Ethics for Artificial Intelligence: the introduction of the Digital Ethics Officer in Electric Industry

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***Abstract*—This article explores the ethical considerations surrounding the use of Artificial Intelligence (AI) in the electric industry. As AI technologies continue to advance, they have the potential to revolutionise various aspects of the electric sector, including power generation, distribution, and consumption. However, the integration of AI systems in this critical industry raises significant ethical questions that must be addressed to ensure responsible and sustainable implementation. The recent release of several guidelines including the IEEE (Institute of Electrical and Electronics Engineers) standard, European AI Act, OECD guidelines and other ones from the society, suggest the companies in the Electric Industry to define since now a road map to be resilient and compliant versus incoming regulations. The paper is the results of workshops with professionals in Italy and Ireland. [1] [2] [6]**

Keywords—artificial intelligence, power system, smart grids, green energy, data analysis, neural networks, machine learning, generative AI, Quantum Computing, simulation, prediction, explainability, fairness, bias, generative artificial intelligence, energy industry, operational efficiency, sustainability, innovation, accountability, Good AI

I. Introduction

The energy industry plays a pivotal role in shaping the global economy and addressing climate change. With the emergence of AI technologies, the energy sector can harness the power of data analytics, automation, and optimisation to enhance efficiency, reduce carbon emissions, and improve overall sustainability. However, ethical concerns arise due to the potential impact of AI systems on human safety, privacy, equity, and the environment. This paper explores the ethical principle of transparency and explainability in the energy sector when implementing Artificial Intelligence (AI) systems as well as the methodologies and algorithms employed to ensure responsible decision-making and mitigate biases. The ethical principles of accountability and bias mitigation are also crucial in the energy industry's utilisation of AI systems. As AI technologies become increasingly prevalent, ensuring that decision-making processes are transparent, fair, and free from biases is paramount.

II. Artificial Intelligence in Electric Industry

AI mainly refers to applications that are designed to search vast data sets and surfaces for specific utilisations (healthcare, new materials simulation, but also speech recognition, human-like relations and so on). The term artificial distinguishes AI from the "natural intelligence" attributed to humans and animals. Narrower definitions see AI as a branch of computer science that deals with machine learning and the automation of intelligent behaviour.

Today's intelligent systems use **artificial neural networks**, where computers learn to process raw data from examples rather than explicit programming. Neural networks are used to solve a variety of problems, including classification, prediction, and regression. [3] [4] [5] and they permeate all aspects of daily life, hidden and not easily perceivable, practically everywhere: education, manufacturing, healthcare, security and so on. AI is often used in connection or sometimes even synonymous with the terms **machine learning, big data, or deep learning**. We keep as reference in the article the one included in the June 14, 2023 approval of **"European Union (EU) AI ACT"** [1]: "*a software that is developed with one or more of the techniques and approaches listed in Annex I and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with*" (Art. 3(1) AI Act).

Practically it not so different from the May 2019 definition by **The Organisation for Economic Co-operation and Development (OECD)** Council Recommendation on Artificial Intelligence, [6] that declares AI as "*a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments*" as well as the IEEE "Ethics Certification Program for Autonomous and Intelligent Systems (ECPAIS)" that has the goal to create specifications for certification and marking processes that advance transparency, accountability, and reduction in algorithmic bias in autonomous and intelligent systems. ECPAIS, as well, intends to offer a process and define a series of marks by which organisations can seek certifications for their processes around the A/IS products, systems, and services they provide.

A. The change in the game - Generative AI

However, we can't ignore the transformative potential of **generative AI** the has the capability to create new data from existing data and identifying their patterns and structures. It improves operational efficiency, optimising energy systems, enhancing sustainability, and fostering innovation, especially through the use of Application Programming Interfaces (API) from dedicated applications.

Referring to the theoretical foundations of generative AI, we should highlight the principles and techniques such as generative adversarial networks (GANs) and variational auto-encoders (VAEs). These models enable the generation of synthetic data and facilitate learning from large datasets, thereby **enabling AI systems to simulate, predict, and optimise energy-related processes**.

The diverse applications of generative and non-generative (discriminative) AI already available in the energy sector, can be utilised for demand forecasting, load management, renewable energy integration, and energy market simulations, facilitate predictive maintenance, fault detection, and anomaly detection in energy infrastructure. Potential improvements in operational efficiency, grid management, and energy production achieved through the integration of generative AI, enhance sustainability efforts by optimising renewable energy generation and reducing environmental impact. The Fig. 1 shows the tendencies in major markets of AI adoption for Electric Industry associated with introduction of renewable energy source and carbon print reduction.

There are though challenges and limitations associated with the adoption of generative AI in the energy sector, that is why we would address ethical considerations, data privacy concerns, and the potential biases inherent in AI algorithms, including the computational requirements and the need for robust validation and verification techniques to ensure the reliability and safety of generative AI systems.

The adoption is guided by administrative and customer relationship processes but is progressively extending to energy production and distribution.

	Penetration of AI in Electric Industry				Production with Sustainable Energy				Carbon Footprint of El. Industry (CO2 ton/year)			
Year	USA	EU	India	China	USA	EU	India	China	USA	EU	India	China
2019	5%	10%	5%	15%	15%	15%	10%	25%	1.2 B	800 M	1 B	2.5 B
2020	10%	15%	10%	20%	20%	20%	15%	30%	1 B	700 M	800 M	2 B
2021	15%	20%	15%	25%	25%	25%	20%	35%	800 M	600 M	600 M	1.5 B
2022	20%	25%	20%	30%	30%	30%	25%	40%	600 M	500 M	400 M	1 B
2023	25%	30%	25%	35%	35%	35%	30%	45%	400 M	400 M	200 M	750 B
2024	30%	35%	30%	40%	40%	40%	35%	50%	300 M	300 M	100 M	500 B

Fig 1 AI adoption progress combined with sustainability (elaborated by the author, based on Gov.s official data)

B. *The Electric Industry*

The biggest challenges for the electricity industry are in increasing efficiency and sustainability and in the progressive introduction of innovation in all fields. Back in the 90s in a survey of the Japanese industry about the use of AI in electric power systems, S. Rahman of Virginia Polytech. Inst. & State Univ. Blacksburg [7] studied the Japanese involvement in the field and visited several Japanese R&D laboratories. At that time the use of AI tools in the Japanese electric power industry was far more widespread than what seen in the US or in Europe. In more recent years, AI has gained relevance also in Western word in a wide variety of sectors, it is now the fastest growing branch of the high-tech industry. It is seen by several governments and European Union as a key strategy for mastering some of the greatest challenges of our time, such as **climate change** and pollution, and becomes more and more important in the energy industry and has a great potential to be deeply embedded in the design of the future systems. Typical areas of application are electricity **trading, smart grids**, or the sector **coupling of electricity, heat and transport**. Prerequisites for an increased use of AI in the energy system are the **digitalisation of the energy sector** and a correspondingly large set of data that is evaluable. AI helps make the energy industry more efficient and secure by analysing and evaluating the data volumes.

In particular, AI is present in the field of intelligent networking of electricity consumers and generators across sector boundaries. With the increasing **decentralisation and digitalisation** of the power grid, it is becoming more difficult to manage the large number of grid participants and keep the grid in balance. This requires evaluating and analysing a flood of data. AI helps process this data as quickly and efficiently as possible.

Smart grids are another area of application. These networks transport not only electricity but also data. Especially with an increasing number of volatile power generation plants such as solar and wind, it is becoming more and more important for power generation to react intelligently to consumption. AI can help evaluate, analyse, and control the data of the various participants (consumers, producers, storage facilities) connected to each other via the grid. Through smart grid based application, the AI in energy and power market is expected to witness rapidly positive growth. For example, **Google** is using AI to optimise the operation of the electrical grid in California, which has helped to reduce outages by 20%. [8]

A particular focus of AI in the energy industry is on the integration of **electro mobility**. An increase in e-cars offers opportunities and challenges. The charging of electric cars must be coordinated, but at the same time, they offer the possibility of storing electricity and stabilising the grid, for example by adjusting the charging demand to price signals and availability. AI can help with all this by monitoring and coordinating.

In addition, the AI can stabilise the power grid by, for example, detecting anomalies in generation, consumption, or transmission in near real time, and then develop suitable solutions. Initial research projects in this field, such as at the Fraunhofer Institute in Germany, are already underway.

Further, AI can help coordinate maintenance work and determine optimal times for the **maintenance of networks** or individual systems. This helps minimise costs and loss of profit as well as disturbances of the network operation. For example, **Siemens** is using AI to predict when wind turbines need maintenance, which has helped to reduce the number of unplanned outages by 50%.[9]

AI in power trading helps improve **forecasts**. With AI, it is simpler to evaluate systematically the large amount of data in electricity trading, such as weather data or historical data. Better forecasts also increase grid stability and thus supply security. Especially in the field of forecasts, AI can help **facilitate and speed up the integration of renewables** . Machine Learning and Neural Networks play an important role in improving forecasts in the energy industry. For example, **Enel** is using AI to forecast demand for electricity in Italy, which has helped them to reduce their operating costs by 10%. (Official reporting)

Developments in forecasting quality in recent years have shown the potential of AI in this area: There is already a **reduction in the demand for control reserve**, even though the share of volatile power generators in the market has increased.

AI can also be used to detect fraudulent activity. This can help utilities to protect themselves from financial losses and ensure that customers are billed accurately. For example, **PG&E** is using AI to detect fraudulent activity in its billing

Climate Change Solution Domain	*Main Section of Electric Industry*	*Selected Area of Machine Learning, AI, and Generative AI*
Decarbonization	Power Generation	*Machine learning for renewable energy forecasting, AI for smart grid optimization, Generative AI for synthetic data generation*
Energy Efficiency	Transmission and Distribution	*Machine learning for demand response, AI for predictive maintenance, Generative AI for virtual power plants*
Sustainable Transportation	Electric Vehicles	*Machine learning for battery management, AI for autonomous driving, Generative AI for personalized driving recommendations*
Green Buildings	Building Energy Management Systems	*Machine learning for energy consumption forecasting, AI for demand side management, Generative AI for personalized energy efficiency recommendations*
Climate Resiliency	Critical Infrastructure	*Machine learning for risk assessment, AI for disaster response, Generative AI for disaster response planning*

Fig 2 Climate change solution domains, corresponding to main sections of Electric industries, matched with selected area of Machine Learning, AI and generative AI that are relevant to each (elaborated by the author)

system, which has helped them to recover millions of dollars in lost revenue.

According to McKinsey & Company, AI and digitalisation can increase asset productivity by up to 20% while reducing maintenance costs by 10%. AI can also predict weather patterns, enabling grid operators to accurately gauge when wind and solar resources are available. The network is, therefore, more reliable

Among the most prominent applications of AI in the energy sector are enhanced data management and data analytics, improved development of equipment and facilities, better equipment management, efficient waste storage and disposal, and more engaging employee training.

Based on the above is expected a growth for CAGR of 24.68% from a market valuation of US$3.103 billion in 2021 to reach US$14.527 billion in 2028 or AI in energy and power market, globally.[10], in fact we can say that AI in energy and power market is primarily driven by the growing energy needs across the globe, as in the case of streamlining the purchase of renewable energy while offering predictability and automation to business and industrial clients, when AI based solutions help companies reach carbon reduction goals with sustainable energy contracts that lower costs, offer predictability and stability, and are supported by market-proven AI. In this way the business provides clients with customised products to meet their unique and complex needs, and also put available next-generation retail energy products, which match clean energy to consumer usage on an hourly basis around the clock.

Europe remains one of the major regions in the AI energy and power market and it is home to a number of top utilities and providers of AI technology. There is a strong emphasis on the adoption of smart grid and green energy technologies. As part of its efforts to combat climate change, the European Union has set a goal of having 32% of its energy consumption come from renewable sources by 2030.

A report by Clutton-Brock et al, [11] add aside effects of use of AI where large datasets exist for existing industrial processes, it will be possible to use data science and AI to optimise the design of new processes. In addition by combining satellite imagery, supply chain data, and financial accounts it may be possible significantly improve tracking of deforestation through corporate supply chains. Overall the application of data science and AI with improving satellite data is offering new opportunities to monitor emissions at a factory or power station level. We can't forget that finding new materials, chemical compounds, and biological agents able to address contemporary challenges—for example, batteries with 10 times more storage capacity, materials that capture more solar energy at greater efficiency, and new drugs targeting emerging pathogens—is also a grand challenge due to the nearly infinite chemical, biological, and atomic design spaces to which scientists have access. Such discovery requires pervasive AI-enabled automation, from experiment design to execution and analysis. [13]

Projecting environmental risk and developing resiliency in a changing environment are central challenges to earth and environmental sciences, encompassing atmosphere, land, and subsurface systems along with their interdependencies. From large-scale observatories such as the Atmospheric Radiation Measurement (ARM) facility, AI methods will be essential to obtaining the data needed to refine complex earth and environmental systems models, and to developing new models with unprecedented fidelity and resolution. [14]. The discovery of unknown synthesisable materials and complex chemical species 1000x faster and with desired properties. From the past our ability to discover new materials and chemical reactions is driven by intuition, design rules, models, and theories derived from scientific data generated by experiments and simulation. The number of materials and chemical compounds that can be derived is astronomical, so finding the desired ones can be like looking for a needle in a haystack. Currently, various machine learning (ML) approaches are used to help scientists explore complex information and data sets with the goal of gaining new insights that lead to scientific discoveries. Future discoveries of advanced materials could be greatly accelerated through ML. Note, for example, the timeline from discovery of LiMn2O4 to nickel- manganese-cobalt (NMC) materials for batteries. Using known data, we could use ML to accelerate discovery of new material classes for batteries from 14 years to less than 5 years (Figure 3). The introduction of the **quantum computers** adds to AI a remarkable calculation capacity, inducing interesting areas of development but with some risk. An expected benefit is in the identification of new compounds for batteries.

The timeline in fig. 3 (this is just a graphical timeline, and the actual dates may vary) shows the introduction of some of the most important new battery technologies over the past century. The first commercial battery, the lead-acid battery, was invented in 1859. In the early 1900s, the nickel-cadmium battery was developed, and in the 1970s, the lithium-ion battery was invented. Solid-state batteries are expected to be safer and more energy-dense than lithium-ion batteries. Lithium-sulfur batteries have the potential to be much cheaper than lithium-ion batteries. And sodium-ion batteries could be a more affordable alternative to lithium-ion batteries for electric vehicles.[13]

The development of new battery technologies is essential for the future of clean energy. Batteries are needed to store energy from renewable sources like solar and wind power.

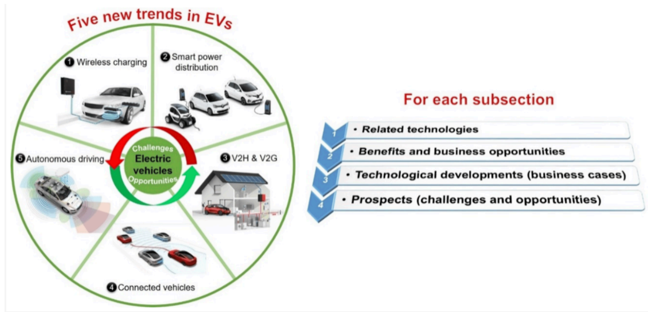

Fig.3 Timeline of introduction for new battery technologies [13]

And they are also needed to power electric vehicles, which are becoming increasingly popular.

Quantum computing and artificial intelligence could lead to unprecedented discoveries, but the history of **new materials** shows how often **seemingly beneficial things can end up causing harm, therefore** new material discovery requires to **ensure that future breakthroughs** don't come with environmental complications

III. The need for Ethics

Everything reported so far is **an exciting picture of a technological revolution heralding surprising innovations, but it is also clear that the period of technological research focused only on a specific aspect is over**: the implications of a particular project take on **much broader connotations than the specific ones of the solution to the initial problem** by requiring developers to consider the project with a **holistic vision** both from a large

technical point of view, considering not only electrical networks, but **also social** ones in uncertain cases. Only recently under the push of government/public bodies, the topics have surged to attention. In the next part of the paper we will sketch a possible roadmap for ethical AI, that sets out prospective research programmes. The recent Salesforce's New Research [10] shows 67% of senior IT leaders (all industries) are prioritising generative AI for their business within the next 18 months, with one-third (33%) naming it as a top priority. A **business using generative AI** technology in an enterprise setting **is different from consumers** using it for private, individual use. Businesses need to adhere to regulations relevant to their respective industries, and there's a minefield of legal, financial, and ethical implications if the content generated is inaccurate, inaccessible, or offensive. For example, the risk of harm when an generative AI chatbot gives incorrect steps for cooking a recipe is much lower than when giving a field service worker instructions for repairing a piece of heavy machinery or an intervention on a power line, momentarily down. If not designed and deployed with clear ethical guidelines, **generative AI can have unintended consequences** and potentially cause real harm. A set of attributes (Fig 4) should help in fixing a common understanding in how to measure a Good AI.

A. More than just a good Quality for Artificial Intelligence

There several cases of companies **establishing ethical guidelines,** to address issues such as fairness, transparency, and accountability. They go through it **creating ethical AI teams,** to oversee the development and use of AI, also **providing training on ethical AI,** helping employees to understand the ethical implications of AI. That pass through **consulting with experts,** to get guidance on how to develop and use AI.

It is possibile in fact to create also big disappointments because generative AI can say things that are **deeply false**. If we have no **critical judgment**, we are heading for problems. For years, we have had an approach that says that AI is there to assist and enhance the human. Not replace it. Some generative AI though reinforces the importance of maintaining control, thinking skills and free will. The more AI becomes powerful, the more it is necessary to know how to manage this technology. For this, **trust is essential as well as consciousness.**

In 2022, a study of 5,000 executives around the world, made by a multinational company, showed that the notions of fairness, security, transparency and ethics were predominant. Strategic, critical subjects, shared by all. Without trust, there is no adoption, no ROI, no scaling. It's a proof of maturity: people are asking for that trust. And the AI revolution will not happen without it. Therefore AI must be transparent, explainable, robust, respectful of privacy. That is way we have used the notion of **ethics**.

We shouldn't forget that we are all biased. We all have different education, values, beliefs, and therefore ethics. We are in a skewed world; it is therefore necessary to work to reduce the bias as little as possible. It's not AI, it's us. An AI is not omnipotent: it is as good or bad as the person who is going to use it or who entered the data. It requires a lot of effort, anyway we need to keep control in the whole creation and deployment process. The human being, or better the whole Globe ecosystem, must remain at the center of everything. Regarding ethics, the **European AI Act**, in progress for final approval, will objectify things, allow the developers to be confident in the manufacturing and use processes. Despite that some large groups have already established internal rules for the development of AI programs in safety

Attribute	Description	Way to Measure or Determine
Accuracy	The degree to which an AI model correctly predicts or classifies an input.	*The accuracy of an AI model can be measured by the percentage of correct predictions it makes.*
Robustness	The ability of an AI model to perform well in the face of noise, outliers, or other unexpected inputs.	*The robustness of an AI model can be measured by its ability to maintain high accuracy even when the input data is noisy or outliers are present.*
Fairness	The extent to which an AI model treats all individuals equally, regardless of their race, gender, or other protected characteristics.	*The fairness of an AI model can be measured by the extent to which it makes decisions that are not biased against any particular group of people.*
Explainability	The degree to which an AI model can be understood by humans.	*The explainability of an AI model can be measured by the extent to which it can provide humans with insights into how it makes its predictions or classifications.*
Efficiency	The amount of time and resources required for an AI model to perform its tasks.	*The efficiency of an AI model can be measured by the time it takes to make a prediction or classification, the amount of data it requires to train, and the amount of compute resources it consumes.*
Scalability	The ability of an AI model to handle large amounts of data and make predictions or classifications in a timely manner.	*The scalability of an AI model can be measured by its ability to handle increasing amounts of data without a significant decrease in accuracy or performance.*

Fig 4 Set of attributes for AI quality with the way to determine them

GE Power has established a set of ethical principles for the use of AI. These principles address issues such as fairness, transparency, and accountability. [15]

Enel has created an ethical AI team to oversee the development and use of AI. This team is responsible for ensuring that AI systems are developed and used in an ethical manner. [16]

PG&E has provided training on ethical AI to its employees. This training helps employees to understand the ethical implications of AI and how to use AI in an ethical manner.[17]

The above ones are very good examples, anyway we shouldn't rely only on these initiatives alone to guarantee the development of a "Good AI". We could foreseen that the European regulatory framework becomes the global framework. It is vital because AI will disrupt the job market. And, for that, we come back to the fundamental notion of trust. People need to know when AI is used, how, by whom..

That links into the concept of AI quality and in particular when models are used to make predictions and decisions that impact the lives of people, it is absolutely essential to respect societal and legal expectations of **AI transparency**, **AI fairness** and **AI privacy.** Quite often, attributes like fairness and privacy are in conflict with simply optimising for model performance. e.

In short, **AI Quality encompasses** not just model performance metrics, but **a much richer set of attributes** that capture how well the model will generalise, including its conceptual soundness, explainability, stability, robustness, reliability and data quality. It also includes attributes embodying societal and legal expectations of transparency, fairness and privacy, and process-level attributes supporting communication, reproducibility, and auditability.

B. Some leading edge project considering an holistic view

In Italy, the company Ricerca sul Sistema Energetico-RSE with headquarters in Milan, tests and evaluates cutting-edge ICT technologies potentially useful for the electricity system. In recent research it has highlighted the paradigm shift that the use of AI entails for a researcher, moving from individual work to teamwork with a holistic vision, including the connection of other networks, not necessarily electric, fundamental for the correct management and analysis of data, effectively confirming what has been expressed so far in the article. The study areas that have shown a significant increase in KPI of interest (to monitor what in fig 4) are distributed over the entire energy distribution process as shown in the table in Fig 5. To be highlighted the effort on **ontology**, that create the base to avoid misunderstanding among different networks, not only electrical, impacted in some way by the projects with an holistic view and the focus on **data collection** process to **avoid bias** and have a real-world representation. (Fig 5) [18],[19],[20]

Use Case	**Approach**	**Result comment?**
Utilities use different information systems than usually they are isolated from each other. These information silos can create many problems (e.g example redundancy of information, misalignment of database, etc.) but also the impossibility of carrying out analyses multi-domain through innovative techniques (e.g. Big Date&ML).	Use of ontologies (standard IEC CIM 61968/61970) e knowledge graph	*Facilitate the interoperability Transparency Explainability*
Utilities not only manage the electricity grid, but they have to manage other systems (gas, district heating, etc.) A lot of information can also be shared (asset management, etc.), instead they are duplicated	Starting from the electrical standard, derive ontologies for other systems as well	*External usability interoperation*
Charging station occupancy forecast that takes into consideration not only the data historical but also real-time data Machine learning and big data streaming	Machine learning and big data streaming	Predictive maintenance based on real situations
Identification of surface discharges on high voltage insulators. Computer vision and deep learning	Computer vision and deep learning	*Reduce cost potential (outage*
Allow the sharing of technical results and best practices (political, regulatory and financial), catalysing the joint efforts of the public sector e private towards the goal of IC1 to accelerate it development and implementation of innovative technologies for smart grids around the world.	Open platform development for sharing documents/ videos (NLP): -Smart Grids Innovation Accelerator (SGIA)	*Facilitate classification of documents and norms*
Automatically manage the regulator voltage ("tap changer") of a primary substation of a medium voltage network (Brescia)	Using a reinforcement algorithm learning (Q-Learning) for the choice of	*Reduce total cost of maintenance*

*Fig 5 Real use cases of applying AI to the electricity-*energy sector with holistic view (courtesy of RSE Milan, Italy)

C. The Digital Ethics Officer

All the above pose the problem for organisations that develop innovation through digital projects, which include the use of AI: they need to equip themselves with ethics appropriate to human values and the challenges of the millennium during the conceptualisation phase. The ethical discipline in this field is not always yet formalised within the policies of private or public organisations; sometimes as a deliberate choice sometimes induced by a focus on the objectives without considering the side effects of a specific application.

In the discussions that have recently animated the introduction of AI in many fields, the idea of an organisational role that has the precise responsibility of ensuring compliance with ethical aspects for digital projects is starting to gain ground. We may call this role **Digital Ethics Officer (DEO)**, but the name is no relevant, the responsibilities are.

It is definitely a new role that must work in a transversal way and with a systemic vision of digital projects, taking into account the specifics of the sector of activity, the territory on which the project will act and the related applicable ethical recommendations. A kind of conductor of a system that is both ethical, legal and technical at the service of a digital manager. He must organise, coordinate and animate the considerations on the sidelines of a digital project of a company or a public body, knowing the roles and responsibilities of the various components of the development team. Vital will be the ability to connect the various organisational areas, often organised in silos: administration, R&D, legal, production, communication, marketing, quality, customer service. Each must have its own field of intervention and the DEO must maintain a clear vision of the process, facilitating the participation of all in the definition of an ethical framework for the activities of the organisation.

It is important that he manages to maintain a common accord between the various elements regarding values to defend and ethical rules to put into practice. In fact, he has to enforce an overall vision between the various components. Both in the planning phase, Design Ethics, and in the execution phase, Evolution Ethics, which ensures its consistency over time. The latter is a constantly evolving part and is based on the ability to consider and capitalise on the evolution of ethical, legal and technical aspects by anticipating the risks associated with a project that exploits Artificial Intelligence.

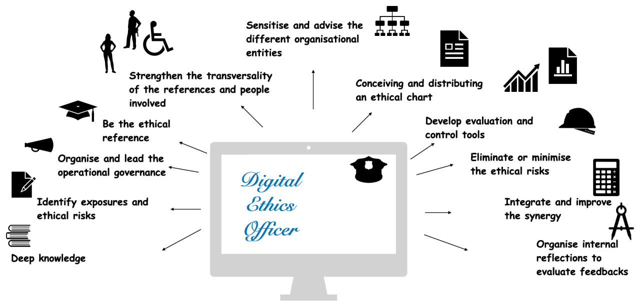

Fig 6 Digital Ethics Officer (originated by the author)

D. The main missions of the Digital Ethics Officer

The role of the DEO covers multiple aspects here so that we try to briefly list the main activities below. (Summarised in fig 6)

1- Have **deep knowledge** and understanding of the company's digital processes

2- Clearly **identify exposures and ethical risks** of projects under development considering all use cases, planning and prioritising actions to be implemented to minimise ethical and legal risks.

3- **Organise and lead the operational governance** for the supervision of the "human" relationship aspects of Artificial Intelligence projects).

4- Be the ethical reference for all digital projects (Ethics by Design/ by evolution) and for all certification activities and related acronyms.

5- **Strengthen the transversality of the references and people involved** in digital projects, the culture of cooperation and collective decisions to obtain co-planning and transparency within the organisation.

6- **Sensitise and advise the different organisational entities** (design, technicians, admin, etc.) on the ethical impact of the role and the associated good practices.

7- **Conceiving and distributing an ethical chart** with the codes of conduct to be applied to digital activities and possibly tools available and educating staff.

8- **Develop evaluation and control tools** within the framework of internal (charters, codes) and external (state of the art practices) rules in relation to the organisation's area of activity.

9- **Eliminate or minimise the ethical risks** of AI based digital projects, including discriminatory and exclusionary biases.

10- **Integrate and improve the synergy** of devices to protect the fundamental rights of consumers and citizens and, if missing, develop new ones

11- **Organise internal reflections to evaluate feedbacks** from customers/users or people involved in the project (internal and external)

All points above require great human, scientific and practical qualities and also require that the role **be absolutely independent** in relation to the staff and management of the organisation, to avoid exploitation and to foster trust from the various parties involved in the project. His action will have to allow the company management to become aware of the ethical effects of the project and to consequently take all the decisions in an informed way.

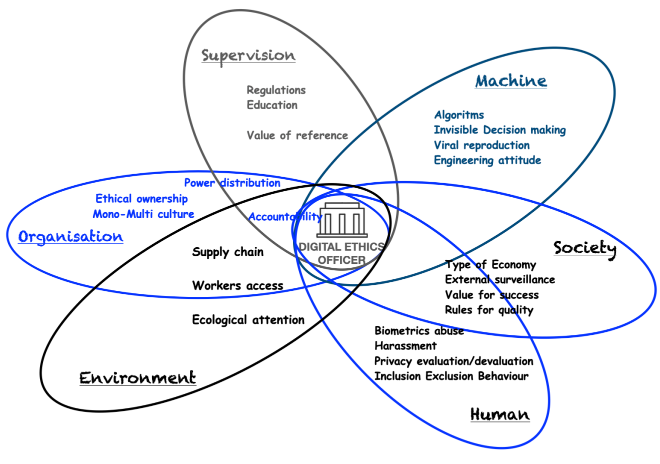

Fig 7 AI Ethics Governance challenges (originated by the author)

E. Conclusion

In this rapid evolution, despite full regulations are not yet released, all organisations need to be prepared to prevent issues, be compliant with market expectations and in some way contribute to the creation of the necessary mind set to foster the technological evolution in support to humanity in a comprehensive and positive approach. **The role of a Digital Ethic Officer or equivalent, inside any organisation, could be a first necessary step to assure AI governance towards a "Good AI".**

It should drive to a re-arrangement of the model how digitalisation and optimisation are implemented through a full holistic vision. The parameters of reference will not be only the traditional financial measurements, because, for the change of market sensibility, the business growth will depend also on new "soft elements", perceived by the clients as key to make a selection among vendors. We are facing a revolution and also the Electric Industry should be prepared, among the first ones.

The interdependence between humans beings and the 'common home' is more intense and evident, both in the environment and in human life conditions, with effects and developments that are not always clear and predictable and drive to new ways to approach to market and society the should be kept in consideration. The EU "AI Act" , IEEE standards are just an initial harmonisation, in the meantime that those guidelines become a structured applicable law every organisation in the Electric Industry urges to plan for what AI is concerned and there should be ongoing training within electric companies at any level of employees. Ethics should be part of the AI culture, and this paper goes in this direction. (Milan July 15th, 2023)

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REFERENCES

1. European AI Act -EUR-Lex - 52021PC0206 - EN
2. Institute of Electrical and Electronics Engineers (IEEE) Standard on Ethical Considerations in the Design of Autonomous Systems (IEEE 7000 Series Standards)
3. Russell, Stuart (8 October 2019). Human Compatible : Artificial intelligence and the question of control. [S.l.]: Viking. ISBN 978-0525558613. OCLC 1083694322.t
4. Roberto Magnani (23 May 2023) " Artifiicial Intelligence for Professions" ed EBS, Italy, ISBN 979-12-5585-057-1
5. Ashish Vaswani, Noam Shazeer, Niki Parmar, Jakob Uszkoreit, Llion Jones, Aidan N. Gomez, Lukasz Kaiser, Illia Polosukhin "Attention is all you need" arXiv:1706.03762
6. OECD Observatory https://oecd.ai/en/
7. S. Rahman, "Artificial intelligence in electric power systems: a survey of the Japanese industry," in *IEEE Transactions on Power Systems*, vol. 8, no. 3, pp. 1211-1218, Aug. 1993, doi: 10.1109/59.260875.
8. California Energy Commission "Data Report" https://www.energy.ca.gov/data-reports
9. Siemens GAMESA "Asset Optimisation", https://www.siemensgamesa.com/en-int
10. Globe Newswire - The "Artificial Intelligence (AI) in Energy and Power Market - Forecasts from 2023 to 2028" report to ResearchAndMarkets.com Dublin, May 29, 2023
11. Clutton-Brock et al, The Rationale for an International Centre for AI, Energy and Climate, March 2020
12. "AI for Science" Report on the Department of Energy (DOE) Town Halls on Artificial Intelligence (AI) for Science -2019
13. Tiande Mo, T., Li, Y., Lau, K., Poon, C. K., Wu, Y., & Luo, Y. Trends and Emerging Technologies for the Development of Electric Vehicles. *Energies*, *15*(17), 6271. https://doi.org/10.3390/en15176271
14. Vehicles Dorothy GE RESEARCH Everywhere You Go: GE Researchers Are Building An AI Brain For Army's Unmanned Vehicles GE RESEARCH July 10, 2020
15. GE Research "Artificial Intelligence" 2023
16. ENEL "OPEN POWER FOR A BRIGHTER FUTURE" 2020.
17. Electrek "California's PG&E accelerates energy transition via AI adoption" 2022
18. RSE: MESP - An Interoperable Platform for Future Multi-Energy Systems DOI: 10.23919/AEIT56783.2022.9951779
19. RSE: Short-term forecast of electric vehicle charging stations occupancy using big data streaming analysis DOI: 10.1109/EEEIC/ICPSEurope51590.2021.9584524
20. RSE: Video Discharge Extractor: a Deep Learning and Computer Vision-based Framework for Surface Discharges Recognition on HV Lines Insulators DOI: 10.1109/MELECON53508.2022.9843010