based entities, increasing the efficiency and effectiveness of the services provided.

Predictive analytics
This perspective in the performance of audit work is a result of the technologies presented above but which requires an increased attention as it can provide a real chance for the audit to regain reliability in substantiating organizational strategies on a medium / long term. Specifically, advanced data analysis technologies are involved to build predictive scenarios

by extracting the necessary information from an organization's system, processed by data analytics tools in order to identify models that align or not with anticipated trends. This gives deep insights on the client's business and financial risks.
Auditors access the client's data which they combine with those obtained from the market or the economic sector / industry in which he operates in order to obtain a complete picture of the state of business and the risks to which it is exposed, to indicate the probabilities of obtaining potential results. The processing is also fed with historical data of both the analyzed company and other similar entities or in comparable circumstances as well as other external data that are permanently analyzed (from various websites, databases, analyzes, studies, forecasts etc.). The information volume obtained is collected in the auditor's modeling software thus reaching a level of knowledge about the client's business that conducts to competent and substantiated opinions (Herron, 2018). It is a simplified presentation on a complex analytical process already used in audit firms that allows warning indicators to be obtained before the end of financial year.
The auditor becomes a permanent reliable partner of the client organization by having the role of "guardian" of the business with the help of predictive analytics tools; predictive auditing is outlined as an extension beyond traditional working tools and even continuous auditing. Real-time or frequent monitoring of an organization's transactions is completed by a generating predictive scenarios system able to warn over significant anomalies or deviations found in large data sets. The major challenge for the audit, beyond the regulated framework or the procedures for accessing the beneficiary's data, is given by the degree of structuring of the processed data and their support - physical or electronic (Kuenkaikaew and Vasarhely, 2013). The table no. 3 provides a comparison of the audit approaches discussed, with a focus on key aspects of the working missions:

Table no. 3. Audit approach

Area/Audit	Traditional audit	Continuous audit	Predictive audit
Control approach	Detective (Backward)	Ongoing	Preventive (Forward)
Objective	Support audit opinion on financial statements	Real time monitoring on financial indicators, transactions, accounts	Support beyond financial purposes; include but not limited to operational audit, compliance and control monitoring
Audit area	Financial statements at an account balance level	Financial indicators, accounts, sub-accounts, inventories	High risk areas in financial statements and operation processes at transaction levels
Frequency	Periodic	Continuous or close to the event or frequent	Continuous or close to the event or frequent
Measurement	Static	Static&Dynamic	Dynamic
Method	Manual (documents, confirmations, inventory accounts, statistics etc.) Automated(CAAT's)	Mainly automated (ERP, CRM, BI, CAAT's, Data mining, AI, Data Analytics etc.)	Automated (ERP, CRM, BI, CAAT's, Data mining, AI, Data Analytics etc.)

Source: Own projection on table available at: Kuenkaikaew, S. and Vasarhely, M.A., 2013. The Predictive Audit Framework. The International Journal of Digital Accounting Research, 13, p.37-71.

The reliability of the results provided by predictive tools depends very much on the quality of involved historical data. New and unforeseen events can create invalid results if not filtered properly. Human prejudices make their mark on the data sets chosen for processing, thus limiting the correctness of the scenarios generated. Although the potential of analytical systems is high, its models are limited, in addition to human understanding and judgment, by numerous other factors, including data storage and retrieval, processing power, algorithmic modeling hypotheses (Dickey et al., 2019).
On institutional level, the reactions to the proliferation of described digital tools are not long in coming. Thus, a working group was set up within IFAC - Data Analytics Working Group (DAWG) that is focused on monitoring ongoing developments in the efficient and appropriate use of technologies, including data analysis, in order to improve audit quality;
Within the same framework of the IAASB, the Technology Working Group (TWG) operates to assist professional auditors in understanding how automation tools and technologies can affect, during the audit engagement, audit documentation in accordance with audit standards - ISA 230. Thus, through documentation developed in April 2020, suggested procedures are detailed so as not to violate specific regulations by adopting intelligent data analysis tools and the reports generated by them (IAASB, Technology - Audit Documentation, April 2020).

Conclusions

With digital tools for intelligent data processing, the future for auditing is getting closer. The article captured recent evolutions of financial-accounting Data Analytics, and also "convulsions" captured on the institutional level responsible for regulating this field. Worldwide representative audit firms make sustained efforts to raise awareness of the factors involved (agencies, client companies, professionals) over the proliferation of smart digital technologies through various studies, research or reports and by adopting sophisticated audit tools.
Inevitably, the audit moves from traditional “post-mortem” methods of analyzing annual financial statements to real-time monitoring of transactions and the construction of key predictive scenarios for organizations. Professional opinions are formulated in real time and keep pace with the dynamics of new economic realities.

Acknowledgment

This paper was co-financed from the European Social Fund, through the Human Capital Operational Program 2014-2020
Priority Axis 6: Education and skills, O.S.6.13. - Increasing the number of university and non-university tertiary education graduates who find a job as a result of access to learning activities at a potential job / research / innovation, with a focus on potentially competitive economic sectors identified by SNC and areas of smart specialization according to SNCDI
Project title: "Development of entrepreneurial skills for doctoral and postdoctoral students in the field of economics" SMIS Code 2014+: 125015
Beneficiary: Bucharest Academy of Economic Studies, Partner P3: "Alexandru Ioan Cuza" University of Iași

References

Accorsi, R., 2011. Business Process as a Service: Changes for Remote Auditing. In: *Proceedings of IEEE 35th Annual Computer Software and Applications Conference Workshops.* Munich, Germany, 18-22 July 2011. New Jersey: IEEE. pp.398-403.

Byrnes, P., Criste, T., Stewart, T., Vasarhely, M., 2014. *Reimaging Auditing in a Wired World*, *White Paper.* New York: American Institute of Certified Public Accountants.

Chua, F., 2013. *Technology Trends: Their Impact on the Global Accountancy Profession,* [online] Accountancy Futures Academy, ACCA. Available at: <www.accaglobal.com/futures> [Accessed 24 April 2020].

Dickey, G., Blanke, S. and Seaton, L., 2019. Machine Learning in Auditing – Current and Future Applications. *CPA Journal,* [online]. Available at: <https://www.cpajournal.com/2019/06/19/machine-learning-in-auditing/> [Accessed 25 April 2020].

Donnan, S. and Leatherby, L., 2019. *Globalization Isn't Dying, It's Just Evolving,* [online] Available at: <https://www.bloomberg.com/graphics/2019-globalization/> [Accessed 23 April 2020].

Ernst&Young, 2020. *Global Forensic Data Analytics Survey 2018,* [online] Available at: <https://www.eycom.ch/en/Publications/20181203-Global-Forensic-Data-Analytics-Survey-2018/> [Accessed 28 Apr. 2020].

Forbes Insights, 2018. Three Technologies That Will Change the Face of Auditing, [online] Available at: <https://www.forbes.com/sites/insights-kpmg/2018/07/16/three-technologies-that-will-change-the-face-of-auditing/#1bbd05bd7544> [Accessed 24 April 2020]

Kamordzhanova, N. and Selezneva, A., 2019. The Impact of the Digital Economy on Accounting, Reporting and Audit. *Advances in Economics, Business and Management Research,* 79, pp.228-230.

KPMG, 2019. *AI Compliance in Control*. [pdf] Available at: <https://advisory.kpmg.us/content/dam/ advisory/en/pdfs/2019/ai-compliance-in-control.pdf> [Accessed 20 April 2020].

Kuenkaikaew, S. and Vasarhely, M.A., 2013. The Predictive Audit Framework. *The International Journal of Digital Accounting Research,* 13, pp.37-71.

Meuldijk, M., 2017. Impact of Digitization on the Audit Profession*. Audit Committee News – edition 58.* [pdf] Available at: <https://assets.kpmg/content/dam/kpmg/ch/pdf/ac-news-8-impact-digitization-en.pdf> [Accessed 19 February 2020].

Ramlukan, R., 2015. How Big Data and Analytics Are Transforming the Audit. *Financial Executives International Daily,* [online] Available at: <https://daily.financialexecutives.org/how-big-data-and-analytics-are-transforming-the-audit/> [Accessed 30 March 2020].

Wang, J.X., Kurth-Nelson, Z., Kumaran, D., Tirumala, D., Soyer, H., Leibo, J.Z., Hassabis, D. and Botvinick, M., 2018. Prefrontal cortex as a meta-reinforcement learning system. *Nature Neuroscience*, 21(6), pp.860–868.

World Economic Forum, 2020. Transforming Paradigms - A Global AI in Financial Services Survey. [pdf] Available at: <https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/innovation/ey-why-a-i-will-redefine-the-financial-services-industry-in-two-years.pdf> [Accessed 25 April 2020].

Wu, H. and Zhao, B., 2016. Overview of current techniques in remote data auditing. *Applied Mathematics and Nonlinear Sciences*, 1(1), pp.145–158.