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Professionalism in artificial intelligence: The link between technology and ethics

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Abstract

Ethical conduct of artificial intelligence (AI) is undoubtedly becoming an ever more pressing issue considering the inevitable integration of these technologies into our lives. The literature so far discussed the responsibility domains of AI; this study asks the question of how to instil ethicality into AI technologies. Through a three-step review of the AI ethics literature, we find that (i) the literature is weak in identifying solutions in ensuring ethical conduct of AI, (ii) the role of professional conduct is underexplored, and (iii) based on the values extracted from studies about AI ethical breaches, we thus propose a conceptual framework that offers professionalism as a solution in ensuring ethical AI. The framework stipulates fairness, nonmaleficence, responsibility, freedom, and trust as values necessary for developers and operators, as well as transparency, privacy, fairness, trust, solidarity, and sustainability as organizational values to ensure sustainability in ethical development and operation of AI.

KEYWORDS

accountability, algorithms, integrative literature review, social contract theory, systems research

1 | INTRODUCTION

The phenomenon of accelerating change suggests that technological development occurs at an increasingly rapid pace—the greater the growth in capability of the technology, the greater the acceleration of its further development (see, e.g., Eliazar & Shlesinger, 2018). We are currently on the cusp of large-scale integration of cyber physical systems otherwise known as the Fourth Industrial Revolution where industries are turning to smart technology communicating seamlessly via the Internet of Things (IoT), greater use of cloud computing, increasing automation, Web 3.0, big data, and other technologies (Ghosh et al., 2021; Lu, 2019; Nazarov & Klarin, 2020; Xu, 2020). True to the nature of accelerating change, the world's leading organizations and institutes are developing technologies that venture into deep learning and working towards general artificial intelligence (AI), which are the domains of the Fifth Industrial Revolution (El Namaki, 2018; Petrillo et al., 2018; Serrano, 2018; Valenduc, 2018).

Technological landscapes are evolving ever faster to the point that policymakers and institutions are struggling to regulate AI technologies to ensure ethical conduct of the technologies (Heilinger, 2022; The Bureau of National Affairs, 2020). Hence, the questions of moral obligation of agents engaged in the development of AI technologies become increasingly pertinent especially considering technology-related autonomous actions and, more importantly, ethical outcomes that impact society (Gibert & Martin, 2022; Matthias, 2004; Ziewitz, 2016).

Research suggests that ethical considerations should be adopted by developers and organizations throughout the entire AI development and deployment process (Almeida et al., 2022; Felzmann et al., 2020; K. E. Martin, 2019a; Neubert & Montañez, 2020). For example, healthcare and the military call for operators or professionals using these technologies to be ultimately responsible for actions of these technologies (Luxton, 2014a; O'Sullivan et al., 2019; RAND Corporation, 2020; Tóth et al., 2022). Research also highlights the need for macro-level regulation of AI development and use to ensure the creation of institutional frameworks for users and developers to operate within (Montes & Goertzel, 2019; Raab, 2020; Weber, 2020). The importance of professionalism consideration in developing and deploying AI to ensure accountability of the actions performed by the technology has been suggested by a number of studies (e.g., Carter, 2020; Gillies & Smith, 2022; Howard & Borenstein, 2018; Luxton, 2014a). The concept of professionalism highlights the importance of the contract between professional members and society (Cruess & Cruess, 2014). The success of this contract is dependent on maintaining public trust, which is associated with the demonstration of knowledge, skills, and adherence to a code of ethics by those working within the profession (Pfadenhauer, 2006; Svensson, 2006). Research argues that ethics, as a component of professionalism, plays a crucial role in promoting trust in professional practice in society (Evetts, 2013). Research basically emphasizes the importance of placing ethics at the core of professional practice, as it allows for a clear distinction between professional and unprofessional behaviour. However, we do not know how professionalism of AI developers and operators can play a role in mitigating the ethical issues of AI. As we witness an increase in utilization of AI and the concerns about its ethical issues for society, it is timely to study the role of professionalism in developing and deployment of AI. Generally speaking, professionalism is viewed as a response to manage unprofessional behaviour by delivering quality outputs and following standards of practice conducted by professionals (Abbott, 1983; Burmeister, 2017); this is especially pertinent in the emergence and integration of AI (Stahl, 2021). Further, the literature on professionalism suggests that ethical behaviour is one of the core elements of being a professional, and organizations should aim to maintain high levels of ethical conduct in the practice of their professionals (Abbott, 1983; Evetts, 2013; Goto, 2021). Therefore, our study aims to answer the following question: How does professionalism bridge the separation between AI technologies and ethics? We aim to utilize systems perspective in answering the posed question.

Systems research is an interdisciplinary approach to study complex systems in society, nature, and designed systems (Checkland, 1999). Ethics is a social construct and as such is a designed system. Furthermore, AI ethics is an interdisciplinary phenomenon and is best studied through the systems thinking approach (Jiang et al., 2022; Li et al., 2022). Considering the multiplicity, complexity, and interdisciplinarity of AI ethics, systems thinking approach will allow to see links and interrelationships between subsystems and constructs and chains of causality between constructs. This practice of analysing the whole rather than individual subsystems is referred to as holism (Nazarov & Klarin, 2020; von Bertalanffy, 1968). Holism approach is ideal in identifying possible causes of AI ethical breaches, the role of professionalism in AI, and what are the prerequisites in ensuring ethical development and operation of AI, which is what we aim to do in this study.

The objectives of this study are threefold. First, we aim to identify a gap in the literature of AI and ethics through conducting a comprehensive review by way of exploring and mapping the data that are available on the entire Web of Science (WoS) dataset of AI and ethics literature. Given that existing studies on AI and ethics are not constrained within specific research disciplines (Hildt, 2019; Martin et al., 2019; Saithibvongsa & Yu, 2018; Xu, 2022), it is important for a review to be cross-disciplined in order to have a systems perspective of the scholarship (Galvin et al., 2021; Klarin et al,, 2021) surrounding AI and ethics. Second, this study aims to highlight the integral relationship of professionalism and ethics. The logic for this relationship is embedded in the professionalism literature as well as the social contract theory that highlights an ethical responsibility of members of a profession towards society. Third, building on the above, we draw on the current evidence of AI and algorithm behaviour in practice through an in-depth analysis of available literature to identify the current state of the link between AI and professionalism. This allows to draw the link between AI, professionalism, and ethics. To fulfil these objectives, this study captures the scholarship of AI and ethics through a three-step review study and provides a systems overview of the concepts and the relationships between them in the interdisciplinary fashion.

This study has a number of contributions to the literature. First, the study expands on the concept of professionalism and its importance within the business ethics paradigm. We would like to emphasize the imperative nature of professionalism in business ethics, thus stressing that labour-related ethics research (including its relationship with automation and AI) inevitably relies on professionalism at work. Second, we provide a systems view of the AI and ethics scholarship to highlight the lack of professionalism-related discussions in this vast interdisciplinary academic scholarship. Third, we provide

evidence to suggest that failures of AI in practice are at least partially related to the lack of professional behaviour in the development or deployment of the technology. In this paper, we contend that successful AI implementation depends very much on professional behaviour instilled into the machines as well as professional behaviour practices of developers and/or deployers, which is reflected in specific values and norms, leading to success in AI utilization. Fourth, we draw the relationship between AI, professionalism, and ethics, which should form the fundamental framework of AI implementation in practice. Finally, this study offers future research directions to strengthen the academic research to guide practitioners and policymakers.

2 | PROFESSIONALISM AND AI ETHICS

2.1 | Ethics in professionalism

Professionalism refers to the beliefs that are held by members of a profession, known as professionals, and is exhibited in the practice of the members' profession (Snizek, 1972). One of the fundamental objectives of professionalism is to be performing and providing good practices and service for society (Pfadenhauer, 2006). Also, the need for professionalism is central to the trust of society (Pfadenhauer, 2006) as well as the status and image of the profession (Author, 2020). As a belief at the individual level, professionalism is closely related to professional self-concept, which is about seeing oneself as a professional (Gibson, 2003). Professional self-concept guides the attitudes, behaviours, and actions of individuals towards their practices (Gibson, 2003). Hence, professionalism is viewed as a way of controlling and improving the quality of work and standards of practice conducted by professionals (Evetts, 2011). This is mainly due to the two core elements of professionalism: *knowledge and skills* as well as *ethicality* (see the seminal studies by Larson, 1979; Wilensky, 1964). Knowledge and skills refer to the assumption that the work of professionals requires a specialized knowledge base as well as a set of skills coupled with competency, which are obtained through extensive education, training, and experience (Hargreaves, 2000).

Ethicality, as the other core component of professionalism, refers to the professionals' adherence to the code of ethics as set by a profession, which aims to control behaviour and holds professionals accountable to clients and society (Abbott, 1983; Brown, 2013). Ethical behaviour is the other key criteria to achieve professional status, which derives the work and practice of individuals by constraining self-interest and making sure clients are provided with quality service (Brown, 2013). Demonstrating ethical behaviour that is rooted in the code of ethics and norms of the conduct of the profession is also considered as an indicator of distinguishing professional behaviour from that which is considered unprofessional (Abbott, 1983).

We do note, however, that it is difficult to definitively identify what constitutes professional behaviour because of the many different ways members of a profession might interpret what it means to act professionally (Evetts, 2013). Primarily, codes of conduct provide guidance, but it is equally important to note that professional behaviour is associated with individual professional characteristics and attitudes towards work. Further, each work context has its own values reflected in norms and presents different constraints on professionalism and a professional's practice (Evetts, 2011).

In addition, research suggests that understanding as to what constitutes professionalism requires an understanding of how the work and actions of professionals generate values and build trust in society (Evetts, 2013; Saks, 2016). Generating values and trust underpin the responsibility of the professionals towards clients and society (Evetts, 2013). In light of the contribution to society, a review of application of social contract theory suggests that adherence to the expectations of society is the key element of perceived professional behaviour (Cruess & Cruess, 2008; Jos, 2006; Welie, 2012). Drawing on the nature of social contract theory, it is argued that there is an agreement between a profession and society in relation to the details of appropriate behaviours and obligations to practice and service expected of professionals (Donaldson & Dunfee, 1994; Mohamed et al., 2020; Rahwan, 2018). Failure in demonstration of certain behaviour and obligations expected by society can be perceived unethical (Jos, 2006). Therefore, one's professional behaviour is to a great extent determined through interaction with society.

2.2 | Professionalism and ethical conduct of AI

The AI ethical codes are also derived from the general organizational code of ethics. It is crucial to ensure that they are embedded into the business practice of organizations and individuals deploying AI technologies. In this way, AI ethics codes guide and maximize the ethical utilization and application of AI technologies (Ayling & Chapman, 2022). Thus, ethicality—which is acknowledged as the core component of professionalism (Abbott, 1983; Brown, 2013)—has been regarded by AI

research as a mean to interpret the outcomes of AI technology development and utilization and its impact on society. However, it is important to note that little attention has been devoted to the investigation of the role of professionalism in addressing and developing codes of ethics for AI. For example, Price et al. (2019) discuss the legal liability of physicians as professionals using AI; however, the discussion does not venture into how professional the practices of physicians are, nor those of the developers of the technology.

Studies that have focused on the standards expected of professionals in a profession who are using AI technologies in delivering services offer some evidence for the existence of the role of professionalism in developing codes of ethics for AI. For example, Cox (2022) has introduced an educational programme that consists of eight ethics scenarios of AI for information professions to help the professionals to learn about the key ethical issues of AI as a technology to increase their self-awareness of AI operation in their professional service. In the field of radiology, there is a global consensus statement on the ethics of AI, which requires all professionals to consider the promotion of well-being, the least harm, and an equal distribution of benefits and harms among all parties when they are deploying AI technologies (Geis et al., 2019). Research also recommends that informed consent, high level of safety, privacy and transparency, algorithmic fairness and biases, and optimal liability as the fundamental ethical principles that should be taken into account and addressed by all healthcare professionals to ensure that AI technologies will be implemented ethically and successfully (Gerke et al., 2020). In the domain of defence, the five ethical principles, namely, justified and overridable uses, just and transparent systems and processes, human moral responsibility, meaningful human control, and reliable AI systems, have been recommended to be considered to minimize the ethical issues that may occur as the result of deploying of AI (Taddeo et al., 2021).

There is also increasing evidence of the lack of professionalism in AI systems, especially in terms of biased data, which is argued to be caused by human judgment (Nelson, 2019). Bias in AI occurs when the outcome of the machine favours one group compared with another, which is often perceived as unfair (Fletcher et al., 2021; Mehrabi et al., 2021). For example, gender bias is evident in the recruitment context. Amazon's AI hiring tool excluded women candidates until the company discovered about the issue in 2018 (Dastin, 2018). The case of Amazon suggests that the company's algorithmic bias reinforced discrimination in hiring practices, which this issue can be regarded as unprofessional behaviour. Another example can be the issue of gender bias, which is found in statistical translation tools such as Google Translate, as it exhibits male defaults more than female and gender-neutral defaults in some occupations, including science, technology, engineering, and mathematics (Prates et al., 2020). Therefore, it can be argued that AI bias has a potential to cause repercussions when the technology is used to make decisions or solve problems (Zajko, 2021). It is important to note that public trust in AI is essential when it comes to the societal acceptance of AI decision-making (Adnan et al., 2018). Public trust depends on the ethical implication of AI for users, affecting their behavioural intention to accept the technology (Adnan et al., 2018). Research on the profession points to the role of professionalism in promoting trust in professional practitioner–client relations (Evetts, 2011). This suggests that biased algorithms that were fed into the system have a likelihood to result in ethical and professional issues. This also suggests determining if professionalism can address AI ethical issues. The consideration of professionalism is important because AI technology is being gradually integrated into business practices. Professionalism can help mitigate biased algorithms by ensuring that the ethical implications are measured before making the AI technologies available to the public.

2.3 | Institutions, AI ethics, and professionalism

Having highlighted the importance of professional conduct, research identifies that supranational institutions including the European Commission High-Level Expert Group on Artificial Intelligence (ECHLEG) with its "Ethics Guidelines for Trustworthy AI" (European Commission, 2021) and OECD values-based privacy principles that address data protection (OECD, 2019b) are active in designing principles of ethical use and development of AI. The European Union General Data Protection Regulation (GDPR) that took effect in May 2018 stipulates a number of conditions on the use of data. One such condition is "the right to explanation," which will require transparency to build trust and reliability, thus resulting in implied accountability placed on the manufacturers of AI technologies (Goodman & Flaxman, 2017). On a national level, governments invariably realize the inevitable nature of technological adoption and thus introduce and expand on AI implementation in their respective countries, for example, the Italian government's White Paper on Artificial Intelligence at the service of the citizen (Vetrò et al., 2019) and British Sociological Association's (BSA) Annexe for Digital Research that accompanies the BSA's Statement of Ethical Practice (Raab, 2020). On top of national and supranational recognition, industry bodies including Institute of Electrical and Electronics Engineers

(IEEE), Information Technology Industry Council (ITIC), and Association for Computing Machinery (ACM) also actively engage in development of principles and guidelines for primarily organizations and other stakeholders developing and using AI (Clarke, 2019).

National and international institutional efforts are being introduced to sanction breaches or issues arising from the development and utilization of algorithms and AI systems. Zuiderveen Borgesius (2020) highlights that the current laws and regulations including the European Convention on Human Rights (that was drafted in 1950) are often inadequate in upholding ethical and legal standards in relation to the development and deployment of AI systems and that provisions such as the GDPR are limited to a specific area of conduct. For example, the Council of Europe put forth nine principles and priorities that are intended to underpin binding and nonbinding legal instruments (Leslie et al., 2021). As such, the Member States are to introduce legislation relating to AI systems in protecting basic rights and freedoms—(i) human dignity, (ii) human freedom and autonomy, (iii) prevention of harm, (iv) nondiscrimination, gender equality, fairness and diversity, (v) transparency and explainability of AI systems, (vi) data protection and the right to privacy, (vii) accountability and responsibility, (viii) democracy, and (ix) rule of law (Leslie et al., 2021). With the EU, arguably, leading institutional regulation of AI and welcoming inputs from society, professionals and organizations will inevitably be held accountable for the development and deployment of AI.

Furthermore, the European Commission (2021), OECD (2019a), and a number of other institutions propose principles, values, and guidelines that AI systems should meet in order to be deemed trustworthy. For example, Goodman and Flaxman's (2017) study describe the General Data Protection Regulation (GDPR) adopted by the European Parliament, which requires algorithms to operate within this new legal framework. In addition, Wagner (2018) describes the set of ethics guidelines developed by the European Group on Ethics in Science and New Technologies (EGE). In addressing the question of whose responsibility it is to assess and manage any risks associated with AI applications, the European Parliament recommended that the deployer of an AI system holds the responsibility of controlling any risks and the level of risk should indicate the liability regime. The European Parliament has endorsed that autonomous traffic management system and vehicles, unmanned aircrafts, autonomous cleaning devices for public places, and robots are high risk AI systems that should be subject to a strict liability regime (Stahl, 2021). In this regard, Borenstein and Howard (2021) argue that while professional bodies and associations provide specific guidance on AI and the ethical issues, it is the ultimate responsibility of the AI professionals—for example, developers of AI technologies to ensure that the AI system is intertwined with ethical requirements. This requires having a professional mindset related to moral sensitivity, which emphasizes that technical aspects/functionalities of the designed AI systems should consider ethical guidelines as part of their professional responsibilities without conceiving the mentality that ethics is someone else's problem (Borenstein & Howard, 2021).

3 | AI ETHICS REVIEW AND EVIDENCE-BASED RESEARCH

We conducted a three-step literature review investigation to ensure a comprehensive systems approach to explicate the role of professionalism in AI and ethics. First, we undertook an overarching review of the relationship between AI technologies and ethics, mostly in social sciences literature, to identify the current issues of this contentious relationship. Second, we conducted an in-depth analysis of the dataset that we extracted from WoS coupled with further research into other databases to identify specific studies that depict perceived unethical outcomes of AI and its related technologies deployment. The analysis involved categorization of the literature into breaches of ethical conduct in deployment of AI and its related technologies. Following this evidence-based review process, we then attempt to identify the causes of the breaches of ethical conduct by AI. Finally, from the above, we suggest that professionalism is the key to ethicality of the development and use of AI technology.

3.1 | Step 1: An overarching view of the relationship between AI and ethics

In the first step, the overarching review provides us with the preliminary assessment of the literature on AI and ethics, its main discussions, and conclusions. At this stage, we aim to identify a gap in the literature and propose a way to fill this gap. We carry out our overarching review using data from WoS. We chose to use the WoS database as it is considered one of the largest scientific knowledge databases (Crossan & Apaydin, 2010; Podsakoff et al., 2008) and has major overlaps with its closest contestant database, Scopus, which means the results have marginal divergences between the two databases especially if looking to compare large volumes of publications (Vieira & Gomes, 2009). Despite nonlisting the extra sources including many book chapters, meeting abstracts, news, and proceedings, WoS is still more

popular in informetric studies as well as meta analyses compared with Scopus (Zhu & Liu, 2020).

The search query was set as "artificial intelligence" or "machine learning" or "intelligent agent*" or "computational intelligence" or "neural network*" or "deep learn*" AND "ethic*" or "moral*," which returned 1592 publications that contain this search query within the topic areas (titles, abstracts, and keywords) of the original works for the period of 1980 up to 01 July 2020 (the beginning of the available data in WoS and the end date of search). Figure 1 demonstrates the study selection criteria.

We carefully read through titles, abstracts, and keywords of all 1592 studies to identify papers that specifically study the relationship between AI and ethics. Although there is no commonly accepted definition of AI, for the purposes of this study, we adopt a broad understanding of AI as any device that perceives its environment through sensors and acts towards achieving its goals (Russell & Norvig, 2010, p. 34). This includes expert systems that operate using predefined parameters to more complex self-learning technologies (Omoteso, 2012; Ryan, 2014; Searle, 1980).

The great majority of the studies fleetingly mention ethics and implications when discussing AI or related technologies. Although there are plenty studies that discuss AI ethics, we chose ones that identify potential and uncovered threats and failures of AI including expert systems (ESs) and various autonomous systems, identification of the responsible parties, and resolutions, recommendations, propositions, and/or contributions of the studies, the studies are listed in Table 1. For example, an excellent review study by Jobin et al. (2019) is not part of Table 1 as it does not depict any specific threats or failures; instead, it carries out a review of guidelines put forth by various institutions in ensuring ethical development and deployment of AI.

Almost all the depicted studies in Table 1 call for the ultimate responsibility of the developers and organizations in maintaining the control over the development and the use of AI and ESs. Although the studies either specify guidelines for developers and organizations or they call for regulatory interventions into this contentious issue, the studies that emphasize a holistic outlook on all three levels of stakeholders are rare (see, e.g., Munoko et al., 2020).

There are studies that show a positive dynamic of organizations to introduce self-imposed ethics codes. For example, Carter (2018, 2020) notes that Google, Microsoft, and IBM have developed their own AI ethical standards in the previous 2–3 years, whereas Amazon commented only that its AI developments and use are ethical and that there is no need to formalize it. We are inevitably left wondering as to what organizations like Amazon consider "ethical." The self-imposed ethics guidelines thus result in an issue of organizations' vested interests in directing the ethicality of development and operation of AI systems. There is a substantial risk that these guidelines become arbitrary, optional, and eventually meaningless (Wagner, 2018; Yeung et al., 2020). Recent studies dismissed the self-imposed ethics guidelines as "ethics washing" (Benkler, 2019; Bietti, 2020; Rességuier & Rodrigues, 2020).

The researchers also significantly contribute by compiling, analysing, and offering their own expert recommendations on the ethical outcomes of AI utilization (Clarke, 2019; Vetrò et al., 2019; Wright & Schultz, 2018). For example, Jobin et al. (2019) carried out a comprehensive review of ethical principles identified in existing AI guidelines, where it was found that transparency, justice, nonmaleficence, responsibility, privacy, and several other values were common among the proposed guidelines.

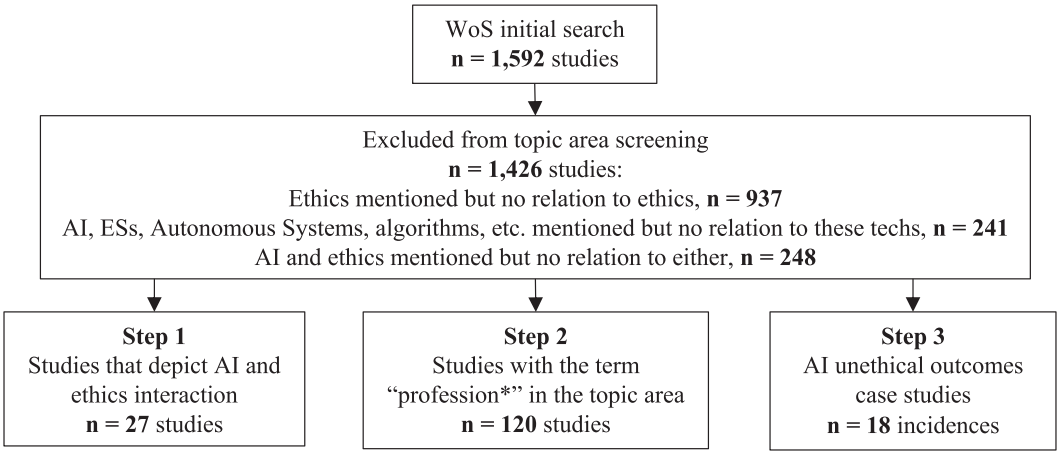

FIGURE 1 Results of the search and study selection criteria.

TABLE 1 Studies of the relationship between AI and ethics.

Reference	Focus of paper/ problem	Accountability[a]			Responsibility of	Propositions/recommendations/ solutions/contributions
		mi	me	ma		
Brusoni and Vaccaro (2017)	Technology for virtuous behaviour	✓	✓		Managers, researchers, organizations	An invitation to consider using technologies to embed, spread, and convey ethical values.
Carter (2018)	Impact of AI	✓	✓		Professionals and organizations	Follow data quality, data governance, and data ethics guidelines.
Carter (2020)	Unregulated potential threat of AI		✓	✓	Primarily regulators, also self-compliance by organizations	International accords recommended; state regulation is emphasized; organizations to follow the regulators and introduce self-compliance.
Clarke (2019)	AI threatens society	✓	✓		Executives and organizations	Proposed a set of principles that is more comprehensive than previous recommendations by individuals and institutions that organizations should follow.
Davenport et al. (2020)	Impact of AI on marketing	✓	✓		Primarily organizations and also developers	Organizations should exceed consumer privacy expectations and overcomply with legal mandates.
Dignum (2018)	Potential issues of new technologies	✓			Human responsibility	Special issue proposing: Ethics by design; ethics in design; ethics for design
Dodig Crnkovic and Çürüklü (2012)	Robot safety issues and morality	✓	✓		All levels within organizations	AI systems should be embedded with principles of morality and exhibit ethical behaviour. If the system evolves, so too should the morals of the system. The system and stakeholders carry accountability.
Etzioni and Etzioni (2017)	It is impractical to make AI ethical	✓	✓		Organizations and specialists need to develop ethics bots	Ethics bots should learn from humans through observation instead of being taught ethics.
Felzmann et al. (2020)	The need for transparency by design	✓	✓		Organizations and AI developers	Proposition of transparency by design that organizations and developers should implement from the outset of the design process.
Johnson (2015)	Responsibility gap	✓	✓		Developers and organizations	Developers carry the ultimate responsibility for the consequences of AI technologies.
Kaplan and Haenlein (2020)	Potential threat of AI		✓	✓	Firms represented by managers and society to regulate AI	AI technologies should be launched only after substantial trials; firms ought to build trust with customers; AI needs to be transparent.
Khalil (1993)	ESs lack ethical capacity	✓			Managers; in some cases, software engineers	ESs to be used in advising capacity; professionals should hold the ultimate responsibility.
Martin (2019a, b)	Unethical conduct of technologies	✓	✓		Coders/developers/ programmers, wider creators, and organizations	Organizations and developers to take the ultimate responsibility for the release and use of technologies.

(Continues)

TABLE 1 (Continued)

Reference	Focus of paper/ problem	Accountability[a]			Responsibility of	Propositions/recommendations/ solutions/contributions
		mi	me	ma		
Martin and Freeman (2004)	Technology and ethics separation	✓	✓		Managers, developers, and ultimately organizations	When designing technologies agents should take a pragmatic approach of the implications of the technology on community.
Montes and Goertzel (2019)	Potential harm of AI to society			✓	Implied responsibility of regulators to curtail large tech organizations	Development of open AI systems, taking away the control for tech giants.
Munoko et al. (2020)	Unintended consequences of AI use	✓	✓	✓	Developers, adopting firms, professionals, regulators, stakeholders	A tension is growing between the three levels of stakeholders in auditing, where ethical guidelines ought to be created.
Neubert and Montañez (2020)	Lack of ethical guidance of AI	✓	✓		Primarily organizations, also managers	Organizations to introduce virtue frameworks for AI development and use, e.g., Google.
Ozkazanc-Pan (2019)	Potential workplace inequality		✓	✓	Regulators and organizations	Regulatory bodies will need input from stakeholders, while organizations need voluntary codes of conduct.
Raab (2020)	AI use ethical concerns		✓	✓	Regulators and organizations	Regulation of technologies and their application through approval systems with an emphasis on ethics—fairness, accountability and transparency.
Sarikakis et al. (2018)	Potential breach of human rights			✓	Policymakers nationally and internationally	Social control perspective—conscious quest for impacting change and cartographing a path of actions and intentions.
Timmers (2019)	Country sovereignty at risk			✓	Primarily regulators at national and international levels	Public collaboration, intergovernmental collaboration, and supranational body interference.
Vakkuri et al. (2020)	AI ethics field is in its infancy		✓		Organizations and people within them	Guidelines for organizations including following regulations, greater stakeholder links, and others.
Vetrò et al. (2019)	Discrimination and biases		✓		Organizations	A set of principles to be followed is advised which include openness and transparency requirements.
Weber (2020)	AI platforms impact on society		✓	✓	Regulators; ethics committees in organizations	Legal framework safeguarding socio-ethical values as well as fundamental rights necessary.
Wright and Schultz (2018)	Social contract violations		✓	✓	Firms, policymakers, and researchers	Integrated ethical framework: identify stakeholders, enumerate social contract, assess stakeholder impact, minimize violations/ disruption.

[a]Level of accountability: mi—micro (individuals), me—meso (groups and organizations); ma—macro (governments, societies, etc.).

As seen from the studies in Table 1, the research suggests accountability of organizations and developers to ensure AI technologies operate to the highest ethical standards. Professional associations as well as governing institutions also play a part in regulating the development of these technologies to the highest possible standards. We agree and build on the findings of the publications by proposing professionalism of individuals either developing or operating the technologies as a pathway to ensure ethical outcomes in the use of the technologies. In the next review step, we identify to what extent professionalism is being discussed in the current literature of AI and ethics.

3.2 | Step 2: Perceived unethical outcomes of AI deployment

In the second step of our analysis to provide an overarching analysis of available literature of unethical outcome of AI technologies, we searched the WoS, Scopus, Google Scholar, and ProQuest Central databases using the following string (partially built on the search string provided by Khalil et al., 2020): "artificial intelligence" or "machine learning" or "intelligent agent*" or "computational intelligence" or "neural network*" or "deep learn*" AND "failur*" or "discriminat*" or "racis*" or "sexis*" or "mistak*" or "error*" or "bias*" or "unethical" or "harm" or "legal" or "unprofessional" or "danger" or "death." We were thus able to locate studies that identify the various unethical practices of AI technology as well as implications and a variety of recommendations that these studies offer to reduce the risks associated with unethical outcomes of the technology use.

The extensive search for studies that portrays the state of the literature of perceived breaches of ethical conduct (as agglomerated by Jobin et al., 2019) in deployment of AI technologies garnered a number of studies, depicted in Table 2. The studies in the first column are available in the list of references. The second column depicts unethical conduct of AI as described in the corresponding studies; the studies also point out or imply the responsible parties in column 3 as well as the implications of the research in propositions, recommendations, or contributions of research in column 4. It was thus possible to code the unethical breaches against a variety of ethical principles as proffered by Jobin et al. (2019) in column 5. The research demonstrates common causes of the perceived unethical conduct, most of which seem to involve the possibility of aversion of these miscarriages of technology through appropriate professionalism checks and balances systems.

The extracted studies demonstrated in Table 2 show that a common cause for perceived unethical behaviour among AI-related technologies falls under questionable design including rushed releases and often implicit bias that is often programmed in algorithm design. As such, research demonstrates that virtual personal assistants (VPAs) including Amazon's Alexa, Microsoft's Cortana, and Apple's Siri appear to enforce gender stereotypes through the programmed behaviour of these assistants (Loideain & Adams, 2020; Woods, 2018). These practices are thought to infringe such values as equality (justice), integrity (nonmaleficence), and choice (freedom) and require further investigation as well as society and state involvement. A purposeful design of the Australian government machine learning mechanism for debt recovery, Robodebt, was deemed to provide false or incorrectly calculated debt notices to eventually equate to government extortion (Braithwaite, 2020; Martin, 2018). As observed by Carney (2019) such legal errors of the Robodebt programme were due to the rushed design by the government not following the legal and ethical standards on machine learning provided by Administrative Review Council in 2004 including breaches in solidarity, dignity, transparency, and trust, which eventually led to the programme being shut down and repayments of unfair recoveries. Further, consider Google Duplex, a virtual helper that is capable of impersonating humanlike conversation for booking reservations and service enquiries including sounds like "umms" and "aahs," these capabilities may be perceived unethical and as such contravene codes prescribed by the British Standards Institution (BSI) and IEEE including dignity and trust in the new technology (Chen & Metz, 2019; O'Leary, 2019).

In addition to the questionable design as outlined above, organizations may not disclose the coding that is responsible for the conduct of such technologies and/or algorithms. As such, YouTube's algorithm ultimately rewards hegemonic and normative performances of femininity, stratifying by class and gender, and subsequently punishing content that does not fit specific criteria some of which are advertisement-centric (Bishop, 2018). Similarly, discrimination demonstrated in the Google Ad service where women get fewer instances of higher paying jobs advertisement as compared with men is hidden behind the blackbox algorithms of Google (Datta et al., 2015). This is supported by the fact that AI-based Facebook Business Manager and Google AdWords showed a potential for discriminatory usage when they are used to exclude people of a certain ethnic or racial affinity as target audience for advertisements posted on these platforms due to the data set chosen and targeting rules embedded in the systems (Dalenberg, 2018). In another example, risk assessment Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) software used in various US jurisdictions to provide sentencing advice has also been

TABLE 2 Perceived breaches of ethical conduct in deployment of AI technologies.

References	Unethical or problematic conduct	Responsible	Propositions/ recommendations/ solutions/contributions	Breached ethical principles
Angwin et al. (2016); Martin (2019a)	Government correctional service (COMPAS) algorithms demonstrate apparent racial bias due to value-laden design.	Organizations	Organizations should take responsibility for the actions of the algorithms and technology.	Justice (e.g., fairness and equality), transparency, freedom (e.g., consent), trust, dignity, nonmaleficence (e.g., safety), responsibility
Belk (2020)	Various types of discrimination by robotics in surveillance, social engineering, and military	Organizations and governments	Further research, raising public awareness and scrutiny of the robots.	Justice (equality and equity), nonmaleficence, responsibility, freedom (choice and empowerment), trust, dignity
Bishop (2018)	YouTube's "black box" algorithms can be class and gender biased.	Organizations	Further research is recommended to bring the issue to light to influence positive changes.	Transparency, justice (equality, nonbias), responsibility, trust, dignity, freedom (consent)
Carney (2019)	Australian government's automated debt recovery system issued incorrectly calculated debt notices.	Government	Due to mounting criticism the system has been scrapped on 29/05/2020.	Beneficence (e.g., well-being), freedom, trust, responsibility, privacy, justice, dignity, solidarity (social security)
Cohen (2019)	Discrimination against women in job application software developed by Amazon.	Organizations	Ensuring technologies are devoid of bias will enhance HR functions.	Transparency, justice (equality and nonbias), responsibility, privacy, freedom (choice and empowerment), trust, dignity
Dalenberg (2018)	Automated job advertising may be discriminating on the grounds race, sex, class, and other associations	Organizations	Organizations should comply to the relevant regulations when designing these systems.	Transparency, justice, responsibility, privacy, freedom, trust, dignity
Datta et al. (2015)	Google job search ads for highly paid positions are less likely to be presented to women.	Google	Further research by academics, organizations themselves, and regulators is recommended.	Transparency, justice, responsibility, privacy, freedom, trust, dignity
Etzioni and Etzioni (2017)	Errors (sometimes fatal) caused by AI-based driverless cars.	Developers, deployers, and regulators	Regulations as well as ethical guidance should be established by developers and deployers, i.e., users.	Responsibility, transparency, solidarity (social security), privacy, freedom, trust, dignity
Feuerriegel et al. (2020)	AI-based credit loan application system was found to favour certain socio-demographic groups.	Organizations	Organizations are required to understand perceptions of fair AI and align these values, to conform to regulations and to build trust.	Justice (equity and fairness), trust, responsibility, transparency, privacy, freedom (choice and empowerment), dignity
Finlayson et al. (2019)	Minor undetectable manipulations of data can change the behaviour of AI systems.	Regulators and decision makers	Regulatory safeguards must be introduced—accountability and standards of procedure.	Nonmaleficence, trust, justice, responsibility, beneficence (well-being), freedom, dignity, solidarity

TABLE 2 (Continued)

References	Unethical or problematic conduct	Responsible	Propositions/ recommendations/ solutions/contributions	Breached ethical principles
Gong et al. (2020)	Deepfake content as a threat to society, politics, and commerce.	Government and society	Legislation, company policy, publicity, training and education, and technology	Nonmaleficence, trust, justice, privacy, freedom, dignity, responsibility, beneficence, solidarity
Howard and Borenstein (2018)	Implicit bias in the design and the data used to guide technologies leads to biased outcomes.	Organizations and all stakeholders	Community involvement, monitoring, multidisciplinary teams, litmus tests, decisions transparency, selectivity of words, built-in comparative analysis.	Transparency, justice, responsibility, privacy, freedom, trust, dignity
Iacobucci (2018)	Health self-diagnosis system previously missed symptoms, generated a high rate of false positives, and regulators considered the app to be outside their regulatory remit.	Regulators and developers	Regulators should be proactive and test new diagnostic technology in safe limited situations, with independent trials and careful assessment.	Transparency, justice, freedom, trust, dignity, nonmaleficence, beneficence, responsibility
Loideain and Adams (2020)	Bias in design of virtual personal assistants with an implied discrimination of women to be 'submissive and secondary to men'.	Regulators and organizations	Further research is required into the digitally gendered servitude, and regulators need to intervene in design.	Transparency, justice, responsibility, privacy, freedom, trust, dignity, nonmaleficence
Obermeyer et al. (2019)	Racial bias because the algorithm predicts health care costs instead of illnesses of patients.	Developers of algorithms	Changing the algorithms to be more impartial and objective by adjusting some indices.	Nonmaleficence, trust, justice (equality), responsibility, beneficence (well-being), freedom, dignity, solidarity
O'Leary (2019)	Google's Duplex is a voice assistant that is capable of impersonating humans and thus is potentially unethical.	Developers and regulators	Ensuring that the system identifies itself as a robot from the outset when performing tasks for owners.	Nonmaleficence (including protection), trust, justice, privacy, freedom, dignity, responsibility
Strickland (2019)	Oncology Expert Advisor system provided useless and sometimes dangerous recommendations. IBM Watson is generally not ready to replace medical specialists.	Developers	Currently no specific solutions are available.	Transparency, justice (remedy and redress), freedom, trust, dignity, nonmaleficence, beneficence (well-being and social good), responsibility
Zuiderveen Borgesius (2020)	Algorithm for a medical school's admission system discriminated against women and people with an immigrant background.	Regulators	Nondiscrimination and data protection laws need to be enforced to prevent discrimination by algorithms.	Transparency, justice (equality), responsibility, privacy, freedom (choice and empowerment), trust, dignity

found to be engaging in racial profiling in its decision-making, which was not "available for defendants to question" (Martin, 2019b).

The other common reason for perceived bias in machine decision-making lurks in the data that are fed to the algorithms, intentionally or unintentionally. In an international beauty contest that utilized AI algorithms to identify the most attractive contestants from a pool of 6000 entrants representing over 100 countries, the winners were predominantly Caucasian (Khalil et al., 2020).

Further, face recognition systems are often discriminatory against people with an Asian background, be it a passport photo system or an iPhone that allegedly shows Asian applicants with the eyes closed when in fact they are open in the former or failing to distinguish between faces of Asian origin in the later (Howard & Borenstein, 2018; Tischbirek, 2020). In another example, Amazon was forced to shut down its job application rating system as it was biased by providing less of a score for female applicants as compared with male counterparts due to the data being based on the pool of Amazon employees, which were mostly male (Cohen, 2019).

Drawing from the above examples in Table 2, developing algorithms in AI systems requires selecting datasets as input. The moral behaviour of developers influences the input of data, the type of data fed as inputs, suitability of the data feed (e.g., limited or biased sets of data), how the data will be used, and who will be using the final output in the decision-making context. AI system developers take on algorithmic accountability, also referred to as artificial morality (Dodig Crnkovic & Çürüklü, 2012), and the responsibility of the system-generated decisions and the consequent implications including potential biases, diminished rights, mistakes, and violated principles (Martin, 2019b). For example, an AI-based system to approve or reject a potential customer a bank loan, a credit card, or a mortgage should be traced to organizations and developers when they decide to automate the process using logics that can potentially exhibit prejudices (Whitby, 2008).

Many of the issues arguably stem from the novelty of the algorithms and technologies introduced, which, unsurprisingly, are unregulated due to the lack of policymakers' inability to keep up with development and subsequent utilization of these technologies. As such, the largest technology companies that are in the forefront of AI technological development remain largely unregulated in this sphere. Some of these conglomerates including Microsoft, Alphabet, and IBM have introduced and are working within the framework of their own ethical conduct guidelines, while others including Amazon have not introduced any such guidelines instead providing an assurance of ethical conduct being programmed into the new AI technologies (Carter, 2020). As described earlier, there are multinational accords, as well as various national, professional association guidelines available to regulate and create some institutional framework on the responsibilities of individuals, organizations, and the consequent technologies on ethical behaviour.

A review of studies in Tables 1 and 2 also shows that the concept of AI ethics at individual level is associated with perceptions embedded in experiences, and the measurement of such concept should be able to capture and assess one's experience of using AI technologies. For example, the emulated capabilities of Google's Duplex system to impersonate human voice has been measured and analysed, and it has been found that impersonation deceives a user by pretending to be a human (O'Leary, 2019). Concerning discriminatory visibility, Bishop (2018) attempted to measure the impact of self-optimization tactic of YouTube's algorithm. It is found that self-optimization tactic of YouTube's algorithm favours middle-class social users to create specific gendered content for advertisement. Within the law field, the measurement of the impact of algorithmic decision-making on human rights has explored nondiscrimination and that they have been argued to be due to that such system can reproduce discrimination from biased training data consisting of discriminatory decision human decisions (e.g., gender, sexual preference, or ethnic origin) (Zuiderveen Borgesius, 2020). Similarly, the utilization of automated online targeting of job advertisement is evaluated, and it is found to be able to cause direct and indirect discrimination when the targeting setting is designed to exclude some specific or a larger group of people (Dalenberg, 2018).

Regarding gender stereotypes and equity, research shows that the gendering of VPAs such as Alexa, Cortana, and Siri causes indirect indiscrimination and societal bias towards women because it creates a notion that women are "submissive and secondary to men" (Loideain & Adams, 2020). Through an experimental technique and statistical analysis, Datta et al. (2015) found that compared with men, females receive fewer ads encouraging them to consider applying for high-paying roles from the "Ad Settings webpages" created by Google, stressing that discrimination exists in online advertainments. Also, Cohen (2019) points to the existence of AI discrimination against women in employee screening developed by Amazon. It is further argued that the discrimination issue is embedded in the data, which have been gathered based on those individuals who have already been recruited, which are primarily men. In addition to the role of such data, research points to the selection bias of the experts, the selection of an image to represent an area of expertise, and the predetermined outputs for a case as the other reasons for the existence of ethical problems in AI (Howard & Borenstein, 2018). Applying the bias measures on several real datasets, Vetrò et al. (2019) explored ethical-social issues associated with the use of AI agents for decision making for some population groups (e.g., disadvantaged), when the database is designed to specifically focus on some narrow objectives such as efficiency and optimizations goals.

Although studies have focused on the potential (un) ethical outcomes of the utilization of AI, the measurement of AI ethics seems to be a major challenge for

researchers. This is due to the fact that the ethics construct comprises different elements and deals with individuals' perceptions of what is right and wrong—all of which mean different things to different people (Nguyen et al., 2008). This becomes even more challenging for researchers when measuring AI ethics based on societal views. With the fact that the societal view of AI ethics is influenced by various social systems (Paraman & Anamalah, 2023), the key challenge for measurement is identifying a set of variables that "corresponds to the aggregate ethical view of society" (Baum, 2020, p. 166), which is also argued to be crucial for developing a framework for a "good AI society" (Paraman & Anamalah, 2023). Hence, the measurement is about selecting a procedure to identify the views on different aspects of AI ethics in a specific context. For example, a survey can be designed to explore the perceptions of a select group of people about the threats of job loss as a result of using AI (Vu & Lim, 2022) or the implication of such technologies on community well-being (Musikanski et al., 2020). A scenario-based survey experiment can also be used to gather perceptions about the fairness and risk of AI systems in making a decision (Araujo et al., 2020). As part of the social system in a context, the perception of policymakers, designers, and developers should also be captured and measured to obtain the composite ethical perception from different stakeholders. The aggregation of ethical views is the next step when the measurement is completed. Drawing on social choice theory (Sen, 2008), research suggests the role of an aggregation procedure in identifying a single ethics view from the measurement outcomes (Baum, 2020). The aggregation is considered important because the AI systems use one single view to decide (Baum, 2020). Therefore, it can be argued that the measurement of societal views contributes to the understanding of the AI social choice ethics.

3.3 | Step 3: Professionalism in AI and ethics scholarship

As seen from the analysis of the perceived ethical conduct breaches in Step 2 as summarized in Table 2, there are specific ethical principles that have been breached in each case. It is seen that individual-level ethical principles including *fairness*, *nonmaleficence*, *responsibility*, *freedom*, and *trust* as well as organizational-level principles of *transparency*, *privacy*, *fairness*, *trust*, *solidarity*, and *sustainability* are consistently infracted. When we talk about these moral principles, we inevitably venture into ethicality of actions. Despite notable progress in the development of AI systems in terms of technological innovation, which is derived from knowledge and skills, we see that issues including rushed designs, insufficient attention to the information fed to the machines, and high levels of secrecy in the design process are the causes of ethical breaches. This paper contends that technology trust and acceptance does not only stem from highest levels of technological innovation development but also stem from the question of ethicality in development and use of these technologies, thus bringing us to the construct of knowledge and skills supported by ethicality, which together constitute professionalism. To find out how much attention is given to the holistic understanding of professionalism, that is, knowledge, skills, and ethicality, we delve deeper into the literature.

In the third step of our overview of AI ethics scholarship study, we identify all publications that contain terms with the *professional** core in them. We aim to discuss the context and the role of professionalism within the studies to identify a gap in the literature. We note that professionals may be referred to by other labels including specific occupation-related labels such as surgeons or engineers; this limitation is addressed in the conclusion. However, we contend that when professions are discussed in terms of codes of conduct, the term profession* will likely show in the discussion (professional code, professional behaviour, etc.). The terms with the *professional** core appear in only 120 publications of the entire set of 1592, which amounts to approximately 8% of all publications in this scholarship.

We read through all WoS 120 publications that mention the term *profession**; we note that the majority of the studies use the term to identify a context within which a particular phenomenon is investigated. For example, Flahault et al. (2017) demonstrate how technology including AI algorithms and machine learning improves professionals' ability to provide healthcare with greater efficiencies and effectiveness. Further related studies examine the direct impact of these technologies on professionals including challenges it presents to professionals (see, e.g., Benke & Benke, 2018) to a potential direct replacement of professionals or at least part of their duties, for example, in legal professions (Armour & Sako, 2020; Sutton et al., 2018). Finally, another stream of research utilizes professionals as samples in studies (e.g., Wangmo et al., 2019; Wiesenberg & Tench, 2020). Almost half of the studies were in the context of the healthcare sector.

There were only six studies of 120 that highlight the relationship between professionalism and ethical development/use of AI technologies. First, Delacroix (2018) looked at automation within the legal profession and suggested that automated systems have a potential to hinder the quality and legal service of professionals in this field. Similarly, Neri et al. (2020) questioned the trustworthiness and reliability of AI use in radiology and argued that

the ultimate responsibility ought to remain with radiologists in utilization of AI. Luxton (2014a, 2014b) reported some ethical issues as the consequence of using AI by professionals in mental healthcare. The studies call for professionals to engage in the study, development, and guidance of the technologies considering the topic of intelligence of these technologies. This argument is further supported by Bezemer et al. (2019), who argue that healthcare professionals ought to initiate and guide the development of support algorithms in clinical care instead of being overwhelmed by technological advancements. The study argues for the developers and the relevant practitioners to collaborate in interprofessional fashion to design these systems with ethics in mind. Finally, a study conducted by Thomson and Schmoldt (2001) in software design calls for AI development organizations to uphold professional codes of conduct to ensure values in design and the resultant success of technologies.

More recently, interdisciplinary research recognizes the role of professionalism in ensuring ethical AI. For example, Gillies and Smith (2022) outline the principles of professional codes of conduct that define professionals; the authors then find that AI systems currently do not meet ethical standards that govern human professionals. Borenstein and Howard (2021) argue that AI ethics should be parts of curricula for members of AI community to ensure professional behaviour of AI and its users. Goto (2021) provided an in-depth analysis of AI development in auditing at a collective professional identity level and found a mutually reinforcing managerial and professional practices relationship when professionals adopt AI at a collective level. This argument is supported in Klarin & Xiao (2023) recommendations for professionals in architecture, engineering, and construction industry. Whilst Qu et al. (2022) argue for the need to ensure AI development is regulated sufficiently to avoid risks in education sector. Finally, Stahl (2021) notes that in computing, including AI, professionalism is less developed than in other areas including medicine and law. Thus, suggesting the need for advancement of professional bodies' involvement in developing AI ethics standardization.

Whilst the studies depicted above are instructive in bringing attention to the field of professional behaviour of AI and its use, they do not provide the detail of the implications of professionalism in the development and implementation of AI from the wider stakeholder perspective. In particular, these studies identify the term profession and professionalism with skills and outcomes instead of the entire complexity of the professionalism construct, which also concerns the perceived professionally ethical behaviour according to certain codes of conduct from the point of view society at large. Finally, these studies tend to be context specific, with four of the six studies that highlight the relationship between professionalism and ethical development/use of AI technologies being centred around the healthcare sector.

Ultimately, we argue that designing algorithms in AI systems require selecting a set of data sets as input and the moral behaviour of designers influence the role of the actor inputting the data, the type of data feed as input, suitability of the data feed, how the data will be used, and who will be using the final output in the decision-making context. As AI system developers/designers with specialized knowledge and abilities are uniquely positioned to design and develop AI system algorithm, they make a moral choice and take responsibility for ethical implications of algorithms given that that an algorithm can either reinforce or infringe ethical principles of the decision-making context (Martin et al., 2019). We furthermore argue that the errors or shortcomings of certain AI systems are due to lack of professional behaviour and accountability on the part of deployers or operators of these systems. Although it is generally understood that there should be a more thorough scrutiny of professionals and organizations in ensuring ethical AI, there have been no studies that identify the values required to be upheld to ensure ethical AI by individuals nor organizations, which is what we aim to propose in this study.

4 | ENSURING ETHICAL AI DISCUSSION

It is futile to expect AI technologies to behave ethically without identifying the causes of unethical behaviour. The evidence-based approach of this review on AI and ethics was instrumental in identifying the gap of connecting AI technologies to the required ethical outcomes of the use and operation of these technologies. This study adopted systems research approach (Klarin et al., 2023) in studying the interdisciplinary nature of AI ethics by merging the AI and ethics scholarships together to offer a holistic and emergent perspective of the scholarship. The holistic systems overview identifies a clear gap in practice and the consequent literature in ensuring ethicality in development and operation of AI. Development of designed systems requires not only knowledge and skills but also ethicality, which is only achievable through instilling professionalism in designing and operating AI systems. Below is the discourse of how this study derives the findings and offers a theoretical contribution in offering ethicality principles at individual and organizational levels in ensuring ethical AI. The study further proffers practice and policy implications as well as directions for further research in this pertinent subject.

4.1 | Theoretical contribution and implications

The studies that examine the relationship between AI and ethics, as depicted in Table 1, call for greater accountability of developers and operators, alongside regulatory bodies, and various stakeholders to create institutional frameworks for the development and use of AI technologies. Building on previous research, we aim to go further and ask: How do we achieve ethical behaviour of developers and operators of AI and the related technologies? We thus contend that professionalism of the accountable parties will ensure proper ethical standards maintenance and a possibility of eradication of perceived unethical behaviour by the development and use of such technologies (Figure 2). We specifically argue that the shortcomings of AI-based systems, regardless of whether they are intentional or unintentional, are due to the lack of professionalism on the part of the developers and organizations designing and releasing these systems. Consider, for example, a relatively common issue with the data source used to feed the algorithm that eventually produces biased results. The data collected in an imperfect world, for example, skewed perceptions of the risks to society that are partially based on racial aggregation of certain individuals, fed to a *tabula rasa* machine will inevitably lead to machine preconceptions and the resulting biases in the actions of the machine. It is for the developers' professional responsibility not only to ensure that the machine is fed the data that exist (reminder of the adage 'garbage in, garbage out') but also to ensure that the data are parsed and unbiased; this is also to be followed by extensive checks and balances system before it is released to serve its purpose. Arguably, there has been some progress in this sphere where national and transnational level institutions design frameworks that aim to curtail the use of data and its resultant use and technologies. For example, Goodman and Flaxman (2017) describe GDPR adopted by the European Parliament, which requires algorithms to operate within this new legal framework. Elsewhere, Leslie et al. (2021) has established nine principles and priorities that serve as the foundation for both binding and nonbinding legal guideline: (i) human dignity, (ii) human freedom and autonomy, (iii) prevention of harm, (iv) nondiscrimination, gender equality, fairness and diversity, (v) transparency and explainability of AI systems, (vi) data protection and the right to privacy, (vii) accountability and responsibility, (viii) democracy, and (ix) rule of law. In addition, Wagner (2018) describes the set of ethics guidelines developed by the European Group on Ethics in Science and New Technologies (EGE).

Figure 2 identified the proposed principles of professionalism in AI on individual professional and organizational levels to ensure ethical AI. Each of the principles is detailed through a comprehensive scoping review carried out by Jobin et al. (2019); we suggest readers to refer to the study for further elaboration of each of the principles as it falls outside the scope of this study to explain each principle in detail. At the individual level, professionals ought to exhibit *fairness* by mitigating bias through respect, inclusion, and equality in access, use and challenge; *nonmaleficence* through safety and security, and aversion of any unintentional and/or foreseeable harm; *responsibility*—acting with integrity and being accountable for the actions and responsibilities for society; *freedom* through moral courage to do the right thing; and building *trust* by the right professional conduct. At the organizational level, professionalism is underpinned by *transparency*, which ensures clarity in the processes for the optimal trust; respect for *privacy* as a fundamental right of society; *fairness* by proactive consolidation of the just cause, inclusion, and equity; *trust* through assurance of the righteous actions in ensuring societal confidence in the organization and its operations; *solidarity* towards society and equitable distribution of the AI benefits; and *sustainability* as it is expected by society that

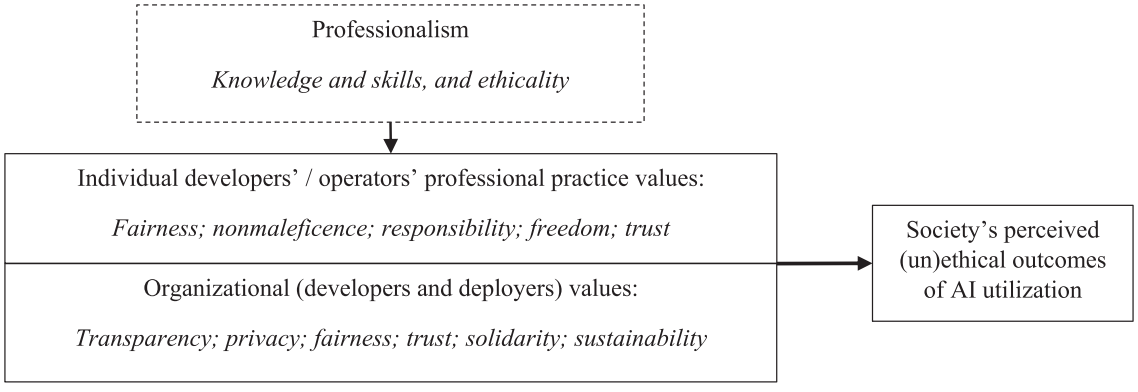

FIGURE 2 Professionalism role in the perceived ethical use of AI technologies.

organizations, especially the larger ones, upkeep with the triple bottom line responsibility towards the environment, society, and stakeholders. Having identified the key professional ethical traits for individuals and organizations, we do note that some values certainly apply to both individuals and organizations. For example, it is expected that at both individual and organizational levels, the respect for privacy is of utmost importance. However, organizations carry the ultimate responsibility to ensure that employees within respect and uphold the privacy rights as we believe that individuals should exercise the righteous moral standards within or by default to be considered truly professional in what they do. Thus, we put privacy principles as a responsibility of organizations more so than individual professionals.

When professionalism in AI is viewed through the social contract theory lens (Donaldson & Dunfee, 1994), ethical or unethical behaviour can be determined based on societal expectations of practices of developers. The theory suggests that the linkage between AI and professionalism should not be disjointed from the expectations of society. In fact, any unethical outcomes experienced or observed by society in utilization of AI technologies jeopardize the social contract between developers and society. In other words, society plays a role in evaluating the practice of AI developers. The more developers embrace societal expectations of AI, the more they are likely to build trust with the general public (Araujo et al., 2020). Trust in applied AI is essential to the process of overcoming society's scepticism about AI adoption (Hengstler et al., 2016). Given that society's trust and expectations have become an integral consideration for applied AI, we contend that professionalism should be exhibited by AI developers and deployers. Accordingly, trust in AI refers not only to the considered ethical standards as part of the development of technologies but also in the evaluation by society (the general public) of the perceived (un)professional behaviour of developers or deployers.

Indeed, developers from organizations designing AI systems are also members of a broader society, and they are expected to comply with the norms of the community and be accountable for the moral consequences related to algorithm as part of a social technical system for diverse stakeholders to realize further social values (Munoko et al., 2020; Sekiguchi & Hori, 2020; Sun et al., 2022). Thereby, drawing on professionalism, this study suggests that professional behaviours of AI technology developers or the entrusted operators centred on the principles, norms of the profession and codes of ethics help ensure ethically acceptable behaviour of AI technologies.

Unsurprisingly, supranational institutions, national governments, and professional associations propose principles, values, and guidelines that AI systems should meet in order to be deemed trustworthy. For example, in addressing the question of whose responsibility it is to assess and manage any risks associated with AI applications, the European Parliament recommended that the deployer of an AI system holds the responsibility of controlling any risks and the level of risk should indicate the liability regime. The European Parliament has recommended that autonomous traffic management system and vehicles, unmanned aircrafts, autonomous cleaning devices for public places, and robots are high-risk AI systems that should be subject to a strict liability regime (Stahl, 2021). In this regard, Borenstein and Howard (2021) argue that while professional bodies and associations provide specific guidance on AI and the ethical issues, it is the ultimate responsibility of the AI professionals—for example, developers of AI technologies to ensure that the AI system is intertwined with ethical requirements. This requires having a professional mindset related to moral sensitivity which emphasizes that technical aspects/functionalities of the designed AI systems should consider ethical guidelines as part of their professional responsibilities without conceiving the mentality that ethics is someone else's problem (Borenstein & Howard, 2021).

However, currently there are no discussions as to what values and standards should AI professionals and organizations exhibit to develop and deploy AI systems. Based on the evidence collected from studies compiled in Table 2, we highlight professionalism-related breaches of values that led to the documented AI ethical failures. Thus, building on AI ethics principles (see, e.g., Jobin et al., 2019; Mittelstadt, 2019), we contend that the key in ensuring professionalism in AI is the need for regulation by unified "fundamental principles of AI professionalism" (Figure 2).

If we adopt a systems perspective of holism that demonstrates how integral mechanisms of a system are interrelated and apply it to professionalism in AI (Nazarov & Klarin, 2020), we inevitably discuss stakeholders as the unit of analysis and their interrelationships (Su et al., 2022; Sun et al., 2022). In Figure 3, we propose the interaction of the key AI stakeholders (Bietti, 2020; Deshpande & Sharp, 2022; Güngör, 2020; Langer et al., 2021; Meske et al., 2022) in developing and utilizing AI from the systems holism perspective that demonstrates how professionalism among developers and organizations is transferred to society, and there are feedback loops in resources and demands from society to organizations and developers.

4.2 | Practice and policy implications

We also note that in certain sectors including military and healthcare (see, e.g., the Step 2 review studies that

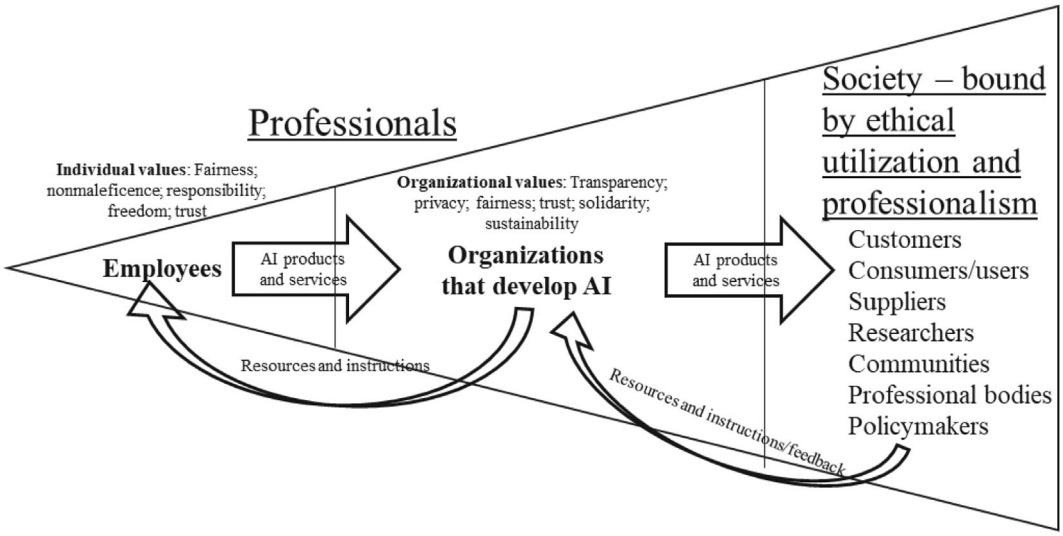

FIGURE 3 Interaction of stakeholders in AI development and consumption.

depict professionalism), where the perceived risks are significantly higher, the responsibility will rest with the person in the "driving seat" of the machine, that is, the operator or deployer. Consider the fact that the US military holds those in charge of autonomous machines ultimately responsible for the actions of these machines, while China has proposed a ban on lethal autonomous weapon systems (RAND Corporation, 2020). In the medical field, O'Sullivan et al. (2019) envision that complex medical machines will be able to perform surgical operations under the guidance of a human surgeon, who will hold the ultimate responsibility as a human in the driving seat of autonomous machinery similarly to the case with autonomous vehicles that roam the roads today. While these two sectors, the military and healthcare, entrust operations to the machines, the responsibility for the actions of AI technologies is in the hands of the professionals in charge of these technologies. Therefore, we are, at least for now, ruling out the possibility of completely autonomous machines performing actions, which hold the possibility of harm to health or loss of life. It is thus the professional behaviour of the operators of these machines that separates the potentially harmful conduct of the machines and society.

Furthermore, we recognize that each profession has its own ethical standards; our intention is to provide generic sets of values for employees/professionals that develop solutions and those that utilize the solutions in practice as well as organizations that disseminate and utilize these machines. We argue that the values demonstrated in Figure 2 and discussed in the previous subsection are the key values to ensure ethical AI in any industry and sector. We utilize the analogy of arms or vehicles being provided to users—where there is only so much manufacturers can do to prevent harm caused by the users. Nevertheless, it is important to produce to the highest quality and ethical standards with various safety mechanisms to ensure the products and services are as safe as they can be. Ultimately, however, it is the user that is held accountable and responsible for the use of guns or vehicles. As such, we argue that organizations and individuals that utilize AI are also required to exercise professional standards to ensure safety and risk aversion of the use of these technologies. Therefore, if all parties (regardless of the industry or context) ensure professionalism in either creation, distribution, or use of AI technologies, this will result in seamless integration of technologies with minimal risks and highest ethical standards involved.

Professional agencies similarly play an inseparable role in advising and guiding certain technological projects to ensure future ethical and impeccable standards are upheld by the technology and its use. As such, Abràmoff et al. (2018) were able to develop one of the first AI-based technology completing the Food and Drug Administration (FDA) regulatory process in the United States. The system was designed from the data of over 1 million samples based on extensive publication history, which spanned two previous decades. The FDA was closely involved in advising and guiding the company through the clinical trial of 900 subjects. This close collaboration undoubtedly played a part in the device being approved for medical use in diagnosing diabetic retinopathy.

We thus aim to bring forth the professionalism role in achieving ethical outcomes as perceived by society in development and operation of AI technologies. AI system developers need to exhibit professionalism in terms

of appropriate knowledge and skills and conformation to ethical codes of conduct related to the profession. These professionals ought to design appropriate AI systems since professional behaviour fundamentally refers to adhering to codes of conduct as part of the profession, understanding ethical implications, working with professional associations, and thus ensuring maximization of benefits for diverse stakeholders including customers, firms, and society (Evetts, 2013; Suddaby & Muzio, 2015). Our proposition lends support to the emerging body of literature that suggests that developers and operators with specialized knowledge and skills can make moral choices and thus they are responsible for the ethical consequences of the utilization of machines given that the technologies can either reinforce or infringe ethical behaviour (Allen et al., 2000; Davis, 2010). Irrespective of whether AI technology is autonomous of human control or is operated by individuals, the ultimate responsibility should remain with the developers and/or operators, dependent on context.

We do realize that many of those who develop AI are not necessarily part of one single profession, which means there is not just one code of conduct that applies to all AI developers. Furthermore, many AI developers are not members of a specific profession (in the traditional sense of the term) or a professional organization. Therefore, we call on a systematic approach to identification of the responsible parties either by holding organizations or individuals that released the technology or those organizations or individuals that utilize AI for operational purposes.

4.3 | Future research directions

From the extensive in-depth review of the scholarship and the pertaining discussion, we propose future research directions. First, future studies need to clarify in which industries and/or sectors the responsibility for the AI actions rests upon the developers, the organization that developed the system, the ultimate operator of the machine, or no clear responsibility exists and why. From this, policy recommendations are required to ensure consistency and alleviation of possible breaches of ethical conduct. Second, we need to explore and measure the impact of appropriate training in professional behaviour of developers and its impact on the conduct of AI technologies. Building on this point, further research is recommended into how organizations that develop these technologies ensure and instil ethical conduct to be followed by their employees including the developers. How are the various regulations and recommendations from intergovernmental and intragovernmental, professional association, and research bodies are applied and/or adhered to? If none of these are employed or insufficiently employed by firms developing these technologies, what is the cause and how these issues are to be resolved to ensure ethical conduct of the technologies? Finally, the research in relation to AI rarely, if at all, specifies who are the managers, developers, engineers, deployers, and professionals. Do the same ethical guidelines apply to a temporary contract employee who replaces one of the developers with the relevant qualifications and conduct? If so, are these temporary workers properly informed of the guidelines? In theory, this should remain so, but does it really apply to practice?

5 | CONCLUSION

The aim of the paper was to build on the existing literature, which calls for greater accountability of developers and organizations in designing and using AI technologies, by proposing professionalism in development and use of these technologies as the cornerstone in ensuring ethical outcomes. While the existing literature calls for greater accountability, using systems thinking approach, we propose professionalism of AI designers and operators to avoid unethical outcomes. Having analysed the perceived unethical behaviour of AI technologies in the past (Table 2), we concluded that these unethical outcomes would be mitigated if organizations devote attention to the importance of professionalism of AI developers and deployers throughout the entire development and utilization of these technologies. Professionalism is demonstrated through knowledge and a set of skills coupled with ethicality of its members. We thus set out several values that individual professionals and organizations ought to exhibit to reduce unethical outcomes of AI technology development and deployment (Figure 2).

The developers inexorably are a part of the real world; thus, it is up to these individuals to instil values into an inanimate object that is tasked with (semi)autonomous conduct. Once the inanimate object is capable of action, the ultimate responsibility should remain with the developer and its organization. Professionals including scientists, engineers, and behavioural specialists are practitioners and disseminators of specialist knowledge and thus are governed by various standards and regulations including ethical codes of conduct. These professionals that design such systems are expected to stand by their developments and are ultimately accountable for the conduct of these developments. Therefore, when a wrongdoing is discovered, the professionals accountable should brunt the full extent of the penalties. On the other hand, experiences from the medical and military

applications of AI technologies demonstrate that the responsibility for the machines may be transferred to the deployers and the users of the machines. These users are also governed by professional conduct and are in agreement with society to uphold the utmost standards in ethical conduct in applying their specialist knowledge and skills whilst in operation of the technologies. In either of the above circumstances, it is the professional behaviour of individuals and organizations either in designing or instilling the ethical values into the machines or operating these machines that will ensure ethical conduct of the technology. To complement, institutional environment in regard to regulating and enforcing ethical practices is also developing and is a necessary component together with responsible practices of professionals and organizations in ensuring ethicality of AI.

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