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The AI ESG protocol: Evaluating and disclosing the environment, social, and governance implications of artificial intelligence capabilities, assets, and activities

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Abstract

AI and data are key strategic resources and enablers of the digital transition. Artificial Intelligence (AI) and data are also intimately related to a company's environment, social, and governance (ESG) performance and the generation of sustainability related impacts. These impacts are increasingly scrutinized by markets and other stakeholders, as ESG performance impacts both valuation and risk assessments. It impacts an entity's potential to contribute to good, but it also relates to risks concerning, for example, alignment with current and coming regulations and frameworks. There is currently limited information on and a lack of a unified approach to AI and ESG and a need for tools for systematically assessing and disclosing the ESG related impacts of AI and data capabilities. I here propose the AI ESG protocol, which is a flexible high-level tool for evaluating and disclosing such impacts, engendering increased awareness of impacts, better AI governance, and stakeholder communication.

KEYWORDS
big data, AI data, ESG, reporting, sustainability

1 | INTRODUCTION

Understanding how artificial intelligence (AI) and data impact businesses and organizations is crucial both for their valuation and governance, and in this article, I propose a flexible high-level framework for systematically evaluating and reporting on how an organization's AI and data capabilities, assets, and activities impact sustainability related issues. Capabilities describe competencies, tools, methods, and processes related to developing AI systems and gathering data. This might include, for example, a company's competencies related to developing specific types of algorithms or capabilities for generating data from sensors. Assets are the algorithms, systems, and data the entity controls and includes, for example, specific data sets or a social network platform. Activities describe how capabilities and assets are used in ways relevant for understanding an entity's business value, development, and position. These relate to how a company, for example, develops products where its development capabilities are used to provide customers with new ways to utilize their data in order to optimize various processes.

AI and data have become key enablers of the digital transformation (Holmström, 2022; Sivarajah et al., 2017; Verhoef et al., 2021) as they impact a company's growth and capacity for innovation and value generation (Leitner-Hanetseder & Lehner, 2022; Wamba-Taguimdje et al., 2020). Being able to communicate technology related soft assets to investors and other stakeholders is imperative for allowing markets to correctly value an entity and for enabling good governance (Leitner-Hanetseder & Lehner, 2022). Since AI and data are intimately related to a company's environment, social, and governance

(ESG) performance due to the impacts of data-based AI systems on both people and the natural world—through, for example, biased and discriminatory systems or the carbon footprint of training algorithms (Crawford, 2021)—understanding the ESG related risks and impacts of these technologies is consequently crucial for internal decision-makers, markets, and other stakeholders. In addition, actors such as the European Union (EU) is pursuing relatively aggressive regulation on data, AI, and digital services/markets (European Commission, 2022b). Such developments entail new demands for transparency and risk management and are of obvious importance to companies operating in the EU, but also others, as regulators elsewhere might pursue similar paths (Mäntymäki et al., 2022b).

Sustainability related impacts are increasingly emphasized by markets and other stakeholders (Dimson et al., 2020), as ESG performance impacts both valuation and risk assessments (Fafaliou et al., 2022; Friede et al., 2015), and potentially also engenders innovation capacity (Ambec et al., 2013; Fafaliou et al., 2022; Porter & Van der Linde, 1995). It relates to and describes an entity's potential to contribute to good, for example to the achievement of the UN's sustainable development goals (SDGs), but it also relates to risks concerning, for example, alignment with current and coming sustainability related regulations.

ESG is not a new concept (Crona & Sunsdström, 2023), but the ESG and sustainability reporting and disclosure landscape is rapidly evolving, and there is no shortage of frameworks, standards, or rating providers (Dimson et al., 2020; Esty & Cort, 2020; Sætra, 2021b). This generates challenges for those in charge of making decisions both within and about entities, but also society more broadly, as reflected through the framework of stakeholder capitalism (Freeman et al., 2007; World Economic Forum, 2020). It also causes problems for companies struggling to analyze and report on their ESG performance, and for investors who face a lack of good and comparable data to assess potential investments (Berg et al., 2022; Dimson et al., 2020; Eng et al., 2021).

A large number of standards and frameworks have led to numerous calls for harmonization (Eng et al., 2021), and efforts to do so are underway on several fronts, such as the European Unions' Sustainable Finance Disclosure Regulation (SFDR), Corporate Sustainability Reporting Directive (CSRD) and EU taxonomy (EU Technical expert group on sustainable finance, 2020; European Commission, 2022a, 2022c), and the IFRS's International Sustainability Standards Board (ISSB) (IFRS, 2022).

Adding to this are the challenges associated with understanding how AI relates to sustainability and ESG (Sætra, 2021a, 2021b, 2022; van Wynsberghe, 2021). The purpose of this article is to present the *AI ESG Protocol*, which is a tool for systematically evaluating and disclosing a company's AI and data-driven risks and opportunities related to ESG and sustainability. While all companies can use the protocol, it will be particularly relevant for AI and data-intensive companies where such technologies and assets are considered material for their stakeholders. This article mainly refers to the entities who adopt the protocol, and it is primarily addressed at directors and managers, while the data and statements production will require the participation of many other actors in the organization using the protocol. The end result of using the protocol, however, is both intended to be action-oriented and useful for the reporting entity, but also of use for investors, public officials, and other stakeholders.

AI ESG protocol is flexible and high-level and is intended as a supplement that interacts with other frameworks and internal business processes. Like the Greenhouse Gas Protocol (World Resources Institute, 2021), the AI ESG protocol distinguishes between scopes 1, 2, 3, and provides a set of questions that allows all types of entities to better understand and disclose their impacts, addressing identified needs for increased awareness and better governance of AI in relation to ESG (Minkkinen et al., 2022). The protocol allows entities to identify opportunities and to bridge identified gaps, which can also be disclosed to markets, investors, and other stakeholders. By using the AI ESG Protocol, the entity will also have to consider questions such as AI readiness and maturity (Holmström, 2022), and it consequently provides value beyond simply mapping ESG impacts.

I begin by establishing the basics related to navigating the world of ESG and sustainability reporting, as this is required for understanding both why the AI ESG Protocol is useful, and how it might be used in combination with other standards and frameworks. The next section establishes the main linkages between AI, ESG, and sustainability to identify the key issues to be mapped and considered. Finally, the basic structure of the AI ESG protocol is presented.

2 | THE CHAOTIC WORLD OF ESG AND SUSTAINABILITY REPORTING

Talk of sustainability and ESG abounds in markets, boardrooms, and C-suites nowadays, and in the context of this article, the main focus is on sustainability and ESG reporting related to AI and data capabilities, assets, and activities. However, existing standards and frameworks are insufficient (Sætra, 2021b), and in order to develop the protocol for assessing the impacts of AI and data, a brief examination of what is meant by sustainability and ESG is in order.

Sustainability here refers to the concept sustainable development, described in the 1987 report *Our Common Future* produced by the United Nations' (UN) Brundtland commission (Brundtland et al., 1987). Sustainable development was here described as meeting current needs without preventing future generations from doing the same, and it consists of three interdependent dimensions, namely the environmental, social, and economic. To achieve sustainable development, issues belonging to all three dimensions must be dealt with simultaneously, as we cannot, for example, deal effectively with climate change unless we also handle issues related to inequality and environmental justice. This concept of sustainable development forms the foundation of the UN's SDGs and Agenda 2030 (United Nations, 2015). The 17 SDGs describe challenges related to all three sustainability dimensions, and the aim is to reach the goals by 2030. While they are not intended as a framework for ESG or sustainability reporting, they are increasingly often used and referred to in this context (Arena et al., 2022; Bose, 2020; García-Sánchez et al., 2022; Sætra, 2021b; SDG Compass, 2015).

FIGURE 1 The SDGs through the lens of ESG. From Sætra (2021b). *Source*: Inspired by Berenberg (2018) [Colour figure can be viewed at wileyonlinelibrary.com]

Sustainable development is now increasingly recognized as something that not only governments, but also private entities must play a significant role in promoting (Esty & Cort, 2020). Initiatives such as EU's Green Deal is consequently premised on the notion that private capital and activity is essential for reaching sustainability related goals (European Commission, 2019). Having businesses factor in ESG entails a move from traditional shareholder capitalism to what is at times referred to as stakeholder capitalism (Freeman et al., 2007; Schwab & Vanham, 2021), and corporations are getting on board for three main reasons. First, regulation and formal requirements, such as the EU Taxonomy, the SFDR and the CSRD (ERM, 2022; EU Technical expert group on sustainable finance, 2020; European Commission, 2022a, 2022c). Second, investor pressure and financial market incentives (ERM, 2022; Friede et al., 2015; Marczewska & Kostrzewski, 2020; Moon, 2014; Nosratabadi et al., 2019; Verbin, 2020). Third, processes related to increased public demand for responsible business practices and what is often term the social license to operate (Demuijnck & Fasterling, 2016; ERM, 2022; He & Harris, 2020; Verbin, 2020).

The concept of sustainable development also forms the basis of sustainability and ESG reporting, but it is not necessarily ideal to rely on the three sustainability dimensions in the finance and reporting context. With the ESG concept, the economic dimension is replaced by the governance dimension. While this entails a change in terminology, it is nevertheless unproblematic to connect ESG reporting to sustainable development and the SDGs. Figure 1, for example, shows how the SDGs can be classified under the E, S, and G dimensions of ESG. The goals most often considered economic (SDG 8 and 9, for example) are here classified as social goals, as it is the social implications of economic activity that most clearly relates to the nonfinancial considerations and risks not covered by a company's financial reporting. An additional benefit is that governance is

given ample attention, and this is particularly important for businesses working to improve the ESG impact of their AI and data related activities.

The obligations to gather and disclose sustainability related data varies between countries, regions, and sectors, and an examination of all these varieties is beyond this scope of this article. However, the AI ESG protocol described below is designed to complement common frameworks, standards, and ratings in order to fill the gap related to the ESG related impact of a company's AI and data based capabilities, assets, and activities, and it can be used regardless of which reporting regime the entity is under and framework they have chosen to use.

Due to the changes in the pressures and nature of expectations of corporations activities, the term corporate social responsibility (CSR) has largely given way to ESG reporting, strategies, and plans (Esty & Cort, 2020; Moon, 2014), which is broader and better reflects how companies are increasingly taking environmental, social, and governance issues seriously (Verbin, 2020). The European Union is emerging as a proactive and strong actor pushing for increasing transparency and disclosure, and Eckhart (2020) describes the mandatory obligations in the EU as opposed the approach of the US Securities and Exchange Commission (SEC). However, things move fast in this domain, and, for example, the SEC recently approved NASDAQ's change in reporting requirements on board diversity (Securities and Exchange Commission, 2021), which had caused wide debates about the role of issuers in the United States.

Two of the major actors in the world of sustainability and ESG reporting have been the Global Reporting Initiative (GRI) and the more investor focused Sustainability Accounting Standards Board (SASB). The latter become the Value Reporting Foundation, which in turn becomes part of the ISSB mentioned above (ERM, 2022). The latter is also a major new development aimed at providing a global standard for meeting the demand for "high quality, transparent, reliable, and

comparable reporting" on ESG (IFRS, 2022). There are a wide range of other standards and frameworks as well, some focusing on specific issues (such as the Carbon Disclosure Project [CDP] and Task Force on Climate-Related Financial Disclosures [TCFD]), while others are general frameworks intended to unify and simplify other frameworks (such as the World Economic Forum's [WEF] Stakeholder Capitalism Metrics [SCM]).

The need for better and more easily comparable data is key for investors who increasingly rely on information about firms' ESG performance. The lack of good and comparable data has led to the growth of ESG ratings agencies, such as Kinder, Lydenberg, Domini, Sustainalytics, Moody's ESG, S&P Global, Refinitiv, and MSCI (Berg et al., 2022). However, due to differences in methodology, and the aforementioned lack of data quality, these rating agencies display high variability when ranking the same company (Berg et al., 2022; Dimson et al., 2020), creating a host of problems related to market uncertainty, but also, for example, attempts to link executive remuneration to ESG performance (Berg et al., 2022).

3 | ESG AND AI

While AI ethics and digital ethics have arguably reached the pinnacle of the hype cycle (Goasduff, 2020), there is still little research linking AI and the concept of ESG, sustainable finance, and sustainability reporting (Minkkinen et al., 2022; Musleh Al-Sartawi et al., 2022). Much work has been and is being done on AI and general issues related to general or aspects of sustainability (Sætra, 2021a, 2022; van Wynsberghe, 2021; Vinuesa et al., 2020), but this is rarely connected to ESG.

In a recent article Minkkinen et al. (2022) identified a research gap in this area, finding only three extant relevant articles on the subject, namely Sætra (2021b), Du and Xie (2021), and Brusseau (2021). While dealing with the linkage between AI and ESG, none of the articles focus on providing a tool for evaluating and disclosing AI related ESG impacts, and the need for such a tool is emphasized by Minkkinen et al. (2022).

It is also worth noting that there is a lot of research on how AI can be used in ways relevant to the world of ESG, for example in accounting (Bose & Bhattacharjee, 2022), in generating ESG ratings (Crona & Sunsdström, 2023), and for addressing the need to find a way to properly value data and AI capabilities in financial reporting (Leitner-Hanetseder & Lehner, 2022). However, the AI ESG protocol here developed focuses on providing a method for evaluating and disclosing the ESG related impacts of using AI, and these other areas of AI use are consequently not directly relevant. Such use of AI can, however, be reported as ESG relevant through the protocol.

The remainder of this section explains key foundational elements of the AI ESG protocol in some detail. First, I explain how impacts are split into three scopes, before briefly presenting the major dimensions to be considered when evaluating AI and data based impacts related to *environment*, *social*, and *governance*. The scope of this article precludes a comprehensive mapping of all sustainability related effects of AI, however, but issues identified in the broader research literature are reflected in the protocol (Sætra, 2022; Vinuesa et al., 2020).

3.1 | Three scopes of impacts

The complexities of ESG related impacts can at times stand in the way of undertaking ESG analyses, and when they do not, the resulting analyses are often not particularly actionable. In order to remedy this challenge, I build on Sætra (2022) and the proposed analytical approach to the sustainability related impacts of AI. This approach is partly inspired by the Greenhouse Gas Protocol (World Resources Institute, 2021) which distinguishes emissions from Scopes 1, 2, and 3, and by doing so, the AI ESG Protocol also ties directly into the most popular and widely used methods used in the climate change section of all other frameworks and standards. Figure 2 shows some of the main sources of risks and impacts in each scope, and these are discussed in more detail below.

While similar, and partly overlapping, measuring impact is slightly different from measuring only emissions due to the broader range of issues to be considered. For the AI ESG Protocol, the scopes are defined as described below, and examples follow in the next sections.

Scope 1 deals with impacts related directly to a company's core activities and governance, limited to internal social and governance impacts and the environmental impacts related to the computing infrastructure the company directly controls (owns or leases). Data gathered by the entity is part of Scope 1. Figure 2 shows, for example, issues related to cybersecurity, the impact of own machines and data, and own staff.

Scope 2 encompasses the upstream consequences related directly to the entity's supply chain. Procurement of electricity and cloud services is part of Scope 2, and the same goes for the procurement of development services, support, and algorithms. An important part of Scope 2 is all the second-hand data the company avails itself of, complementing the data gathered by the entity itself as detailed under Scope 1. Figure 2 shows this through, for example, the purchasing of cloud services, the humans involved in the upstream supply chain, upstream cybersecurity, and energy sourcing.

Scope 3 is the broader upstream *and* downstream impacts of the company's AI and data-based capabilities, assets, and activities. This includes, for example, an algorithm used for AI in hiring, and how this might entail risks of discrimination, or potentially the reduced occurrence of bias in hiring. It also includes how the entity's activities encourages or discourages consumption, if the entity sells or disseminates tools that, for example, drive emissions up- or downstream. Figure 2 shows this through, for example, the datafication of human relations, increasing use of internet of things (IoT) in the business and private sector, increased targeting and surveillance of individuals and groups, value creation and innovation, transportation, impact on water use, nature and biodiversity, and so forth.

In sum, detailing the impacts in these three scopes encompasses all ESG related impacts stemming from AI and data, which helps both the entity and its stakeholders understand where in the value chain
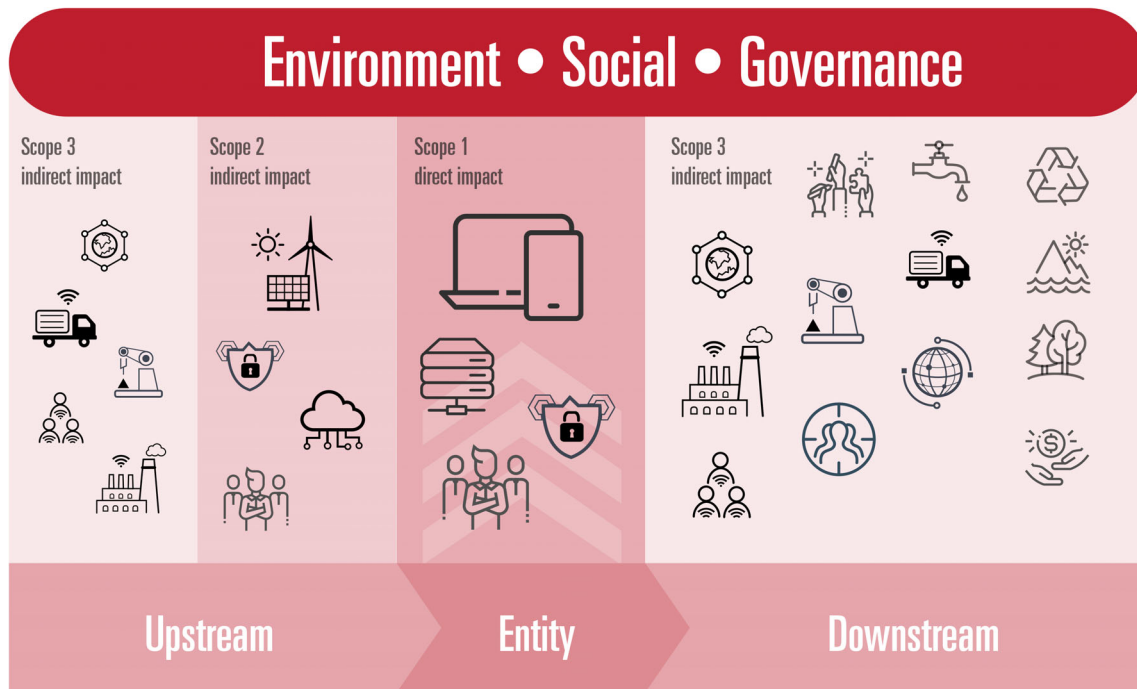
FIGURE 2   Examples of sources of impact and risks in Scopes 1, 2, and 3. *Source*: Author's own arrangement [Colour figure can be viewed at wileyonlinelibrary.com]

the impacts and risks occur and consequently what can and must be done to either minimize the negative impacts and risks or maximize and exploit upside risk and positive impact.

The three scopes help sort impacts from various sources up- and downstream, but another key distinction needs to be made between different types of impacts and risks. As the protocol is based on the ESG approach, the main types to which I now turn relate to environmental, social, and governance issues.

3.2 | Environmental impacts and risks

The environmental dimension is currently getting most attention in the ESG world (ERM, 2022), and climate has been the obvious headline grabber. The Paris agreement is still key for understanding climate targets (UNFCCC, 2022). Companies are now increasing setting NetZero targets and strategies (ERM, 2022), and AI and data related emissions must be part of such strategies. The integrity of natural systems is, however, increasingly attracting attention both on its own and because it is integral to solving climate related challenges (ERM, 2022).

The main issue related to AI in this dimension is how AI both consumes energy and generates emissions (Bender et al., 2021), and potentially allows for solutions that help mitigate climate change and promote adaption efforts (Rolnick et al., 2022). AI will potentially simultaneously have both positive and negative emission related impacts, and determining whether or not an entity's use of AI is sustainable requires us to understand both sides of the equation (Sætra, 2022). The direct emissions generated from AI will often be

confined to Scopes 1 and 2, while Scope 3 is where an entity can demonstrate positive impact.

Computing infrastructure also has a material basis (Barley, 2020; Brevini, 2021). This necessitates a consideration of the use of materials in and environmental impacts of the machinery used, either by the entity itself, or through data on or from, for example, cloud providers in the supply chain. While emissions from the production of equipment matters, so do aspects related to hazardous waste, rare minerals, and so forth.

As has become clear, AI is not only relevant with regard to climate change adaptation and mitigation, but also has potential impacts related to, for example, biodiversity, innovation, and making sense of data in order to face environmental challenges, land use change, use of water (Crawford, 2021; Sætra, 2022; Vinuesa et al., 2020).

3.3 | Social impacts and risks

Investors are increasingly focusing on the social aspects of an entity's activities. A range of developments encourage this, and examples of drivers include COVID-19 and the great resignation, the black lives matter movement, and new regulation related to modern slavery (ERM, 2022; He & Harris, 2020). This all means that issues related to (a) employee satisfaction, engagement, and retention, (b) supply chain issues and human rights, and (c) the broader impact related to social justice and discrimination are important for investors.

These are all issues known to be relevant for the use of AI and data. The broader impacts of AI is a staple of mainstream digital or AI

ethics, and issues of discrimination and bias in such systems are increasingly well understood. Such issues mainly fall into Scope 3 in the AI ESG protocol. Regarding supply chain issues, Crawford (2021), for example, has explored these issues in great detail. In the context of the AI ESG protocol, issues related to the rights of *data* subjects are included in the analysis of supply chain human rights issues in Scope 2 and own data gathering in Scope 1.

In addition to discrimination and bias, there is also a need to deal with the *economic* consequences related to inequality, poverty, access to infrastructure, and so forth under the social dimension of the AI ESG protocol. As discussed by Sætra (2021a, 2022), AI is part of a broader and potentially unsustainable socio-technical system, which is arguably not conducive to promoting all aspects of SDGs 8, 9, and 10, for example. Who owns the data, who has access to services, who benefits from the solutions made, and so forth, are important questions in this context. Issues related to using AI and data to promote growth and innovation are also relevant in this category, but they must be coupled with an analysis of the social consequences to be complete.

Finally, issues related to consumer activity and political institutions must also be analyzed under the social banner. This reflects broader market trends related to expectations for companies to take responsibility for and make efforts to engender positive and sustainable behavior from their customers and partners (ERM, 2022), and also how their products, solutions, and systems relate to and interact with democracy and political institutions, which has become relevant due to, for example, how social media have been used to impact elections (Greenfield, 2018).

3.4 | Governance

One of the main benefits of using the AI ESG protocol is that it focuses attention on governance related issues, and that it does so based on approaches from the finance and investor world where such issues have a long history and where mature and well-established frameworks and tools exist. This is arguably particularly important for governing AI and data intensive entities, as they are part of a relatively immature industry with rapid growth—struggling to find good governance approaches. There is, for example, an extreme proliferation of frameworks for responsible, trustworthy, and otherwise "ethical" AI (Floridi & Cowls, 2019; Jobin et al., 2019; Mittelstadt, 2019), and ongoing debates about the relationships between ethics and politics and regulation, both in and of corporations using AI and data based solutions (Floridi, 2018; Sætra & Fosch-Villaronga, 2021). Nevertheless, there are emerging governance approaches to AI worth noting, and these both can and should be considered when using the AI ESG protocol. The protocol itself favors no specific approach, and simply requires an entity to describe and disclose their approach to the governance of AI and data related risks and opportunities, and this could be based on some of the approaches to AI governance being developed (Mäntymäki et al., 2022a; Mäntymäki et al., 2022b; Papagiannidis et al., 2022; Schneider et al., 2022). It is, however, imperative that AI governance is seen as an integrated part of an

entity's existing governance structure, and the proposals by Mäntymäki et al. (2022a) and Mäntymäki et al. (2022b) account for this need and focus on AI unique aspects and how AI governance relates to, for example, IT and data governance. Governance also related to stakeholders, and Cihon et al. (2021) highlights the need for multistakeholder approaches and cooperation for good AI governance. This is in line with existing approaches to sustainability and ESG, for example with the network, forum, and guidance approach found in UN Global Compact (UN Global Compact, 2022).

In addition to broader governance related issues, the protocol can also be combined with various approaches to auditing and assurance of AI systems (Raji et al., 2020). On a lower level, impact assessments for specific algorithms have also been proposed and presented as the natural evaluation of auditing and assurance (Metcalf et al., 2021). While impact assessments are required, it remains unclear if replacing topical assessments (e.g., "environmental impact assessments") with technology defined ones (algorithmic impact assessment) negates the need for auditing and assurance. In the world of sustainability reporting and disclosure, internal and external auditing processes, and limited or reasonable assurance work will most likely retain their functions.

In the AI ESG protocol, governance issues relate to risk control, governance systems, auditing systems, and to what degree a corporation has strategies and plans related to AI and data capabilities, assets, and activities. Scope 1 encompasses most of these issues, but governance is also included in the other scopes through, for example, indicators related to performing due diligence and assessments of their suppliers and partners.

As the AI ESG protocol is not a complete and full ESG reporting framework, issues related to *general* issues of governance, such as board composition, and so forth, will be handled through the more general framework used. The TCFD framework, for example, provides recommendations for disclosure on governance and risk management that could with good effect be incorporated into the reporting on the governance issues in the AI ESG protocol (TCFD, 2022). If the company does not report on ESG through broader frameworks, certain general indicators could be included in the protocol, but this will mainly be relevant for companies that are highly AI and data intensive, for which the AI ESG protocol will reflect most material issues.

4 | THE AI ESG PROTOCOL

With the preliminaries in place, we can now see how this all comes together in constituting the AI ESG protocol. The protocol is a high-level tool and method that allows all companies to systematically evaluate and disclose the impacts of their AI and data based *capabilities*, *assets*, and *activities*. These three categories were selected as they cover the key factors related to ESG related potential for impact (capabilities and assets), whereas activities highlight current and actual use of AI and data. Combined with the distinction between three scopes, the structure of the protocol can be shown as the cube in Figure 3.

The protocol ties directly into the GHG protocol, as discussed, and if the environmental impacts covered by the AI ESG protocol are calculated according to the GHG protocol, this can feed directly into
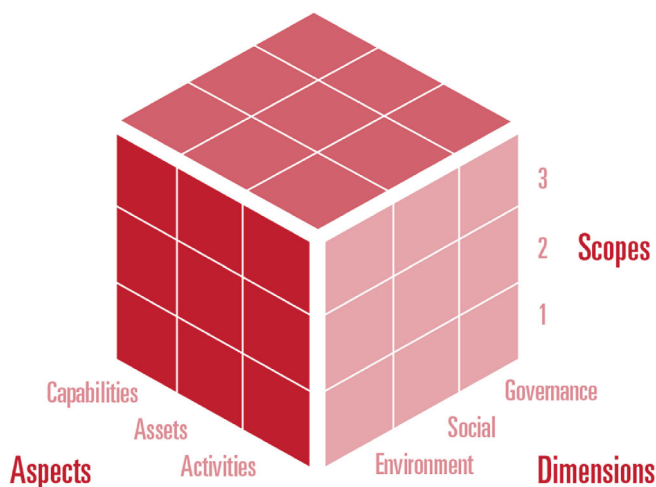
FIGURE 3 The elements of the AI ESG protocol. *Source*: Author's own arrangement [Colour figure can be viewed at wileyonlinelibrary.com]

FIGURE 4 The AI ESG protocol structure. *Source*: Author's own arrangement [Colour figure can be viewed at wileyonlinelibrary.com]

the entity's general climate accounting, while also allowing for separating the AI and data driven emissions. This resembles the approach of the TCFD, which is a framework for reporting on climate related financial risks and opportunities. This framework also requires the use of the GHG protocol for climate related metrics and targets, and provides a set of recommendations for governance, strategy, and risk management disclosures, with 11 key disclosures in total (TCFD, 2022).

The AI ESG protocol is flexible as it is built to connect with other standards and frameworks and internal processes and governance structures. This flexibility enables the protocol to be used by many different actors in highly varied contexts. However, the high-level nature and flexible approach also entail that the protocol is not primarily targeted at stakeholders interested in purely quantitative and directly comparable data for companies within or between sectors.

The protocol was gradually developed through the author's own work on the AI ethics and the relation to governance and sustainability reporting (Sætra, 2021a, 2021b, 2022), and through his work as a sustainability consultant in KPMG Norway. This combined experience demonstrated both the lack of actionable potential in much AI ethics related work, as it tends to be developed far away from corporate C-suites, and how existing sustainability and ESG related standards and frameworks lack sufficient sector specific guidance for AI and data intensive companies. The process consisted of an examination of relevant existing standards and frameworks and the subsequent development of the new AI ESG protocol which incorporates key insights from, for example, AI ethics.

4.1 | Protocol structure

The AI ESG protocol can be completed through manual reconstruction of the information contained in this article, or through ready-made tools online or offline, being produced and scheduled to be made available spring 2023.[1] The structure of the entire protocol is presented in Figure 4, and while a completed protocol provides the most

value to the reporting entity and stakeholders, it is also possible to only do parts of the protocol. Decisions regarding how to use the protocol must be made on the basis of how the protocol fits into the entity's existing ESG and sustainability related strategy and reporting structures. The AI ESG protocol's four main parts are the initial descriptive statement, the main impact statement, the risks and opportunities statement, and an action plan, each of which is described below.

The *Initial descriptive statement* contains a qualitative description of how and where AI and data capabilities and assets reside in the organization, and what sort of activities are related to these capabilities and assets. Users of the protocol are encouraged to include an organizational chart which helps situate AI and data in the organization. This statement should also help clarify who is operationally in charge of developing and handling AI and data in the organization, but also who is formally responsible. Furthermore, any relevant strategy, action plan, and governance related documents should be linked to and briefly explained, including, for example, processes related to AI and data internal audits (Minkkinen et al., 2022; Raji et al., 2020). Finally, if relevant, the entity should describe its ethics policy and whether this is based on existing frameworks or guidelines related to, for example, trustworthy or responsible AI (Dignum, 2019; High-Level Expert Group on Artificial Intelligence, 2019).

Key elements in the initial descriptive statement:

1. Where in the entity is AI used?
2. What sort of data does the entity control?
3. What sort of AI and data related capabilities does the entity have?
4. How is AI and data used in the contexts described above?
5. Who is operatively in charge, and who holds responsibility?
6. What are the relevant strategies, plans, and governance documents?
7. Is there an ethics policy, and/or does the entity subscribe to any ethics/sustainability standard?

The *Main impact statement* is the core of the AI ESG protocol and is described in more detail in the next section detailing the impact questionnaire. This is the part of the protocol where impacts related
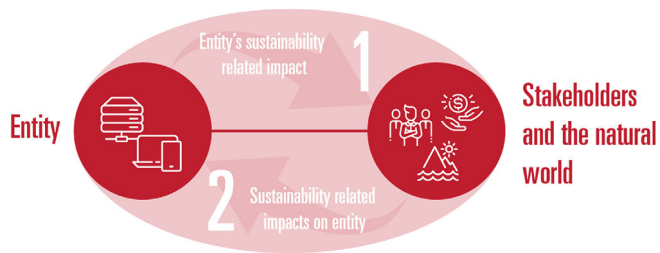
FIGURE 5 Double materiality, with outbound impact considered first, then inbound risks and opportunities. *Source*: Author's own arrangement [Colour figure can be viewed at wileyonlinelibrary.com]

to ESG for all scopes are mapped based on a set structure and guiding questions. This statement is both qualitative and quantitative and presents both known impacts *and* data and knowledge gaps. Key elements in the main impact statement are described in the next section.

In the *Risks and opportunities* part, an entity will evaluate the content of Parts 1 and 2 in order to arrive at a comprehensive picture of the risks and opportunities (upside risk) related to the entity's AI and data based capabilities, assets, and activities. This is facilitated by the structure of the main impact statement, which conveys both known impacts and identified data and knowledge gaps. Depending on the entity's approach to risk management, this analysis can be integrated into a broader approach. If the entity does not have other supporting processes the AI and data risk assessment can be integrated into, the AI ESG Protocol suggests constructing a risk matrix and performing a materiality analysis of AI and data related topics (Jebe, 2019; Ni et al., 2010), and finally coupling this with an AI and data readiness assessment. The protocol is open for a variety of approaches to these latter aspects, and a business can, for example, use the AI readiness framework proposed by Holmström (2022).

Key elements in the risks and opportunities statement:

1. What are the main identified risks and opportunities?
2. Risk analysis and matrix
3. Materiality analysis and matrix
4. Readiness assessment

It is highly encouraged to adopt a *double materiality* approach to the identification of material issues do be disclosed, which is also the approach adopted in the GRI framework and European regulation on sustainability disclosure for financial (SFDR) companies and others (as seen in the EU taxonomy and in the coming CSRD) (Adams et al., 2021; Deloitte, 2022). The double materiality approach proposed is shown in Figure 5 and highlights how material issues are not restricted to those that pose financial risks and opportunities for a company (left/inbound arrow), but also the sustainability related impacts of the company's activities (right/outbound arrow). It is recommended to start with an analysis of outbound impact before assessing the risks and opportunities for the company's development, performance, and position (often referred to as financial materiality and the approach adopted in the TCFD), as this encourages casting

the net broadly enough to avoid unduly prioritizing traditional financial risks (Adams et al., 2021).

Finally, it is encouraged to follow Step 3 with the development of an action plan for improving ESG performance, unless AI and data are naturally integrated in existing strategies and action plans. Based on the risk assessment and materiality analysis, the entity can identify which AI and data related aspects require attention, either in terms of negative impact mitigation, positive impact development, or attending to gaps in AI and data readiness. The action plan should describe which topics are addressed, what should be done, when it should be done, and describe in detail who oversees implementation and who controls progress on the initiatives described. It is also highly recommended to include a roadmap and a discussion of where the entity is currently at in its "AI ESG journey." When first reporting according to the protocol, not all data and statements will be complete, and it will be useful both for the entity and stakeholders to know what plans are in place for improving ESG performance and reporting in subsequent years.

Key elements in the action plan:

1. What must be done to limit risks and exploit opportunities?
2. What is the timeline for each action?
3. Who is responsible for implementation and overseen implementation?
4. How will the action be implemented?

4.2 | Impact questionnaire outline

The impact statement will partly be a statement of qualitative answers related to policy and approaches, and partly indicators measuring the quantity of capabilities, assets, and activities. As indicated by the presentation of potentially relevant topics above, all potential aspects cannot be covered in this article, but the main categories of the initial impact questionnaire are presented in Figure 6. The protocol builds on the division of AI impacts into the micro, meso, and macro levels (Sætra, 2022), and also uses the guide questions presented in *AI for the SDGs* (Sætra, 2022) as a starting point for many of the topics. This provides an approach which ensures that all major impacts are considered, but users of the protocol can decide to use other approaches if this is considered beneficial for their context.

For each topic, the AI ESG protocol suggests providing a qualitative statement and one or more of the following, depending on suitability:

1. Quantitative data on relevant indicators
2. Links and references to relevant indicators from other standards and framework (i.e., GRI)
3. Links to data sources (internal/external)
4. Links to policies, assessments, processes
5. Person/department responsible
6. External sources of information (suppliers, partners, etc.)

FIGURE 6 Main categories in the impact questionnaire. *Source:* Author's own arrangement [Colour figure can be viewed at wileyonlinelibrary.com]

AI ESG protocol questionnaire, v0.1b

AIESGprotocol

Scope	Up/down-stream	ESG	Topic
1	-	E	Number of owned computers - Type and categories
1	-	E	Cooling/power etc owned and operated on premises
1	-	G	Datasets produced and owned - governance and cybersecurity
1	-	S/G	Datasets produced and owned - Privacy and user interests
1	-	S	Workers exposure to environmental harms
1	-	S	Workers exposure to harmful data etc
1	-	E	Algorithms/models (internally developed) - energy cost in training (potentially also equipment costs/degradation)
1	-	S	Algorithms/models (internally developed) - negative impacts related to source data, privacy, etc
1	-	S	Algorithms/models (internally developed) - positive impacts related to source data, privacy, etc
1	-	G	Algorithms/models (internally developed) - documentation of origin and legality of data used
1	-	G	AI readiness evaluation results
2	Up	E	Electricity bought (for own computers - AI related)
2	Up	E	Type of electricity used (category)
2	Up	E	Algorithms/models (externally developed) - energy cost training and approx. number of users (potentially also equipment costs/degradation)
2	Up	S	Algorithms/models (externally developed) - negative impacts related to source data, privacy, etc
2	Up	S	Algorithms/models (externally developed) - positive impacts related to source data, privacy, etc
2	Up	G	Algorithms/models (externally developed) - risk assessment origin and legality of data used, due dilligence
3	Up	E	Own and sourced computer equipment - Production (life cycle assessment)
3	Up	S	Own and sourced computer equipment - Workers' rights
3	Up	G	Own and sourced computer equipment - Materials and circularity
3	Down	E	Use of company's AI based services - Positive environmental impact
3	Down	E	Use of company's AI based services - Negative environmental impact
3	Down	S	Use of company's AI based services - Positive social impact
3	Down	S	Use of company's AI based services - Negative social impact
3	Down	S	Use of company's AI based services - Positive sustainability related economic impact
3	Down	S	Use of company's AI based services - Negative sustainability related economic impact
3	Down	G	Use of company's AI based services - ESG risk assessment

The AI ESG protocol is a high-level framework intended to be used with other frameworks, and this is also in line with the Esty and Cort's (2020) proposal to see reporting as *tiered*. Tier one contains the core mandatory disclosure elements, whereas tier two contains industry-specific indicators tailored specifically to, in this case, AI and data intensive entities.

As described above, general corporate governance related issues are reported through, for example GRI indicators on board composition, qualifications, and so forth, while the AI ESG protocol supplements the Tier 1 framework with more specialized information on governance related specifically to AI and data based capabilities, assets, and activities. Furthermore, the goal of the AI ESG protocol is not to subsume all existing or future more specialized frameworks and approaches to AI and data, and it can accommodate various approaches to, for example, ethical AI, AI auditing, AI impact assessments and AI governance approaches.

Another example of an additional framework already mentioned is the AI readiness framework of Holmström (2022). This framework consists of questions related to past and present issues related to AI in the categories of *technologies*, *activities*, *boundaries*, and *goals*, and constitutes one potentially valuable tool for use within the protocol—both in the initial descriptive statement, but particularly in the risks and opportunities part of the protocol.

5 | CONCLUSION

As AI and data capabilities, assets, and activities are increasingly important parts of modern organizations, understanding how these generate impacts, risks, and opportunities is imperative for proper governance and oversight. There is a lack of tools for systematically evaluating and disclosing such impacts and risks (Minkkinen et al., 2022), and the AI ESG protocol has here been proposed to meet this need.

The AI ESG protocol is a high-level and flexible tool intended to supplement existing standards and frameworks (e.g., the GHG protocol and the TCFD) and serves the Tier 2 function in the proposed future ESG hierarchy proposed by Esty (2020), as it provides specialized tools and indicators particularly relevant for AI and data intensive entities.

Another aspect of flexibility is that the protocol opens for various optional activities related to risk and maturity assessments and the development of action plans. This is done to meet the need for making ESG data more actionable and valuable not just for investors, but also for those making strategic decisions in the entity (Minkkinen et al., 2022).

CONFLICT OF INTEREST

The author is developing a solution to make the use of the AI ESG protocol easier and is consequently in a position to potentially gain from the adoption of the AI ESG protocol.

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ENDNOTE

[1] www.aiesgprotocol.com.

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