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The Accounting Profession in the Twilight Zone: Navigating Digitalisation's Sided Challenges Through Ethical Pathways for Decision-Making

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The Accounting Profession in the *Twilight Zone*: Navigating Digitalisation's Sided Challenges Through Ethical Pathways for Decision-Making

- **Purpose:** The paper aims to explore the sided challenges facing the accounting profession in an advanced digitalized future where humans and robots will collaborate in working teams.
- **Methodology:** Employing a qualitative approach, the paper conducts a reflexive thematic analysis to identify challenges and associated socio-ethical risks of digitalisation; it then introduces an ethical decision-making model aimed at addressing these challenges.
- **Findings:** Key professional accountants' sided challenges refers to autonomy, privacy, balance of power, security, human dignity, non-maleficence and justice, each of them possessing multifaceted dimensions that are interconnected dynamically to create a complex web of socio-ethical risks.
- **Originality:** By innovatively intertwining ethical positions with decision-making pathways, the paper offers a potential solution to address digitalisation's sided challenges that might interfere with practitioners' professional judgement and identity.
- **Practical implications:** The ethical decision-making pathways corresponding to each detected challenges provide a useful reference and guideline for professional accountants in the digitalized future of the profession.
- **Social implications:** Using an anthropocentric perspective, the research addresses the sided challenges of accounting profession's accelerated digitalisation; it contributes to fostering accountability and legitimacy of the accounting profession which serves the public interest.

Keywords: disruptive technologies; Artificial Intelligence; transhumanism; ethics; professional accountants; decision-making; professional judgement

1. Introduction

As Digital Society evolves, it opens the door to a new stage of society's development known as transhumanism. Transhumanism is grounded in the anthropocentric belief that humans are the most important or central entity in the universe and technologies are augmenting human capabilities, sensory reception, emotive ability, and cognitive capacity (Bostrom, 2014). However, fears mount that the utopia envisioned by Internet pioneers regarding the rapid integration and potential of Artificial Intelligence (AI) and other digital technologies into daily life might transform into a dystopian reality. The fast digitalization phenomenon is multifaceted (Unerman & Bennett, 2004), and it is difficult to pinpoint its precise effects. While there is optimism that technological progress will improve the quality of human life and reduce the contradictions of a society that cherishes both the free market of economic liberalism (Grossi & Pianezzi, 2017) and the social welfare of social liberalism (Viale *et al.*, 2017; Argento *et al.*, 2020), some concerns persist. These include fears regarding the loss of sovereignty over humanity's technological creations, loss of individual privacy, and the rise of irrationality (Viale *et al.*, 2017). They may replicate a new form of feudalism known as "techno-feudalism" (Varoufakis, 2024) which could potentially obliterate vital synergies amid systemic inequities, injustices, and discrimination (Wang *et al.*, 2021).

The accelerated digital transformation raises many concerns about the future of the accounting profession (Quattrone, 2016) and calls for future research. Thus, our research explores the actual and possible future challenges of the accounting profession in the "Twilight Zone" (Guthrie *et al.*, 2015), a pivotal space ("*the middle ground between light and shadow, between science and superstition*"), where the complexities of technological advancement intersect with professional practice ("*between the pit of man's fears and the summit of his knowledge*")¹. Against this background, we aim to illuminate the nuanced challenges inherent in digital transformation, offering a concrete understanding of its dynamic implications for ethical decision-making.

Until now, a significant part of the research has primarily focused on the practical advantages and implications of incorporating AI into accounting practices. Digital transformation improves system efficiency (Arnaboldi *et al.*, 2017) and, in some cases, completely alters the business model (Estep *et al.*, 2023). Given that AI relies on pre-programmed algorithms created by humans, it is critical to consider the ethical implications of using these technologies. Acknowledging the potential nihilistic aspects of digital culture amid the decline of technological society (Gertz, 2018), ethical decision-making in a digitalized environment should entail considering the moral implications of technological advancements and their impact on individuals and society. This requires addressing inquiries related to human autonomy, privacy, equality, social justice, and the potential consequences of technological interventions (Unerman & Bennett, 2004; Martinez, 2011; Viale *et al.*, 2017; Knudsen, 2020).

¹ The Twilight Zone, TV Series, 1959–1964, 2019

For this reason, our research focuses on the dystopian facet and aims to reveal the sided challenges of the professional accountants (PAs) in a transhumanist workplace from an ontological and epistemological perspective of ethics and propose possible judgemental ethical pathways for a PA to avoid them.

Our research contributes to the debates that explore issues related to ethics and disruptive technologies in the specific context of the accounting profession, where human supremacy is recognised as one of the core features of the profession, which serves the public interest and is based on professional ethical judgement.

The research employs a qualitative approach. First, the paper provides a reflexive thematic analysis of the digital transformation's challenges based on academic literature. As a result, six major themes (autonomy, privacy, balance of power, security, human dignity, non-maleficence and justice) are assigned to the accounting profession's digitalisation challenges. Second, in response to these challenges reflecting the dark side of accelerated digitalisation, the paper proposes mediation links in the form of a useful ethical decision making pathways. The application of the model may assist in handling difficult situations by allowing the accounting profession to reflect on itself, uncovering contradictions, and displaying symbols for the six dominant ethical pathways. Our research aligns with the contemporary focus on technology user readiness, multi-actor ecosystems support (Geels, 2014; Mora & Deakin, 2019), and a systematic approach, while also advocating for testing innovations in living labs (Mancini *et al.*, 2017) within a connected society.

The paper structure continues with the theoretical framework. The methodology section describes the steps taken to achieve the research objectives. The results section discusses the main socio-ethical risks of digital transformation for accounting organisations, followed by a discussion section where we propose solutions, as well as further developments, and the last section presents the conclusions.

2. A theoretical framework for PA's ethical decision-making for dystopian dilemmas in transhumanism

Following the society's development, the accounting profession is transforming and facing profound challenges, out of which we depict the most impactful ones. First, data collection now extends beyond governments to corporations (Arnaboldi *et al.*, 2017), a departure from Orwell's (1949) prediction of capitalism's abolition and a closer alignment with Huxley's (1932) dystopian perspective of a "Brave New World". Second, data is now collected and stored as a default practice (Munoko *et al.*, 2020). Last, but not least, AI's capacity to minutely analyse data enables pervasive surveillance that is less resource-intensive, cost-effective, inconspicuous to those under monitoring (Viale *et al.*, 2017), and expansive in scope. Thus, this new context is represented either as a utopian (Grossi & Pianezzi, 2017; Mora & Deakin, 2019; Argento *et al.*, 2020) or a dystopian future, alias a "Promethean promise".

Digitalisation presents a *utopian* vision for PAs, promising an enhanced quality of life through digital tools, equal training opportunities, global mobility, and remote work, all of which improve work-life balance (Grossi & Pianezzi, 2017; Mora & Deakin, 2019). An augmented workforce elevates human capabilities through technology, fostering "collective intelligence" in large accounting settings where human intelligence and Artificial Intelligence synergize (Tiron-Tudor & Deliu, 2022).

Conversely, the *dystopian* aspect of digitalisation is evident as robots undertake various tasks performed by PAs. This shift signals a future where complex duties involving cognitive work, professional reasoning, and pattern-based decision-making may also be automated (Shaw, 2019; Munoko *et al.*, 2020). The darker picture of technological evolution includes labour deskilling, fewer jobs, intensified workload (Lehner *et al.*, 2022), increased surveillance under powerful control systems (Martinez, 2011; Mancini *et al.*, 2017), impoverishment of labour content (Quattrone, 2016), and potential exclusion of individuals resisting change passively (Geels, 2014; Mora & Deakin, 2019). Thus, the sided effects embody a variety of tensions, contradictions, and interpretations around the core ideas of reason, rationality, ethics, justice, democracy, social systems and individual aspirations (Bostrom, 2014; Gertz, 2018). These have an immediate effect on human heritage, culture, and environment that value freethinking, personal responsibility, individual freedom, self-direction, self-respect, rational thinking, and respect for others.

Against this backdrop, we embrace Nietzsche's (1874, 1883) viewpoint on the necessity for a "new age" spirit within the impending emergence of a digital culture amid the waning shadows of technological society. While he did not directly address technology and digitalisation as we understand them today, his philosophical concepts can be applied to contemporary discussions about technology, thus paving the way for our examination. Nietzsche's critique of modernity and the consequences of nihilism resonate with current debates on the impact of technology on human values and meaning. His exploration of the "will to power" can also be interpreted in the context of technological advancement and the drive for innovation and control over our environment. *Nietzsche's philosophy* explores human existence, morality, and power, providing valuable insights into different aspects of human experience and society. In the current era, society grapples with the coexistence of humans and AI systems, as scientific and technological progress grants humans enhanced capacities. Embracing the technology, people are increasingly adopting a "transhuman" identity, accepting physical and intellectual enhancements and

embodying Nietzsche's vision of the *Übermensch*: "Man is something that shall be overcome". Some of Nietzsche's ideas are extremely relevant to the ethical decision-making process in the transhumanist context. His critique of traditional moral values can shed light on the power dynamics inherent in disruptive technologies, particularly concerning sensitive aspects of data collection and surveillance. Additionally, his focus on individual self-realisation and the embrace of personal potential resonates with the transhumanist aspiration for self-improvement. Nietzsche's view, rejecting absolute truths and emphasising interpretations, can assess the ethical considerations in the subjective nature of digital data and diverse perspectives shaping interpretation. Overall, his ideas suggest that the era of technology embodies a paradox: it fulfils the ideals of idealism while simultaneously negating them. Technology draws its motivation and values from idealistic principles, yet its "ideology" opposes idealism. This dichotomy scrutinizes the very essence of consciousness in the digital age.

Using Nietzsche's (1874, 1883) philosophy, the exploration of the accounting profession in transhumanism is grounded in three key ideas: (i) *A vision of human self-overcoming* envisions surpassing biological limits for a superior form of existence. Nietzsche's concept of the "superior individual" transcends human conditions through "will to power", revaluation of values, and individual improvement, aligning with transhumanism's goal to use technology for human enhancement, self-creation, and transcendence (i.e., the importance of becoming through technology). (ii) *Critique of morality* challenges traditional morality and conventional values, asserting that they constrain individual potential and development. Transhumanism similarly criticises norms, seeking to overcome societal constraints through technology and human enhancement, fostering self-creation. (iii) *Challenging limits* encourages individuals to surpass their limits and construct their existence. Transhumanism advocates for individual autonomy and the freedom to shape one's evolution, surpassing biological constraints through technology and innovation.

These ideas are applied regarding the use of technology to enhance human abilities and potential, to surpass traditional limits, and to promote a form of "transcendence" through technological enhancement. **Figure 1** provides a visual representation of our conceptual framework at the emergence of Nietzsche's philosophy, transhumanism, and the accelerated digital transformation of the accounting profession:

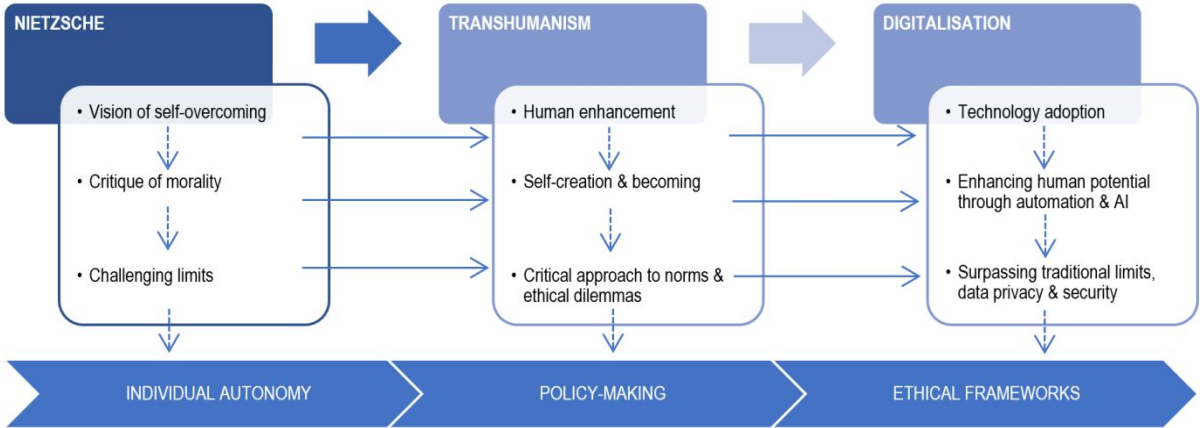


Figure 1. The theoretical framework of the paper

The *vertical* orientation of the theoretical framework illustrates the hierarchical relationships within each thematic category, showcasing how foundational concepts lead to more specific considerations in each domain. First, Nietzsche's vision of self-overcoming leads to a critique of morality, encouraging individuals to question established norms. This critique, in turn, fosters a mindset of challenging societal and personal limits, promoting autonomy. Policies promoting human enhancement set the stage for self-creation. Second, policies address ethical challenges by ensuring responsible practices in transhumanist technologies and supporting autonomy. Third, technology adoption leads to ethical frameworks guiding the enhancement of human potential through automation and AI. These frameworks extend to policies addressing challenges like surpassing traditional limits, data privacy and security, and preserving digital autonomy.

The *horizontal* orientation illustrates relationships across main categories and subcategories. First, Nietzsche's vision of self-overcoming is consistent with transhumanism's emphasis on human enhancement; this extends to digitalisation, where pursuing self-overcoming and human enhancement influences technology adoption. Second, Nietzsche's critique of morality resonates with transhumanism's emphasis on self-creation. Policies for self-creation impact digitalisation's ethical frameworks, shaping how technology is adopted to enhance human potential while respecting autonomy. Third, the call to challenge limits aligns with transhumanism's critical approach to norms and ethical dilemmas. This extends to digitalisation, where ethical frameworks address challenges like surpassing traditional limits, data privacy, and security.

Hence, Nietzsche's philosophical ideas and transhumanism's technological ideas connect with digital transformation and the development of ethical frameworks. Henceforth, our approach provides a backdrop for

ethical considerations within transhumanism from the perspectives of personal autonomy, the pursuit of self-realisation, the use of technology in human enhancement, the balance between individual and collective values, and the potential impact on human identity and flourishing.

Within this frame of reference, we consider that *ethical decision-making in transhumanism* involves considering the moral implications of AI systems and their impact on individuals, society, and the environment. By incorporating these philosophical concepts, PAs and accounting organisations can engage in thoughtful ethical discussions and considerations when making decisions regarding the deployment, development, and use of disruptive technologies. AI systems are increasingly able to simulate human judgement and collect evidence, and PAs are expected to incorporate it into their decisions (Commerford *et al.*, 2023).

The evolving philosophy of technology suggests that “we shape technologies just as technologies shape us”, posing the existential question of whether technology empowers or enslaves. Nihilist debates centre on reconciling human values with technological progress, prompting reflection on navigating conflicts between values and progress (i.e., “What should we do when values and progress come into direct conflict with each other?”) (Gertz, 2018). In this context, balancing superficial enthusiasm and techno-pessimism about the future of the accounting profession requires nuanced cartographies of the transhuman status of PAs.

Consequently, in the digitalised work environment, the fragmentation and discontinuity in innovation processes (Mancini *et al.*, 2017) lead to shifts in work dynamics and professional parameters. Primarily, the conventional markers of professional identity (i.e., professional judgement, professional expertise, professional scepticism, upskilling, deskilling, and serving the public interest) are radically changing due to technology. Additionally, the role of the accounting profession in society is evolving to enhance the trust among societal actors. PAs may find themselves navigating a fluid, interconnected transhumanist environment, challenging traditional power structures (Zhang *et al.*, 2023) in pursuit of decentralised subjectivity.

This prompts us to explore the challenges that could impact the professional judgement of PAs, the most important marker of their professional identity, along with their ethical decision-making in the “*Twilight Zone*”. To offer potential solutions, this paper provides various insights, moving through existential ontologies, critical utopianism, and ethical imperatives. Our study intends to offer perspectives on how such clashes might be addressed and comprehended.

3. Methodology

The research design implies two steps, each with a specific objective. The first step aims to assess and identify the state of the art in the scientific literature on the challenges of the digital transformation of the accounting profession, revealing possible dystopian outcomes and decision-making dilemmas for PAs in transhumanism. In the second step, by using the Throughput Model, we explore ethical pathways for PAs that may provide guidance on how decisions might be accomplished in the transhumanist context based on ethical considerations to enhance the organisation's core values (Shaw, 2019; Munoko *et al.*, 2020; Stahl *et al.*, 2021).

3.1. Literature review procedure

Initially, we conducted a systematic review of academic publications to collect studies on ethical issues arising from the digital transformation of the accounting profession. We sourced relevant publications through a keyword search on the Web of Science (WoS) platform, chosen for its extensive coverage of high-impact journals relevant to our research topic, enabling us to pinpoint the most impactful and pertinent papers in terms of quality (Ding *et al.*, 2017). The keyword combinations used were: (“ethic” OR “judgement” OR “decision-making”) AND (“accounting” OR “audit”) AND (“digital*” OR “AI” OR “algorithm*” OR “technology*”). The employed keyword combinations were: (“ethic” OR “judgement” OR “decision-making”) AND (“accounting” OR “audit”) AND (“digital*” OR “AI” OR “algorithm*” OR “technology*”). Filters were applied for searching in the title, language (English), and WoS category (Business, Finance, Management and Economics). A parallel search was conducted in the Scopus database covering subject areas in Business, Management, and Accounting. This initial search provided a pool of 62 academic sources. We thoroughly screened the search results to select only those sources addressing the relevant study domain while filtering out sources covering unrelated topics (Schmitz & Leoni, 2019). This resulted in a total of 21 publications that explicitly address ethical concerns in the accounting profession emerging in an AI environment.

As the exploration of this topic is in its early stages within core economic literature, we found it beneficial to extend our search to Information Systems literature, where ethical issues are extensively debated. Using the keyword combinations (“ethic” OR “judgement” OR “decision-making”) AND (“computing” OR “IT”) AND (“digital*” OR “AI” OR “algorithm*” OR “technology*”), we initially identified 41 titles. After a rigorous review process, we found 10 titles that are directly relevant to our research objectives. Rather than evaluating a large-scale sample of different web-based sources superficially, a smaller sample size provides more insights into significant themes and the underlying strategic intentions of professionals (Schmitz & Leoni, 2019). The final sample of articles analysed is presented in *Table 1*.

Using the retained sample, we conducted a qualitative reflexive thematic analysis (RTA) to understand and interpret existing literature. RTA prioritises breadth over depth in coverage, allowing researchers to actively contribute to knowledge production through their interpretations of meaning patterns across the dataset. This approach reflects the researcher's interpretive analysis at the intersection of the dataset, theoretical assumptions, and analytical skills (Braun & Clarke, 2019).

The research team employed a collaborative and reflexive approach, prioritising richer interpretations over a consensus on meaning. Codes were generated through an inductive, “data-driven” technique, ensuring they reflected the data's substance without pre-existing theoretical constraints (Braun & Clarke, 2013). Open coding allowed us to capture meaning from scientific arguments rather than fitting them into a predetermined frame. Combining conclusions from papers with different theories posed a methodological challenge in the literature review. To address this, the team navigated through regular discussions and iterative reflections, identifying common threads and patterns across diverse theoretical perspectives. The synthesis highlighted various approaches, considering diversity as a strength that enriches the overall understanding of the topic.

The authors individually coded the papers, resolving any divergent opinions on codes or thematic categorizations through discussions to reach consensus. The initial codes extracted from the articles primarily reflect the risks. For instance, pervasive techniques, subconscious Internet of Things (IoT) influence, biased information manipulation, micromanagement culture, and algorithmic reliance, all illustrate the risk of “control and manipulation through technology”. Subsequently, these risks (or first codes) were organised into challenges (or second codes). For example, risks related to technological paternalism, control and manipulation through technology, steering preferences and freedom of choice, pure autonomous systems, and filtering and freedom of expression were all grouped under the “autonomy” challenge. We identified six primary sided challenges of a PAs operating in a transhumanist setting (*Table 1*).

Table 1: Main sided challenges emerging in an AI environment

Field	Reference	Autonomy	Privacy	Balance of power	Security	Human dignity	Non-maleficence and justice
Accounting	Alles <i>et al.</i> (2022)	X	X		X	X	X
	Arnaboldi <i>et al.</i> (2017)	X	X				X
	Commerford <i>et al.</i> (2022)	X		X	X		
	Dahlin (2019)	X	X	X	X	X	
	Estep <i>et al.</i> (2023)	X		X			
	Eulerich <i>et al.</i> (2023)				X	X	
	Gunz & Thorne (2020)	X				X	X
	Knudsen (2020)	X	X	X			X
	Kruskopf <i>et al.</i> (2022)	X	X	X	X	X	
	Lehner <i>et al.</i> (2022)		X	X			X
	Martin (2019)	X		X		X	X
	Martinez (2011)		X			X	
	Moll & Yigitbasioglu (2019)	X	X	X	X		
	Munoko <i>et al.</i> (2020)	X	X	X	X	X	X
	Quattrone (2016)	X		X	X		
	Sonnerfeldt & Jonnergård (2023)	X				X	
	Seethamraju & Hecimovic (2022)		X	X	X		
	Sutton <i>et al.</i> (2018)	X	X	X	X	X	X
	Tiron-Tudor & Deliu (2022)	X	X	X	X		X
	Tiron-Tudor <i>et al.</i> (2021)	X					X

	Zhang <i>et al.</i> (2023)	X	X	X	X	X	X
	Gordon <i>et al.</i> (2022)	X	X	X		X	X
	Holt <i>et al.</i> (2017)	X	X	X		X	
	Madary & Metzinger (2016)				X	X	
	Müller (2021)	X		X			X
	Roman <i>et al.</i> (2013)	X	X		X		
	Royakkers <i>et al.</i> (2018)	X	X	X	X	X	X
	Shaw (2019)	X	X			X	
	Spahn (2013)	X		X		X	
	Spiekermann & Pallas (2006)	X	X	X			
	Stahl <i>et al.</i> (2021)	X	X				

Each challenge is discussed in the Results section, highlighting the most significant socio-ethical risks implications.

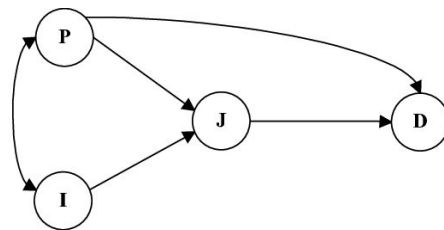
3.2. Ethical decision-making model architecture

The theoretical framework depicted in **Figure 1** ties digitalisation with ethical considerations. Therefore, after detecting and debating the myriad of sided challenges generating socio-ethical risks and their synergic effect, we are proposing an ethical decision-making way, grounded in the Throughput Model (Rodgers & Gago, 2001).

The Throughput Model (TM) is suitable to evaluate the specific influence of the identified challenges on ethical decision-making in an AI-based future of the accounting profession and clarifies critical pathways that may be followed. It provides a basis for how *perception* (framing situational conditions) interrelates to *information* and impacts *judgement* (analysis of information and situational conditions) and *decision choice* (Rodgers & Gago, 2001). This model is unique since it entails addressing issues such as privacy, security, algorithmic bias, the digital divide, and the broader socio-cultural consequences of digital transformation. Hence, this particular architecture is instrumental in addressing cognitive biases (Guiral *et al.*, 2015).

Moreover, this model aligns with critical theory's sociological facet, uncovering fundamental concepts beneath the surface of social life and highlighting assumptions for enhanced understanding. The model's ideal theoretic structure disrupts established thinking, empowering PAs with the knowledge to navigate situations effectively. This approach can specify constructive acumen about how distinct pathways may influence the strategies exercised by PAs.

The TM identifies six key pathways in ethical decision-making that form a parallel rather than a serial process (**Figure 2**).



where P= perception, I= information, J= judgement, and D= decision choice.

Figure 2: The Throughput Model (Rodgers & Gago, 2001)

The interrelation of perception and information (i.e., $P \rightarrow I$ in **Figure 2**) is analogous to a Bayesian statistic in that the “information” concept is continuously transforming a person's perception. That is, preceding information is often denoted within the “information” construct. Additionally, information sources obliterate individuals' prior decisions. Therefore, the $P \rightarrow I$ correlation functions in part as a frame that is comparable to a neural network (Rodgers & Gago, 2001). The flexibility of cognitive processing in an AI deep neural network is dependent on experience from previous decisions. Decision results are consistently provided to the decision-maker and decision pathway in a continuous loop of reinforcement learning.

To apply TM effectively, it is essential to break up all the paths marked with arrows in *Figure 2* into sets of general pathways that can then be independently analysed for their contributing properties to individuals' decision processes (Guiral *et al.*, 2015). Each pathway represents a distinct aspect of the decision-making process, facilitating a comprehensive examination of the factors influencing ethical decision-making in accounting (Rodgers & Gago, 2001). The traits impacting PA's decision-making can be assessed independently along these six potential decision-making routes, reflecting six prominent *ethical positions* (*Figure 2*). These positions signify distinct philosophical stances, embodying different priorities, values, and considerations in ethical reasoning. This approach enabled us to elucidate the complex interplay between individual agency, societal norms, and technological advancements, thereby shaping ethical decision-making within the accounting profession.

- (1) $P \rightarrow D$ depicts *ethical egoism*, which stresses that individuals are always motivated to act in their perceived self-interest. Nietzsche's (1874, 1883) philosophy emphasizes the idea of self-overcoming and individual agency. According to the TM, this fits with ethical egoism because individuals are seen as acting in their own best interests. Nietzsche's concept that "he who does not obey himself will be commanded" resonates with the model's focus on the challenge regarding personal **autonomy**.
- (2) $I \rightarrow P \rightarrow D$ underlines the *relativist* perspective that assumes that decision-makers use themselves or the people around them as their basis for defining ethical standards. Relativism, in the context of Nietzsche (1874, 1883), can be seen through his critique of fixed moral standards. The TM facilitates an examination of decision-makers' reliance on personal or societal bases for ethical standards regarding **privacy** challenges.
- (3) $I \rightarrow P \rightarrow J \rightarrow D$ characterises the *ethics of care* philosophy (or stakeholders' position), which focuses on a set of character traits that are deeply valued in close personal relationships, such as sympathy, compassion, fidelity, love, friendship, and the like. Lastly, the ethics of care philosophy, rooted in personal relationships, can be linked to Nietzsche's (1874, 1883) emphasis on values such as sympathy and compassion. By addressing socio-ethical issues, TM allows the PA to consider these character traits in decision-making when dealing with a **balance of power** challenge.
- (4) $I \rightarrow J \rightarrow D$ suggests the *utilitarian* position, which is concerned with consequences as well as the greatest good for the greatest number of people. Utilitarianism, another ethical position, finds resonance with Nietzsche's (1874, 1883) emphasis on consequences and the pursuit of the greatest good. The TM enables the PA to consider the broader consequences of their decisions in light of **security** challenges.
- (5) $P \rightarrow I \rightarrow J \rightarrow D$ reflects the *virtue ethics* outlook, as represented by Plato and Aristotle. The cultivation of virtuous traits of character is viewed as morality's primary function. Morality and implicit virtue ethics, central to Nietzschean thought (1874, 1883), are reflected in the TM's emphasis on cultivating virtuous traits in the decision-making process, addressing challenges regarding **human dignity**.
- (6) $P \rightarrow J \rightarrow D$ depicts the *deontology* viewpoint, which emphasizes the rights of individuals and the judgements associated with a particular decision process rather than its choices. Furthermore, the TM allows for the exploration of deontology, emphasising individual rights and judgement in the decision-making process. Nietzsche's (1874, 1883) stance on the importance of individual judgement as regards challenges regarding **non-maleficence and justice**.

In conclusion, the TM, grounded in six dominant ethical theories - *ethical egoism, relativism, ethics of care, utilitarianism, virtue ethics, and deontology* - empowers PAs to disentangle each of the six socio-ethical issues. This model, which draws inspiration from Nietzsche's (1874, 1883) philosophy, offers a systematic framework for comprehending and navigating the perplexing interplay between *autonomy, privacy, balance of power, security, human dignity, non-maleficence and justice*.

The novelty of this research lies in intertwining ethical positions with decision-making pathways. Therefore, this research is primarily focused on the decision-making process and how ethical positions can improve human-AI team synergy. Consequently, this study advances research by prioritising ethical decisions in a transhumanist future.

4. Results: The myriad of sided challenges generating socio-ethical risks and their synergistic effect

A thorough examination of each challenge facilitates a comprehensive understanding by delving into recurring themes identified in specialised literature. For each identified sided challenges (referred to as main themes), we revealed associated socio-ethical risks (referred to as sub-themes). Our approach not only highlights individual concerns but also emphasises the inherent interconnections and relationships among sub-themes within each overarching theme. These sub-themes are linked, demonstrating varying degrees of interconnectedness and interplay. Although our depiction is not exhaustive, it offers an overview of the diverse socio-ethical risks arising from digitalisation in the accounting profession.

On the one hand, *autonomy*, *privacy*, and *human dignity* are the most well-known and universally accepted liberal values in traditional communities (Grossi & Pianezzi, 2017). On the other hand, although distinctively constructed within a liberal polity, *balance of power*, *security*, and *justice* are values that ought to be found in a modern, emancipated society (Viale *et al.*, 2017; Argento *et al.*, 2020).

Debates on accelerated digitalisation's challenges for the accounting profession primarily revolve around *autonomy*, *privacy*, *balance of power*, *security*, *human dignity*, and *non-maleficence and justice* in a snowball effect, seldom expanding to more detailed socio-ethical risks (Stahl *et al.*, 2021). By identifying their corresponding socio-ethical risks, we aim to delve into the implications of AI-human interaction within the specific domain of accounting and auditing.

The resulting thematic map (Figure 3) depicts these main themes and their corresponding sub-themes. It illustrates network connections between all the sub-themes, with some extending beyond their own theme. Black lines connecting the themes highlight these connections between sub-themes, facilitating a clearer understanding of their interrelations.

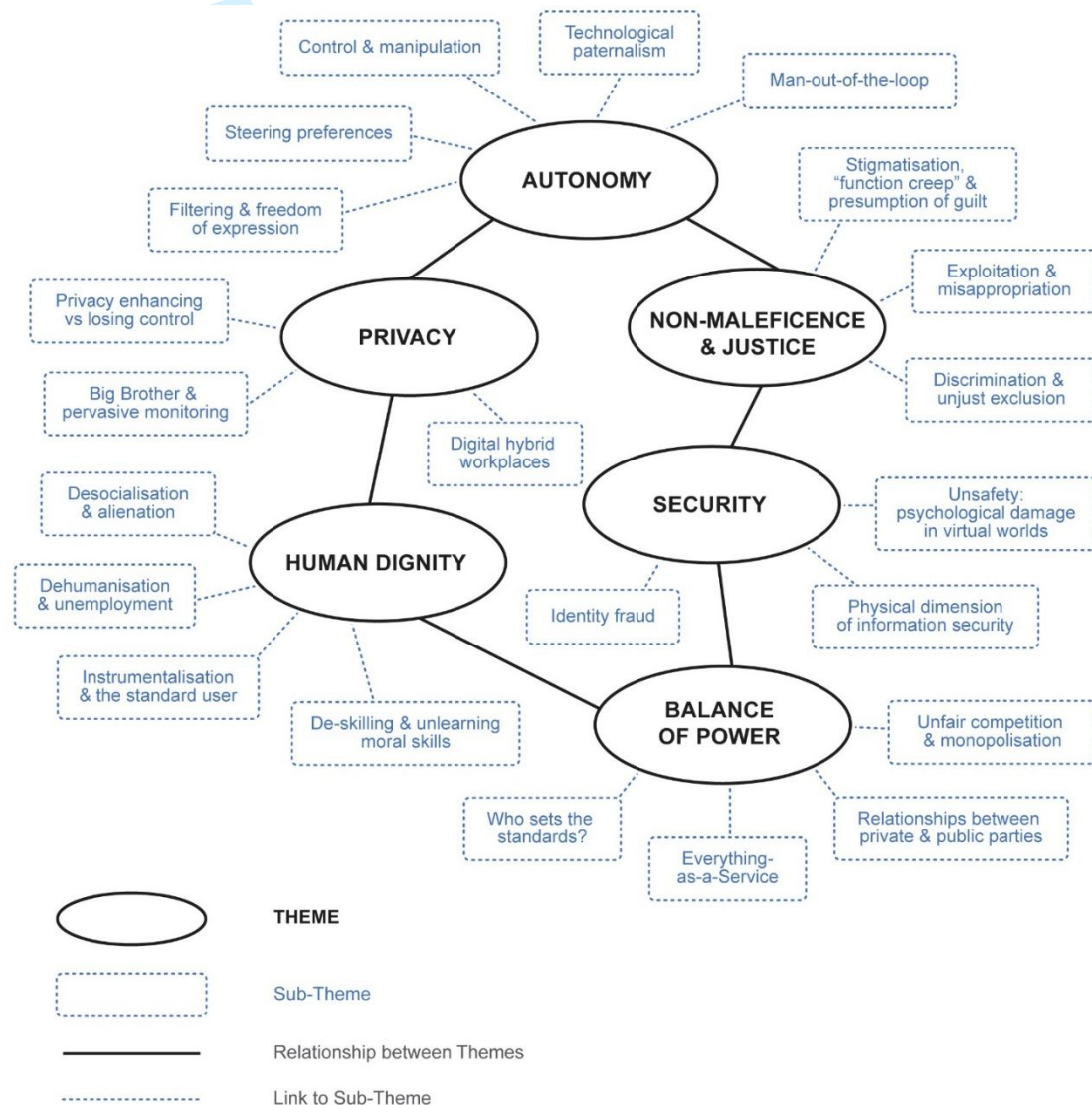


Figure 3: Thematic map of the six-sided challenges and their generated socio-ethical risks

i. AUTONOMY

Pervasive technology raises a crucial ethical question: to what extent can individuals maintain their autonomy, and when should technology be employed (Sonnerfeldt & Jonnergård, 2023)? With the increasing use of automated and AI systems (Martin, 2019; Kruskopf *et al.*, 2022), there is a concern that PAs may have limited control over both the decisions that affect them (Commerford *et al.*, 2022; Zhang *et al.*, 2023) and the choices they make (Quattrone, 2016; Arnaboldi *et al.*, 2017).

Ethically, paternalism involves imposing presumed solutions on others without their consent, presenting a dilemma as it violates autonomy and may involve persuasion and manipulation (Alles *et al.*, 2022; Estep *et al.*, 2023). **Technological paternalism** occurs when AI systems exert control or influence over individuals, imposing decisions or actions on them for their perceived benefit, often without explicit consent, but to guide or protect them (Spiekermann & Pallas, 2006). For PAs, AI systems can serve as both a comfort and a source of technological paternalism (Stahl *et al.*, 2021; Viale *et al.*, 2017; Gordon *et al.*, 2022), relying on predefined regulations (Martin, 2019) and strict enforcement of rules. For example, while AI-based Auditing Tools can prevent errors or fraud, analyse vast amounts of financial data, detect anomalies, and generate reports (Commerford *et al.*, 2022), they may also limit the PA's autonomy and decision-making abilities (Alles *et al.*, 2022). Even more, since the results of Data Analytics are seen as reflecting the truth, the PA may no longer be required in the decision-making sphere (Quattrone, 2016; Gunz & Thorne, 2020). Once technologically derived data are perceived as absolute truth, it narrows the space for human judgement. The ethical dilemma arises when considering whether the robot should be allowed to make decisions jointly (Royakkers *et al.*, 2018) or on behalf of PAs (Dahlin, 2019), as this can compromise their autonomy (Roman *et al.*, 2013; Moll & Yigitbasioglu, 2019) and limit their professional judgement (Estep *et al.*, 2023). This can raise concerns about the erosion of accountability (Gunz & Thorne, 2020), professional responsibility (Munoko *et al.*, 2020), and the potential for errors or biases (Commerford *et al.*, 2022) in automated decision-making processes. Long-term use of AI systems may lead to "power over the user", wherein auditors focus solely on issues identified by the AI system (Alles *et al.*, 2022), affecting their professional scepticism. However, choosing not to impose a solution, may neglect the best interests of individuals or businesses (Tiron-Tudor & Deliu, 2022). While a paternalistic approach may be feasible in human-AI interactions, there is ongoing debate about interfering with individual autonomy (Martin, 2019; Kruskopf *et al.*, 2022). This is because relying on these tools may restrict the PA's independent reasoning and critical thinking.

Consequently, there's a cascade effect, wherein **control and manipulation through technology** involve using pervasive techniques, behavioural profiling, and targeted advertising to shape individuals' decision-making, ultimately influencing their choices and actions. To safeguard autonomy, persuasive technology must ensure voluntariness (Spahn, 2013), meaning actions are willingly taken without excessive stimuli or coercion. Ideally, pervasive technology should guide users toward desired behaviours rather than manipulating them (Royakkers *et al.*, 2018), eventually becoming obsolete. In an IoT context, disruptive technologies may subtly and subconsciously influence behaviour (Roman *et al.*, 2013; Moll & Yigitbasioglu, 2019), posing a threat to autonomy if regulation occurs without individuals' awareness (Royakkers *et al.*, 2018). For PAs, controlling influences arise when technologies (i.e. data analytics and visualisation tools) manipulate information (Arnaboldi *et al.*, 2017; Munoko *et al.*, 2020), potentially leading to biased or misleading outcomes (Quattrone, 2016; Zhang *et al.*, 2023). Time-tracking tools may create a sense of constant monitoring (Moll & Yigitbasioglu, 2019) and pressure to conform (Holt *et al.*, 2017). Although they can enhance productivity management, they may also foster a culture of micromanagement, exerting control over PA's work processes and time allocation. Also, while Key Performance Indicators offer valuable feedback (Arnaboldi *et al.*, 2017), an excessive focus on predefined metrics can prioritise quantity over quality, compromising professional reasoning (Tiron-Tudor & Deliu, 2022). Moreover, the increasing use of AI systems in decision-making processes (i.e., financial analysis and forecasting) enhances accuracy and efficiency, but poses a risk of undue reliance on algorithms (Martin, 2019), potentially introducing hidden biases or ethical concerns for the PA. For example, Vendor Lock-In, where accounting firms rely on specific software vendors, limits PAs' autonomy to choose alternative tools, leading to a sense of control by technology providers (Munoko *et al.*, 2020). This technology-driven control and manipulation affect PAs' work, decisions, and autonomy, emphasising the importance of transparency and understanding persuasive technology in preserving the accounting profession's independence.

Filtering, linked to **freedom of expression**, involves selectively presenting or suppressing information based on predetermined criteria or AI systems, thus restricting the visibility or dissemination of certain content or viewpoints. In digital contexts, information production and usage risk being de-contextualized, posing challenges for PAs in data interpretation (Quattrone, 2016). Online platforms wield significant influence over the information accessed by employees (Tiron-Tudor *et al.*, 2021), shaping their perceptions. Unlike traditional deterministic algorithms, AI systems do not follow a set of established rules (Müller, 2021), and operate with self-learning statistical methods, making their decisions less explainable and beyond human control (Martin, 2019), creating ethical dilemmas in the workplace regarding the responsibility gap (Gunz & Thorne, 2020). Understanding the decision-making process of AI systems (Shaw, 2019; Munoko *et al.*, 2020) and ensuring transparency (Alles *et al.*, 2022) are essential safeguards against manipulation, with implications for democracy. These developments raise concerns about the role of large platforms in shaping free speech and information filtering (Royakkers *et al.*, 2018; Gunz & Thorne, 2020). Thus, PAs need to comprehend accounting inscriptions (i.e., "fact fabrication") that form economic objects to be communicated and that, through visualisation, become objects for manipulation and governance that are measured and communicated in the shift towards digital platforms. In order to reveal the "truth", emphasising scrutiny over blind reliance on figures is crucial to avoid adverse outcomes in decision-making (Quattrone, 2016). In accounting firms, autonomous AI systems can operate independently, adapt to different situations, and make decisions without PA help or intervention (Munoko *et al.*, 2020). This may entail a lack of human oversight or control over the decision-making process (Shaw, 2019), with no means for human

intervention or overriding. However, these systems often lack intuitive and empathetic intelligence, which are essential for adapting to changing conditions and meaningful human interactions (Kruskopf *et al.*, 2022). As AI transitions from supportive tools to independent entities, the potential benefits and cost savings become more evident. Yet, the deployment of self-driving AI systems in human roles with minimal oversight brings forth new ethical and social challenges (Müller, 2021; Stahl *et al.*, 2021; Gordon *et al.*, 2022). Accountability issues persist, especially in the absence of human interaction (Quattrone, 2016), leading to difficulties in identifying and rectifying flaws. Further exploration is needed to address the responsibility for managing issues that arise without human control in the realm of autonomous AI.

Digitalisation, driven by AI systems and personalised recommendations, can *steer preferences and impact freedom of choice*. Advanced technology may anticipate preferences and detect preferred options even before individuals are aware of them, based on past behaviour (Royakkers *et al.*, 2018; Moll & Yigitbasioglu, 2019). In smart IoT environments, predictions about the company's alleged preferences guide decision-making, steering professionals toward specific choices (Tiron-Tudor *et al.*, 2021). Consequently, digital tools and platforms may restrict PAs from exploring alternative approaches or exercising independent judgement (Munoko *et al.*, 2020), raising concerns about professional autonomy and ensuring the best interests of their clients or organisations. Human-AI system interaction also affects human cognition, attention, and conduct (Dahlin, 2019; Kruskopf *et al.*, 2022), with auditors needing to address algorithmic bias that arise from human propensity across the data (Shaw, 2019; Seethamraju & Hecimovic, 2022). In this context, transparency in the profiles (Alles *et al.*, 2022) underlying autonomous judgements within an audit engagement, is essential for preserving PA autonomy and independence (Commerford *et al.*, 2022; Estep *et al.*, 2023).

Pure Autonomous Systems represent a shift in robotics paradigms, progressing from human-controlled “in-the-loop” systems, to data-driven “on-the-loop” systems, and finally to autonomous “out-of-the-loop” systems. In the latter case, in certain activities the systems autonomously make decisions without human intervention (Tiron-Tudor & Deliu, 2022). PAs' judgement will be limited (Munoko *et al.*, 2020) if critical decisions are taken by AI systems or automated procedures (Martin, 2019), raising concerns about accountability, transparency, and the capacity to deal with complicated or unexpected circumstances (Arnaboldi *et al.*, 2017). PAs' role has significantly evolved due to the surging volume of data from diverse sources that requires processing and evaluation for decision-making. This led to a shift from human-centric decision-making to increased reliance on technology (Shaw, 2019). Robots, equipped to handle Big Data, have become indispensable collaborators for PAs (Royakkers *et al.*, 2018), addressing challenges beyond human capabilities (Dahlin, 2019). Advanced knowledge systems can analyse vast datasets and engage in complex reasoning processes (Sutton *et al.*, 2018; Knudsen, 2020). Robots excel in objective decision-making scenarios due to their immunity to psychological anguish, distress, and burnout, and capacity to minimise errors in high-pressure situations, making them formidable contenders. Hence, robots are becoming increasingly self-sufficient as AI progresses (Dahlin, 2019). However, questions arise about how these systems reach conclusions and whether competing software would yield similar judgements and reach the same conclusion. Nevertheless, the crux of the ethical issue lies in their lack of accountability, prompting experts to caution against entrusting pivotal decisions entirely to these sophisticated autonomous AI systems (Spiekermann & Pallas, 2006). Calls for a “human-governing-the-loop” model (Tiron-Tudor & Deliu, 2022) advocate for a balanced approach, where AI augments human decision-making rather than completely replacing it. Consequently, the debate centres on whether moral decision-making should solely rely on AI or if society should establish well-defined guidelines for robots' roles, particularly in contexts where ethics and accountability are paramount considerations.

ii. **PRIVACY**

Digitalisation is a double-edged sword when it comes to **privacy**, offering both protective and invasive dimensions for PAs. The proliferation of personal data raises concerns about unauthorised access, breaches, surveillance, and potential misuse, leading to detailed profiles and privacy risks for both public and private entities (Alles *et al.*, 2022). Accounting firms adopting AI-driven technology face privacy-related challenges, including client confidentiality, transparency (Alles *et al.*, 2022), and technological complexity (Seethamraju & Hecimovic, 2022).

In **digital hybrid workplaces**, the fusion of physical and digital interactions is standard. However, accounting firms increasingly find that AI and IoT technologies transmit vast amounts of their information, often without their awareness (Sutton *et al.*, 2018) or control (Martinez, 2011; Roman *et al.*, 2013; Knudsen, 2020). PAs may unknowingly grant data usage permission due to complex user agreements or “consent fatigue” from numerous requests (Royakkers *et al.*, 2018). Additionally, IoT and AI devices in their digital hybrid workplaces blur office boundaries, enabling the monitoring of procedures (Arnaboldi *et al.*, 2017). PAs rely more on digital platforms for communication and collaboration, including virtual meetings, and document sharing. While automating workflow streamlines processes and enhances efficiency, it can limit adaptability and nuanced decision-making, reducing autonomy and control over the work process. Gaining **insight into all e-platform interactions** implies the potential for tracking, monitoring, and analysing these digital exchanges (Holt *et al.*, 2017), granting organisations and employers visibility into the actions and communications of PAs (Lehner *et al.*, 2022). For

example, platform administrators have access to all of the platform's transactions and interactions, many of these containing sensitive information (Kruskopf *et al.*, 2022). Thus, strict surveillance of privacy requirements for platforms with a proclivity for evading legislation (Viale *et al.*, 2017) is needed, especially in the case of accounting firms.

In organisations, **pervasive monitoring**, rooted in the “**Big Brother**” concept (Orwell, 1949), entails continuous surveillance of employees by management through various software, including file access, email and phone monitoring, tracking online activities (Royakkers *et al.*, 2018), text messages, screenshots, keystrokes, social media posts, private messaging applications, and in-person interactions with coworkers. This covert data collection raises legal concerns regarding image ownership and potential exploitation for profiling and business purposes. This shift underscores the importance of safeguarding not only physical privacy (Royakkers *et al.*, 2018) but also digital privacy (Seethamraju & Hecimovic, 2022) for PAs. Continuous surveillance can foster social conformity, diminish authenticity, and promote self-censorship (Holt *et al.*, 2017; Gordon *et al.*, 2022), posing ethical quandaries about monitoring employees during personal moments. Workplace surveillance or monitoring of PA's digital activities (Holt *et al.*, 2017; Lehner *et al.*, 2022) raises trust concerns and the potential chilling effect on professional autonomy and creativity (Zhang *et al.*, 2023). Robots, like the IoT, contribute to the growing data collection in previously unmonitored contexts (Roman *et al.*, 2013; Dahlin, 2019; Moll & Yigitbasioglu, 2019; Alles *et al.*, 2022). They can monitor conditions, such as auditors using drones to observe inventory counts, potentially intruding on audit clients' privacy (Seethamraju & Hecimovic, 2022). It is crucial to shield against digital surveillance, ensuring that PAs can work freely and exercise their professional judgement in an environment characterised by well-being.

In addition, biometric technology presents a privacy paradox. While it can be **privacy-enhancing** by using minimal data for tasks like access control, it also poses challenges by potentially **revealing sensitive information**. For instance, in applications like e-gates, biometrics ensured privacy through authentication without identity disclosure. However, concerns arise about institutions accessing sensitive racial and health-related information from biometric data. Advanced biometric systems can detect health issues from walking patterns or facial expressions, adding complexity to the privacy dilemma (Royakkers *et al.*, 2018). The widespread use of face recognition technologies, fuelled by massive image databases (Alles *et al.*, 2022) and smartphone cameras (Spiekermann & Pallas, 2006), takes this to another level. In this framework, one enters a new realm by not only identifying individuals but also gauging their emotions, notably “mental” privacy. Emotion recognition technology, while helpful for auditors in fraud detection, raises significant privacy concerns (Sutton *et al.*, 2018) as data can be collected discreetly without auditors' discretion, including embedding face recognition technology in client areas (Seethamraju & Hecimovic, 2022).

iii. BALANCE OF POWER

Digitalisation has the potential to disrupt the balance of power between individuals, governments, and corporations (Gordon *et al.*, 2022). The concentration of data and technological capabilities in the hands of a few powerful entities can lead to the exploitation of individuals, the erosion of democratic processes, and the amplification of existing power imbalances (Bostrom, 2014), thereby undermining the principles of democracy and fair competition.

Everything-as-a-Service (EaaS) delivers various digital services and resources over the Internet on-demand, on a subscription basis, offering Cloud-based accounting software, Data Analytics tools, and collaboration platforms without hefty infrastructure investments (Munoko *et al.*, 2020). It brings scalability, flexibility, and cost-effectiveness. In accounting and auditing AI introduces real-time evidence collection, just-in-time validation (Commerford *et al.*, 2022), and continuous transaction monitoring (Seethamraju & Hecimovic, 2022). This enables potential collaborations between PAs, robots, and digital assistants like Intelligent Virtual Agents (Dahlin, 2019; Moll & Yigitbasioglu, 2019). However, the rapid profusion of real-time information raises concerns, urging PAs toward reasonable, rather than purely rational, decision-making (Quattrone, 2016). The Big Four companies are already offering EaaS, potentially expanding their influence. This raises questions about platform dominance and client dependency, as switching to a new platform becomes inconvenient due to network size. Moreover, EaaS may blur and collapse the physical distance between PAs and clients (Quattrone *et al.*, 2016), presenting both opportunities and challenges.

However, PAs encounter challenges in interacting with omnipresent technology, lacking the conversational fluidity possible with human interlocutors. This leads to a one-sided dynamic where technology sets the standard, leaving the user exposed to it unilaterally (Martin, 2019). Therefore, users should ideally have control over the **standards-setters**, and how these standards are established as feasible (Spahn, 2013), ensuring informed consent in adopting ubiquitous technology. For example, when pervasive technology enters the digital hybrid workplace, the issue intensifies (Royakkers *et al.*, 2018). It prompts questions about whether accounting firms should dictate behavioural standards for clients or employees, potentially infringing on their autonomy. PAs may get entangled in a nomadic, transversal, and relational transhumanist setting that goes against the grain of power hierarchies (Zhang *et al.*, 2023) in search of a decentred subjectivity. This underscores the importance of establishing

frameworks to address these issues, particularly in addressing the webs of power relations. In the realm of digitalisation, standards are pivotal for ensuring interoperability, compatibility, and quality of digital products and services. Developing these standards involves collaboration among stakeholders like industry associations, regulatory bodies, standards organisations, technology providers, and professional bodies, covering areas such as data security, privacy, reporting frameworks, auditing procedures, and ethical guidelines in the accounting profession (Commerford *et al.*, 2022; Lehner *et al.*, 2022). Continuous collaboration, consensus-building, and ongoing monitoring (Holt *et al.*, 2017; Estep *et al.*, 2023) are essential to keep pace with the evolving digital landscape.

Some platforms thrive not just due to technological capabilities but also by exploiting “illegality as a method”, leading to unfair competition with traditional businesses for PAs (Müller, 2021). Professional platforms like Airbnb and Uber grow rapidly, disrupting traditional sectors and societies, often steering to **unfair competition and monopolisation**. This growth can lead to power concentrations and monopolies with substantial profit margins driven by network effects (Moll & Yigitbasioglu, 2019). The “winner takes it all” phenomenon makes competing with such dominant apps challenging. As a result, clients may become dependent on these platforms due to the inconvenience of switching, creating a “lock-in effect” (Royakkers *et al.*, 2018). Emerging digital business models also risk market dominance by certain accounting companies or platforms, potentially engaging in anti-competitive practices (Martin, 2019), thereby reducing choice (Kruskopf *et al.*, 2022), raising fees (Estep *et al.*, 2023), and creating entry barriers for other participants (Lehner *et al.*, 2022).

In digital platforms and e-workplaces, the “public space” is largely controlled by private hands. All interactions within this **pseudo-public space** belong to these firms, allowing them to utilise the generated data as they see fit (Royakkers *et al.*, 2018). Platform administrators can even dictate the terms for these interactions, leading to a form of digital or technological feudalism (Varoufakis, 2024) where individuals’ ownership of themselves - their digital representation - is eroded, exacerbating information asymmetry between stakeholders (Estep *et al.*, 2023; Zhang *et al.*, 2023), with individuals becoming more transparent while companies become less so. Moreover, digitalisation often requires collaboration between private entities and government, regulatory bodies, or public institutions. For PAs, navigating these relationships may involve compliance with regulations, sharing data with authorities, participating in industry consultations, or engaging in **public-private partnerships** to shape digital policies and standards.

iv. SECURITY

As digital technologies become more integrated into PAs’ professional lives, they face increased vulnerability to cyber threats such as hacking, identity theft, and other forms of digital crime (Moll & Yigitbasioglu, 2019).

Beyond data breaches, criminals can exploit smart devices to extract valuable information, adding a **physical dimension** to accounting firms’ **security challenges**. The interconnected nature of IoT devices complicates security issues (Roman *et al.*, 2013; Kruskopf *et al.*, 2022), making them more susceptible to hacking or Distributed Denial of Service attacks that paralyse websites or systems (Royakkers *et al.*, 2018). Spoofing, where attackers impersonate authorised users to gain unauthorised access, is also a concern (Eulerich *et al.*, 2023), particularly in scenarios like auditors using drones to observe inventory counts at their clients’ premises (Commerford *et al.*, 2022; Seethamraju & Hecimovic, 2022). There is growing concern in policy circles about cyber-terrorism and hackers’ ability to access sensitive data, which poses risks if data held by PAs falls into the wrong hands.

Another growing social concern is **identity fraud**, involving the deliberate acquisition, appropriation, ownership, or creation of fake identifiers for illegal purposes (Royakkers *et al.*, 2018; Kruskopf *et al.*, 2022). Recognising the “informatisation of the body”, there’s a need to understand how biometrics may reshape how individuals use their bodies and perceive space and time in the future (Alles *et al.*, 2022). For example, advanced biometrics enhance security by verifying physical presence and reducing fraud risks like document forgery, card theft, and password compromise (Royakkers *et al.*, 2018). However, they are also vulnerable to spoofing, complicating identity theft recovery. PAs face challenges such as phishing scams, fake websites, and stolen credentials (Moll & Yigitbasioglu, 2019), along with deep fake technology that tricks them into disclosing sensitive information. Criminals use various means, including data breaches, malware, and social engineering, to gain unauthorised access and cause financial harm to both PAs and their clients. The shift to remote work during Covid-19 has heightened the risk of identity fraud, with data breaches exposing client and personal information (Tiron-Tudor & Deliu, 2022) that is exploited for fraudulent activities.

As PAs increasingly engage in virtual settings via professional social networks, concerns about **unsafety and psychological damage** arise in **virtual worlds**. Virtual reality (VR) can be problematic as it immerses users in a different body (Madary & Metzinger, 2016), particularly when interacting with other virtual or real people (Royakkers *et al.*, 2018), leading to instances of unethical behaviour. Emotional involvement in a virtual environment in which a PA is genuinely embodied (Madary & Metzinger, 2016) can be significant (Alles *et al.*, 2022). This situation necessitates auditors to incorporate additional tasks in the audit engagement planning phase,

ensuring adequate risk assessment of clients' exposure to emerging VR technologies (Seethamraju & Hecimovic, 2022) and other cybersecurity risks.

v. **HUMAN DIGNITY**

The growing integration of technology into various aspects of life can lead to dehumanisation and social isolation (Alles *et al.*, 2022), eroding meaningful human interactions (Kruskopf *et al.*, 2022). When PAs rely solely on AI systems and automation for decision-making, it can breed discrimination, bias, and exclusion, undermining the individuals' dignity and equality (Sutton *et al.*, 2018; Martin, 2019).

Critics fear that by distancing actions from their repercussions, controllers may treat crucial decisions like a video game. Teleguided robots have the potential to dehumanise opponents (Martinez, 2011), desensitising the controller in the process (Royakkers *et al.*, 2018). While robotics can aid in professional services like accounting, auditing, and consulting, improper use risks jeopardising human dignity (Royakkers *et al.*, 2018), with PAs becoming objectified or instrumentalized, or, in other words, dehumanised. **Dehumanisation** occurs when human professionals are sidelined or replaced by automation or AI systems (Munoko *et al.*, 2020; Eulerich *et al.*, 2023). As more tasks and processes become automated, there is a risk of losing human touch, empathy (Sutton *et al.*, 2018), and the ability to exercise professional judgement (Zhang *et al.*, 2023). This devalues the unique skills and expertise PAs bring to their work (Lehner *et al.*, 2022; Sonnerfeldt & Jonnergård, 2023). If robots replace PAs in advisory roles, there is a danger of dehumanising professional care and diligence per se. PAs may feel objectified when robots take over tasks like consulting. The ethical issue of "objectification" arises from the intrinsic incapacity of robots to provide care or guidance (Kruskopf *et al.*, 2022) and to replicate the empathic skills and reciprocity of human interactions (Tiron-Tudor & Deliu, 2022). Moreover, automation-driven job displacement may require redeployment, retraining (Seethamraju & Hecimovic, 2022), or even result in **unemployment** (Dahlin, 2019), affecting PAs' sense of purpose (Sutton *et al.*, 2018; Zhang *et al.*, 2023), dignity, and well-being (Lehner *et al.*, 2022). While robots can aid accounting firms, they could eventually replace more and more of PAs' tasks and jobs (Eulerich *et al.*, 2023). The debate on automation's effects spans two opposing perspectives: first, that it spurs employment and economic growth, since new jobs may be created; and second, that it leads to job scarcity and declining prosperity.

Digitalisation can lead to **instrumentalisation**, where PAs are reduced to mere operators or users of digital tools and systems. As technology advances, there is a risk that PAs become passive participants in decision-making (Gunz & Thorne, 2020), constrained by the capabilities and limitations of these tools (Spiekermann & Pallas, 2006). Standardised processes and reliance on predefined algorithms may limit PAs' professional autonomy and creativity (Martin, 2019), potentially diminishing their sense of dignity and fulfilment at work. For example, biometric technologies and AI can produce both "false positive" and "false negative" results (i.e., when the identification device fails to recognise an authorised person, potentially causing inconvenience), inadvertently instrumentalising PAs and reducing them to mere data points within a system (Royakkers *et al.*, 2018). While biometrics may be user-friendly for some, rectifying errors for individuals incorrectly labelled as suspicious can be challenging. Additionally, biometrics may not suit all accounting firms, as many systems are designed with specific **standard user** characteristics, excluding those who don't meet these criteria, such as individuals with mismatched names or changed genders.

Pervasive technology, while a powerful regulatory tool (Royakkers *et al.*, 2018) demands extra scrutiny due to moral concerns, as users' behaviour is viewed as detached from ethics, lacking moral decision-making (Shaw, 2019), and instead reflecting controlled behaviour (Martinez, 2011; Spahn, 2013). Critics paint a doom-and-gloom picture of pervasive technology, warning of a society (or a profession) in which inhabitants (i.e., PAs) may be unwittingly coerced into certain behaviours. Some argue that technology stimulates PA's deliberative capacity (i.e., their ability to acquire knowledge, consult with others, and exchange ideas), fostering contemplation (Mozorov, 2014), and ultimately leading to behavioural change (Sutton *et al.*, 2018). Digitalisation can contribute to **deskilling and unlearning moral skills** as tasks traditionally performed by PAs are automated or outsourced to technology (Zhang *et al.*, 2023). While automation improves efficiency and accuracy (Munoko *et al.*, 2020), it may also lead to a gradual erosion of specific skills and knowledge possessed by PAs (Sutton *et al.*, 2018). Moreover, reliance on digital tools and AI systems may prioritise technical proficiency over ethical considerations (Martin, 2019), potentially undermining the development and application of moral reasoning and professional judgement (Lehner *et al.*, 2022). Ultimately, this impacts the ethical dimensions of PAs' work and sense of professional dignity. Therefore, pervasive technology should encourage PAs to do the "right" things and continuously apply the due professional care and diligence principles outlined in the deontological code of the accounting profession.

Technology, while enhancing technical accuracy, by replacing social interaction and taking on authoritative roles, may compromise accountability and decision quality, negatively impacting ethical considerations (Gunz & Thorne, 2020). For PAs, distinguishing between actions suitable for machines and humans involves categorising behaviours as either mimeomorphic (consistent across situations) or polymorphic (adaptive to varying contexts). Polymorphic actions, deeply influenced by society, require socialisation, while mimeomorphic actions can be

encoded for transferability, even by machines, if not overly complex. For example, VR technology blurs the line between virtual and physical workplaces, raising concerns about its impact on our connection with nature and the potential loss of distinction between “real” and “fake” (Royakkers *et al.*, 2018). As frequent VR users, PAs risk disconnecting from their bodies and physical surroundings as they become more immersed in the virtual environment (Madary & Metzinger, 2016), neglecting their physical and social well-being. Additionally, reliance on social media and VR can hinder emotional intelligence development and diminish relationships depth (Arnaboldi *et al.*, 2017), potentially leading to a less empathic younger generation, and society. There is even a vision of a future where interactions with virtual entities become common, further altering the concept of authentic sociality in society. Digitalisation can lead to PAs' disorientation, frustration, and distress (Tiron-Tudor & Deliu, 2022), fostering **desocialization and alienation**, and, ultimately, leading to exclusion and social unrest (Gordon *et al.*, 2022; Alles *et al.*, 2022). With increased remote work and virtual interactions, there is a risk of reduced human connection and sense of belonging to professional communities. Isolation and detachment from colleagues, clients, or stakeholders can lead to a loss of social connections and a sense of alienation (Alles *et al.*, 2022). This can impact PAs' well-being, satisfaction (Holt *et al.*, 2017) and perception of professional dignity, leading to a loss of professional identity.

vi. NON-MALEFICENCE & JUSTICE

The deployment of autonomous systems without adequate accountability and safeguard mechanisms can lead to accidents, misuse, or intentional harm (Alles *et al.*, 2022), undermining principles of non-maleficence (i.e., doing no harm) and justice (i.e., ensuring fairness). Inequalities in access to digital technologies and skills can exacerbate existing social and economic disparities (Gordon *et al.*, 2022), creating a “digital divide”. Additionally, technological failures, system errors, algorithmic biases, and biased data used in decision-making processes can result in harmful outcomes for individuals and society (Martin, 2019), including discrimination and further marginalisation of certain groups. Lack of transparency and accountability in the digital realm can impede seeking redress for injustices.

While recognising the promising opportunities, it is crucial to address societal groups left behind by growing digital disparities. Some individuals are grappling with adverse mental health effects (Alles *et al.*, 2022), such as irritability, anxiety, and guilt, even in our hyper-connected world. Loneliness and segregation have become more prevalent than ever among professionals (Knudsen, 2020). Biometrics, for instance, can inadvertently contribute to misclassification and **stigmatisation**, pigeonholing individuals into categories (Royakkers *et al.*, 2018), possibly shifting the presumption of innocence. Storing such assumptions in databases might perpetuate stigmas, especially when combined with facial recognition, which simplifies identity verification. Concerningly, PAs might face stigmatisation without their awareness (Sutton *et al.*, 2018), a step toward “**function creep**”, where technology is repurposed for unintended uses, potentially exacerbating these challenges. Stigmatisation in the accounting field arises when PAs or firms are unjustly associated with negative traits based on their digital profiles or data, while “function creep” occurs when data or technologies are extended beyond their original purpose (Gunz & Thorne, 2020), often leading to unintended repercussions. As a result, the **presumption of guilt** emerges when automated systems used to assess risk or detect fraud (Sutton *et al.*, 2018; Martin, 2019) wrongly label individuals as high-risk or guilty without sufficient evidence or due process (Zhang *et al.*, 2023). These risks undermine the principles of non-maleficence and justice, potentially causing harm, unfair treatment and reputational damage to PAs and the accounting profession.

The escalating collection, processing, and sharing of data pose risks such as unauthorised access, data breaches, and information misuse. In this context, **exploitation** occurs when sensitive data is used in unintended ways, violating individuals' privacy rights, while **misappropriation** involves the unauthorised use of data or intellectual property. These risks can lead to financial harm, loss of competitive edge, or reputational damage, raising concerns about justice and fairness (Munoko *et al.*, 2020). For example, accounting e-platforms and digital workspaces enable users to act as both producers and consumers, often referred to as prosumers (Tiron-Tudor *et al.*, 2021). These platforms efficiently connect supply and demand, instilling trust through sophisticated assessment systems. They frequently engage flexible providers available on demand (Alles *et al.*, 2022), giving rise to the “on-demand economy” or “gig economy”. As PAs may offer services on demand and not be regularly engaged, traditional methods of employee protection may be strained, with potential for exploitation looming (Royakkers *et al.*, 2018). Platforms can unilaterally deny access, impacting users' livelihoods. PAs might need a minimum rating, akin to Uber drivers, and must maintain a positive demeanour, often performing “emotional labour” alongside their intellectual work (Müller, 2021).

AI systems and automated decision-making systems, while efficient, pose risks of errors (Sutton *et al.*, 2018), perpetuating biases (Lehner *et al.*, 2022), or generating discriminatory outcomes (Mancini *et al.*, 2017), especially if the underlying data or algorithms are flawed or biased (Martin, 2019), raising concerns about **unjust exclusion** and **discrimination** against PAs (Sutton *et al.*, 2018; Alles *et al.*, 2022). Profiling, used to categorise individuals for customised services, can inadvertently disadvantage certain groups of PAs (Royakkers *et al.*, 2018). Even without using explicit factors like race or religion, discrimination can occur based on closely related characteristics

such as age or gender. Consequently, PAs may discriminate against certain individuals or groups due to factors like gender, race, or socio-economic status when AI systems influence their decisions or actions (Sutton *et al.*, 2018; Zhang *et al.*, 2023). Moreover, persistent profiles resulting from past behaviour can significantly impact future opportunities, leading to “digital predestination” (Alles *et al.*, 2022), where PAs cannot escape their digital records. The presumption of innocence is challenged when profiling and risk assessment methods are used proactively, potentially labelling individuals before any suspicion arises, thanks to the capabilities of Big Data (Arnaboldi *et al.*, 2017). These factors can result in unfair treatment, unequal opportunities, and the exclusion of marginalised or vulnerable individuals among PAs.

While acknowledging the complex synergy between the challenges inherent in digital transformation and the interplay between the whole set of their associated socio-ethical risks, it is crucial to conduct a thorough analysis of each challenge. This will provide a concrete understanding of its dynamic implications for PAs’ ethical decision-making and propose a solution, respectively a possible ethical decision-making pathway for each challenge.

5. Discussion: Ethical decision-making in a transhumanist context

To address the challenges and associated socio-ethical risks related to *autonomy, privacy, balance of power, security, human dignity, non-maleficence and justice* in the professional realm, based on TM, a possible pathway to be followed is proposed for each challenge.

First, to preserve **autonomy**, one may follow the *ethical egoism* pathway. This advocates for respecting individual rights by society and organisations, emphasising personal autonomy and the freedom to make choices. Nietzsche (1885; 2005) dismisses concepts like democracy and equal rights, favouring sovereign individualism, and postulating that “he who does not obey himself will be commanded”. His idea that self-obedience avoids external command aligns with ethical egoism’s emphasis on self-centric decision-making, focusing on individual agency, self-determination, and the pursuit of personal well-being. In this context, the PAs have a deontological obligation to act based on professional judgement (Sutton *et al.*, 2018) and express their views. AI-produced inscriptions should facilitate the PA in asking the right questions and fostering doubt rather than certainty, as “doubt, not prophecies, creates the space for scrutiny” (Quattrone, 2016). To sum up, technological advancements in the accounting profession pose autonomy challenges related to paternalistic technology, exerting control, and imposing predefined rules, limiting the PA’s *autonomy* and decision-making. By anchoring the model’s *ethical egoism* pathway in the decision-making process, the PA can find a balance between leveraging technology for efficiency (Arnaboldi *et al.*, 2017) and retaining control and independence (Knudsen, 2020).

Second, to address **privacy** challenges, the *relativism* pathway is recommended. Privacy is culturally and institutionally defined, varying across different cultures and societies. Respecting privacy requires different behaviour and is often asserted as a universal value, although there is a consensus that it has an intrinsic, core, and social value. Nietzsche’s (1874, 1883) ideas advocate for individualistic moral re-evaluation, balancing between relativism, which recognizes diverse viewpoints, and privacy, which respects personal boundaries within these viewpoints. Privacy shapes beliefs and values, guarding against undue influence (Gertz, 2018). Given the complexity of maintaining data privacy, PAs adopting a relativist approach consider legal, ethical, societal, and environmental factors. To counter dystopian *privacy* problems, following the *relativism* pathway helps PAs understand how digital platforms handle data (Munoko *et al.*, 2020) and adhere to relevant legal and moral rules (Zhang *et al.*, 2023). Consequently, accounting organisations should establish clear policies and procedures for digital platform use, ensuring transparency, consent, and protection of privacy rights (Lehner *et al.*, 2022). Striking the right balance between technological efficiency and privacy is crucial for maintaining trust, confidentiality, and professional integrity in the digital age.

Third, addressing **balance of power** issues can be achieved through the *ethics of care* pathway. While power balance ensures fairness, the ethics of care emphasises nurturing relationships. Nietzsche’s (1874, 1883) philosophy encourages asserting individual will over established norms, and calls to overcome traditional constraints and embrace one’s unique desires. Under this paradigm, PAs are urged to share power and facilitate empowerment in their organisations. However, professional socialisation patterns may lead to a lack of sharing in decision-making, excluding key individuals from the planning, implementation, and evaluation of a sound strategy and leading to frustration. The ethics of care serves as a framework to analyse proposed modifications in accounting practice and as a visionary ideal. PA’s independence represents a concern and a paradigm shift, in part due to the emergence and impact of AI technology on accounting. Besides, as the corporate reporting process becomes more digitalised, the technical context in which accounting standard-setting and reporting are integrated has grown significantly. By utilising cutting-edge technologies, circumstances that are purposefully created in unfair competition and against professional ethics may arise. In the accounting field, ethics play a significant role in raising the profession’s profile in typical competitive conditions, which results in situations that add value to the profession. However, unethical behaviour, unfair compensation, and sharing without contribution are all examples of unfair competition among PAs (Alles *et al.*, 2022), harming both professionals and clients morally and financially. These may trigger profound changes in the roles, duties, and emotional responses of various

accounting and management actors, as well as policymakers. Navigating the *balance of power* requires active participation from PAs, industry associations, regulatory bodies, and policymakers. The *ethics of care* pathway promotes collaboration, open dialogue, and stakeholder engagement, all of which are vital to ensuring the development of fair standards, promoting healthy competition, protecting professional interests, and fostering the benefits of digitization while mitigating potential risks (Martin, 2019; Lehner *et al.*, 2022). Ensuring fair competition in the digital realm requires robust competition policies and regulatory oversight. Ultimately, the accounting profession's claims to professional status may be seriously threatened as a result of the technical advancements brought on by the economic compulsion to broaden the range of services provided by the profession. Hence, the ethics of care (or stakeholders' approach, Manetti *et al.*, 2017) provides a balance of power approach, focusing on responsiveness to injustice and proposing new frameworks for social connection to justice.

Fourth, for **security**-related challenges, the recommended pathway is *utilitarianism*. This perspective views security as a bona fide activity, emphasising that the sum of individual security efforts is meaningful. However, utilitarianism rejects extensive public surveillance if it causes distress among the majority. In other words, if surveillance does not enhance the happiness of organisations or the public, then it would be considered immoral. According to the utilitarian school of thought, morality is based on the concept of utility. Utilitarianism seeks to maximise overall happiness, and security can contribute to this happiness. However, Nietzsche's (1874, 1883) critique challenges utilitarian calculations, emphasising the importance of individual will and creativity in ethical considerations, and calls for authentic self-expression. PAs with access to sensitive financial and personal client data are for cybercrime targets. Utilitarian accounting firms would assess the negative effects of increased respect for privacy (and the trade-off of profitability and job creation) against the rights of individual privacy. In this consequentialist process of determining right from wrong by focusing on outcomes while working on e-platforms and virtual workplaces, PAs need to preserve confidentiality and maintain the safety of information in the process of providing professional services to their clients. Understanding the *utilitarianism* pathway involves implementing technologies, policies, or practices protecting sensitive information (Alles *et al.*, 2022) and ensuring data reliability and confidentiality (Zhang *et al.*, 2023). Encryption, multi-factor authentication, and secure file-sharing platforms enhance privacy. To address concerns about data control and *security* (Martinez, 2011) in the digital age, analysing potential issues related to cloud storage or third-party providers is crucial. All concerns about data ownership, data breaches, or unauthorised access to confidential information (Munoko *et al.*, 2020) must be thoroughly analysed. The TM aids PAs in balancing digitalisation benefits with robust security measures, maintaining control over sensitive information.

Fifth, for preserving **human dignity**, the *virtue ethics* pathway may be followed. As such, the core of character education is the acknowledgement of human dignity, both in other people and in oneself. Parallely, virtue ethics provides individuals with a guide for ethical living without specific rules for resolving ethical dilemmas. Consequently, character training enables one to respect one's own and other's dignity. Human dignity is the recognition that individuals possess a distinct value intrinsic to their humanity (Gertz, 2018) and, as such, are worthy of deference solely because they are people. Virtue ethics promotes character development for ethical living, while human dignity underscores the inherent worth of individuals. Nietzsche's (1874, 1883) critique questions traditional morality, advocating for the assertion of individual will over imposed values. The link lies in the tension between universal virtues and the individualistic ethos of Nietzsche's philosophy. Therefore, virtue ethics suggests a "good" PA possesses not just technical knowledge and abilities but also moral virtues (i.e., courage and self-control), and the virtue of practical wisdom. Improving the public perception of the accounting profession amid emerging technologies that are transforming the accounting industry as a whole is essential. Addressing dystopian outcomes regarding *human dignity* requires considering the *virtue ethics* pathway enabled in the decision-making process that will allow the PAs to strike a careful balance between leveraging the benefits of digitalisation and preserving the essential human aspects of the profession. It will also allow recognition of the unique skills and expertise that PAs bring, promote ethical considerations, foster a supportive work environment, and provide opportunities for ongoing skill development and meaningful engagement, as well as equal treatment for all (Munoko *et al.*, 2020). PAs must address interpersonal obstacles, assess integrity concerns, and develop new working habits, ensuring digitalisation complements professional dignity and well-being, while supporting professional judgement and upholding ethical standards (Tiron-Tudor & Deliu, 2022), to contribute meaningfully to their organisations and society.

Sixth, to defend **non-maleficence and justice**, a *deontological* pathway may be instilled. Deontology requires fair treatment of others, while justice addresses unequal treatment, presumption of innocence, discrimination, and unjust exclusion (Alles *et al.*, 2022). Nietzsche' (1885; 2005) denies objective moral truths and maintains that conventional moral standards are simply manifestations of the "will to power", or the desire to rule and control others. While not traditional deontology, his philosophy supports personal values, urging individuals to live by their own "inner law" or "eternal recurrence", rather than abiding by external moral laws. In the tension between duty-driven ethics and Nietzsche's call for individualistic moral revaluation, PAs must develop and uphold their moral principles guided by duty. Cultural influences and political and market dynamics impact accounting regulations (Geels, 2014), determining the PA's role in the economic system and as a defender of justice, which can only prevail in a society that embraces it. Addressing risks regarding *non-maleficence and justice* requires

enabling the *deontology* pathway in the TM. This will support the PA in considering ethical forethought, accountability, transparency, and fairness in the design and deployment of AI systems (Alles *et al.*, 2022). Consequently, it would promote diversity and inclusivity by ensuring the use of unbiased data and algorithms and implementing robust privacy and security measures to safeguard against exploitation and misappropriation (Martin, 2019).

Consequently, from an anthropocentric perspective, the ethical decision-making pathways corresponding to the challenges and their associated socio-ethical risks should provide a useful reference and guideline for PAs in the digitalized future of the profession. This would lead to the consolidation of their professional judgement and identity and, ultimately, would contribute to fostering accountability and legitimacy of the accounting profession and, thereby building trust and benefiting society at large.

6. Agenda for further research

In light of the extensive exploration of the socio-ethical risks arising from the digital transformation of the accounting profession, this study paves the way for *future research endeavours*.

Moving forward, it is imperative to pose targeted research questions that delve deeper into the intricacies of each of these challenges. Specifically, investigations into the nuanced interrelationships among the identified sub-themes and the exploration of emerging ethical considerations offer fertile ground for further exploration. Delving into these sub-themes with a finer lens can unveil complex dynamics and highlight potential areas of tension or synergy, thus contributing to a more nuanced understanding of the socio-ethical landscape in the digitalized accounting realm.

Moreover, there is a pressing need to explore the efficacy and implications of ethical decision-making models, such as the algorithmic model proposed in our study, in real-world accounting practice. Empirical studies evaluating the implementation and impact of such models in professional settings can provide valuable insights into their effectiveness, usability, and potential limitations. Additionally, comparative studies examining different ethical decision-making approaches and their respective outcomes can offer valuable insights into best practices and inform the development of tailored ethical decision-making strategies for accounting professionals.

Furthermore, given the dynamic nature of technology and its impact on the accounting profession, longitudinal studies tracking the evolution of socio-ethical risks and professional responses over time can provide valuable insights into trends, patterns, and emerging issues. By capturing the ongoing evolution of the digital landscape and its implications for professional ethics, such studies can inform proactive strategies and interventions to address emerging challenges effectively. Overall, by charting a course for a research agenda, our study seeks to catalyse scholarly inquiry into the socio-ethical dimensions of the digital transformation of the accounting profession, thereby contributing to the development of robust ethical frameworks, informed professional practices, and a more ethical and resilient profession in the digital age.

Finally, the Throughput Model offers opportunities for further explorations. This model can become a valuable aid for PAs in ethical decision-making, especially within the context of digitalisation's *tool*, *proxy*, and *ensemble* views. The *tool* view in digitalisation sees technological artefacts (i.e., algorithmic ethical pathways), as an efficient apparatus serving individuals and organisations. In this light, the algorithmic pathways are perceived as a managerial mechanism advantageous for supporting PAs and the goals of accounting firms. The *proxy* view highlights individuals' role in adopting and implementing AI tools, employing a social constructionist approach where the impact of AI technology is influenced by PA's cognitive and behavioural responses (Orlikowski & Iacono, 2001). Accounting profession becomes an active participant, not a passive adopter, shaping algorithmic ethical pathways to align with their understanding, goals, and potential modifications. The *ensemble* view regards technology as a system emerging from multifaceted interactions within organisational, social, and legal environments (Geels, 2014; Mora & Deakin, 2019). This perspective enhances the potential for placing the TM pathways in advanced organisational and social contexts, shaping the incorporation and interpretation of new AI technology. Moreover, it offers a comprehensive and adaptable framework to help practitioners analyse possible risks, opportunities, and obstacles when dealing with disruptive technologies, as well as a lens for professional accounting associations and bodies by assisting them in prioritising the holding and seizure of jurisdictions as an essential part of safety and security.

7. Conclusions

The digital transformation and collaboration between humans and AI in accounting pose significant challenges. PAs, crucial in upholding ethical standards and advocating fairness for the public interest, must address these dilemmas to ensure digitalisation prioritises autonomy, privacy, balance of power, security, human dignity, non-maleficence and justice. In this context, the paper makes both theoretical and practical contributions, enhancing the development of knowledge in the field.

From a *theoretical* perspective, this paper leverages Nietzsche's philosophy to delve into the convergence of

transhumanism, digitalisation, and the accounting profession. His insights into human existence, morality, and power offer a rich perspective for examining the challenges of disruptive technologies. Rooted in Nietzschean philosophy, our exploration of the accounting profession in transhumanism revolves around three key ideas: individual's survival, self-determination, and improvement; critique of morality and norms; and challenging limits. This philosophical foundation lays the groundwork for ethical considerations within the navigation of the accounting profession in the "Twilight Zone" of digitalisation, encompassing aspects regarding personal autonomy, self-realisation, human enhancement, and the balance of individual and collective values. Integrating these concepts provides PAs and accounting organisations with a nuanced framework for ethical decision-making in the evolving technological landscape.

In this setting, our research offers a comprehensive exploration of the intricacies of socio-ethical risks in emerging technologies, providing professionals, researchers, and industry stakeholders with highly informed insights, aiding them in navigating the changing landscape of the accounting profession. Addressing the challenges and socio-ethical risks requires careful consideration of ethical frameworks, robust regulations, transparency, accountability, and inclusive decision-making processes to ensure that digitalisation is aligned with human values and societal well-being. All these examples outline the interplay between technology and human abilities in a digitalised connected society. As a consequence, we proposed a model for decision-making to address the main challenges.

The results debate prevailing solutionist and instrumental approaches to the digital transformation of the accounting profession, indicating that implementing novel technologies and integrating a digital culture within an accounting organisation requires some new *modus operandi*.

From a *practical* perspective, from the human-digital labour complex duality perspective, the study gives useful insights for accounting and auditing firms, PAs, professional bodies, standard-setters, and regulators, showing the implications of digital culture infiltration in accounting activities.

First, PAs are at the forefront of navigating the multifaceted challenges arising from the digital transformation of their field. As the study identifies autonomy, privacy, balance of power, security, human dignity, non-maleficence and justice as pivotal challenges, practitioners could now proactively address these concerns in their daily activities. The Throughput Model enables PAs to critically assess the impact of digitalisation on their professional roles, exercise independent judgement, uphold ethical standards, validate professional identity, and remain vigilant about potential biases or hindrances introduced by technology. PAs should devise a strategy that capitalises on their intrinsic skills, unique competencies, and talent, establish forward-thinking organisational procedures, and actively navigate workplace dynamics, personalities, and responsibilities.

Second, one of the paramount takeaways for PAs lies in the delineation of ethical decision-making strategies embedded within the proposed algorithmic model. The study underscores the importance of weaving ethical considerations into the fabric of decision-making processes. PAs can leverage these strategies to confront dilemmas posed by autonomous AI systems and ethical dimensions such as privacy concerns and power dynamics. The study advocates for a proactive stance where practitioners actively consider the ethical implications of their decisions in a rapidly evolving digital landscape. In this context, the Throughput Model equips PAs with ethical pathways for decision-making and the insights necessary to embrace technological advancements, fulfil their roles effectively, and expand their responsibilities. Therefore, the TM solution might also be useful for organisations as regards eventual ethical dilemmas that arise in a human-AI system working team.

Third, the study's revelations about the collaborative landscape of human-AI systems offer practitioners valuable insights into fostering synergy between human expertise and AI. As autonomous AI systems become integral to accounting practices, PAs can strategically position themselves to capitalise on the strengths of AI while preserving their professional autonomy. Practical guidelines for navigating this collaborative dynamic are outlined, empowering practitioners to harness the potential of technology without compromising their ethical responsibilities.

Fourth, in contemplating the transhumanist future, PAs are presented with a forward-looking perspective that necessitates adaptability. The study encourages them to proactively engage with ongoing technological advancements, acknowledging that embracing change is pivotal for professional growth. Practical recommendations for staying abreast of technological shifts, continuous upskilling, and embracing a mindset of lifelong learning are imperative for practitioners to thrive in the transhumanist landscape.

Fifth, central to the implications for practitioners is the preservation of their professional identity amidst technological disruptions. The study advocates for practitioners to critically assess the evolving landscape, actively contributing to the discourse on ethical considerations in the digital age.

By upholding the core values of the accounting profession, PAs are essential in shaping ethical norms and ensuring the enduring trust of stakeholders. These are essential paths to a long-term ecosystem of accounting-related digital innovation and PAs finding their way in the "Twilight Zone" by balancing the advantages of digitalisation while ensuring professional integrity, professional scepticism, accountability and safeguarding client interests. By doing so, practitioners can play a proactive role in preserving the integrity and ethical foundation of the accounting profession as it traverses the transformative journey of digitalisation.

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