*International Journal on Recent and Innovation Trends in Computing and Communication*
*ISSN: 2321-8169 Volume: 11 Issue: 3*
***Article Received:*** *25 January 2023* ***Revised:*** *12 February 2023* ***Accepted:*** *30 March 2023*

# Accountability Frameworks for Autonomous AI Decision-Making Systems

**Ugandhar Dasi,**
Independent Researcher, USA.

**Nikhil Singla,**
Independent Researcher, USA.

**Rajkumar Balasubramanian,**
Independent Researcher, USA.

**Siddhant Benadikar,**
Independent Researcher, USA.

**Rishabh Rajesh Shanbhag**
Independent Researcher,USA.

***Abstract:*** As artificial intelligence systems become more sophisticated at making judgments on their own, it will become increasingly difficult to enforce accountability, responsibility, and adherence to moral and legal standards. In order to support the structured responsibility for assignment and proof of AI systems, this paper will address the nature of an accountability framework and its associated issues. Important elements like openness, human oversight, and flexibility are incorporated into the proposed framework to regulate AI in order to meet the accountability difficulties that have been highlighted. Through industrial case studies, some important guidelines for implementing and expanding the framework were also supplied, ensuring that businesses boost compliance, trust, and responsible adoption of AI technology.

***Keywords:*** *Accountability, Autonomous*

## Introduction

Intelligent self-governed decision-making systems are new on the scene but they can be seen as the greatest achievement that human beings can offer to the world since they come with huge advantages and also greater implications.

As these systems find their way into different sectors including health, finance and others, the question of decision making without the intervention of human beings is very worrying.

The operations of AI are intricate and for this reason, the decision made by the algorithms are hard to explain hence the issue of blame in case of a mistake or a bias.

Such lack of transparency creates situations when AI may face ethical problems, legal issues, and loss of people's trust.

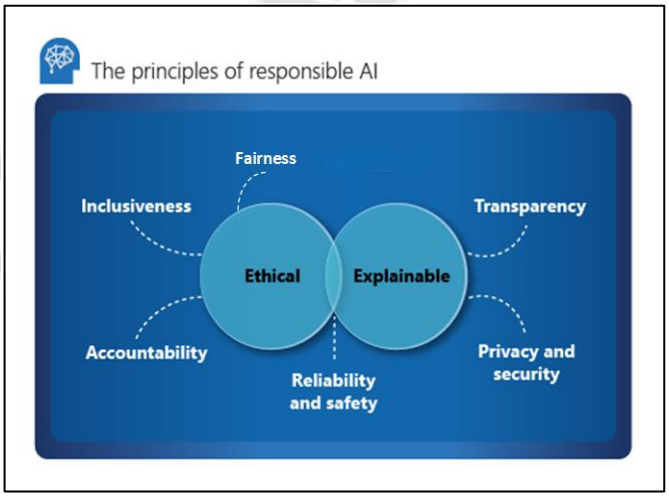


**Figure 1: Responsible and trusted AI**
(Source: https://www.google.com/url?sa=i&url=https%3A)

This is due to the rising use of AI to make important decisions in our society Therefore, proper framework to guide AI's

*International Journal on Recent and Innovation Trends in Computing and Communication*
*ISSN: 2321-8169 Volume: 11 Issue: 3*
***Article Received:*** *25 January 2023* ***Revised:*** *12 February 2023* ***Accepted:*** *30 March 2023*

behavior in order to conform to societal norms and adheres to the law must be put in place. Accountability frameworks offer structure for how risks related to AI decision-making are to be solved in fair, transparent, and reasonable manner.

## Literature review

### Defining Accountability in AI

**According to Novelli, *et al.* 2023:** Accountability in artificial intelligence (AI) presents a controversial and rather fuzzy problem, which is rather difficult to define. accountability in AI can be explained though the concept of answerability, meaning authority recognition, interrogation and restriction of power. Accountability is therefore important in the governance of artificial intelligence particularly as these systems are assumed to assume decision making responsibilities. Accountability is one of the major principles laid down in both the AI Act and GDPR in Europe, and while these principles are available, they lack clarity on how one can implement accountability across multiple systems. The question of accountability within the sociotechnical construct of AI systems opens up a number of issues that are difficult to solve. AI systems work through components of human and technological nature, with no clear line of who is responsible for the consequences of AI-based decisions. The nature of artificial intelligence algorithms – their informal structure and non-deterministic character – adds to the problem of assigning clear responsibility to an AI system and making its decision making transparent. Concerning the present ideas of accountability in AI discussed in the major European regulations, one can mention that frequently the main focus is made on compliance-oversight perspectives while some other significant features like transparency or ethical aspects can remain in the shadows. There is no well-articulated and systematically developed theory of accountability that explicitly defines all the above types and degrees of enforcement and the sociotechnical aspects of AI and that hasn't been filled yet by the writers and policy makers yet.

### Accountability in Autonomous Systems

**According to Verdiesen *et al.* 2020:** One of the significant topics closely related to both ethical and legal dimensions of autonomous systems as well as governance concerns is accountability, especially in the context of AWS. That accountability is most of the time a retrospective view of responsibility, where actors need to justify their actions after the occurrence of an event. In connection with the practice of AWS, this gives rise to crucial concerns as to possible existence of the so-called 'accountability gaps,' under which nothing is hold responsible by human. This is compounded with the fact that such systems are complex and often fully autonomous which makes it hard or impossible sometimes to link decisionmaking back to the operators. The literature recognizes that accountability is significantly needed in the autonomous systems, and control mechanisms known to help to facilitate it. Some attributes of contemporary tactical missions management that are the mission mandate and rules of engagement could be irrelevant or insufficient for fully autonomous systems. They should thus recommend a Comprehensive Human Oversight Framework that encompasses technical and socio-technical alongside governance dimensions to ensure that AWS stay within meaningful human control.

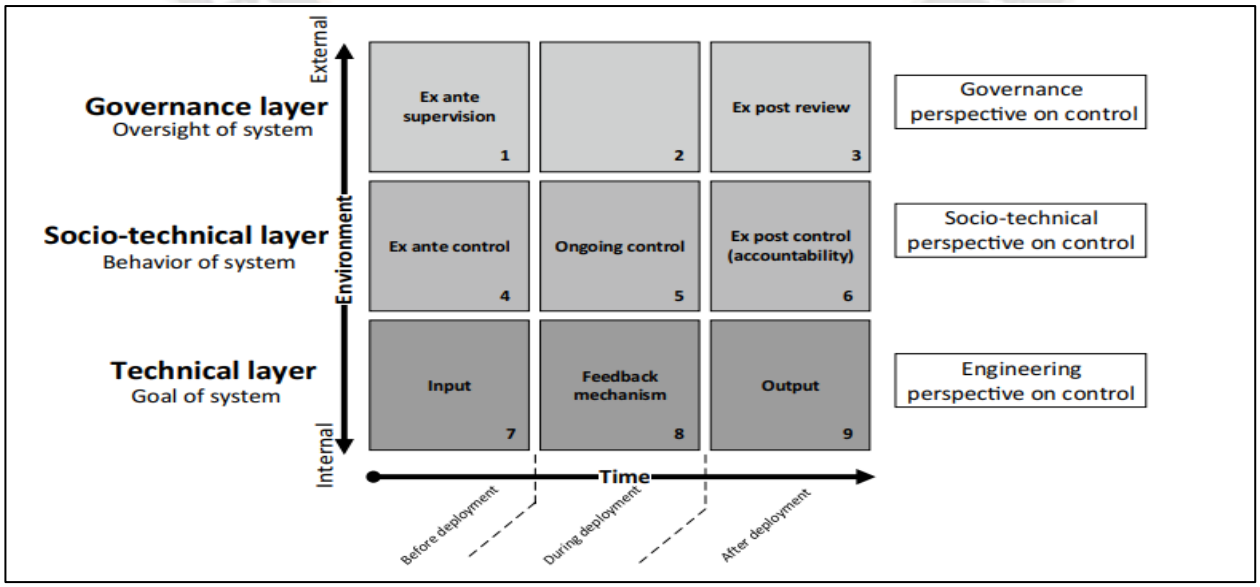


**Figure 2: Comprehensive Human Oversight Framework**
(Source: https://www.google.com/url?sa=i&url=https%3A%2F%2)

*International Journal on Recent and Innovation Trends in Computing and Communication*
*ISSN: 2321-8169 Volume: 11 Issue: 3*
***Article Received:*** *25 January 2023* ***Revised:*** *12 February 2023* ***Accepted:*** *30 March 2023*

Substantial concerns remain in applicable governance and oversight mechanisms in the deployment phase of autonomous systems, even though these shortcomings have not completely obliterated previous, existing attempts at constructing responsibilities as well as accountabilities in autonomous systems. The article advocate for a more holistic approach that factors the difficulties created by the autonomy of AWS. Without such measures, there are chances whereby accountability will not be enough and this may result to legal and ethic challenges.

**Responsibility in Autonomous Systems**

**According to Yazdanpanah *et al.* 2023:** Applying IS into society introduces new problems of responsibility, including the question of how these systems are to navigate the boundaries of the legal and moral. According to Yazdanpanah et al. (2023), the concept of responsibility related to autonomous systems must be perceived both as prospective and as the ability to assign responsibilities before an actual event to occur and as the retrospective view to assess the blame. The possibility of numerical measurement and distribution of the degree of liability is vital to highlight the deficit of account, particularly when automated processes are used to manage a rather large amount of operations to a certain extent on their own. The literature points out that there is the crucial task of creating a proper framework that could enable autonomous systems to make ad satisfying decisions regarding responsibility to guarantee the reliability of these systems and their compliance with legal and ethic norms. This approach is vital for the integration of reliable self-governing systems in the society, and reducing consequences of failures.

**Methodology**

**Collection of Data and Treatment of Data**

Thus, a requirement for accountability frameworks for feeding the decision-making systems for AI is to use high-quality and complete data from which accountability can be derived. It is done by collecting a broad range of first-hand information regarding functioning of existing AI systems, their decision-making patterns, results of these actions, as well as respondents' interactions with AI (Díaz-Rodríguez *et al.* 2023). This involves accessing data from areas where the AI systems are applied including the health industry, the financial systems, and auto mobile industry. Information collection also involves obtaining information about the AI technologies from the relevant authorities and other organizations that regulate the use of such technologies. Information compiled should include cases that involved TI AI Systems performing well to those with negative repercussions to various segments of the society, with special emphasis towards how accountability was provided, or lacked in some incidents.

**The Process of design of the Machine Learning Models**

Recurrent forensic affairs denote that Machine learning (ML) models are indeed important in determining the behavior of autonomous AI systems especially where responsibility is paramount. The structuring of these models is done based on the fact that these are models intended to model decision-making processes and this is done with a view of matching real life problems in the application of AI (Falco *et al*. 2021). These are then fed to the ML models to analyze the data and to determine a certain pattern and to find out more where we have strong accountability structures in place or where we have gaps.

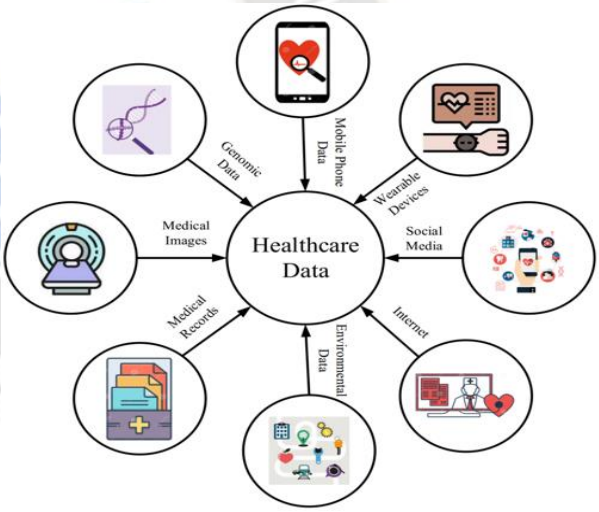


**Figure 3: Autonomous implementation in Healthcare** (Source: https://www.google.com/url?sa=i&url=https%3A%2F%2F)

The models are developed with an interpretability aspect that means the human mind can understand the decisions made by the AI models (Percy *et al*. 2021). This is particularly important in terms of compliance with the accountability frameworks, as it makes it possible to analyze the decision-making process of the created AI systems. Mlda provides for this transparency through the incorporation of feature importance analysis as well as the other model explainability tools. The models are also intended to be trainable in a fashion that enables constant training with new data which is importance given the rapid development in technology.

*International Journal on Recent and Innovation Trends in Computing and Communication*
*ISSN: 2321-8169 Volume: 11 Issue: 3*
***Article Received:*** *25 January 2023* ***Revised:*** *12 February 2023* ***Accepted:*** *30 March 2023*

**Implementation and Deployment**

The delivery of the accountability frameworks and the ML models that are associated with it are phase-based. First of all, the frameworks and models are used in artificial conditions to prove they are efficient. This final phase involves practicing on different kinds of industries to confirm on ability of the models to evaluate and optimise accountability in those fields (Laitinen and Sahlgren 2021).

Any deficiencies that might be observed are communicated back into the models and frameworks in order to fine tune it. After successful test, the frameworks and models are implemented in actual practice, starting with pilot examples in certain sectors. This is however closely supervised with constant collection and analysis of data to see the effectiveness of these frameworks in enhancing accountability (Bjørlo *et al*. 2021).

Training of stakeholders that include the developers of AI as well as the regulators is also done during this phase in order to ensure that they comprehend on how to use the laid down frameworks as well as to and decipher the results from the ML models .

**Result**

**Evaluation of the Framework for the Increase in the Responsibility**

Accountability, therefore, has the potential of enhancing the overall transparent functioning of AI using the suggested framework when applied on the autonomous AI decision-making systems.

From the elucidation of the framework, it was seen that through incorporating of the above measures through the framework, AI systems could provide clearer decision trails easy for identifying the responsible entities when decisions resulted in the negative impacts (Loi and Spielkamp 2021).

Also crucial in the case of accountability was one of the key principles of the presented framework – transparency and human supervision, which significantly limited the key drawback of autonomous AI – the lack of operational openness.

**Examples of cases and results of applying the criteria**

In the case studies conducted in different sectors of economy, the framework was flexible and stable. For instance, in the healthcare industry, the framework helped in defining better responsibilities when AI systems joined the diagnosis and the treatment planning.

In finance it assisted with the identification of decisions in automated trading systems, which assisted in compliance (de Almeida *et al.* 2021). The compatibility of the framework with other regulation concerning the use of AI also helped maintain compliance of the AI systems with the law to avoid violation of the law and make all the relevant stakeholders conscious of their responsibilities. from the results, one is able to deduce that the proposed framework goes further in improving accountability while at the same time increasing confidence towards the use of autonomous AI systems in different industries.

**Discussion**

Coherently, the implementation of the suggested accountability structure and its auditing have shown progress in improving the autonomy of AI decision-correlated systems by increasing its precision. By addressing the nation's responsibilities and maintaining human moderators, the framework permits the moral incorporation of AI in a variety of sectors.

While the use of the framework faces new challenges as a result of technological advancements, it remains focused on upholding fundamental values like decision-making transparency and multidimensional decision handling (Taeihagh, 2021). By adding a real-time monitoring capability and compliance with a continuous learning method, it could improve the framework. All things considered, the current study emphasizes that accountability is essential to building confidence and ensuring that AI is used ethically in society.

**Future Directions**

It is suggested that subsequent research and development should be channeled towards the further development of the proposed accountability framework since challenges associated with the application of auto decision making systems of AI are likely to evolve with time. Given this, the decision making bot may change with time depending on the advancement of the different AI technologies so as to meet the requirements of the framework (Malgieri and Pasquale 2022).

One of the interesting future directions of the research is the integration of the real-time monitoring technology and the adaptive learning to bring the practical application of the proposed framework to the next level for better management of accountability in complex and changing system environments.

Also, reviewing the relationship between AI ethics and legal regulation more broadly on the international level can help find the guidelines for establishing the generally accepted forms of accountability. Coordination between the entities

creating the AI systems, ethicists, and policy makers are going to be essential to bringing about some of these changes.

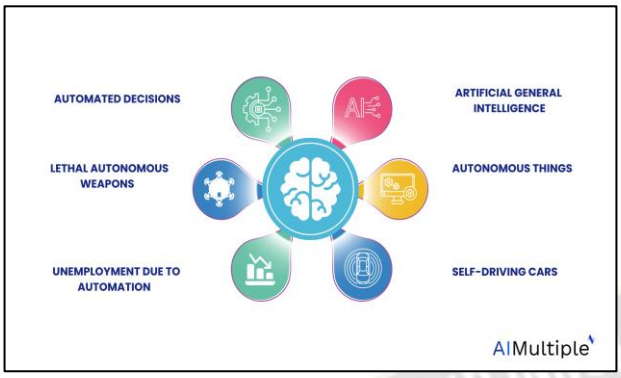


**Figure 4: Future Directions for AI technologies**

(Source: https://www.google.com/url?sa=i&url=https%3A%2F%2Fresearch.aimultiple.com)

## Conclusion

The development and existence of has-independent-accountability measures is essential if autonomous AI decision-making systems are to continue operating as intended. According to the study's goals, the framework that was suggested has shown promise in raising transparency, closing the accountability gap, and ensuring that AI systems abide by ethical and legal standards. The adoption of the framework reassures the many industries that the AI technologies would be closely monitored, as it delineates the responsibilities and accountability. However, as AI and its applications advance in sophistication, these frameworks will need to be further enhanced and fine-tuned in the future.

## Reference list

[1] Novelli, C., Taddeo, M. and Floridi, L., 2023. Accountability in artificial intelligence: what it is and how it works. *AI & SOCIETY*, pp.1-12.

[2] Verdiesen, I., Santoni de Sio, F. and Dignum, V., 2021. Accountability and control over autonomous weapon systems: a framework for comprehensive human oversight. *Minds and Machines*, *31*(1), pp.137-163.

[3] Yazdanpanah, V., Gerding, E.H., Stein, S., Dastani, M., Jonker, C.M., Norman, T.J. and Ramchurn, S.D., 2023. Reasoning about responsibility in autonomous systems: challenges and opportunities. *AI & SOCIETY*, *38*(4), pp.1453-1464.

[4] Díaz-Rodríguez, N., Del Ser, J., Coeckelbergh, M., de Prado, M.L., Herrera-Viedma, E. and Herrera, F., 2023. Connecting the dots in trustworthy Artificial Intelligence: From AI principles, ethics, and key requirements to responsible AI systems and regulation. *Information Fusion*, *99*, p.101896.

[5] Percy, C., Dragicevic, S., Sarkar, S. and d'Avila Garcez, A., 2021. Accountability in AI: From principles to industry-specific accreditation. *AI Communications*, *34*(3), pp.181-196.

[6] Bjørlo, L., Moen, Ø. and Pasquine, M., 2021. The role of consumer autonomy in developing sustainable AI: A conceptual framework. *Sustainability*, *13*(4), p.2332.

[7] Loi, M. and Spielkamp, M., 2021, July. Towards accountability in the use of artificial intelligence for public administrations. In *Proceedings of the 2021 AAAI/ACM Conference on AI, Ethics, and Society* (pp. 757-766).

[8] de Almeida, P.G.R., dos Santos, C.D. and Farias, J.S., 2021. Artificial intelligence regulation: a framework for governance. *Ethics and Information Technology*, *23*(3), pp.505-525.

[9] Malgieri, G. and Pasquale, F., 2022. From transparency to justification: toward ex ante accountability for AI. *Brooklyn Law School, Legal Studies Paper*, (712).

[10] Taeihagh, A., 2021. Governance of artificial intelligence. *Policy and society*, *40*(2), pp.137-157.

[11] Falco, G., Shneiderman, B., Badger, J., Carrier, R., Dahbura, A., Danks, D., Eling, M., Goodloe, A., Gupta, J., Hart, C. and Jirotka, M., 2021. Governing AI safety through independent audits. *Nature Machine Intelligence*, *3*(7), pp.566-571.

[12] Laitinen, A. and Sahlgren, O., 2021. AI systems and respect for human autonomy. *Frontiers in artificial intelligence*, *4*, p.705164.