

**Kaunas University of Technology**  
School of Economics and Business

# **Assessing the Influence of Artificial Intelligence on the Auditor Profession: A Qualitative Study**

Master's Final Degree Project

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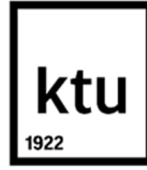
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**Kaunas, 2023**



**Kaunas University of Technology**  
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Master's Final Degree Project  
Accounting and Auditing (6211LX037)

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**Kaunas, 2023**



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## **Assessing the Influence of Artificial Intelligence on the Auditor Profession: A Qualitative Study**

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### **Summary**

Since the start of the Fourth industrial revolution, different types of digital technologies entered the business market and are perpetually changing its processes. Artificial Intelligence is considered one of the main digital technologies yet developed and due to its complexity, it is usually used with implementation of other digital technologies. Audit companies are not only starting to use digital technologies in everyday tasks but also investing in developing new prototypes, especially those using Artificial Intelligence. There are two main opinions regarding the usage of such t using such technologies between auditors: some are eager to learn new things and are looking forward to exploring innovations; others are afraid that such technologies can replace humans and eventually many of them will lose jobs.

Research object: Artificial Intelligence in the context of financial statements audit.

Aim of Research: To explore how Artificial Intelligence will impact the work of auditors.

The research strategy is qualitative. Ten experienced auditors from the top 4 audit companies in Lithuania participated in semi-structured interviews. Transcripts were analyzed using MAXQDA 2022 where all information was divided into groups and subgroups based on the selected topics (usage in audit, benefits, drawbacks, solutions to the problems, compliance with the laws and standards, reasons why Artificial Intelligence will not replace auditor and future skills for auditors).

Qualitative study results showed that Artificial Intelligence is already being used in the audit to some extent and all interviewed people know at least basic knowledge about AI and its capabilities and are aware of how it can be used in audit and what possible impact it can have. During the interviews, it was identified that AI can be used in all stages of audit – from planning to the conclusion: processing of initial information, risk assessment, document reading, relationship analysis, repetitive work, identification of unusual transactions, decision making, subsequent events analysis, work done documentation. The main benefits of using AI in audit processes would be efficiency, reduction of technical work, better quality of audits, independence assurance, and increased attractiveness of the profession. The main drawbacks are differences between audit forms, wrong information, uniqueness of audit, confidentiality, responsibility, compliance with laws and standards, excessive reliance, Information Technology (IT) limitations, and learning to use new tools. All respondents believe that AI will not replace auditors in the future however auditors will need to learn new skills such as basic IT knowledge, fast adaptation to changing processes and tools, and critical/analytical thinking in order to be competitive. Overall, the results of these interviews showed that Artificial Intelligence implementation into audit processes is inevitable it will change how audits are performed but will not change auditors' profession, however, audit companies need to thoroughly test applications in order to address all drawbacks and maximize all benefits to gain the best results.

Grigonytė, Gintarė. Dirbtinio intelekto įtakos auditoriaus profesijai vertinimas: kokybinis tyrimas. Magistro baigiamasis projektas / Doc. dr. Kristina Kundelienė; Kauno technologijos universitetas, Ekonomikos ir verslo fakultetas.

Studijų kryptis ir sritis (studijų krypčių grupė): Apskaita, Verslas ir viešoji vadyba.

Reikšminiai žodžiai: Dirbtinis intelektas, finansinių ataskaitų audytas, kokybinis tyrimas.

Kaunas, 2023. 66 puslapiai.

## **Santrauka**

Nuo ketvirtosios pramonės revoliucijos pradžios į verslo rinką įžengė įvairios skaitmeninės technologijos, kurios nuolat keičia joje vykstančius procesus. Dirbtinis intelektas laikomas viena iš pagrindinių vystomų skaitmeninių technologijų ir dėl savo sudėtingumo paprastai yra naudojamas kartu su kitomis skaitmeninėmis technologijomis. Audito įmonės ne tik pradeda naudoti skaitmenines technologijas kasdienėse užduotyse, bet ir investuoja į naujų prototipų, ypač naudojančių dirbtinį intelektą, kūrimą. Tarp auditorių vyrauja dvi pagrindinės nuomonės dėl tokių technologijų naudojimo: vieni noriai mokosi naujų dalykų ir nekantriai laukia naujovių, kiti bijo, kad tokios technologijos gali pakeisti žmones ir ilgainiui daugelis jų praras darbus.

Tyrimo objektas: Dirbtinis intelektas finansinių ataskaitų audito kontekste.

Tyrimo tikslas: Ištirti, kaip dirbtinis intelektas paveiks auditorių darbą.

Tyrimo strategija yra kokybinė. Dešimt patyrusių auditorių iš keturių didžiausių Lietuvos audito įmonių dalyvavo pusiau struktūrizuotuose interviu. Transkripcijos buvo analizuojamos naudojant MAXQDA 2022 programą, kurioje visa informacija buvo suskirstyta į grupes ir pogrupius pagal pasirinktas temas (panaudojimas audite, nauda, trūkumai, problemų sprendimai, įstatymų ir standartų laikymasis, priežastys, kodėl dirbtinis intelektas nepakeis auditoriaus, ir būsimi auditorių įgūdžiai).

Kokybinio tyrimo rezultatai parodė, kad dirbtinis intelektas tam tikru mastu jau naudojamas audito srityje ir visi apklaustieji turi bent jau pradines žinias apie dirbtinį intelektą ir jo galimybes bei žino, kaip jis gali būti naudojamas audite ir kokį galimą poveikį jam gali turėti. Interviu metu nustatyta, kad dirbtinis intelektas gali būti naudojamas visuose audito etapuose - nuo planavimo iki išvadų: pradinės informacijos apdorojimas, rizikos vertinimas, dokumentų skaitymas, tarpusavio ryšių analizė, pasikartojantis darbas, neįprastų sandorių nustatymas, sprendimų priėmimas, poataskaitinių įvykių analizė, atlikto darbo dokumentavimas. Pagrindinė dirbtinio intelekto naudojimo audito procesuose nauda būtų efektyvumas, techninio darbo mažinimas, geresnė audito kokybė, nepriklausomumo užtikrinimas ir didesnis profesijos patrauklumas. Pagrindiniai trūkumai - audito formų skirtumai, klaidinga informacija, audito unikalumas, konfidencialumas, atsakomybė, įstatymų ir standartų laikymasis, pernelyg didelis pasitikėjimas, informacinių technologijų (IT) apribojimai ir mokymasis naudotis naujomis priemonėmis. Visi respondentai mano, kad ateityje dirbtinis intelektas nepakeis auditorių, tačiau, norėdami būti konkurencingi, auditoriai turės išmokti naujų įgūdžių, pavyzdžiui, pagrindinių IT žinių, greitai prisitaikyti prie besikeičiančių procesų ir priemonių bei kritinio ir (arba) analitinio mąstymo. Apibendrinant, šių interviu rezultatai parodė, kad dirbtinio intelekto diegimas į audito procesus yra neišvengiamas, jis pakeis audito atlikimo būdą, bet nepakeis auditorių profesijos, tačiau audito įmonės turi kruopščiai išbandyti taikomąsias programas, kad pašalintų visus trūkumus ir maksimaliai išnaudotų visą naudą, siekdamos geriausių rezultatų.

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## **List of abbreviations and terms**

### **Abbreviations:**

Assoc. prof. – associate professor;

ACCA – The Association of Chartered Certified Accountants;

AI – Artificial Intelligence;

ATE – Anticipatory Technology Ethics;

ETICA – Emerging Information and Communication Technologies;

GDPR – General Data Protection Regulation;

IT – Information Technology;

ML – Machine Learning;

NLP – Nature Language Processing;

OCR – Optical Character Recognition;

Prof. – professor;

RL – Reinforcement Learning;

RPA – Robotic Process Automation.

## Introduction

Since the Forth Industrial Revolution start technologies improved immensely. Initially it was thought that all these innovations are far from usage and will be available only in the late future. However, it has already made and impact to everyday life as people tend to buy more smart appliances than selecting other similar old-fashioned products, especially when some of these smart products are sold at affordable price. There are also people who are unwilling to use digital innovations due to lack of knowledge or fear that technologies will overcome humanity. Similar situation could be seen in businesses as well, but they are concentrating more onto bigger technologies which need larger resources and more time. This suggests that only bigger companies can make such big investments.

If smart technology product could make some of the routine tasks easy, application of big, digitalized function could entirely change concept of work. Digital technologies could be applied to almost every profession or company however they need to measure all benefits and drawbacks to determine whether is it worth it for the company to start this process. Normally bigger companies would develop technology and then sell it to smaller companies.

Audit companies are not only starting to use digital technologies in everyday tasks but also are investing in developing new prototypes and especially the ones that are using Artificial Intelligence (later on - AI). There are two main opinions regarding the usage of such technologies between auditors: some are eager to learn new things and are looking forward to exploring innovations; others are afraid that such technologies can replace humans and eventually many of them will lose jobs. Therefore, it is important to understand the real impact of how Artificial Intelligence (including other digital technologies) could interfere with auditors' work and even replace them.

**Research object:** Artificial Intelligence in the context of financial statements audit.

**Research question:** How Artificial Intelligence will change the auditor profession?

**Aim of Research:** To explore how Artificial Intelligence will impact the work of auditors.

### **Objectives of Research:**

- 1) To analyze the scientific literature about Artificial Intelligence usage in the auditors profession and to identify opportunities and challenges.
- 2) To analyze the theoretical part of Artificial Intelligence risks and implementation in financial statements audit.
- 3) To prepare research design methodology on Artificial Intelligence's influence on the audit profession.
- 4) To analyze the results of qualitative research, to evaluate the importance of Artificial Intelligence to financial statements audit.

**Research method:** Systematization and analysis of scientific literature, semi-structured interview. The results of the interviews were processed using the MAXQDA application.

## **1. Problem analysis of the influence of Artificial Intelligence usage to audit profession**

Since the start of the Fourth industrial revolution, different types of digital technologies entered the business market and are perpetually changing its processes. Artificial Intelligence is considered one of the main digital technologies yet developed. Due to its complexity, it is usually used with the implementation of Robotic Process Automation (later on - RPA). By the nature and purpose these technologies should improve audit procedures and the whole process, however, companies are having mixed thoughts about its usage due to a number of reasons.

Bigim, Bonera, and Eriksson (2020) described AI as a valuable novelty to the business: its usage is not only a technology implementation but also a business capability. Artificial Intelligence is automating and optimizing processes which requires a lot of human attention, improving customer experience (in marketing), it is proving insights into decision-making, and reducing data theft.

As mentioned before AI is rarely used alone, tools are usually created with the help of some other digital technology. Shidaganti, Salil, Anand, and Jadhav (2021) AI use with RPA described as “[...] one can think of AI as the brain and RPA as the limbs”. The RPA part is to perform developed automated business operations with inputs of mathematical factors (economic, financial, commercial) and the AI part is to learn from collected information and provide results for a more complex task where critical thinking, reasoning, and logic are required.

Bakarich and O'Brien (2021) surveyed public accounting professionals (in the United States of America (later on USA)) about AI (specifically RPA and Machine Learning (later on - ML) implementation in a working environment. In total ninety respondents filled in quantitative and qualitative questions related to AI during the summer of 2019. The survey showed that almost none of the participants and their clients are using RPA or ML in their work and has almost minimal knowledge about it. The majority of the companies organize trainings about digital technologies, however, some qualitative responses indicated that usually, employees are not sure if those trainings or specific technology would be used in the future or company at all. It means that companies themselves are not properly creating plans for AI implementation and wasting their resources on trendy software and trainings without factual benefits. Other professionals had an opinion that public accounting is far behind in the usage of AI compared to how fast it is improving and developing. Results from the next questions showed that the majority of the participants believe that AI will have a huge impact on their daily responsibilities in the next 5 years, however few of them saw a correlation between the age of the management and usage of technologies, as they believe that younger colleagues will try to implement AI to processes more actively than the older ones. Also, some opinions are divided on how it will affect the accounting profession – one said that some processes will be fully automated but still will require human interaction, and another one stated that there will be some pushback from employees who are not very friendly with new technologies in general. Additionally, the survey showed that the size of the company has a huge impact on the level of knowledge about RPA and ML as the Big Four companies are organizing more trainings. However, it is not technically right to apply the results of a survey done in the USA to the population due to a few reasons: most Lithuanian companies have smaller budgets than worldwide corporations, also survey was performed in 2019 and since then results of AI usage could have changed rapidly.

According to Davenport and Ronanki (2018), all companies should start implementing Artificial Intelligence as soon as possible in order to achieve their goals and improve their cognitive

capabilities. Many companies are avoiding AI projects as they are too complex to create and sometimes end up with major complications or even failure. However, usually, the biggest mistake at the start is that companies do not have deep knowledge about Artificial Intelligence, what it is capable of with the help of other digital technologies, and are investing huge funds into ones which are not right for the job at hand. They need to gain a full understanding of their most important projects or processes and research what type of technologies could be integrated in order to achieve the results set and implement it into further usage in the company. Brigo, Hoy, Lamberton (2017) described a few issues arising from not properly implemented RPA projects. Firstly, it is very important to choose the right processes for which RPA could be applied as it is not very effective to use RPA on very complex ones. It is important to have proper process assessment as automation could be applied not for the full process but for part of it to reach the highest productivity. Another issue is not properly developed Information Technology (later on – IT) infrastructure, a wrongly chosen delivery methodology which would help to achieve the best results and avoid challenges with the outputs. Lastly, some companies lack the general understanding that there should be a reasonable number of trainings for employees in order to gain enough skills to create and maintain RPA processes. Also, there is a lack of understanding that RPA implementation itself will not create more efficiency or profitability as companies need to reassess all processes to create efficient processes.

Davenport and Ronanki (2018) made a survey of 250 executives who already are using some digital technologies and know their companies' goals to use Artificial Intelligence. Results showed a split in what management believes to be the main advantages of future AI usage in the company:

- 1) Enhancing existing products – 51%
- 2) To make more space for creativity by automating workers' tasks – 36%
- 3) Advancing internal processes – 36%
- 4) Improving decision-making – 35%
- 5) Creation of new products – 32%
- 6) Advancing external processes – 30%
- 7) Expanding into new markets – 25%
- 8) Identifying and applying scarce knowledge where needed – 25%
- 9) Minimizing workforce by implementing automation – 22%.

As described above primary expectations for Artificial Intelligence projects which would improve companies' processes includes many different spheres and in general are very promising, management also raises several thoughts about the main challenges which are faced nowadays while planning to implement AI. The same survey concluded what percentage of executives see the factors listed below as disadvantages of AI:

- 1) Difficulties implementing Artificial Intelligence projects on already existent processes and systems – 47%
- 2) High costs of implementation and consultations – 40%

- 3) Lack of knowledge by the management about technologies and their operating principles – 37%
- 4) Lack of employees with proper knowledge about technologies in general – 35%
- 5) Immaturity of technologies – 31%
- 6) Technology oversold in the market – 18%.

General Artificial Intelligence advantages and disadvantages for the company are a great representation of what should be considered in general before starting projects for AI implementation in business processes. However, each type of business has more individual considerations. Munoko, Brown-Liburd, and Vasarhelyi (2020) made a research on accounting firms' websites and collaborated with AI auditing software firms in order to summarize where AI could be used, its capabilities, challenges, and values at risk. The authors excluded main capabilities: efficiency increase, high amount of data coverage, larger samples, increased insight into data, automation of repetitive processes, prediction improvement, fast identification of errors, coverage of bigger amount, low-risk judgment assessment solely by AI and lastly it saves time and allows auditors to focus on more important or more critical thinking required task. The same survey also identified challenges risen from potential Artificial Intelligence usage in audit processes: propagation of human biases learned from data labeled by auditors, AI not equal to the human brain, not ability to work solely as incidents or inconsistencies need to be reviewed by a human, difficulties in using different format data and its quality, lack of privacy, trust and cybersecurity issues, the reasoning behind AI decision making can be hard to understand and in such case auditors could question its reliance.

Abu-Ghazaleh, Askary, and Tahat (2018) explored the reliability of accounting information which is important both for accounting and auditing professions. The main responsibility of the accountants is to provide reliable financial information to financial statement users while auditors need to evaluate if financial statements represent factual information and if that information is in accordance with relevant accounting standards. Information reliability could be improved with qualitative internal control systems and especially with integrated Artificial Intelligence. Mainly AI implementation would help to identify control deficiencies or weaknesses before bigger damages to the entity's activity or financial performance. Also, it should help with providing the best solutions based on the system, historical data and using automated analysis and robotic solutions in order to eliminate and fix problems as soon as possible.

Alisov et al (2022) agree that the implementation of digital technologies could have both positive and negative sides to the companies and its audit. Firstly, it could fasten the internal processes, improve lucidity and allow the identification of problems or violations in a timely manner. On the other hand, it could lead to inaccurate results (when algorithms are used) and confidentiality problems. However, they suggest that both of these problems could be solved by improving the level of knowledge of IT professionals especially when their competence increased worldwide in recent years due to the popularity of the profession. The solution for the second problem could be improving the level of cyber-security. Brown-Liburd, Munoko, and Vasarhelyi (2020) agree that in general constantly developed digital technologies raise many ethical concerns such as safety, non-maleficence, privacy, confidentiality, data protection, fairness, collection limitation, etc. Some of the issues could be resolved, however, some are still open. The author also raises a question of whether those ethical issues should be questioned now as it could slow down or stop the process of digital technologies

development which is very important both in the short-term and long-term perspective. The development of digital technologies, including AI, has much more advantages than disadvantages and it is more logical to develop and try to minimize drawbacks than stop the process (Bolvachev et al, 2021).

Zemankova (2019) explored more drawbacks of AI, particularly in audit and accounting. One of the biggest issues of AI development is the regulatory environment – many countries have already created standards or laws for cloud-based services. Especially Europe has one of the strictest restrictions creating bigger advantages for financial institutions as they have fewer restrictions on managing financial data and could use it in AI creation for certain tasks. However, there is still a huge requirement for General Data Protection Regulation (GDPR) which states that companies need an explanation for each algorithm decision, and it has to be audited as well. It may be seen as unnecessary in accounting however it is needed for AI used in other jobs such as medicine. However, it still creates issues in AI development and only companies with big budgets can afford it. Haenlein and Kaplan (2019) agree that states which such regulations are limiting AI development. As China is implementing AI in its social processes, some states of America are banning facial recognition technology and Europe is creating regulations that are stopping AI development and which could have a long-term impact on smaller and less-developed countries. Haenlein and Kaplan (2019) also highlighted issues with regulation – it needs updated regulations. But instead of regulating AI use or application, there should be set requirements for trainings and testing protocols of AI algorithms which could give warranty for its users. Additionally, there needs to be regulation in respect of employment which would help save or reduce to minimum loss of work positions in the future. As an example, the author suggests regulation on money saved from process automation to be invested in training people for new jobs which cannot be automated. Also, companies can extend work hours in order to create more work for employees.

Hirth and Tiberius (2019) performed a two-stage Delphi study in order to design a future scenario for the impact of digitalization on auditing in Germany. As this was the first Delphi study on this topic authors decided to choose an exploratory scenario and to cover several audit stages or aspects for projections creation rather than going into details. Overall, the survey results were split into 6 sections:

1) Changes in audit user perceptions:

- 41 percent of experts disagreed that automated processes will be more reliable than manual ones, however, authors considered that answer was highly impacted by the age of respondents as the majority of them were 41 years or older. 91 percent stated that human decision will be still more valuable than automated
- Whether auditors anticipate audit consumers to experience a growing expectation gap in relation to future-oriented risk statements is unknown as survey results were split almost in half.

2) Changes in the auditor-client relationship:

- 61 percent of respondents agree that increased use of automated procedures in auditing will decrease firms' costs by lowering manpower and it will rise more tensity between client and audit firms because audit fees likely will not be decreased. However other

respondents believe that automation of procedures will not be the reason for lowering the fees. Also, the majority of experts agreed that increased transparency will not rise more tension between clients and audit firms

- 82 percent of respondents disagreed with the statement that when companies will start to use public blockchain technology they will reconsider if additional certification is needed. The main reason was that there are some items in the financial statement that require individual judgment and blockchain technology has no impact.
- 3) Regulatory changes – the majority of experts agreed that in 5 years there still will be a big substantial regulatory gap between existing auditing standards and business digitalization due to Artificial Intelligence development.
  - 4) Structural changes for auditors:
    - 93 percent of experts agreed that automation will reduce routine tasks and workload in general as more time will be spent on topics which requires higher judgment. However, the majority of respondents disagreed that saved time will be used on IT compliance or cybersecurity consultations
    - Almost 75 percent of respondents disagreed with the statement that small and mid-size companies will probably not survive digitalization as it requires huge investments in technology infrastructure as they will not be able to afford it. They believe that a 5 – 10 years period is too small for such big changes.
  - 5) Procedural changes for auditors:
    - 78 percent of respondents agreed that based on current Artificial Intelligence capabilities in a 5 year period it will not be able to make decisions on complex tasks involving a high degree of expertise
    - 57% percent of experts agreed that Artificial Intelligence will allow auditing all transactions rather than selecting a random sample. However, 43 percent disagreed as they are not sure if a full audit has more advantages in a timely and expensive manner.
  - 6) Changes in the auditor’s professional profile – the majority of respondents said that in the future IT-orientated employees will not be more attractive to audit firms than auditors. They believe that there will be higher support from IT experts, but it will not significantly impact the need for audit specialists.

We gain a lot of information about advantages, disadvantages, and other opinions regarding the usage of Artificial Intelligence in audits. It is equally important to review the factual usage of AI. Digital technologies usage depends on the size of the company. It is widely known that the Big Four companies are investing the most in the development of AI and currently are using some of the already developed applications (Zhang et al, 2020):

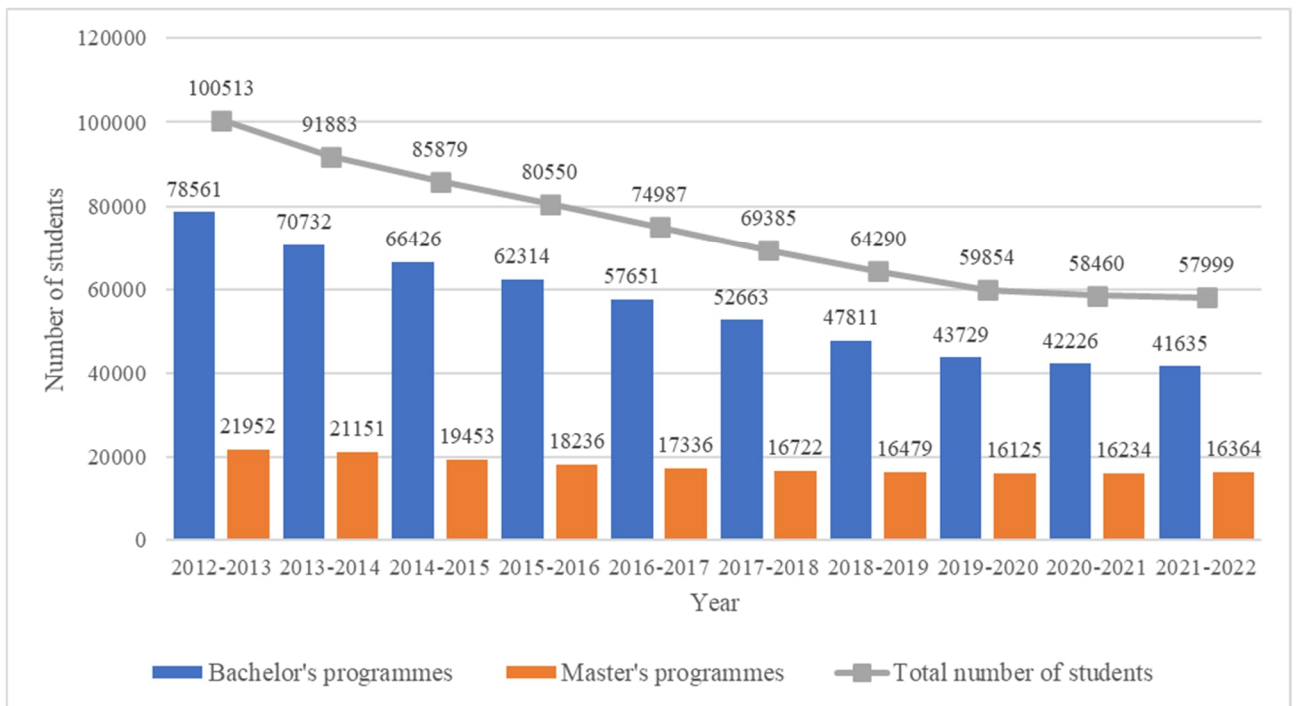
**Table 1.** AI applications implemented by Big 4 companies (prepared by the author based on Zhang et al, 2020)

<b>Deloitte</b>	<ul style="list-style-type: none"> <li>• With the help of RPA, it is currently using a robot based on cooperation with Kita Systems which is used for lease contract review</li> <li>• With McLaren Applied Technologies developed an application which test millions of scenarios in order to determine the best option for the tested process</li> </ul>
<b>PriceWaterhouseCoopers (PWC)</b>	<ul style="list-style-type: none"> <li>• K-analyzer - tax analytics used for large amounts of data</li> <li>• Tool used to extract information from the bank statements and perform required testing</li> </ul>
<b>Ernst &amp; Young (EY)</b>	<ul style="list-style-type: none"> <li>• Tools used to review lease contracts, updates, acquisitions</li> <li>• With the help of ML there is a tool that helps detect fraud</li> <li>• Drones with AI implementation are used in inventory counts</li> </ul>
<b>Klynveld Peat Marwick Goerdeler (KPMG)</b>	<ul style="list-style-type: none"> <li>• With the help of RPA they are using a tool for agreement reading, summarizing which learns from every work done</li> <li>• KPMG Ignite ecosystem which helps to further develop AI implementation</li> <li>• Other small applications for analytics</li> </ul>

However, those technologies are created globally and not all of them are applicable to Lithuanian branches. It shows that even if technology is already created and applied it does not mean that it will be used in every country. It only strengthens the statement that not all companies are able to afford AI development or implementation.

Artificial Intelligence is rather new, and the majority of the articles describe its theoretical impact on audits and procedures. There is not much practical research done worldwide which would show how it affects auditors as employees and the profession itself. There is one opinion that it could possibly replace auditors, however, there is also evidence that the demand for specialists is higher than the supply. The opposite side of Artificial Intelligence possibly replacing employees is that auditing and especially when Big 4 companies are taken into consideration requires higher education which in Lithuania could be reached only by finishing university studies. Lithuanian statistics show that in the period of the last ten years total number of students decreased by 42% (see Figure 1). It shows that the number of possible employees is decreasing significantly. Going further into the data, the number of people who finishes the bachelor’s program is decreasing more significantly than the ones who finish the master’s program: bachelor’s students decreased by 47% while master’s – by 25%. It shows that interest to reach higher education is dropping almost twice compared to 2012. There are various variables that are affecting such change: more strict requirements for university attendance, increasing the price of studies, and increasing opportunities to study abroad. However, with the vastness of the internet nowadays people are choosing to learn things by themselves and work in a more flexible environment or they are choosing freelance gigs which would not need commitment to study for several years or to work in a corporate environment.





**Figure 1.** Number of students by degree program in last 10 years (Lithuanian Official Statistics Portal)

The statistic above shows threats of lack of employee shortage in various markets including audit. B. Hastings (2022) wrote an article about what issues are being faced by auditors and accountants and one of them is talent retention and development. He states that it is getting hard to find people who would choose their career path in accounting and even fewer of them in auditing. The main reason is that now there is more choice in the job market – rather than choosing Big 4 companies’ people can choose other private entities with similar roles but lower working hours and workload in general. Now such corporations need to lower their standards and hire employees with lower education or with higher education in different studies. If this trend will keep its pace Artificial Intelligence could possibly be not a threat to the employment rate but it could save some sector’s work by fully replacing some employees.

During problem analysis various kinds of research about digital technologies in audit and accounting were analyzed, however, the majority of them are more orientated toward the accounting profession. There is a gap of knowledge in the literature of auditors’ opinions regarding the changes in auditing procedures and threats to the auditor profession. As of now research about Artificial Intelligence’s influence on the auditor profession was not performed. As AI is not yet widely used in Lithuania it would be valuable to gain an understanding of what auditors with high competencies think about AI implementation, and how it will affect their profession.

## 2. Theoretical aspects of influence of Artificial Intelligence on the auditor profession

### 2.1. Concept of audit of financial statements

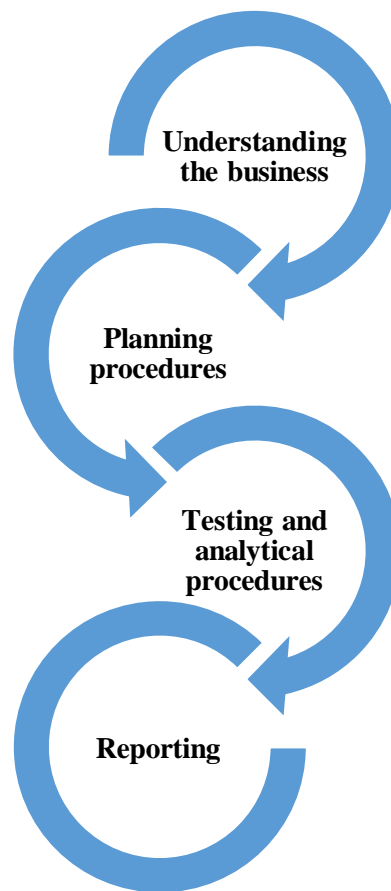
The audits are frequently seen as an efficient technique to guarantee adherence to and application of set policies. Usually, audits can be split into two types: internal and external. Companies conduct internal audits to assess and give unbiased assurance that their internal controls, corporate governance, and accounting procedures are working properly. They offer a reflective look at the way things are right now and examine what may be improved or what can be taken from bad situations. Internal audits contribute to implementing new procedures in the company, encourage accountability, and benefit senior management and stakeholders. Internal auditing frequently covers a wide range of business activities, including compliance, financial reporting, operations, and legal matters. However, in order for the company to be reliable for interested parties outside the company – it needs to conduct an external audit. External audits can be quite beneficial in removing any prejudice when examining the position of a company's finances. Financial audits look for any significant inaccuracies in the financial statements. Users of financial statements can be confident that the financials are accurate and full if the auditor's view is unqualified, or clean. Hence, external audits give stakeholders the information they need to make wiser judgments about the organization under audit. This research will concentrate on external audits of financial statements. Based on different sources its purpose can be defined differently (see **Error! Not a valid bookmark self-reference.**):

**Table 2.** Purpose of financial statements in the scientific literature (prepared by the author)

Author	Description
Appelbaum, Kogan, Vasarhelyi (2017)	The main purpose of the work conducted by an auditor in an external engagement is to obtain reasonable assurance that the client's financial statements are free from material misstatements and to subsequently express an opinion regarding these financial statements and the client's internal controls in the auditor's report.
Klarskov (2019)	Auditors hold an exclusive position within companies, serving as representatives of the public interest by keeping an eye on an organization's conformity with predetermined standards and providing reports on their findings.
Akbulut et al. (2018)	The primary objectives of an audit of entity financial statements are to enable the auditors to use their knowledge and expertise to determine whether the entity's financial statements have been prepared accurately based on the right accounting framework and to demonstrate to the owner or company that the management's integrity has been maintained.
Kewo, Afiah (2017)	The purpose of the audit is to increase consumer confidence in financial statements

To sum up, the purpose of a financial statements audit is to issue an opinion regarding the financial statements after obtaining assurance that the company's accounting and financial statements are free from material misstatements, in accordance with accounting standards and another regulatory framework. It helps to increase confidence for all users.

Financial audits can be divided into a number of phases, which are important to ensure a high-quality and efficient audit. Based on the literature review there are four main stages (see **Figure 2**):



**Figure 2.** Steps of the financial audit (prepared by the author)

The first stage is crucial for best audit strategy development as auditors need *to understand* what the business purpose of the client is, in which markets he is operating, what are the main risks in the market, who are the main competitors, what is generating the most revenue and other relevant information. With all this information auditor can have a full picture of the company's activity and can identify both inherent and other risks (Appelbaum, Kogan, Vasarhelyi, 2018; Knechel, Thomas, Driskill, 2020).

*The planning stage* should begin after gaining enough information about the client's business. Planning procedures consist of risk assessment procedures, audit strategy creation, and gathering an audit team. It affects not only the audit implementation but the outcome of the audit as well (Anugraheni, Setiawati, Trisnawati, 2022). Without the planning, audits would be performed with inconsistencies with audit objectives, standards, and local guidelines. The type and scope of planning stage procedures vary based on the fact if it is a first years' or recurring audit, the type, size, and complexity of the company, professional knowledge of the audit team, audit team experience with the company, and the alterations in circumstances that take place while audit work is being performed (Galvez, 2022).

One of the most important planning procedures is risk assessment. After determining the appropriate assertions to use for each of the accounts that could potentially be affected by significant risks, the next step is to assess the risk of material misstatements. According to the risk identified auditor must

plan relevant audit procedures, evaluate collected information and if needed change the audit strategy and obtain additional information. If risk assessment is done wrongly or is communicated not accurately between audit team members it can result in not accurate audit results and failure to modify opinion when it is needed to avoid potential misjudgment (Fukukawa, Mock, 2011).

According to Tirllea (2017) planning is a recurring process that begins after finishing last year's audit and ends after finishing the current year's audit. This stage is intended to address the most essential parts of the audit in order to:

1. Organize as smooth an audit as possible
2. Introduce the audit team with allocated tasks and train them if it is needed
3. Identify arising problems on time to minimize the damage
4. Provide solutions to arising problems as soon as possible
5. Make sure that the audit process is well managed and proceeds according to the standards
6. Make sure that work is reviewed on a timely basis throughout all audit process

After the planning stage audit team needs to perform testing and analytical procedures assigned in the audit strategy. Procedures are assigned based on the account, assertions, and risk identified in the general ledger. Procedures include gathering information required for the testing; preparing working papers where documentation of work done, testing, and conclusions are presented; reviewing of the working papers by higher audit team members and adjusting procedures based on the comments made; making conclusions. Apart from testing itself, the main benefit of conducting testing and analytical audit procedures is transparency which helps the reader to evaluate the properness and assurance of work done (De Kleijn, Van Leeuwen, 2018). Analytical procedures in some cases can be more valuable than substantive testing as they can help identify possible unusual relationships and material misstatements (Appelbaum, Kogan, Vasarhelyi, 2017).

Lastly, the key stage of the audit is reporting which mainly consists of preparing and issuing auditors' opinions on the financial statements. It is important for company stakeholders as it should disclose all critical findings made during the audit and gives assurance on financial statement reliability. It helps to make decisions about the future of the company or some investments. If there were no significant findings auditors should issue an unmodified opinion, however, in case there were any critical misstatements identified – qualified, adverse, or disclaimer opinion could be issued. Auditors issue audit opinions in order to communicate the results of the risk assessment of financial statements (Fang et al, 2018).

To sum up, an external financial audit is important for a company's stakeholders because it provides insight into the company's reliability of the financial statements. The audit process is usually divided into 4 segments: understanding the business, planning, testing and analytical procedures, and reporting stage. Each step is crucial to assure that the audit was performed correctly and that all important accounts and risks were identified and tested.

## 2.2. Concept and types of Artificial Intelligence

The term Artificial Intelligence could be traced back to 1955 when McCarthy released a proposal for the Dartmouth Summer Research Project on Artificial Intelligence where a small group of scientists participated in the conference. They intended to study how machines could implement the language, use other human metrics, solve problems, and create solutions (McCarthy, Minsky, and Rochester, 1955). After this conference, AI started to get more interest from other people, companies, and even governments and that's why its development started to emerge. The first business application was introduced only in 1980 and used widely in different markets. Edward Feigenbaum created systems which were able to copy a process of making a decision by learning from experts in virtual situations and then providing solutions to other people (Massis, 2018).

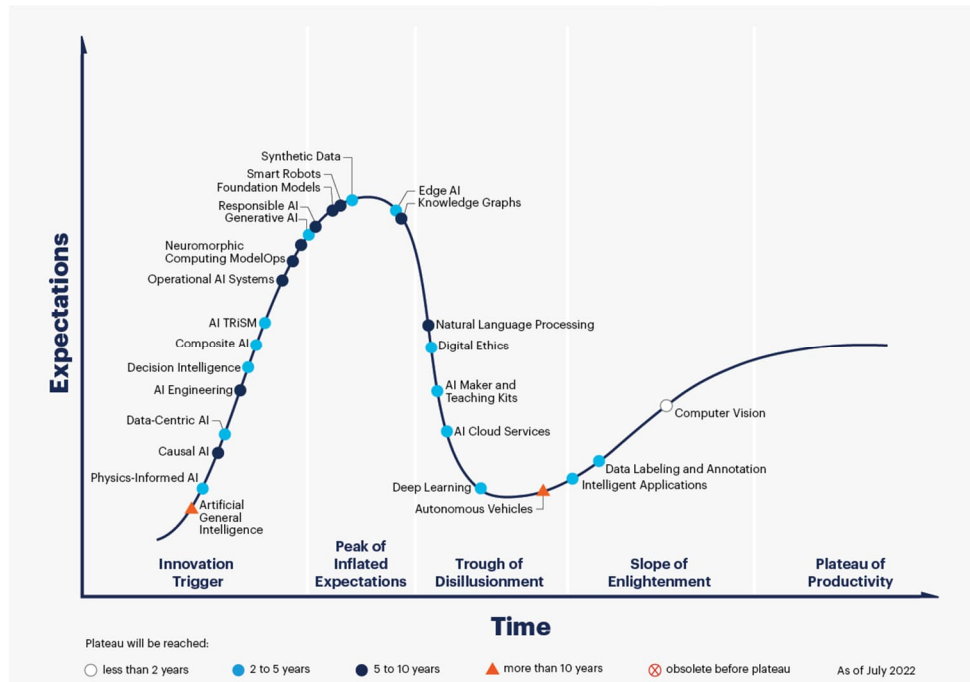
Nowadays, Artificial Intelligence is important for society, it will eventually change the way people are processing and working in different industries. The term itself can be heard on a daily basis everywhere starting from television to social media. There are many variations of its definition and interpretations (refer to Table 3):

**Table 3.** Definitions of Artificial Intelligence in the scientific literature (prepared by the author)

Author	Description
Haenlein, Kaplan (2019)	Artificial Intelligence is a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation.
AlSheibani, Cheung, Messom (2018)	Artificial Intelligence is described as robots that can think like humans, reason, and make judgments and in general can be called human-level AI.
Brown-Liburd, Munoko, Vasarhelyi (2020)	Artificial Intelligence is a technology that may be trained to mimic human reasoning and cognitive abilities and be made to recognize signals from its surroundings. AI systems can evaluate risks to decide, predict, or act based on these cues. Instead of being explicitly designed by a person, AI systems "learn" from data and can change over time because of exposure to fresh data.
Abu-Ghazaleh, Askary, Tahat (2018)	Artificial Intelligence is a combination of hardware and software that can handle complicated business problems by using reasoning, learning, elucidation, and pattern recognition just like a human expert. Artificial Intelligence applies machine intelligence rather than human intellect and uses expert systems in place of experts.
Hirth, Tiberius (2019)	Artificial Intelligence is meant to do tasks based on how people absorb information, like pattern detection, learning, and planning.
Yigitbasioglu, Moll (2019)	Artificial Intelligence refers to a set of computational techniques to solve problems and complement decision-making.

Arrieta, Diaz-Rodriguez, Del Ser, Bennetot, Tabik, Barbado, ... Herrera (2020)	Artificial Intelligence systems are achieving unprecedented levels of performance when learning to solve increasingly complex computational tasks, making them pivotal for the future development of the human society
Zhang, Xiong, Xie, Fan, Gu (2020)	Artificial Intelligence is the result of successful implementations of big data and Machine Learning technologies to comprehend the past and forecast the future based on vast amounts of data.
Odoh, Echefu, Ugwuanyi Chukwuani (2018)	Artificial Intelligence is defined as a program that has the capacity of software to perform tasks that are typically performed only by the human brain. The capacity for knowledge and the ability to acquire it is among these activities. It also includes the capacity for judgment, relational comprehension, and unique cognition.

To conclude the table of definitions provided by different authors, AI could be described best as a technology which is used with the implementation of other digital technologies in order to perform tasks, evaluate risks, solve problems, compute decisions, and in some cases replace manpower. As there are many different types of AI changes in understanding its concept are normal. Information technology (IT) research and consultancy company, Gartner, has developed the graph of the Hype Cycle which represents 5 stages an innovative technology goes through from conception to maturity and widespread adoption: innovation trigger, the peak of inflated expectations, trough of disillusionment, the slope of enlightenment and plateau of productivity (for cycle please refer to Figure 3).

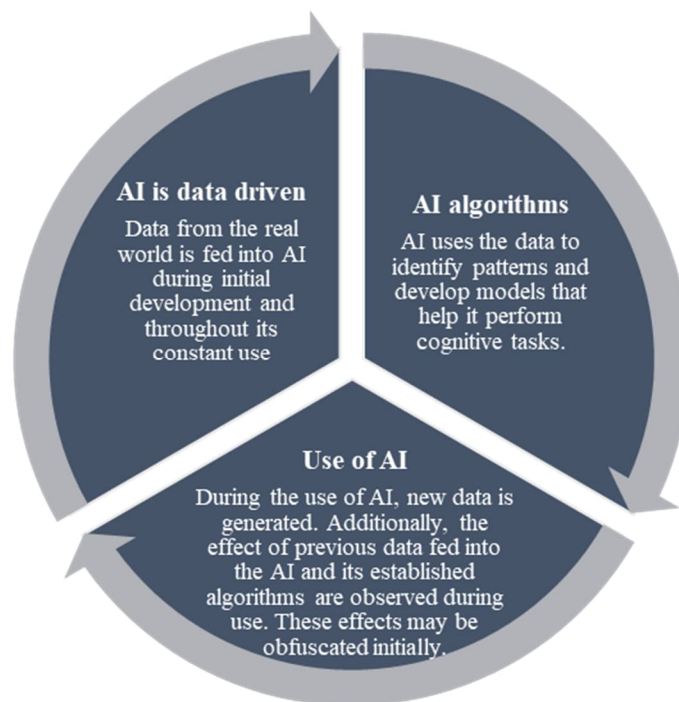


**Figure 3.** Hype Cycle for Artificial Intelligence (Gartner, 2022)

The Gartner Hype Cycle technique provides a reliable source of information by allowing you to see how a technology or application will develop over time. Each stage of the cycle can be described as:

- 1) Innovation Trigger: a technology is conceptualized at this level. Prototypes may exist, but practical goods and market research are frequently absent. The possibility sparks curiosity in the media and occasionally proof-of-concept tests.
- 2) Peak of inflated expectations: technology is usually implemented by younger users as in some cases they do not evaluate enough if the capabilities of technology meet the expectations.
- 3) Trough of disillusionment: this stage is for technologies for which interest decreased due to slow results or results not in line with the goals.
- 4) Slope of enlightenment: when the capability of technology becomes well acknowledged more businesses start on implementing or testing it in their environment. In some cases, even new versions of already existing products are created.
- 5) Plateau of productivity: in this stage, technologies are implemented in many businesses and their market position and application are well-known publicly. In order to evaluate technology providers, standards are developed.

Artificial Intelligence has changed through the years and especially since the first prototypes called expert systems. Previously for systems to work people needed to input specific data, rules, and facts, nowadays systems are capable to analyze input data autonomously. They are using historical data to learn from it and form algorithms which will perform descriptive and predictive tasks. In previous years outcomes were based on human actions and now it cannot always be traced to humans as AI is capable to develop to some extent by itself. Therefore, it can be stated that AI is working both based on data and intelligence aspects (Brown-Liburud, Munoko, Vasarhelyi, 2019). For visual representation please refer to Figure 4.



**Figure 4.** The data-driven and intelligence aspects of AI Technology (Brown-Liburud, Munoko, Vasarhelyi, 2019)

Firstly, as Artificial Intelligence started to use data it created ethical and social concerns about how it is impacting humans – the system could take sensitive or personal information, copy its activities and trends without human realization. Secondly, algorithm creation itself has questions about how AI is capable to develop processes as they are usually complex and hard to retrieve. It concerns its ability to overcome the human brain in the future. Lastly, according to Brown-Liburd, Munoko, and Vasarhelyi (2019) usage of Artificial Intelligence can be split into three artifacts: assisted AI, augmented AI, and autonomous AI.

**Assisted Artificial Intelligence** is considered to be the simplest. It is mainly used to automate straightforward procedures and processes by using the strengths of Big Data and other data sciences to support decision-making. A further advantage is that it frees humans to perform more complex jobs by giving up more monotonous ones. Assisted intelligence only functions with inputs and outputs that are well-defined and require ongoing human input and involvement. While assisted intelligence can notify a human about a problem, it leaves the final choice in the hands of end users because the major objective of supported intelligence is to improve things people and organizations are currently doing. The exception would be in situations where a clearly stated predefined action has been established (Zhang et al, 2020).

**Augmented Artificial Intelligence** is more about assisting functions of technologies rather than repeating repetitive tasks. The goal of this cognitive technology is to assist human intelligence rather than to replace it and in general usually Machine Learning abilities are added on top of current systems to improve human potential. Instead of imitating independent intelligence, enhanced intelligence supports human judgments to enable organizations and individuals to do things they otherwise could not. Machine Learning, natural language processing, image recognition, and neural networks are some of the models covered by this category. In contrast to assisted intelligence, which can only discover patterns and implement planned answers, augmented intelligence can mix current data and knowledge to create new solutions (Liew, 2018).

**Autonomous Artificial Intelligence** is the most complex type of AI in which procedures are automated to produce the intelligence that without any human interactions enables computers, bots, and systems to behave independently. The idea is that for AI to develop to its best capabilities, just like humans, it needs autonomy. Although there are more uses for autonomous intelligence, businesses may never be prepared to give machines complete control. In addition, not all applications, especially those where it is challenging to quantify the optimum result are a good fit for autonomous intelligence. AI can work as an automated advisor in these circumstances, with humans still in charge of accepting and putting into practice any choices made by the technology (Bryson and Winfield, 2017).

Artificial Intelligence is widely used with other digital technologies. The main reason is that different technologies implemented together complement each other and it helps Artificial Intelligence integration in businesses. One of the main tools is Robotic Process Automation (RPA). Artificial Intelligence and Robotic Process Automation are very different systems: while AI is process-driven, RPA is data-driven. Looking from one perspective process-driven tools are more attractive in current markets, however, there is still a need for data-driven problem solutions. Therefore, it is clear that in the near future, AI will not replace RPA (Gotthardt et al, 2020). Robotic Process Automation is usually used for standardized and repetitive tasks in order to save time, however, it is not capable to understand handwriting, scanned documents, or including judgment in work performed. That is where



Artificial Intelligence steps in. Both AI and RPA could be used separately but using these tools together can increase the value of each other as with their help RPA could make some level of decision-making while performing time-consuming, technical work (Perrier, 2018).

There are a few other tools which can be used together with Artificial Intelligence and is usually considered part of AI:

- 1) Optical Character Recognition (OCR). The system itself is capable to recognize text in every format and to extract it from images with the help of neural networks and the ability of Machine Learning. It is usually embedded into Artificial Intelligence technologies in order to eliminate human interaction as much as possible (Lee and Tajudeen, 2020).
- 2) Nature Language Processing (NLP) and natural language generation (NLG). While NLP is used for analyzing text and data with the help of learned algorithms, NLG is used for generating formatted text from structured data. AI usage with both of those tools can help with the generation of analysis reports (Gotthardt et al, 2020).
- 3) Machine Learning (ML). ML differs from AI as it can develop intelligence for a computer system when Artificial Intelligence is capable of mimicking human thoughts and actions. Together these tools allow systems to develop more precise outcomes without being programmed to do it (Kibria et al, 2018).

In general, Artificial Intelligence has developed a lot since its discovery in the 1950s. It has many different types and stages, however not all of them are giving the expected results due to limitations or lost interest from the public or financing. To extend its abilities AI started to use the implementation of other tools or technologies which in general help to develop autonomous systems that can be used in various markets.

### **2.3. Artificial Intelligence integration into audit procedures**

As audit contains a lot of mechanic and monotonous tasks it makes the implementation of Artificial Intelligence very suitable. Especially it is very advantageous in time-consuming tasks where rules-based processes are applied. The first AI exploration in the audit was performed by Borthick and West. They created an expert system which could be used in determining the size of materiality, evaluation of provisions, and internal control level. Creators believed that it would increase audit effectiveness and efficiency, however, it was later discovered it had more impact on effectiveness, expertise, and education (Zemankova, 2019).

Zemankova (2019) also distinguished 4 types of Artificial Intelligence and how it is or could be used in audit processes:

- 1) Fuzzy systems. The main idea of these systems is that they only allow materiality assessment using a continuous scale rather than binary.
- 2) Neutral networks. Usually, neutral networks are implemented into risk assessment procedures. They are able to understand, generalize, and classify both complete and partial data. Additionally, it could be used for fraud, bankruptcy detection, and developing going concern decisions.

- 3) Genetic algorithms. Mainly such algorithms are used for bankruptcy detection but also it could help with assurance of proper time and recourses used during some audit processes.
- 4) Hybrid systems. It consists of a mixture of any procedures mentioned before and is usually needed for more complex assessments when both quantitative and qualitative research should be performed.

Baldwin, Brown, and Trinke (2006) discussed various audit processes where digital technologies could be applied. The most important ones are listed below:

- 1) Materiality assessment. There are existing expert systems which could help to determine materiality levels and bases and it would help to fasten the planning stage of audits.
- 2) Classification. There is an issue in audit with determining whether some accounts should be classified as assets or as liabilities, what type of debt they should be accounted under if certain transaction is legal or maybe it is a sign of fraud. The author suggests that genetic algorithms could be used to solve this issue.
- 3) Going concern valuation and decision making. An auditor delivers a going-concern uncertainty decision when the client is in the possibility of failing or otherwise faces a threat to its continuity. The usage of decision models can be advantageous for this unstructured audit activity. Decision-making frequently combines qualitative judgment with quantitative analysis.
- 4) Analytical review procedures. Auditors carry out analytical review techniques in order to gather audit evidence. They have the ability to use a variety of methods.
- 5) Bankruptcy prediction. There are already several models of Artificial Intelligence which could help to create predictions for bankruptcy (neural networks, genetic programming, and classification trees).
- 6) Risk assessment. Usually, risk assessments need qualitative and quantitative analysis and identification of variations and deviations. Certain models created using both neural networks and expert systems could help with assessing the risk of different accounts.

Rozario, Vasarhelyi, and Zhang (2019) examined automation possibilities in audits using Robotic Process Automation. They agreed that nowadays when automation in audit is mentioned it is only talked about how certain digital technologies could ease or fasten up standard procedures such as digitalization and management of working papers or performing regression analysis using statistical software. However, as the majority of more complex audit procedures are combinations of inputs converted into outputs for process automation it needs to go beyond standardized tasks. The authors excluded two RPA projects for external audits. The first one is for risk assessment procedures where the RPA prototype was created utilizing the revised and further standardized audit methods, which typically involve filling out a planning worksheet with data obtained through a number of straightforward analytical techniques and the auditor's expert opinion. The first module was for data standardization where data provided by the client was changed into a standard format which could be read by machines using Python software. The second module is for generating a summarized worksheet which would be created based on a list of repetitive tasks which are performed with the auditor's judgment. The last module is for taking the required data from the summarized sheet to the

planning worksheet. All of the modules are connected and performed with the help of a Robotic Process Automation tool. The second project is for the revenue test of details. Using RPA full testing was performed starting from collecting evidence from separate locations and converting it into a readable format to matching preprogrammed details between invoices and shipping documents. The authors say that the revenue test of the transaction process could be changed in order to perform other account testing, such as cash, internal controls, and pension plans.

Joshi (2021) discussed possible Artificial Intelligence usage in audits starting from the pre-planning to reporting phase: AI could be used in preparing initial information, estimating budget hours, calculating materialities and fees, analyzing information provided by clients, identifying inconsistencies in controls, doing substantive testing and forming opinion or audit report. The author also discussed more detailed procedures and the possibility of them do be done by Artificial Intelligence in the future (see Table 4). There are six tasks in total which according to Joshi could be fully done by AI. Artificial Intelligence is capable to process big amounts of data in a short period of time, thus companies' general ledger entries could be checked and authorized independently. With the help of AI patterns of fraudulent activity or unusual items could be detected more efficiently. Other important procedures are verification of transactions and records, contracts evaluation, and usage of visualization and patterns which with implemented AI and other digital technologies could be done without human interference. However, there were some tasks which according to the author could be done only partially and requires human help – five in total. Artificial Intelligence can form or adjust existing expenses policy but for inputting different kinds of information from various sources people would still be needed. Also, AI can collect objective-based evidence and alert on the weaknesses but will not be able to evaluate and identify potential risks. AI can be used in examining complete populations rather than testing selected samples. Lastly, Artificial Intelligence could be implemented into the security of applications, files, or other digital information, however, will need bigger storage and can possibly slow it down.

**Table 4.** Possible tasks and activities affected by AI in auditing (modiefed from Joshi, 2021)

<b>Audit tasks and functions</b>	<b>To be replaced by AI?</b>
Checking debits and credits, authorizations, and manual work	Yes
Enforce a company's expense policy.	Partially
Objective-based audit evidence	Partially
More efficient at fraud detection	Yes
The extra layer of protection	Partially
Examining the complete population instead of sample selection for evidence gathering.	Partially
Verification of transactions and records	Yes
Contract evaluation	Yes
Identification of high-risk areas as part of the auditing process and alerts on key control weaknesses	Partially
Collects and analyses Big Data (exogenous)	Yes

Use visualization and patterns	Yes
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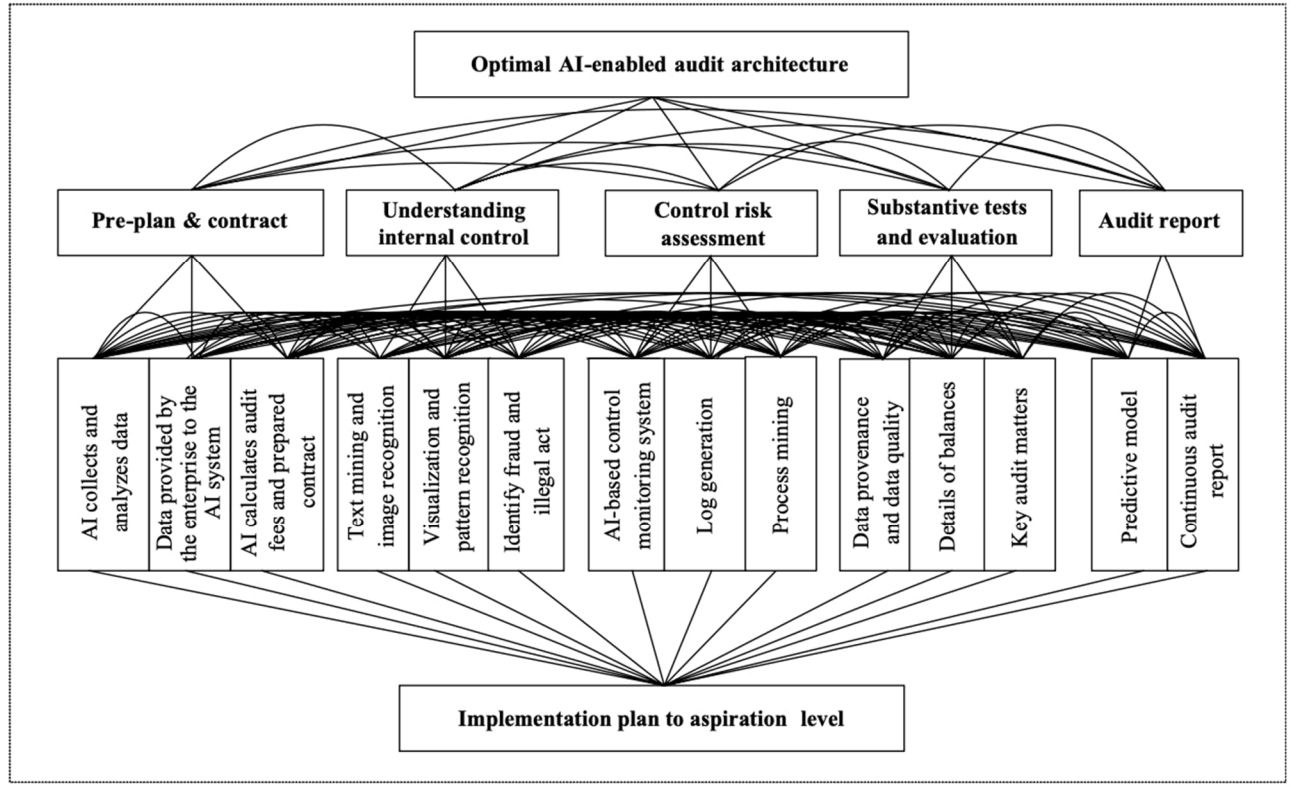
Brown-Liburd, Munoko, and Vaserhelyi (2020) studied Artificial Intelligence dividing it into 3 types already discussed before augmented AI, autonomous AI, and assisted AI. The authors excluded separate phases of an audit in which one or a few of the AI types could be used in (see Table 5).

**Table 5.** Usage of Artificial Intelligence by type in audit procedures (prepared based on Brown-Liburd, Munoko, and Vaserhelyi (2020) research)

Artificial Intelligence type	Type of procedure
Augmented	Risk assessment; selecting transactions for testing; analytics
Autonomous	Monitoring client’s internal controls; substituting auditors’ judgment
Mixed	Preparing audit working papers; testing transactions; evaluating controls; going concern evaluation

Based on the table above conclusion could be made that processes performed using augmented AI are mostly task-based or data-based where judgmental thinking is not required. While autonomous AI could be used in processes where auditors’ judgment is needed, and human interaction is minimal. Mixed Artificial Intelligence is used on the most complex tasks where both quantitative and qualitative analysis is required in order to fully eliminate the human resources needed in these tasks.

Hu et al (2021) discussed that enabled Artificial Intelligence could be applied to several procedures which can be separated into 5 stages: pre-plan and contract, understanding internal controls, control risk assessment, substantive tests, and evaluations, and lastly audit report. The authors systemized how AI could be used in each stage and created a relationship scheme (see Figure 5 **Figure 5**).



**Figure 5.** Analytic architecture of AI-enabled auditing mutual influence relationship (Hu et al, 2021)

The first part of the process is pre-plan and contract which simply consists of gaining information from the clients. Before starting an audit, the audit company needs to check the information provided by the client to ensure its precision and compliance. After personnel inputs data into the software AI jobs would be to collect it, change it into a readable format, and analyze it. One of the benefits would be that AI based on information received would be able to determine the size of the fee and formulate a contract which later would be sent to the client for sign-off.

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The second stage is understanding the internal controls system which is important for reducing business risk and even adding value to it. Authors considered that text mining and image recognition could be used to extract important information from documents provided. It could help to identify fraudulent or strange activity which is not that seeable during statistical analysis.

The majority of audit procedures need constant control risk assessment, and it is highly related to the client's internal controls and if they are effective. Firstly, Artificial Intelligence could be used in forming internal control monitoring system which would identify inconsistencies. Log generation may be implemented to avoid tampering with audit evidence. It would not only show persons who are using information but also would permit evidence usage to some extent or for some employees. Process mining also is very important as companies are using huge amounts of data, it could help to determine if there are any inconsistencies between client's operations and design processes.

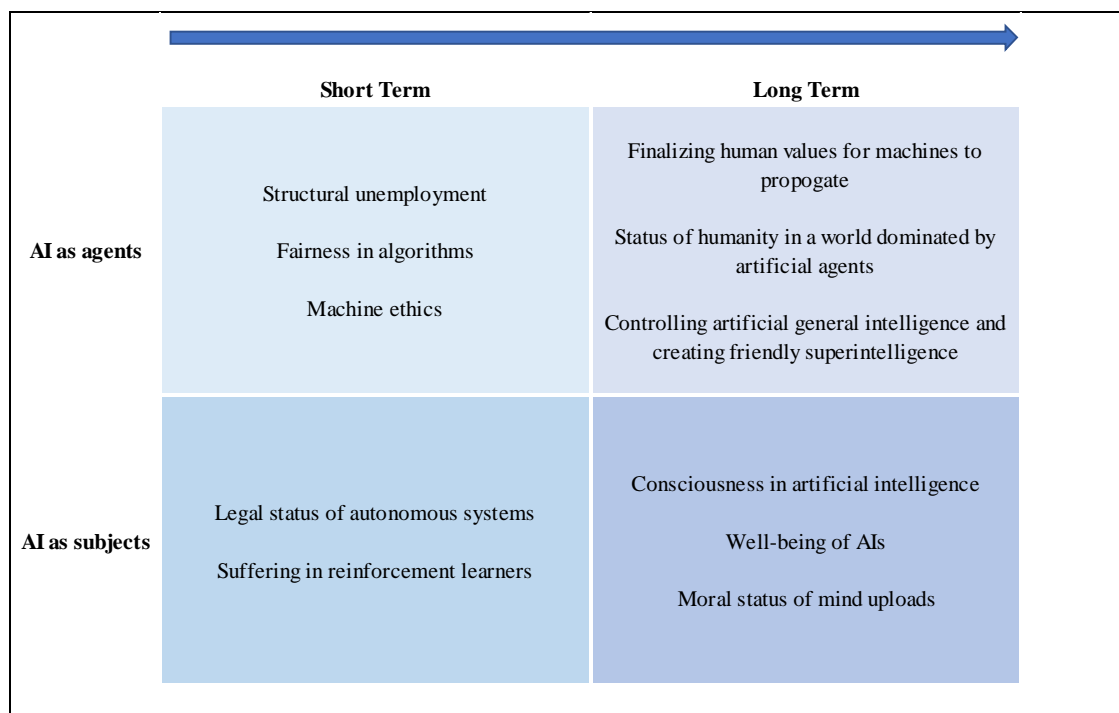
To make sure if company's financial data is viable substantive tests and evaluations should be performed on all account balances. There is a lack of understanding about the origins and condition of provided data by the client when AI is not used in the process. AI could not only provide assurance for data reliability but also can do such reviews on a continuous basis which would improve audit results in general. Artificial Intelligence could also be helpful in testing details of balances and identifying amounts or transactions which need more attention or additional testing such as obtaining confirmations from third parties. Lastly, AI can help with summarizing the information provided in financial statements which should be communicated according to auditor reporting standards in order to help financial statement users to identify important information when the amount of information provided is hard to assess quickly.

The last stage in the audit process is the audit report. In order to construct and develop a prediction model as a decision-support framework for the efficient functioning of the audit process, CPA firms have developed AI-enabled auditing methodologies. The risk assessment associated with ongoing client operations may be anticipated by auditors through the use of continuous tests using various models. The main job of the prediction model is to carry out audit risk prediction, which entails assessing the model's performance, predicting a risk category, and predicting fraud. When an AI-enabled auditing technique is fully implemented, CPA firms provide a corporation with a continuous audit report called a verdict that includes information on all the findings in the last phase.

## 2.4. Ethical issues of implementing Artificial Intelligence

Artificial Intelligence can be used alone or with the implementation of other technologies in various audit procedures, however, as with everything else it comes with certain negative aspects. Accounting and auditing have separate global or local standards along with each country's legislation system. It helps not only to regulate the properness of the procedures but also helps to avoid or detect fraudulent activity. As AI is considered to be quite new and constantly developing technology there is a lack of regulations on how it should be used in the audit or accounting processes, what limitations should be applied and in general, there is a limited regulatory framework as of now. It is important to have Artificial Intelligence regulations as from a business perspective it gives better assurance for the quality of financial statements.

By nature, Artificial Intelligence is set to work independently without human interference. It raises many concerns on how it would not take into consideration feelings, critical thinking about the well-being of people, and making decisions without thinking as a human in general. Based on various sources map of AI ethical issues was prepared by dividing raised issues into short and long terms and if it came from Artificial Intelligence as a tool and as a subject, map please refer to Figure 6 below.



**Figure 6.** The map of Artificial Intelligence ethical issues (modified by author using Hpluspedia information)

Nehme (2018) raised concerns about short-term issues which will arise from Artificial Intelligence applications. First and one of the most important ones is that it will have an impact on employment despite the market it will be used in. The author states that employment issues in general will affect each country differently based on its birth rate – countries with a high rate will suffer the most. As of now, AI is not yet developed to the extent where it can replace human employees completely, however, it is automating procedures and as a result, it requires less human interference, and some employees are being laid off. The main goal of businesses usually is to minimize costs and maximize profits and most executives will not take into consideration people's lives and will choose Artificial

Intelligence as a replacement. The second concern is bias in AI systems. The main issue is that algorithms in AI are usually designed with the implementation of Machine Learning and it relies on the correlation between different variables, however, in the majority of cases the correlation between those variables is affected by a third factor. As an example, the application can find a connection between heat and the number of bought vacations to the sea, however, high temperature itself does not make people buy trips, there are other things which affects this decision such as financial situation, jobs, etc. Humans can understand this but machines cannot think this deeply yet, therefore in some cases decisions made by AI can be biased. The last short-term issue is machine ethics. The goal of AI usage is that it could make decisions without any or with minimal human involvement, however, at the same time it scares people how it can be done without having any feelings. It mostly applies to AI which decisions involve people's lives such as employment, insurance, health care and etc. Artificial Intelligence does not understand how any decision could have an impact on the person or employee yet.

Long-term issues are formed based on the short ones. The issue with Artificial Intelligence without feelings or values is highly discussed and it forms the goal for future developments to create AI which would take into consideration human values. However, it is complicated not only from a development perspective. Conn (2017) stated that it is hard to determine which values are right or wrong and which have to be implemented into the principles of Artificial Intelligence performance. As it is hard for humans in general to find a compromise on proper values it is important to have a discussion about this topic at least on the AI application level. The second issue is concern about what humanity will look like in the future where Artificial Intelligence will be responsible for a high amount of processes and decision-making. AI will impact human lives from various perspectives starting from lower in workspaces, and changing job profiles in general Artificial Intelligence will be used in the majority of activities and people will face it daily (Marr, 2020). Another highly discussed problem is that AI can learn not only from data but from itself as well and that finally, it will become a better decision-maker than humans. Therefore, there is a need to control Artificial Intelligence by creating super-intelligent AI which will not harm human lives in the future. Choi (2021) suggests a few ways that would help to avoid control problems: firstly, AI should be cut off from internet usage and secondly, AI should be implemented with values in the best interest of humanity. However, the first suggestion can slow down AI development as the internet is the biggest base for learning.

As mentioned before there is a gap in legislation of Artificial Intelligence. In 2017 European Parliament issued the Resolution on the Civil Law Rules on Robotics in order to encourage both the development and usage of AI. It mostly concentrates on defining different types of AI, their abilities, and what support is needed. Also, it touches on the importance of the Artificial Intelligence legislation system and its absence. The resolution proposes possible legal solutions: in case there are some damages from procedures performed by autonomous applications, robots should have legal statuses and it would help to define what is responsible for the damages made; there should be insurance coverage on robotic applications which would help companies to avoid potential damages as well; lastly, there is a proposal to create general or individual funds for AI to fasten its development. Apart from this resolution, there is no other official legislation which would determine the limits of Artificial Intelligence and it increases distrust. Another short-term AI ethical issue is Reinforcement Learning (RL). Its concept is to learn from the environment to maximize the result, however, its main driver is to get a reward or penalty for the best results. There is a concern that due to self-learning ability RL will learn to get the maximum reward without actually completing the tasks required.

Therefore the process of controlling Reinforcement Learning is hard and the issue is still open (Joby, 2021).

The first long-term Artificial Intelligence ethical issue is lack of consciousness. It is hard to describe consciousness in the human world because it is a common thing in everyday life which is not taught but comes from instincts. Therefore, it is even harder to achieve that machines or robots would have consciousness or would act in a way that results would be impacted by the morals of consciousness (Wah and Chi, 2020). One of the ways to make robots think as close to humans as possible is called “mind uploading“. The method has an almost straightforward meaning – it would need the human brain and it would scan the salient features, map it and transfer it to a robot or other device. However, there is a moral issue regarding this method as it would copy the human brain and also would make robots even more similar to the human being which raises concern if robots will not overcome people in the future. Also, another issue is that it requires a real organ which is not morally supported by everyone as it is most likely that it will not survive the process. As of now, there is no information that this process is possible to perform at all, therefore it is attributed to long-term ethical issues which will arise at some point in the future (Haggstrom, 2021).

Munoko, Brown-Liburd, and Vasarhelyi (2020) raised ethical questions about using Artificial Intelligence in auditing and made research about possible ethical frameworks which would help to avoid some of the ethical issues described above. There is a concern about regulating AI usage that it would discourage companies to invest in or develop this technology and it could affect AI usage and implementation in business processes in the future. Therefore, the authors suggest that one of the approaches could be to not regulate its usage at all. Another concern is that it is hard to predetermine what issues could rise from AI usage, thus the second approach would be to not regulate procedures themselves but to deal with the issues when they will appear in the process. However, most likely both of these approaches would slow down AI development as it could bring more problems than advantages regarding the reliability and results itself. The authors formed a third framework which has a goal to predict what ethical issues could possibly arise from Artificial Intelligence implementation by combining two different models: Ethics of Emerging Information and Communication Technologies (ETICA) and Anticipatory Technology Ethics (ATE). For ethical frameworks for emerging technologies of both models see Figure 7.

The main idea of the third approach is not to set straightforward rules but to make research on possible outcomes which could have “many true futures“. ATE method was built based on ETICA, therefore both methods can be divided into 3 steps:

1. **Technology analysis.** ETICA model intends to analyze technology itself and identifies which features could breach ethical norms and raise concern. In this stage, ATE model goes more deeply into the technology and makes a separate artifact analysis. The main difference from the first method is that firstly ATE model aims to examine inherent technology ethical risks without taking into consideration how and where it could be used and secondly, it aims to analyze what ethical concerns can arise from using this technology in certain markets, procedures, and other variables.
2. **Application analysis.** In both models this stage is for researching the actual technology in use and how it could affect end users and what issues could be missed out during the prior stage.



3. **Review of governance and policy.** In this stage, all of the identified issues are evaluated, systemized, and if needed feedback on policy recommendations needs to be communicated.

Steps followed in this paper	Alignment of steps to existing ethics frameworks		Description of analysis performed at each level				
	ETICA Framework	ATE Framework	Capabilities	Constraints	Social impact analysis	Ethical impact analysis	Critical issues
STEP 1:	<b>Technology analysis:</b> Analyze the features of the technology of ethical concern	<b>Technology analysis:</b> Consider the impact of the technology independent of any artifacts or applications. <i>Focus of analysis at this step for this paper:</i> Features of AI of ethical concern	Describe the capabilities of the technology	Describe the constraints of the technology	Consider the inherent risks and the consequential risks of the technology, independent of the use		
		<b>Artifact analysis:</b> Consider the physical configuration of the technology, which, when operated in a proper manner produces the desired result. <i>Focus of analysis at this step for this paper:</i> Assisted, Augmented and Autonomous AI	Describe the capabilities of the artifacts	Describe the constraints of the artifacts	Consider the risks as a result of the intended use of the artifacts		
STEP 2:	<b>Application Analysis:</b> Analyze the application of the technology within a specific context. <i>Focus of analysis at this step for this paper:</i> Existing and anticipated AI applications as used within an auditing context		Describe the capabilities of the applications	Describe the constraints of the applications	Consider the unintended consequences for the users of the applications and other stakeholders as well		
STEP 3:	<b>Review of governance and policy:</b>  1. Review/critique of governance 2. Provide policy recommendations						

**Figure 7.** ETICA and ATE ethical frameworks for emerging technologies (I. Munoko, H. L. Brown-Liburd, M. Vasarhelyi, 2020)

Ethical issues are believed to be one of the most important negative aspects of Artificial Intelligence now. They are not only slowing down AI development but distancing people and companies from using it in their work. Ethical issues can be divided into short and long terms and come not only from Artificial Intelligence usage but also from its capabilities as an autonomous machine or device. As of now, there are no legal regulations on how AI should be limited, what is required to be done in order to use it, and what cannot be done, however, its importance is highly discussed and expected to be prepared in the future at least at some level.

### 2.5. Impact of Artificial Intelligence to auditor’s work

During the research of ethical issues regarding Artificial Intelligence usage one of the main concerns is how it will affect the employment of humans. In the future when AI will be widely developed and there will be more autonomous applications or even devices such as robots AI will be able to replace humans, however as of now its development is in quite an early stage. Now Artificial Intelligence mostly is implemented with other digital technologies such as Machine Learning, Robotic Process Automation, and various others which makes AI operating principles more enabled than autonomous. The reason is that it is easier to apply AI-enabled applications to work processes and especially in business.

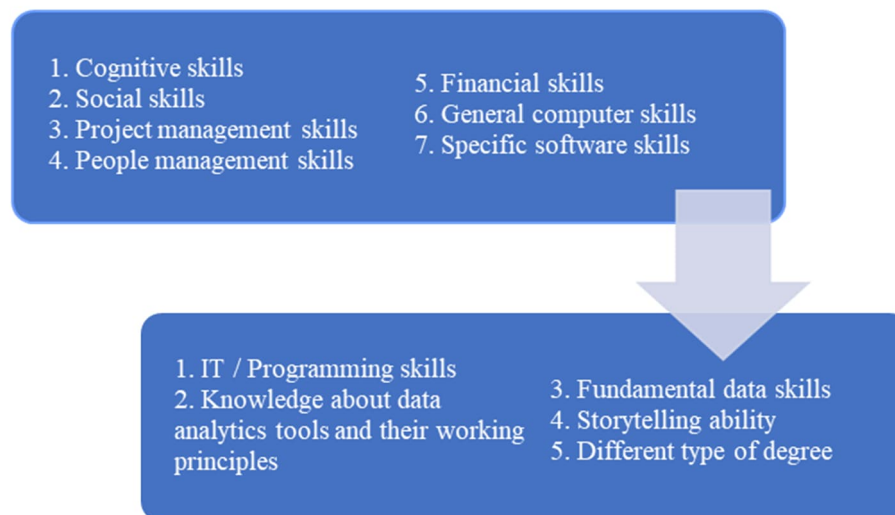
Businesses usually have many processes which consist of both technical and analytical tasks which would require critical thinking. Now existing Artificial Intelligence applications can only replace tasks which would not require any critical thinking, however, even those procedures usually cannot be done without any human interaction because people are needed either for modifying data which would be used by the application, or they need to check final results to make sure that they were done properly. However, the prevailing opinion is that people are more afraid of Artificial Intelligence rather than excited for such revolutionary technology to reach their work. Weber Shandwick together

with KRC Research (2016) surveyed more than 2 thousand consumers and 150 executives about Artificial Intelligence and found that 60% of all respondents are very concerned about losing their job due to AI. However, auditing and accounting is changing throughout the years as it is adjusting to changing environments including technological and other changes. It is considered to be part of professional improvement which cannot be avoided, and people will have to adapt eventually. Greenman (2017) stated that even if people are expecting a decrease in accountants due to AI replacing workspaces, statistics show different tendencies – back in 2017 the number of accountants almost doubled and it is expected at least 11% growth in the accountant profession during the next 10 years.

Forstenlechner, Lehner, and Leitner-Hanetseder (2021) conducted a study which showed potential results of how AI will affect the accounting profession. It partly agrees with the concern raised before – AI will change the majority of tasks performed by humans however, the intervention of a human will be needed as well. Research showed that processes that will not be changed by AI will probably be still performed using AI-integrated technologies with the help of employees. The accountant profession will not vanish however tasks performed in the future will change drastically. According to the study, there will be at least three new specialties: AI technology expert, process manager (to select which processes have to be automated and performed with the help of AI), and legal and ethical supervisor for digital processes. Arnold, Holt, and Sutton (2018) perfectly sum up the human and AI relationship: “The human is not going to win the race against AI, so the solution is to alter the race from a competition into a collaboration”. Therefore, it is more likely that employees will have to learn new skills and gain additional knowledge in order to know how to work with AI or AI-enabled programs.

Nowadays digital technologies are already used in audits and people are required to have some technical skills and adapt fast to the changing processes. However, the perception of how we are seeing auditors now will be changed in the future in general, and additional or even different competencies and skills will be expected from employees. Based on different sources main skills required now and in the future when Artificial Intelligence will be used more often were summarized (please refer to Figure 8). Law and Shen (2021) listed the number of expertise required for auditors’ work. The first one is cognitive skills which represent one of the main competencies – critical, logical thinking, visual processing, solving issues, and working memory. Auditors are working with many different clients and they need to have proper communication skills in order to avoid unnecessary conflicts. Also, they are usually working in hierarchical teams and it requires not only knowing how to reach all sorts of people with different characters but also they need to have certain project management skills for the project to go as smoothly as possible. From the education side, all auditors nowadays need to have financial or accounting knowledge as a minimum to understand the process of financial statement preparation and specific accounting rules. Apart from that, almost in every company, all audit work is being done digitally, therefore it is necessary to have general computer skills and in some companies, even specific software skills are being held as an advantage because in this case less training would be needed. In the future when Artificial Intelligence will be implemented into audit work, auditors will need to adapt to the changing processes and procedures which will force companies to search for people with new sets of skills (Bhattacharjee and Gambhir, 2022). It is expected that with the help of Artificial Intelligence, the majority of technical and even analytical tasks will be done automatically but for it to work AI has to be “taught” beforehand, and also in case of any errors it has to be fixed. From here comes one new expertise – IT and programming knowledge.

As mentioned before even now audit companies are using digital technologies in their work and it is expected that it will be used even more in the future and knowledge about data analytics tools and their working principles will be a mandatory requirement. According to AICPA-CIMA strongest auditors hereafter will have fundamental data skills which will help to understand a variety of different accounting or other systems which are and will be used by their clients in the accounting and preparation of financial statements. With big data usage, it is important for people to understand the data which will be processed by Artificial Intelligence or other digital technologies, thus they have to highly improve their storytelling ability. Lastly, there is a possibility that audit companies will not particularly search for people with finance or similar degree but rather with technology or IT degree because it will more suit new procedures. Figure 8 does not particularly mean that the skillset will change drastically from one to another but rather that new skills will be required and maybe even more appreciated as there will be a higher need to support all applications.



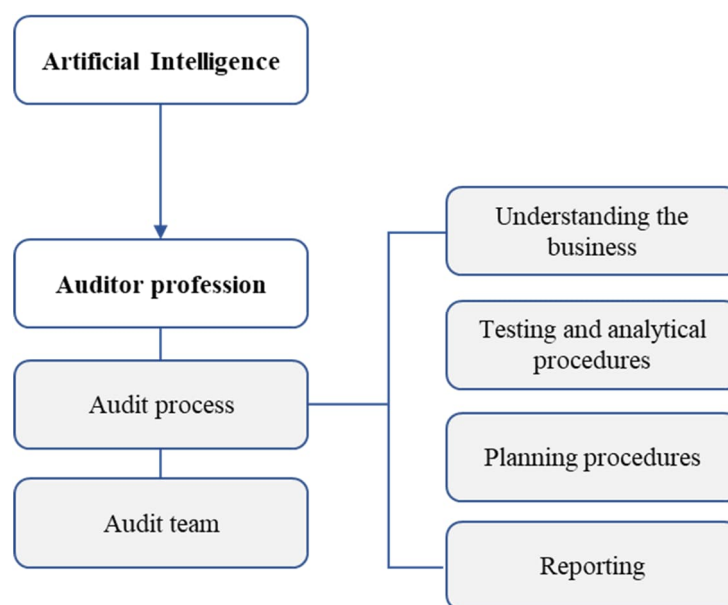
**Figure 8.** Audit skills requirements now and in the future (prepared by author)

To conclude, with quite fast Artificial Intelligence development employees are afraid that it can replace their work or even professions in the future. However, existing studies show that even though AI will perform a lot of procedures, it will still require human surveillance. Therefore, there is a possibility that employees in the future will be required to have a different set of skills (more orientated to technologies) in order to be competitive in the market.

## 2.6. Conceptual model

The process of the financial statement audit can be divided into different stages such as understanding the business, planning, testing, and analytical procedures and reporting. Each step is important and has an impact on the duration, quality, and reliability of the audit. The usage of Artificial Intelligence in the process can provide new opportunities for gathering information from the client, the scope of both substantive and analytical procedures, help to improve the quality and fasten the whole audit process.

The conceptual model was created based on theoretical research in the first two sections (see Figure 9). It was created to investigate how Artificial Intelligence can impact the auditor profession from both the process itself and the employee's perspective. In section 2.1 it was identified that the financial audit process can be divided into 4 separate stages and each stage consists of separate audit procedures which possible could be affected by Artificial Intelligence. In section 2.5 it was discussed that **AI can change the majority of procedures** and ease up auditor's work. Sections 1 and 2.4 were orientated into the benefits and drawback of AI usage in the audit which concluded that although AI has many benefits there is still a lot of questions about the ethical, trust, and decision-making side of the technology. In addition, research showed that auditors will be required to have another set of skills in the future to be competitive in the market. This concludes that **Artificial Intelligence can have an impact on the auditor profession**, how it is proceeded, and how **it can replace auditors**. However, there are still high-risk questions about making decisions autonomously which indicates that it will not likely change auditors in the future.



**Figure 9.** A conceptual model for assessing the influence of Artificial Intelligence on the auditor profession (prepared by the author)

The conceptual model reveals the relationship between Artificial Intelligence and its usage and impact on the auditor profession. Further investigation will be conducted in this order:

1. To determine knowledge about Artificial Intelligence and its usage now in the Lithuanian market from audit professionals' perspective.
2. To determine which audit stages and procedures can benefit from the use of Artificial Intelligence.
3. To identify benefits, drawbacks, and solutions arising from Artificial Intelligence usage in the audit.
4. To determine Artificial Intelligence spread in Lithuanian audit companies.
5. To evaluate whether Artificial Intelligence can replace audit professionals.
6. To determine what skills will be required for auditors in the future.

### 3. Research methodology of assessing the influence of Artificial Intelligence on the auditor profession

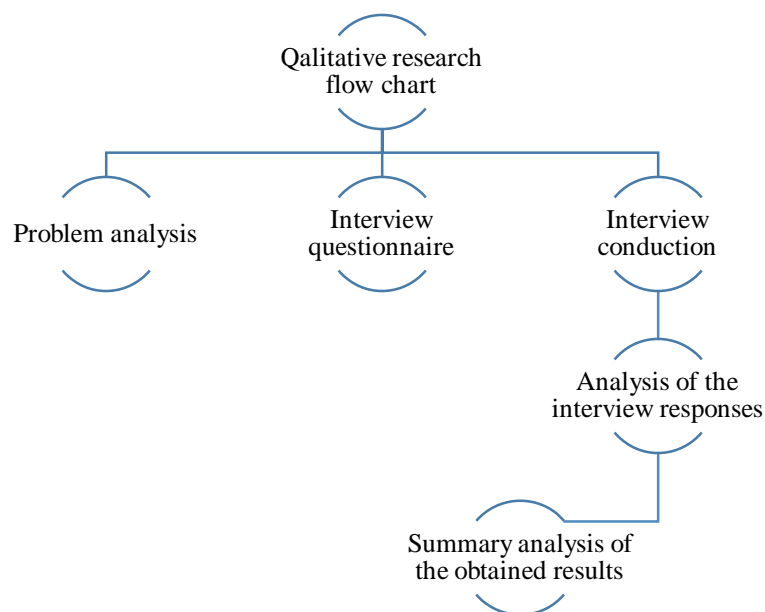
**Research hypothesis.** After conducting theoretical research, it was discovered that there is minimal information about research on auditors' opinions regarding Artificial Intelligence usage in audit procedures and how it will impact the audit itself and the auditor's profession. However, as digital technologies including AI is developing rapidly and more applications are started to use in nowadays audits it is important to address the impact of this change in the future.

The main problem examined in the research: is how Artificial Intelligence impacts audits and will change the audit profession in the future. People tend to believe that AI will replace working spaces and will increase the unemployment rate including auditors, however, another side of people believes that AI will require employees to change their job profile and learn new skills which will change auditors' profession from the basis.

**Research object.** Artificial Intelligence in the context of financial statement audit.

**Aim of research.** To gain knowledge about what experienced auditors think about Artificial Intelligence integration into audit procedures and how it will affect their profession.

**Process of the research.**



**Figure 10.** Process of the research of assessing the influence of Artificial Intelligence on the auditor profession

**Type of the research.** Qualitative.

**Method of the research.** Artificial Intelligence is not yet widely used in Lithuania and especially in audit of the financial statements. In order to assess how it can affect auditors' work, the auditor profession as a whole, and what opportunities, benefits, and drawbacks can be seen now an interview will be conducted.

Questions for the interview were created based on theoretical research (refer to Table 6):

**Table 6.** Interview questions for the research of assessing the influence of Artificial Intelligence on the auditor profession

Topic	No.	Questions
<b>Introduction</b>	1	What is your position in the company, years of experience in audit and what degree or qualification do you have?
<b>Knowledge</b>	2	Are you aware of any Artificial Intelligence tools which are being developed or already used in an audit?
	3	How in your opinion Artificial Intelligence could be used in the audit process?
<b>Benefits</b>	4	What benefits do you see from using Artificial Intelligence in audit processes?
<b>Drawbacks</b>	5	What do you think are the ethical implications of using AI in auditing, and how can they be addressed?
	6	What do you think are the main challenges and drawbacks of implementing AI in auditing, and how can they be overcome?
<b>Specific risks</b>	7	How can auditors ensure that they are using AI tools in a way that meets audit standards and regulatory requirements?
<b>Future perspectives</b>	8	Do audit companies in the Lithuanian market have sufficient resources and knowledge to install and customize Artificial Intelligence in the activities of the company?
	9	Do you believe that Artificial Intelligence can replace your work as an auditor? Or maybe it can replace lower-rank auditors?
	10	What skills do you think auditors will be required to learn new skills in order to be competitive in the future?

The analysis of the research questions will be explored through a qualitative research method using semi-structured interviews. This type of interview allows to deviate from the base question – “semi-structured interviews allow for the exploration of lived experience as narrated in the interview in relation to theoretical variables of interest. <...> The semi-structured interview offers researchers a way to attend to lived experience and pursue questions from extant theory” (Galletta, 2013).

**Population.** Artificial Intelligence requires not only huge monetary investment but also human resources with various skills and knowledge. Looking from Lithuania’s perspective it is more likely that only the biggest audit companies could dedicate such resources towards development or only implementation of already created tools. Therefore, to obtain more informative answers it was decided to conduct interviews within the top four biggest audit services providing companies: Ernst&Young, PwC, KPMG, and Deloitte (Big 4 companies).

As this is an open interview – the possible number of respondents is limited. It was decided to use only experienced professionals, thus individuals (experienced auditors starting from managers to partners) will be chosen as units of research. Based on unofficial research there are around 40 experts, who comply with the requirements. For deeper analysis selected size of the population was 10 people (two assistant managers, eight senior managers, and one partner). All of them were interviewed anonymously

**Data analysis method.** All interviews were recorded and later on, transcribed. Each transcription was analyzed separately but general results for all interviews were summarized together. For research, it was selected to use MAXQDA 2022 which helps to analyze conducted and transcribed interviews, code information, and provides functionality to systemize the data. Data were interpreted based on 4 main topics (knowledge, benefits, drawbacks/specific risks, and future perspectives). Based on the

answers provided all groups were divided into subgroups which helped to identify general results and conduct a proper analysis.

**Time and place of the research.** Interviews were conducted during the April of 2023 in Vilnius (virtually and live). Analysis was done during April – May of 2023.

## 4. Results of qualitative research on Artificial Intelligence in financial audit

### 4.1. Artificial Intelligence in financial audit – knowledge of respondents

All respondents have higher education (both Bachelor's and Master's degrees, two of them also have PhD degrees). Interviewed audit specialists have a wide range of experience working in audit (from 5 to 30 years) and their job title varies from assistant manager to managing partner. A summarized table was prepared, in order to properly assess information about respondents, their experience and knowledge about Artificial Intelligence and its usage nowadays in audit (refer to Table 7).

**Table 7.** Analysis of interview answers about job title and AI knowledge

No.	Job title, years in audit	Other relevant qualifications	Knowledge about AI and its usage in audit
1	Manager, 12 years	ACCA, Certified auditor of Lithuania	Has general knowledge about AI but does not know about any tools used in audit nor has tried it.
2	Senior manager, 12 years	ACCA (level 1)	Has deep knowledge about AI and constantly updates it. Has used some AI tools in audit which are more robotic rather than AI. Has knowledge about AI tools which will be used in near future in the firm he is working for.
3	Senior manager, 11 years	ACCA, Certified auditor of Lithuania	Has deep knowledge about AI but did not use it yet. Is aware of few tools which are being developed.
4	Senior manager, 16 years	Certified auditor of Lithuania	Has general knowledge about AI. Has used some AI tools: one not specifically in audit – for time planning and other called Data Snipper, which can recognize relevant information in documents based on added filters. Also used other digital technologies but is aware that they are not really AI but rather a digital tool.
5	Assistant manager, 4 years	ACCA in progress	Has advanced knowledge about AI. Is aware of few tools already used in audit: iSAF (used for listed clients; compares purchases information with other market companies), automated tools for sample selection. Is aware of other digital technologies which are being widely used in the company.
6	Senior manager, 11 years	ACCA	Has advanced knowledge about AI and is aware that tools used in audit now are more robotic and automatic rather than AI. She has used one tool in audit – Data Snipper.
7	Managing partner, 30 years	Certified auditor of Lithuania	Has advanced knowledge about AI, knows several tools with AI implementation which are used in audit in sample selection, PDF document reader.
8	Senior manager, 12 years	ACCA, Certified auditor of Lithuania	Has deep knowledge about AI but in his opinion does not know any tools used nowadays because they are more automatic and not AI.
9	Manager, 5 years	ACCA in progress	Has deep knowledge about AI but in his opinion does not know any tools used nowadays because they are more automatic and not AI.
10	Manager, 10 years	ACCA	Has deep knowledge about AI, is aware of some AI tools used in the company: Data Snipper, sample selection



Based on the answers of respondent's majority of them are aware of Artificial Intelligence to some extent. Level of knowledge does not have any correlation with the experience or job title of surveyed auditors, however, the majority of them are confused about whether digital technologies used in audit now are a part of AI or not. One respondent said: *"I'm perhaps not quite sure what is the concept of AI, because we usually put it in a very abstract, generic way. So, when we talk about AI which is now used in audit, I understand it more in a pragmatic way, it's about data analytics, things that help us to carry out all kinds of procedures from planning, and execution to completion, but they are still human-driven, human-initiated procedures. That is probably what it looks like to me, that it is not an element of Artificial Intelligence"*.

There were few respondents that did not know any Artificial Intelligence tools being used in audit now or in the future (which is already under development): *"Specifically in auditing, probably not. In practice, we don't have something like that, we have a robot in the time planning, but in the audit itself, no"*. Seven respondents out of ten replied that they are aware of some specific tools already used in the audit: *"These days we use a number of such tools in our own company, one of which is the document information reader, where when a document is uploaded, certain data is scanned according to a given command, and we also use automated tools to make selections"*. However, one person who is actively involved in novelties and development of digital technologies talked about pilot projects and changes in internal systems due to AI implementation in the near future in the company he is working for:

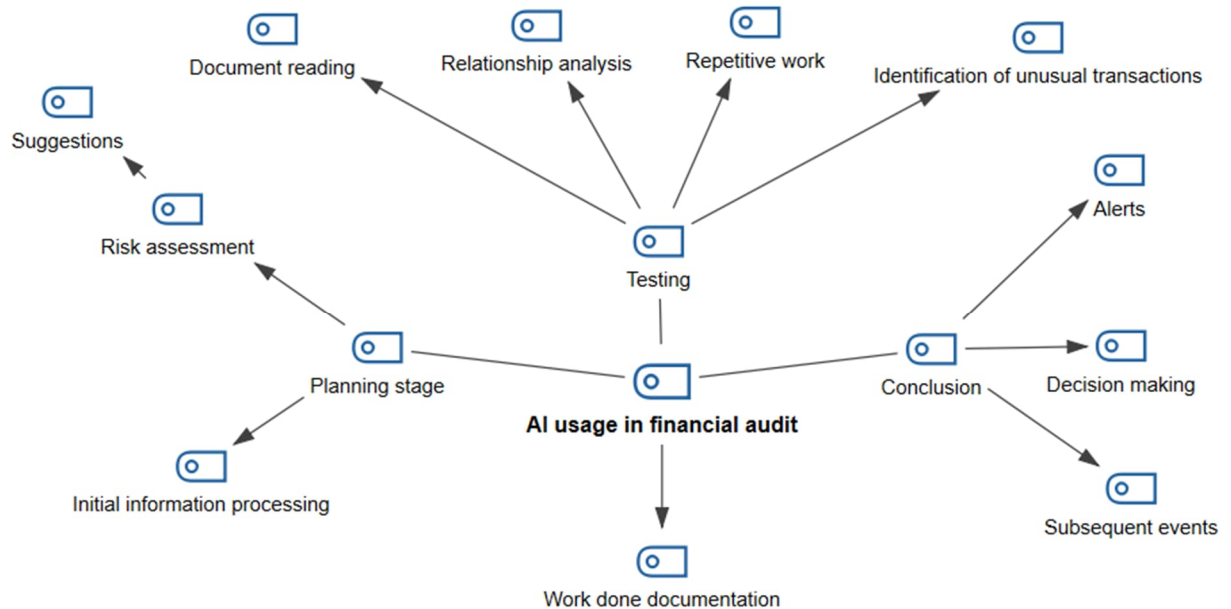
1. Providing insights: *"When the AI analyses all our previous projects and so on, it will do some insights according to the client profile, which means industry, listing or non-listing, and similar criteria. <...> But for example, it will show certain risks that are usually present in an engagement of a similar profile and then the auditor will be able to take it and consider whether to have one or the other Fraud or Significant risk or not"*.
2. Suggesting assertions: *"If, for example, an Artificial Intelligence sees that we do not have one some assertions on respective accounts it will recommend the most common assertions in practice"*.
3. General ledger integration to the internal audit system: *"So the system will look at what the company's data is, calculate the indicators and then benchmark those indicators against market data. And then it will throw some alerts to the auditor if one or another domain, index or indicator is underperforming or overperforming, and thus it will also point out some fluctuation with the competitors in the market"*.

Based on all interviews, the majority of respondents are aware of Artificial Intelligence and its concept, however many of them do not distinguish between other digital technologies and AI or do not know if it is partly integrated into some tool. Now some AI-integrated tools are already being used in audits. Additionally, one respondent is continuously renewing his knowledge about AI and disclosed what can be expected in the near future.

In order to understand where Artificial Intelligence can be used in audit next part of the interviews needs to be analyzed.

## 4.2. Artificial Intelligence in financial audit – usage

When asked about the usage of Artificial Intelligence in audit procedures seven experienced auditors (out of ten) told that it can be used in every stage of an audit. A map of possible AI usage in financial statements is provided in Figure 11 (AI usage on ESG reports is not included in the map as it is not a financial audit).



**Figure 11.** Map of possible Artificial Intelligence usage in financial audit (prepared by the author).

Starting from **planning stage** four auditors believe that it can help with **initial information processing** especially where large datasets are being used, as one of the respondents stated: “*It is to process them quickly and to see some trends, some bigger picture*”. Another important part of initial work on audit is **risk assessment** which was further discussed with two specialists: “*<...> it's just again using data to guide the auditors, both in the final audit, in the auditing procedures, through data, through comparison with the market, and so on*”. Risk assessment of particular audit could be improved with **AI suggestions**: “*In the planning phase, for example, when we talk about audit risks <...> Artificial Intelligence could take a number of predefined attitudes, attitudes according to the industry of the company, according to the size of the company, and it could read the data and present such proposed risks <...>, calculate some relative, primary indicators from the general ledger or draft reports and presenting some kind of red flags*”.

All respondents agreed that AI mostly can be used for the **testing** of the general ledger. Based on the responses testing was separated into four sub-themes:

1. As one of the most time-consuming parts of the audit is **reading supporting documents** few respondents believe that AI could be used to reduce this type of work – “*it would read that whole document much faster. It takes him a few seconds, whereas it can take a human being a couple of hours. It could read it and make some kind of summary*”.
2. Four auditors stated that firstly AI or tools with partly integrated AI should be used for **repetitive work**. One of them said: “*<...> maybe not quite Artificial Intelligence, but*

*automation throughout the whole process, where some administrative work/tasks could be replaced or reconstructed”.*

3. Three experts agreed that by using algorithms and other inputs AI could **recognize unusual transactions** and give errors or red flags. There are a few thoughts which should be highlighted: *“The Artificial Intelligence would identify for you as an auditor the areas where you would not expect to find, based on the type of company and it would consider that these are unusual transactions and unusual types of transactions”*; *“Tools <...> can analyze enormous financial datasets to swiftly and reliably spot suspected criminal activity like fraud or money laundering. These techniques can also be used to spot dishonest account setups or dangerous financial activity”*.
4. One respondent suggested that AI can be used to **measure the relationship** between two accounts: *“<...> for the analysis of the data provided, in the context of a given task, such as the analysis of data in a manufacturing company for the relationship between two accounts, either balance sheet or profit and loss items”*.

Three auditors emphasized **documentation of the work done** during every stage of the audit. All of them suggested using one of the newest AI tools which can generate answers based on the questions and inputs: *“I think even Chat GPT could be used <...> it could help with the descriptive part. When you have for example identified variants, you know the company, the market, the country, the industry, <...> and just with those few parameters <...> it could describe for you and document the procedures and work done and even the main trends that it could put together, the whole description.”*

Some important procedures performed at the end of the audit can be assigned to the **conclusion** of the project. Eight out of ten respondents agreed that in the future based on the inputs AI will be able to **provide** solutions and give **decision** suggestions. Additionally, one auditor suggested that AI could be integrated fully into the internal system and automatically give **alerts**. The auditor has provided some examples: *“If we are talking about the preparation of working papers, when we finish an audit there is a rush that something is missing, or some review note has not been cleared, or there are some colored unfinished parts left in the files, of course these are hygienic things, but tools like this could be able to identify for us such things as, for example: it could identify that a revenue file has not been opened in the last three months and you have a fraud risk, or you do not really need to do anything else to that file. So those are the kind of help signals I think could be at the beginning and at the end of an audit”*.

Lastly, one auditor considered how AI can be used while performing **subsequent events procedures**: *“Artificial Intelligence will read some public sources, and analyze whether there is any impact on the audited client or its industry that could have, for example, information relevant to post-accounting events or so on. So it would be a basically continuous process, even the performance, where indicators, benchmarking, and so on are analyzed”*.

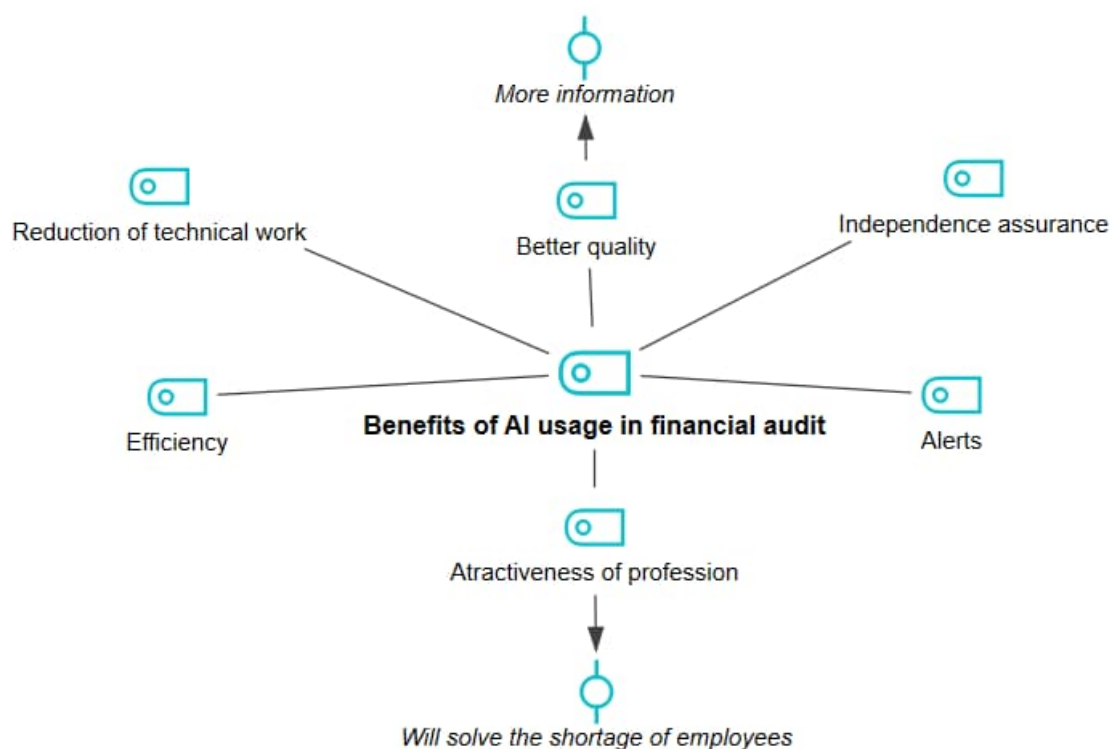
While talking about the usage of AI in audit one auditor considered the importance of AI in auditing non-financial data based on ESG directives. Starting from 2024 200-300 Lithuanian companies will have to prepare ESG reports which will be audited. According to the expert: *“I think all these tools will be even more helpful there, because all this non-financial reporting will be a big innovation not only for the companies but also for the auditors, to check it, to review it and so on. As auditors, we have been used to dealing mainly with currency figures (euros, dollars, etc.) <...> and there will be*

*a lot of other, which means non-monetary units of measurement. That is where I think Artificial Intelligence tools will be very necessary and useful”.*

Based on all conducted interviews, experts believe that Artificial Intelligence could be used in all stages and almost all parts of the audit, however as currently there is a limited amount of tools with integrated AI it is hard for them to describe what exactly could be done by AI or even if it is possible. All suggestions are rather theoretical but worthy to look into.

### 4.3. Artificial Intelligence in financial audit – benefits

According to interviewed experienced auditors, there are several benefits rising from the possible Artificial Intelligence integration into audit procedures, for all of them refer to the map provided in Figure 12:



**Figure 12.** Map of benefits from using Artificial Intelligence in financial audit (prepared by the author).

All auditors agreed that using AI will improve work *efficiency*. Some respondents said:

- *“The primary benefit, in my opinion, would be increased productivity”; You could do that, but it would be faster for AI to do it”.*
- *“<...> but it could speed up processes, and free up more time for some critical areas that need more consideration. I think the main plus point is the saving of human time by automating processes”.*

One of the most discussed advantages (7 out of 10 respondents) is the *reduction of technical work*. There are some thoughts from respondents regarding it:

- “<...> it takes away the repetitive, admin work, where you just have to put something together, look for something. It takes away all that administrative burden and you can focus on where the risks really are and where you need the most human judgment”.
- “Well, plus with not doing some technical work, you can spend time on analysis of the same indicators, benchmarking”.

Both reduction of technical work and higher efficiency according to 4 respondents can possibly **make the auditor’s profession more attractive and solve the issue of employee shortage**. The main statements were:

- “It would just make everyday work easier, it would reduce the human input, where it's really only technical processing that's needed Artificial Intelligence can perform many of the duties currently performed by audit specialists, saving time and resources”.
- “<...> we have serious problems with attracting and retaining people, I mean in the whole profession. I think there is probably nothing you can do about it as a human being because the number of people in Lithuania is simply decreasing, the demographics are decreasing, and naturally, that is very much reflected in our profession, and I think it would help us to plug those human resources problems”.
- “<...> it is the most interesting part of the job, once the figures have been processed, is looking at the bigger picture, what the figures show, whether they are correct, whether they are in line with what the client has said <...> we would like to spend more time there rather than crunching numbers, looking at long lists. It would be good to give as much of that back to the machines as possible, and in the future the more it is possible, the more attractive the profession will be for all age groups”.
- “It is more interesting to analyze the opinions once you have the result, well, for example, you import the data and you get some report, it is more interesting to analyze it than to have to do it yourself before”.

Five auditors highlighted **better quality** as one of the benefits as discussed before Artificial Intelligence can help work with big data sets and provide analysis which cannot be performed by hand. Auditors excluded a few main reasons:

- “The benefit is first of all an even better audit quality, as these tools allow you to work with the full, complete information, with all the records for the year <...> also <...> documents, which can then also be analyzed much more in-depth <...> to give to a tool to read and summarise and the auditors only need to look at the conclusion”.
- “<...> it will also raise some issues where the auditor would not have even noticed <...> Artificial Intelligence actually comes into play in the same way as in the place of the reviewer, that the auditor can do some work alongside it, that is, the auditor looks from his own perspective, the AI also generates certain things and some general conclusions can be drawn based on his own experience as an auditor and on the conclusions drawn by the AI”.
- “<...> perhaps even prevent mistakes by eliminating the need to train less experienced colleagues to carry out specific tasks”.

- “Accuracy would also be advantageous in this situation because AI might identify and recognize potential threats as well as falsified financial data, freeing up time for more crucial activities“.
- “I believe there will undoubtedly be tools available in the future that will enable us to perform analysis that we may not even be able to accomplish on our own right now, greatly enhancing the quality and extending the audit itself“.

Only one expert saw **independence assurance** as an advantage. This assurance refers to using Artificial Intelligence in sample selection to remain independent. The auditor stated, „It ensures the independence of the audit and that the audit is done correctly“. Also, another auditor stated that a big benefit would be if the AI tool would alert in case some accounts with significant or fraud risk will be not tested fully or in case something is left in working papers.

Based on conducted interviews there are six main benefits arising from the usage of Artificial Intelligence in financial audit and they are closely related to each other. However, there are some drawbacks (general and specific risks) identified in the interview, thus we have performed an analysis.

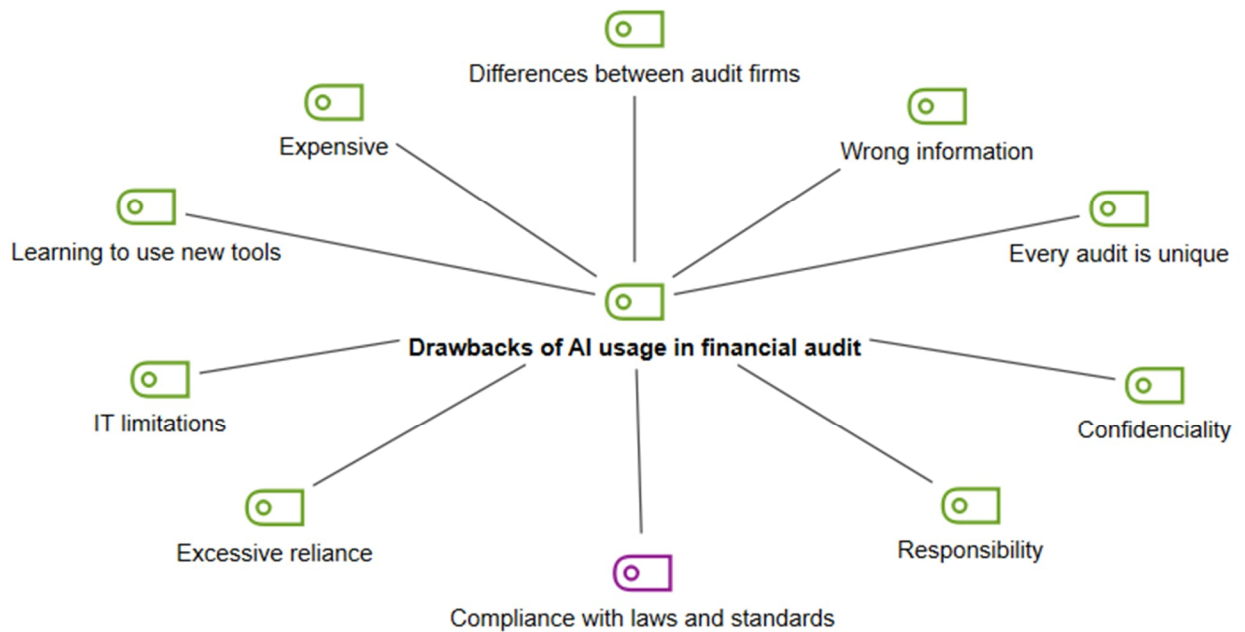
#### **4.4. Artificial Intelligence in financial audit – drawbacks and solutions**

Artificial Intelligence is a novelty therefore its usage is not yet developed to the extent where there would be only minor drawbacks, therefore during interviews main drawbacks were discussed with suggestions on how they can be solved.

##### **4.4.1. Drawbacks**

During interviews with audit experts identified in total 10 drawbacks (9 general and 1 with a specific risk to comply with laws and standards (see Figure 13).

The main issue with developing and using AI in audit – is **financial resources**. All interviewed auditors stated that this technology is very expensive and will not be available for everyone. One auditor provided more deep considerations regarding this issue and how it will affect **different audit companies**. Not all audit companies will be able to implement AI in their audit procedures and in a long-term perspective it can really affect how audit is being done in bigger and smaller audit companies: “<...> if it is expensive, it is obviously the biggest audit firms that are leading the way, and what would the profession and the practice look like then, when four firms, or three, or even two, will get chances with some tools, some solutions, and do a different kind of audit than the smaller ones do because the fact is that they do not have the resources and they will never have the resources unless somehow the regulator empowers them to work with the technology. <...> Auditing has always been and is a standardized service practically on a global level, even though we understand that there are many qualitative differences (between the audit companies), the regulation, and the opportunities in work are the same at the moment. It would be a question of how, in the context of the spread of Artificial Intelligence, the integrity of the auditing profession could be maintained. This is a challenge for the profession rather than for the audit firm“.



**Figure 13.** Map of drawbacks of using Artificial Intelligence in financial audit (prepared by the author).

As with every technology, in the beginning, it takes some time to get used to it and **learn how to use** it. Few auditors believe that as AI is still new to everyone and we are not yet aware of its limits it could be hard to get maximum benefits in a reasonable timeframe: *“The main challenge, as with any new tool or group of tools, is to master it, to find out as quickly as possible what it can really do for you. Metaphorically speaking, it's like a new toy and people can be stuck with playing with it, for the sake of fun and not for researching its possibilities. And then you may not get enough out of that research, so I think the key is to approach it with reason and practicality and rationality”*.

Another similar issue was raised by 4 auditors – **excessive reliance**. When people are too fascinated with technology it can lead to a lack of critical thinking: *“The challenge is probably to avoid that the auditor starts to trust blindly those suggestions or those risks that, for example, this tool offers. Well, and perhaps also it can lead to not thinking about the risks that are newly emerging and if there is too much concentration on those historical risks, because, well, they do not stand still, there are all sorts of new ones emerging with new innovative tools, even the same Artificial Intelligence”*. According to one expert this type of behavior can be already seen with other technologies: *“The challenge is to find the right middle ground and not to over-play with these tools, which is what we are seeing, I would say, in the work we do now. We use data analytics and so on, at least I am of the opinion that we sometimes rely too much on the fact that what we are doing gives us a lot of assurance, that it gives us a lot of audit evidence because we are using this or that, but actually sometimes when you look at it, it is just an automated sort of passing of the data, skipping over it, producing a report without looking very much at what is in it. So there is a risk here that we do not get too excited about it and neglect that, how shall we say, challenging and reading what has been done”*. All 10 respondents stated that AI should not make any decisions and only be used as an assistant because: *“Decision-making is a professional characteristic, a trait and even a duty of the auditor as a human being, so to speak, according to the standards”*. One audit expert described what AI cannot perform: *“Artificial Intelligence in auditing, it has success up to certain limits, and those limits would be concepts such as professional judgment, such as professional ethics. Of course, perhaps AI enthusiasts could somehow argue and counter-argue that there is nothing that you can*

*program and replicate in human thought and action with such algorithms, but it still seems to me that professional ethics is primarily about what is good for human beings as creatures, and it is not a kind of sterile mathematically expressible algorithm for thinking. It is a very subjective algorithm that is inherent in human beings as to what is ethical, what is not ethical, when you meet some qualitative ethical principle such as independence. Some aspects of independence, for example, can very easily be coded with a certain command, such as the ratio of non-audit fees, which are mathematical indicators that you can easily calculate, track, but when there is independence as a way of thinking about whether I meet one or the other requirement, whether I am doing the right thing, the wrong thing, then you probably cannot give somebody a command to decide. You have to always, as an auditor, as a professional, take responsibility for that what Artificial Intelligence cannot do”.*

Four experts had concerns about the cases where AI would make decisions because someone should take **responsibility** for the actions made:

- *“If we are talking about the widespread use of Artificial Intelligence, unleashed, as it were, uncontrolled responsibility, then the question arises as to who bears responsibility”.*
- *“Regarding the issue of accountability, who would be held accountable if an error occurred during a procedure for which Artificial Intelligence was solely responsible”.*
- *“What if it happens that an error is actually introduced? Who will then be held responsible? I think there is no way that Artificial Intelligence will be relied on 100% here”.*

Now all responsibility is held by audit partners who are signing financial statements but there is a question when there would be some legal issues about who will be responsible.

Half of the respondents as a main issue raised **confidentiality issues** due to improper usage of sensitive information. All of them described this issue very similarly relating it to General Data Protection Regulation (GDPR) and that it is the audit firm’s responsibility to ensure that proper data is input and being used. A similar problem with the usage of **wrong information** was identified by the same 5 respondents. One audit expert described how employees are using wrongly formed information for audit procedures and how it can result in wrong, non-usable conclusions. She raised a question if it happens to a human being, how a machine without critical thinking be able to avoid such errors: *“It is a question of whether Artificial Intelligence could detect such things and whether it would not simply be using the wrong data and the work it has done would be worthless”.* Other issue identified was how to assure that even when primary information was formed good it was processed in proper way: *“<...> that Artificial Intelligence can misinterpret data, can apply an algorithm in the wrong place and in the wrong way”.*

Another issue is **Information Technology (IT) limitations** which were discussed with two auditors out of ten. Currently, there are many different accounting systems in the market and their interface and possibilities are different as well *“The challenge is that not all clients are able to provide the data in the format that we need <...>, sometimes it happens that the companies are not able to provide the data that is needed for certain procedures”.* here comes an issue with the processing of information received as AI would only use the information provided in particular way *“<...> disadvantage of Artificial Intelligence is that it still works with data or with documents and something has to go into it for us to get a result and that input has to be in a single format, a single type of*



*document, information, a similar cut <...>, probably going to be very difficult to apply to all types of companies”.*

Four respondents believe that there is also an issue with how AI is working as it is working based on historical data, and prior audits when in reality **all companies**, their problems, and audits **are unique** and it can be hard to calculate, find solutions and make proper decisions in every single situation. There are some considerations extracted from the interviews:

- *“As for the decisions, the AI is still making decisions based on past integrated data, and companies are very different with different problems, so it is possible that the proposed solutions may not be exactly the same as the company being audited according to certain criteria”*
- *“Artificial Intelligence in critical places I think cannot make decisions, cannot completely replace human thinking, cannot adapt to each specific situation, because the business environment is changing a lot, the situations are very specific to the companies and it is probably not possible to create a common algorithm that is suitable for all situations”*
- *“Challenges for us in such a smaller market, Lithuania and the Baltics, I think it will be challenging to find comparable information, <...> still be more difficult to compare with our smaller customers. If you need to do some analysis or use it here it may often not be relevant to us”.*

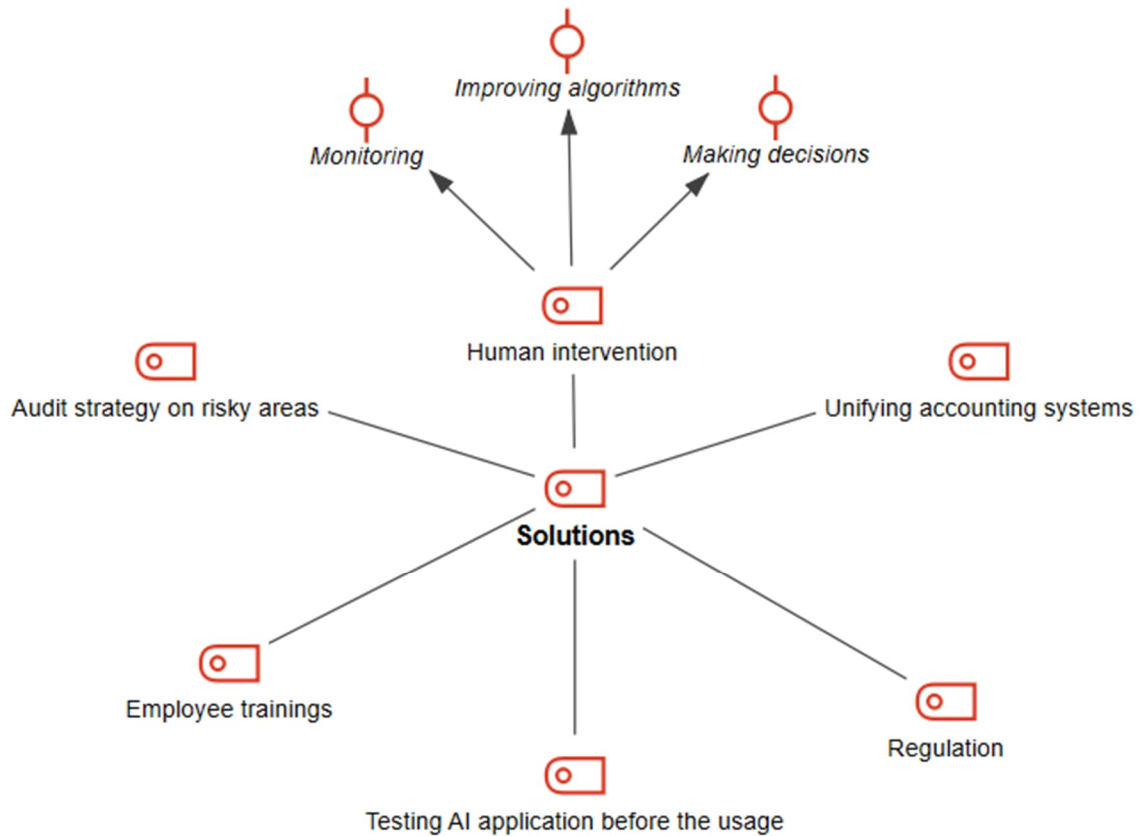
During theoretical research as one of the main issues with AI usage **ethical problems** were identified, however, 7 out of 10 audit experts stated that they did not think that there are any ethical issues at all before the interview. A few explanations are listed below:

- *“I think there shouldn't be much of an ethical problem here in particular. Well, especially when analyzing that first step of those Artificial Intelligence solutions. Because these are just pre-existing audit engagements and based on that profile client proposals, benchmarking, mass media it might be relevant“.*
- *“I don't see many risks of ethical problems right away. Because our work is also the financial reporting and auditing standards themselves, they do not ask for opinions, interpretations, likes and dislikes, and so on. It is more about factual information, about checking how it complies with the actual effective rules, and of course, we are not writing them by ourselves“.*
- *„I do not see any major risks, because that work of ours is largely based on subjective facts and not on opinions, let alone offensive opinions because this is not our field of work“.*

Based on conducted interviews there are 10 main drawbacks arising from the usage of Artificial Intelligence in financial audit and they are closely related to each other. However, solutions which could help solve potential drawbacks were analyzed as well.

#### **4.4.2. Solutions**

During the interviewees solutions to some disadvantages were discussed with all respondents and systemized into six categories (see Figure 14).



**Figure 14.** Map of solutions to problems related to AI usage in financial audit (prepared by the author).

All surveyed auditors believe that Artificial Intelligence cannot be used autonomously no matter the audit stage to avoid mistakes and other inconsistencies. The need for **human intervention** was mentioned throughout different questions and in a different context, thus it was decided to split it into three parts: **monitoring**, **improving algorithms**, and **making decisions**. Firstly, as discussed before, there is a possibility that AI may be not able to identify wrongly formed initial information or make mistakes during the testing or other processes due to malfunction or wrong interpretation, thus every expert suggested that human beings should be involved in the process in order to **monitor** if information, testing, and provided results are correct and reasonable. One of the respondents said: *“This is probably that one thing where it will obviously need that human filter and review to see whether it is really the right information being collected and stored. <...> is there really no sensitive information that should not be collected for audit procedures. So I think there needs to be some kind of control here, whether it is a human control or some kind of tool to identify sensitive information”*. There also should be constant monitoring of AI to avoid algorithm **malfunctions**:

- *“However, when Artificial Intelligence works according to algorithms and may select something that is not at all what is needed, then, again, that critical review is still necessary”*.
- *“These instruments should also be examined simultaneously to determine whether they adhere to the necessary regulations. It goes without saying that this testing and monitoring should continue even after the tool has been made available so that it can continue to be enhanced”*.

All respondents stated that **decision-making** should be left to humans to make sure that it is correct and ethical. Below are argumentation of two respondents:

- *“More generally, it is still up to a human being, the auditor, to assess whether a decision has been made ethically by Artificial Intelligence“.*
- *“Auditing standards emphasize that the auditor must maintain that professional skepticism, that decisions must be based on a certain amount of practice, professional ethics, and independence. So perhaps it is important here again that the auditor will have these tools as ancillary tools and they will not be in any way the main ones, making decisions and so on. Well, in that way, the auditor will retain that power of judgment “.*

One audit expert thinks that all three sub-groups of human intervention are important and should be addressed: *“It's a constant supervision and checking of the work, that the AI cannot do everything, and the auditor has to constantly review, check the reports generated, the work done and make critical decisions in important areas and well, also be involved, checking maybe even recalculating to check that the algorithms are properly designed and give good decisions”.*

Another solution to avoid mistakes done by AI during the testing process is **testing AI application before starting to use it**: *“It's all going to start with the fact that the tools that we use, they have to go through a very long cycle of checks and testing and maintenance before they get to the point of being really used in the audit, to not take too much information and to be compliant with all kinds of GDPR“.* 5 respondents said that it is the responsibility of audit firm to ensure that applications used in audit processes are liable: *“I believe that auditing firms should only use tools that are already compliant with auditing standards and some local laws and that they should constantly look for any discrepancies”* thus three auditors suggest to have extensive testing before starting to use the application. One of them described how it can be tested because it is already being done with other digital technologies in the company she is working for: *“Practically any IT tool is developed by a team that consists of IT people and audit. And those auditors are sometimes randomly selected, sometimes volunteers, and when the pool is created there is testing. It is mostly from us, I have been involved in various testing of new pools myself, so the knowledge you need is very minimal. It's about checking how a new IT solution works. I think that certain things should be left to specialists and in this case, the development and maintenance of IT solutions should be in the hands of specialists. The auditor needs to be involved to the extent that he is able to test the solution and verify that it meets the audit standard, he needs to understand how it works but he doesn't need to know how to write the code to make it work“.*

Two respondents out of ten suggested that **training for employees** should be mandatory in order to:

- avoid mistakes done by humans, to understand what information is needed by the tool and how it should be extracted: *„More training should be given on the data we received from the client so that the audit consultants would understand how the data should look like. <...> And when we import the data, sometimes it requires input from the audit team itself to understand the data and what it should look like“.*
- learn how to use a tool and maximize the benefits of using it in the financial audit: *“And that training should be routine and massive, and <...> if only a selected few audit firm employees are trained to work with these tools, we will not see the full spread and usability and optimization of such tools. It would be necessary to incorporate them in such a way that they become ordinary, in a good sense, tools that every auditor understands, so that they know how to work with them efficiently in order to get the maximum benefit from them“.*

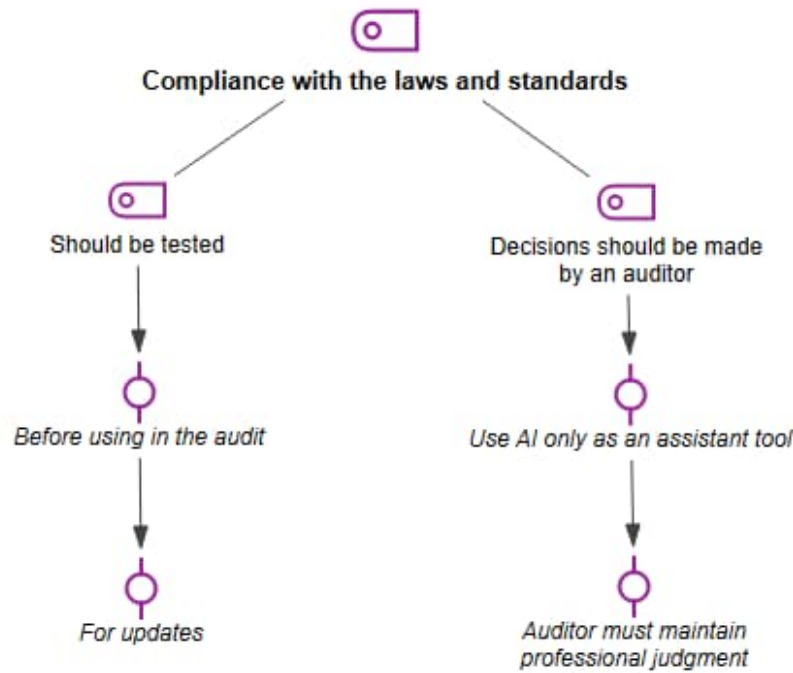
According to half of the surveyed audit experts, there should be **regulation changes** in order to protect audit firms from risks arising from the usage of AI in the financial audit:

- as discussed before there should be clear limits set in order locally or globally to know to what extent AI can be used regularly: *“That these ethical issues are really big and need to be addressed, and to address them through regulation - the relevant authorities have to decide what are the permissible limits and what decisions can be taken“*; *“What is needed here is international regulation that is adjusted, bearing in mind that Artificial Intelligence is coming into auditing and we are not going to avoid it. We need to keep up with it and change our approach to the way things are done”*.
- referring to the responsibility issue, one audit expert suggested that either state or the government should be held responsible in the future when AI will take more responsibility or even take over decision-making: *“We are talking about a futuristic vision of the audit profession, that the profession will disappear, there will be no need for people, and AI will do the auditing. Then we have the serious question of who is going to bear the responsibility, who is going to control Artificial Intelligence - the state or the government“*.

Two other solutions were discussed with two experts during the interviews:

- During the audit strategy meeting it should be discussed where AI should be or not be used. Audit experts suggested that we should **avoid using AI for testing high-risk areas**: *“We have to look at the audit strategy where Artificial Intelligence cannot be used because of the risks in the audit, or where the human input has to be increased”*.
- It is very important to have initial information in a certain format for AI processing and testing, however, as discussed before companies are using different accounting systems and there is a possibility that AI will not be able to use the provided information. Thus one auditor expressed their thoughts on how it would be much easier if there would exist only a few accounting systems and **information would be unified**: *“Not all clients are able to provide the data in the format that we need and sometimes it seems that it would be much easier if we had 2 accounting systems and all the companies use them and we get all the data in one format because sometimes it happens that the companies are not able to provide the data that is needed for certain procedures”*.

During the problem analysis, it was identified that the regulatory gap between current and future audits will be significant after 5 years, thus during the interview one question was related to this specific risk or disadvantage. Audit specialists were asked how auditors can ensure that AI would be used in compliance with auditing standards and other laws. All answers were systemized and divided into 2 groups: all AI tools require testing and decisions should be made by an auditor (see Figure 15 **Figure 15**).



**Figure 15.** Map of solutions to specific problem related to AI compliance with laws and standards (prepared by the author).

Firstly, two respondents stated that if there will be any tools created by third parties, they should be in line with local standards and laws before entering the market, and audit firms could rely on them: *“I would then assume that the audit firms, having fulfilled those general requirements, within the framework of those tools that will be purchased from the market or developed by third parties - those should have been already fulfilled all the necessary requirements”*. Three experts talked about the importance of testing Artificial Intelligence tools in two stages: before starting to use them in the audit procedures and after implementation to capture errors. Testing itself was described in different ways, while two auditors were talking about IT testing, the other relied more on human evaluation of potential risks, however opinion about continuous testing was the same:

- *“There has to be that testing process, then a process where errors can be captured and there are updates of those tools, but then we also bump into the fact that there will have to be a very frequent local modification because there are still some local legal requirements that would have to be followed as well”*.
- *“I believe that before we begin using AI tools, there should be employers who evaluate any potential risks and come up with solutions. If they determine that the risks are simply too significant, then perhaps we shouldn't be using them at all. Of course, these instruments should also be examined simultaneously to determine whether they adhere to the necessary regulations. It goes without saying that this testing and monitoring should continue even after the tool has been made available so that it can continue to be enhanced”*.

The most suggested solution (by all respondents) was to avoid decision-making by AI because most decisions require professional judgment: *“Auditing standards emphasize that the auditor must maintain that professional skepticism, that decision must be based on a certain amount of practice,*

*professional ethics, independence*". Three respondents highlighted that AI should only be used as an assistant tool which provides insights and forms complex reports while interpretations and conclusions should be done by auditors with specific knowledge and professional judgment. In this way, auditors would be responsible to make sure that results are in line with the standards and other laws. Below are listed a few of the opinions:

- *"The AI prepares the reports for us, the data that we can analyze, and then we decide whether or not it is in line with the auditing standards, and that requires the intervention of the audit team. And it would be necessary to assess whether the final decision is in line with auditing standards or not"*.
- *"We have internal processes and internal procedures to make sure that auditing standards are being followed, so again, when considering any AI solution, there has to be a review of the relevant auditing standards and the relevant standards that are relevant to the regulation of AI and auditing. And if there are any updates, it is only internal procedures and processes and working groups that can ensure that the requirements of those standards are met"*.
- *"To make AI more of an insight provider and an advisor rather than some kind of decision maker. Decision-making is a professional characteristic, a trait, and even a duty of the auditor as a human being"*.

After the analysis of all drawbacks identified and solutions provided by the audit experts it could be concluded that auditors do not believe that AI could work autonomously without human interaction and especially in decision-making because otherwise, it can result in not complying with regulations, errors in the testing or wrong interpretation of primary information. To conclude, audit professionals suggested in total 6 solutions which could help to minimize the drawbacks identified.

#### **4.5. Spread of Artificial Intelligence usage in financial audit in Lithuania**

In order to find what interviewed auditors think about the spread of Artificial Intelligence in Lithuanian audit companies, they were asked if such companies have sufficient resources and knowledge to implement and apply AI in audit procedures. All experts had the same opinion that implementation of AI will possible only for market leaders Big Four or other few international companies such as Ernst&Young, PricewaterhouseCoopers, Deloitte, KMPG, BDO, and Grant Thornton specifically: *"I would think that foreign-owned or companies that are part of large networks have the resources to both implement and operate because they share not only resources from a financial perspective but also human resources and know-how"*. Although all respondents believe that only market leaders would be able to use AI, few of them explained that all development and testing will probably be done globally, and in Lithuania, audit companies will only need to adjust based on local requirements: *"<...> probably only a network or group companies would be able to use such tools because it really requires unimaginable resources. I think only minimal improvements or changes can be made locally, only as much as the local market needs. But the whole base, the structure on which all the systems, applications, and so on are built will be created elsewhere"*.

As a reason why smaller local companies would not be able to use AI now and in the future majority of respondents stated that it requires **huge investment, not only financial but human resources** as well: *"It is not the job of the smaller Lithuanian auditors to develop it, deploy it and so on, because it requires a lot of money, a lot of resources, that is to say, a huge investment and a lot of time, and a*

*good enough number of specialists who know auditing and all that digital part*". One auditor as a reason stated that maybe **local companies do not have a need** for complex technologies at all: "*Local Lithuanian companies have up to three auditors at most and they are not big and they don't have many clients and maybe they don't see such a need for Artificial Intelligence*". Another expert also shared her knowledge about small audit companies – that they are able to do majority of procedures manually as digital tools are not worth the cost: "*I tried to tell the lecturer that nobody does manual calculations anymore, because there are automated tools, but he said that not all the companies use certain tools. I take it from that answer that smaller companies do not have the means to install the relevant tools used for selection*". However, there was one expert who stated that there are some lower-scale tools which are sold by third parties and possibly could be bought by smaller audit companies as it does not require such huge investment: "*unless we are talking about some smaller-scale tools like account scanning, which I think is already available on the market*".

Two audit experts saw a risk that there will be **a gap between the audits** of market leaders and local companies which needs to be solved: "*We understand that Big4 has the biggest market share, four companies, so in Lithuania there are around 200 companies <...> so we are still talking about a very small percentage of companies that have the capacity to do so and the vast majority of these service providers do not have the capacity and will not have the capacity as long as the profession operates in this format. <...> That is the limitation here when we are talking about Artificial Intelligence in the audit profession going forward, it will eventually be inevitable, but how do you make the whole market have those capabilities, that is a question for the regulator and the futurists*". Other expert shared his insight about a need to unify capabilities for all auditors in order to achieve best results from AI: "*In order to maximize the benefits and, as I said, I think it is best to maximize the usability so that it becomes one of the regular tools for every single auditor, not just for some small group*".

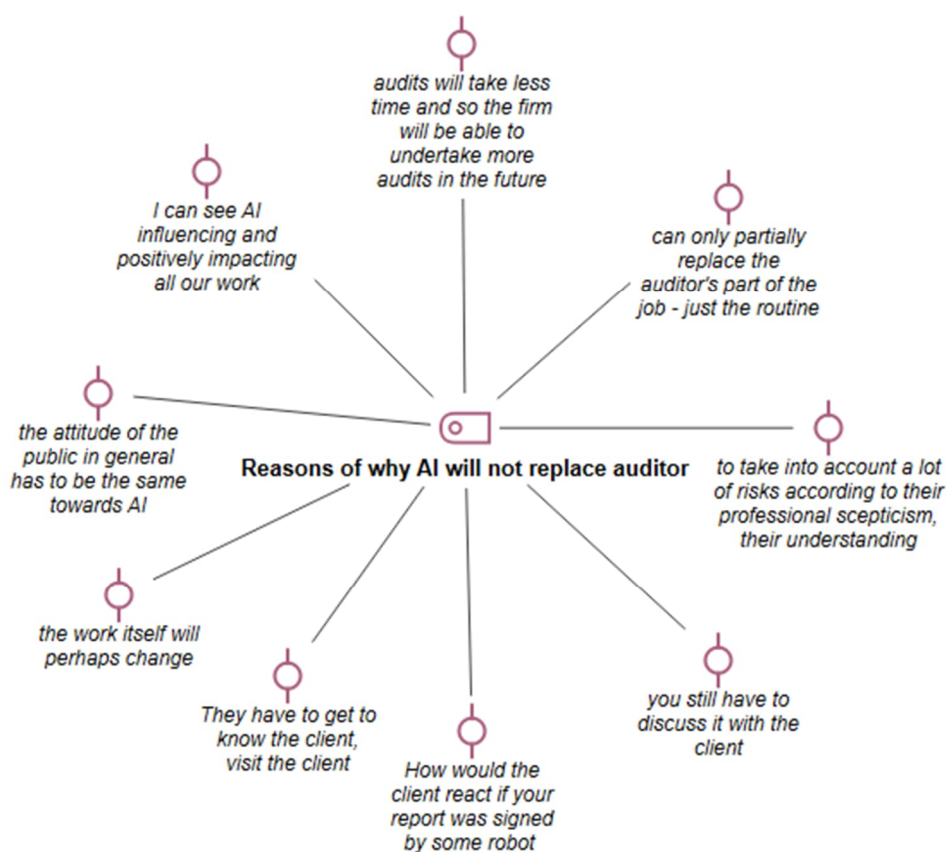
In conclusion, Artificial Intelligence requires a lot of financial, human, and time resources and not companies can afford such investment, thus all interviewees believe that it can be used and implemented only by companies which belongs to international groups which are capable to develop such tools by themselves.

#### **4.6. Artificial Intelligence influence on the auditor profession**

All ten interviewed auditors stated that in their opinion Artificial Intelligence will change the profession and their work in some way but will not replace them. While three out of ten experts think that the number of required lower-rank employees will decrease in the future, all of them agree that higher-rank auditors cannot be replaced at all as they take a crucial part in the audit: "*I think that Artificial Intelligence cannot replace the higher level employees or the people who are involved in the development of the audit strategy, because it still involves a lot of factors that you have to consider, not only in terms of the numbers, in terms of the performance of the company, but also in terms of the external environment <...>, because we are learning from experience as well, and I think that for those, so to say, top-level people in the audit team, Artificial Intelligence is not going to be a threat*". Based on the answers obtained during the interviews map of all arguments on why AI will not replace auditor was created (see Figure 16).

As mentioned before opinion regarding lower rank auditors varies between respondents: while some thinks that demand of such employees **will decrease** as AI will automatize majority of their work ("*will reduce the workload whether you want it or not and you won't need as many staff, especially,*

as I said before, you won't need as many junior staff, because their job can be done nowadays by other technologies“; “So I think it can only partially replace the auditor's part of the job - just the **routine part**, but where it requires some professional judgments, some weighing up of different things that you cannot always weigh up in a straightforward way and compare them, it will still require the auditor as a human being”) other believe that it will just **change the way work is done** (“But I think that even the lower-ranking audit consultants will not be replaced, the work itself will perhaps change, they will have to work with digitalization, with Artificial Intelligence, and perhaps they will have less of that repetitive work”). One audit expert had a different opinion regarding the demand for lower-rank auditors in the future. According to her if some tasks will be automatized it will save time and human resources, however increasing demand for audit services will **balance out the need for lower-rank employees**: “It’s likely that there may be a reduction in auditors in the long term, but right now it seems like the number of clients that are approaching our firm for our audit services in the future seems like it shouldn’t. It seems that audits will take less time and so the firm will be able to undertake more audits in the future and simply still need to maintain an adequate number of auditors”.



**Figure 16.** Map of arguments on why AI will not replace auditor (prepared by the author).

3 out of 10 auditors questioned **the client’s opinion towards AI usage** in the audit of their company. The audit process includes not only testing the general ledger, and information but also communication with the client and keeping a good business relationship in order for audits to go smoothly. Firstly, it is important to maintain a good professional relationship with the client either during phone calls or in person and AI as a tool or machine cannot have close communication: “And the auditor has to assess the various risks according to the auditing standards. They have to get to know the client, visit the client”. Also, during the audit, employees are **constantly communicating**



with the client because they need some information, or documents or need to discuss arisen differences or other issues: *“You still have to analyze the data from the human side, discuss it with the client. Because it happens that when we analyze the data, we have one impression, and when we talk to the client, it turns out to be a completely different situation. And then we decide whether everything is fine or whether something is substandard and needs to be fixed. Basically, an audit is not very feasible without communication with the client”*. As Artificial Intelligence is just a tool or application it will not be able to have conversations with the client to understand the issue and find a solution, thus in the near future it will not be able to change auditors at least in communication with the client. It was mentioned before as a drawback that there is an open question on who would be responsible for audit if AI would work autonomously. One auditor discussed this issue more deeply by raising another question ***if the client would be happy*** if all work would be done by AI: *“How would the clients see it if your report was signed by some robot and said that we have run some algorithm and there are no material misstatements in the reports”*. Possibly client will need more assurance on procedures performed and opinions made because as mentioned before there is a possibility of errors, wrongly interpreted information and etc.

Clients are not the only users of the financial statements, depending on the business they also can be suppliers, buyers, banks, investors, and other third parties. In order for AI to work autonomously and give decisions it has to be trusted by all of the end users of audited information. In other words, ***opinion towards AI*** in business has to be ***unified*** and probably regulated: *“It is not only that the use of Artificial Intelligence in auditing would be successful to the extent that the audit firms have implemented and applied it properly, but that the attitude of the public, in general, has to be the same towards the use of this solution, Artificial Intelligence, the scale of its use, because it is all about trust, after all, and until there is a level of trust between auditors, information consumers, regulators, clients and so on, the issue will be unbalanced”*.

Based on audit standards auditors ***must keep professional skepticism*** and professional judgment and AI is only working based on historical data which raises the question of whether it could be possible for AI to implement such features:

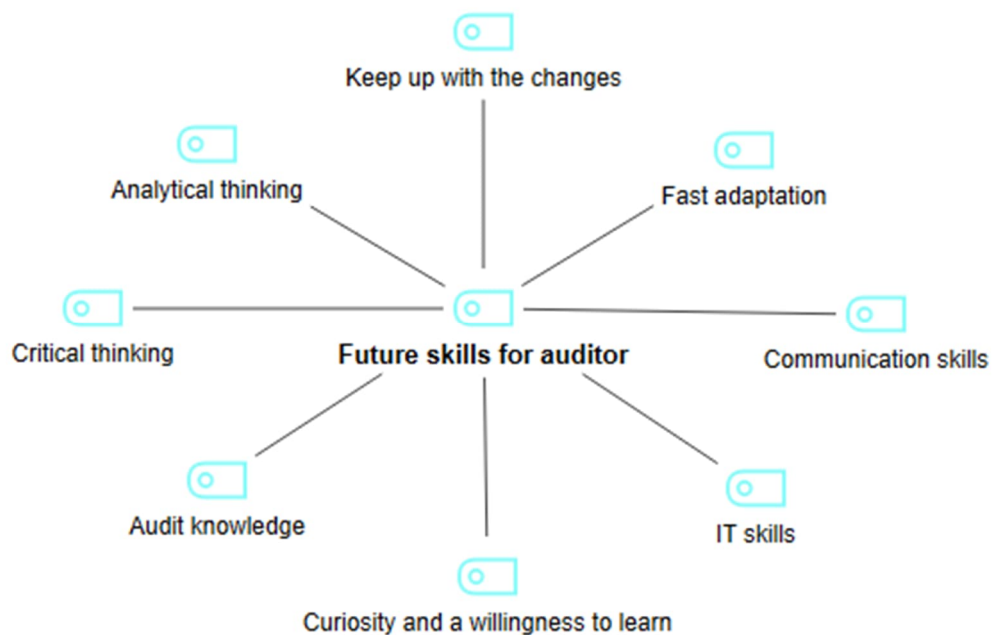
- *“From the point of view that, as a professional, the auditor is bound by things like professional skepticism, professional judgment. Professional judgment is a set of knowledge, experience, and skills. Knowledge can probably be concentrated in Artificial Intelligence, experience it will learn, but the question is how long will it take, skills - well, maybe it will learn too... But in a word, if we look deeper into what a professional judgment is, it would be a question of how we can train an AI effectively, quickly”*.
- *“When reading the financial statements, to take into account a lot of risks according to their professional skepticism, their understanding, which is something that Artificial Intelligence is not yet capable of doing these days”*.

And lastly, even though all interviewed auditors think that they will not be fully replaced by Artificial Intelligence in the future, they all stated that nevertheless, it will have a positive impact on the audit, procedures, and overall, all work as it has many benefits which were described in 4.3 section: *“I can see AI influencing and positively impacting all our work. There are several tools in the audit team and everyone higher up equally supervises the work of junior colleague”*.

To conclude, all interviewees stated that Artificial Intelligence will have great impact to auditors work in the future and will probably take over majority of them, however they believe that it will not replace the auditor profession as it cannot make autonomous decisions and be responsible for made conclusions.

#### 4.7. Auditor skills which will be required in the future

During the interviews, it was discussed that Artificial Intelligence will change how audit is done and it is likely that it will change the scope of skills required for auditors to be competitive in the market. One of the questions asked audit specialists what skills will be crucial for their profession in the future and based on the answers received map was created (see Figure 17 **Figure 17**).



**Figure 17.** Map of skills which will be required for the auditor (prepared by the author)

Firstly, not all auditors agreed that there will be a need for a new set of skills. One stated that at least in the company he is working for they already have all the required skills including adaptation to technology and he does not think that they will need deeper IT knowledge: *“In order to stay competitive in our company we already have and work with those skills, which are not only understanding the company's business but also understanding what's happening in the marketplace, improving the audit, the effectiveness of the audit, using new tools and identifying areas where those new tools can be used. So, I think we are already working fast in those areas”*. Another auditor had a similar opinion and said that the same skills will be required including adaptation to the new tools which are already being done now: *“No development will be required from auditors. It will be more about using the tools that somebody creates, and you have to adapt to them quickly and learn how to use them”*.

Eight interviewed auditors first referred to the need for **Information Technology skills**, however, the opinion on the extent of it was different. One auditor believes that auditors will need to have more extensive knowledge about technologies and how they are developed: *“and some involvement in the process with the developers”*. Nine out of ten interviewees agreed that auditors will not be required

to have advanced IT knowledge and rather will need to **learn how to adapt quickly** and **understand how tools are working** in order to understand the results or reports that are being formed by them:

- “You'll have to know maybe not as much as you'd have to know in programming, but again you'll have to know how to get to grips with it, how to navigate quickly, how to find your way around all those Artificial Intelligence programs, the possibilities, and so on”.
- “It's more about learning, thinking, and looking at how to understand what it is so that you can use AI and other tools to your advantage”.
- “I think that already the development of the same solution in IT will be done by those who are specifically involved in IT development. <...> The auditor <...> needs to understand how it works but he doesn't need to know how to write the code to make it work”.

One expert concentrated more on the **processing of initial information** which will be input into new tools and how auditors should understand what information is needed, how it is processed, and be able to explain it to the client: “We get the data from the client, but we don't know how it's put together there. So, I think in the future we will definitely need to understand more about data processing because it is natural that there will be questions from the client's side as well when we ask for data in one format or another”.

All auditors stated that basic **audit and accounting knowledge** will not be replaced by AI and it will be required to have it: “Maybe it will be mostly expert knowledge and expert skills that you have acquired over the years in audit, which you don't get immediately when you come here and so on, but the fact is that you will actually need all the skills that we have now”. One auditor thinks that in the future it will be crucial not only to quickly **adapt** to technologies but also to changing regulations and standards. A few auditors also said that you will need not only to adapt quickly but also to **be innovative** and search for novelties as well: “The main skill will probably be curiosity and a willingness to learn new things”.

Few experts highlighted the need for **analytical and critical thinking** in the future due to the implementation of AI in audit procedures: “The main one - critical thinking - and that's relevant now and will be even more relevant in the future because more and more work will be done by these automated procedures with Artificial Intelligence, but the data and the results will need to be analyzed. Analytical thinking and critical thinking will probably be the main things that an auditor will need”.

Lastly, three interviewees talked about the importance of **communication skills**. As AI will be integrated into the majority of audit procedures communication with the client might suffer, thus it is very important to keep a good relationship with the clients: “So even if the simplest type of work is done by Artificial Intelligence, the communication and the shaping of the company's image, not only as an image but also as an auditing profession, is still in the hands of a human being. So, I think that from that perspective, we should be even more insightful, have even more communication with the people in charge in companies, have even more professional communication in this area”. Also, it was already discussed that AI and tools will not be able to discuss with the client rising issues, thus humans will have to be included in such parts: “auditors still work in teams, with people both within the team and with the client. This means no tool can replace human skills, communication, critical thinking”.

The majority of respondents believe that the required set of skills for auditors will change in the future but not very significant as they still will need to have audit and accounting knowledge and analytical and critical thinking skills, however, the last one will need to be developed even more because auditors will need to assess AI provided results and make proper decisions. Also, auditors will need to learn at least basic IT knowledge and understand how newly implemented tools are working, how are they processing the data and providing results. Only one auditor believed that there will be a need for advanced IT knowledge in the future.

To conclude all interviews, the application of Artificial Intelligence in audit processes is inevitable probably it will be used in every stage of the audit. Although it has multiple advantages it also has important disadvantages which need to be addressed before starting to use AI or tools with some AI implementation in the audit procedures. All interviewees agree that local small audit companies will probably not have enough financial and human resources to use AI in their work, thus there will be a gap in audits performed between audit companies in Lithuania. Also, all interviewees believe that Artificial Intelligence will not replace auditors but will change how audit is performed and will require auditors to obtain a new set of skills to quickly adapt to the changes and be competitive in the future.

## Conclusions

1. Artificial Intelligence is not yet extensively used in audit as now mainly the biggest audit companies in the world are using or developing such tools. It is also rarely used alone in businesses, as it provides greater value when combined with other digital technologies such as Robotic Process Automation and Machine Learning. Employees lack sufficient knowledge about AI and how it can be applied to work processes, particularly older employees who are unwilling to adjust to change.

Artificial intelligence can be used in various audit processes starting however it has both advantages and disadvantages. Positively, it can increase work efficiency, cover repetitive tasks, allow auditors to spend more time to focus on more important matters, and enhance decision making. On the negative side, it requires significant investment, employees lack technological knowledge, it can cause ethical issues and it is not yet highly developed. The prevailing opinion is that in the near future AI will be used in majority of tasks, however auditors will not be able to fully trust the results and they believe that AI will not be making any decisions. In conclusion, the primary issue is the lack of research on the use of Artificial Intelligence in auditing firms and auditors' attitudes toward it, as the vast majority of research focuses on accounting.

2. Artificial Intelligence is comparably new in the world compared to other digital technologies and not yet much developed. There are various types of AI discussed in the literature, however, there are a limited amount of ones which are fully developed or practically used in work. Usually, AI is used together or with the implementation of other digital technology (mostly RPA or ML) in order to maximize the reliability and accuracy of the results. Theoretical research showed that AI independently or with human intervention can be used in various audit processes such as materiality assessment, preparing initial information, account classification, going concern valuation, analytical review procedures, bankruptcy prediction, risk assessment, and decision making. Based on scientific literature the main issues arising from AI usage are ethical which could have both short-term and long-term damage to surroundings: in the short-term, it can cause unemployment, errors due to malfunctioning algorithms which interpret information wrongly, and also there is a gap in AI legislation; in long-term it can be developed to such extent that it will be able to think as and replace a human. Theoretically, AI usage in audit has both advantages and disadvantages, however, it will have an influence on the demand of auditors in the future as it will make audits more efficient and faster. Therefore, research showed that auditors will have to adapt to the changes and develop or be more orientated into these skills: Information technology/programming skills, knowledge about data analytics tools and their working principles, fundamental data skills, storytelling ability, and different type of degree (not accounting), which means that in the future auditors will have to be more orientated into IT and data analytics. To conclude, AI will influence the audit profession significantly and auditors will have to adapt to it quickly.
3. As there is a gap of knowledge in the literature of auditors' opinions regarding the changes in auditing procedures and threats to the auditor profession it was decided to conduct semi-structured interviews with experienced auditors from the Big Four companies. Ten questions were formed in order to: gain knowledge about the interviewees, to understand their knowledge level about Artificial Intelligence (are they aware of any used or being developed

AI tools in the audit) and in what audit processes it could be used, what are the main benefits and drawbacks of its usage, how it can be regulated to be in line with laws and audit standards, what are perspective of AI usage in Lithuanian audit companies, to understand if in their opinion AI can replace auditors and what new skills will be required for auditors to be competitive in the future. In total, during the April of 2023, ten interviews were conducted, and the transcripts were analyzed using MAXQDA 2022, where all information was divided into groups and sub-groups which helped to identify results and conduct a proper analysis.

4. Qualitative study results showed that Artificial Intelligence is already being used in the audit to some extent and all interviewed people know at least basic knowledge about AI and its capabilities and are aware of how it can be used in audit and what possible impact it can have.

During the interviews, it was identified that AI can be used in all stages of audit – starting from planning to the conclusion: processing of initial information, risk assessment, document reading, relationship analysis, repetitive work, identification of unusual transactions, decision making, subsequent events analysis, work done documentation. Results are quite similar to theoretical research, except theoretically it was not discussed that AI could provide some insights for future or ongoing projects based on historical data.

Based on experienced auditors main benefits of using AI in audit processes would be efficiency, reduction of technical work, the better quality of audits, independence assurance, and increased attractiveness of the profession. The main drawbacks: are differences between audit forms, wrong information, uniqueness of audit, confidentiality, responsibility, compliance with laws and standards, excessive reliance, IT limitations, and learning to use new tools. The main difference compared to theoretical research is that their main issue was ethical while during the interviews majority of auditors do not see significant ethical issues arising from AI. All respondents believe that AI will not replace auditors in the future however auditors will need to learn new skills such as basic IT knowledge, fast adaptation to changing processes and tools, and critical/analytical thinking in order to be competitive.

Overall, the results of these interviews showed that Artificial Intelligence implementation into audit processes is inevitable it will change how audits are performed but will not change auditors' profession, however, audit companies need to thoroughly test applications in order to address all drawbacks and maximize all benefits to gain the best results.

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