Towards an ESG-specific Enterprise Modeling Method and Supporting Tool: A Design Science Research Plan

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Abstract

Environmental, Social, and Governance (ESG) concerns are increasingly determining organizational strategies, driven by regulations such as the CSRD (Corporate Sustainability Reporting Directive) and ISSB (International Sustainability Standards Board) as well as investor and societal expectations. While most initiatives treat ESG primarily as a matter of data aggregation reporting and accounting, there is a design-oriented research gap in how ESG concerns can be incorporated into enterprise modeling and knowledge management practices.

The aim of this PhD work is to investigate how ESG semantics can be integrated in a knowledge-driven assessment and reporting capability complementary to the current data-driven analytics approaches. This will take the form of an ESG-specific enterprise modeling method and a supporting tool prototype to be used and evaluated as a demonstrator in the spirit of Design Science. Therefore, the intended artifact contribution has two parts: (1) a methodological component, consisting of an enterprise modeling method built around a domain-specific language and reporting mechanisms that semantically leverage ESG concern taxonomies, roles and content flows mapped on traditional BPMN, and (2) a technical component in the form of a prototype implemented on the ADOxx metamodeling platform to support the method deployment and evaluation.

In the current stage (1st year of PhD), the work focuses on problem formulation refinement, artifacts requirements specification and an initial structured literature review - which confirms the dominance of data-driven and fragmented approaches across ESG reporting frameworks, and a shortage of design works on ESG integration with enterprise or business process architectures. The paper summarizes such preliminary results and outlines the Design Science research plan tailored to the specificity of modeling method engineering.

Keywords

ESG accounting, method engineering, enterprise modeling, knowledge management, domain-specific modeling language, design science research

1. Introduction

Environmental, Social, and Governance (ESG) refers to a set of non-financial criteria that evaluate how organizations manage sustainability and responsibility across the environmental, social, and governance dimensions. Originally a reporting practice driven by regulatory and investor pressure, ESG has evolved into a core element of organizational accountability. However, treating ESG exclusively as a reporting obligation may risk reducing it to a data aggregation task, rather than fostering its role as a knowledge-driven capability. The three ESG dimensions introduce rich semantics and taxonomies in many aspects of an enterprise or business process architecture: new roles, new content (data or knowledge) objects, new task and even types, specific communication or material flows. Established enterprise modeling languages do not traditionally incorporate ESG semantics, while ESG semantics are mostly tacit or implied by conceptual models that manifest in the data structures being collected for ESG data reports - however lacking the traceability and granularity that allows ESG concerns to be mapped on business processes, functions or enterprise architecture layers.

Bringing together enterprise modeling and ESG conceptual models may also contribute to a Knowledge Management (KM) capability, where ESG-related information is consistently mapped and integrated into sense-making and decision-making efforts. ESG concerns can be mapped onto the Business Process Management (BPM) culture that already exists in many organizations, where established modeling

PoEM2025: Companion Proceedings of the 18th IFIP Working Conference on the Practice of Enterprise Modeling: PoEM Forum, Doctoral Consortium, Business Case and Tool Forum, Workshops, December 3-5, 2025, Geneva, Switzerland

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methods (e.g. Business Process Model and Notation (BPMN) [1], ArchiMate [2], Unified Modeling Language (UML) [3]) already provide a basis for representing processes, resources, and governance mechanisms, however they were not designed specifically for ESG applicability – this requires richer and more focused semantics that can extend post-hoc data aggregation practices (i.e. ESG data collected from past process executions) with prescriptive designs of ESG processes and their architectural requirements, or post hoc reporting that can apply data filtering criteria based on granular semantic traceability of ESG concerns to business processes and elements of their enterprise context (documents, products etc.).

Initial investigations of this PhD work suggest that ESG concerns are increasingly defining organizational strategies, under pressure from regulations such as the Corporate Sustainability Reporting Directive (CSRD) [4] and the International Sustainability Standards Board (ISSB) [5], as well as investor pressure and societal expectations [6]. Reporting frameworks such as the Global Reporting Initiative (GRI) [7] and the Sustainability Accounting Standards Board (SASB) [8] have gained widespread adoption, consolidating ESG as a central element of organizational accountability.

Even with this progress, ESG is predominantly addressed through data reporting and disclosure frameworks, lacking in granular system and process views that would allow mapping ESG concerns into enterprise models or knowledge management practices [9, 10]. While reporting frameworks strengthen regulatory alignment and external communication (e.g. investor relations; regulatory reporting; public disclosures; engagement with NGOs, customers, and the general public), they rarely support organizations in operationalizing ESG as a by-design capability. Recent contributions have pointed out this limitation and introduced the notion of ESG as a knowledge management capability supported by enterprise modeling and semantic technologies, along with initial BPMN design directions [11].

Enterprise modeling and domain-specific language engineering provides an opportunity to address this gap. Through well-recognized languages such as BPMN, ArchiMate, or UML, enterprise modeling enables structured representations of processes, structures, and governance mechanisms. Extending them with ESG concepts, properties and relationships can facilitate a multi-perspective semantic integration of sustainability into knowledge-based organizational capabilities [12, 13]. Both the academic literature and industry practice bring to light scattered initiatives, varying from extensions of BPM for sustainability [14] to semantic frameworks for supply chains reporting [15], but without converging towards an integrative method with explicit ESG modeling constructs.

This doctoral research sets out a Design Science Research (DSR) agenda to address the identified gap and to propose both technical artifacts and methodological treatments. Guided by the research process model of Peffers et al. [16], the research aims to investigate how ESG can be conceptualized in order to enrich enterprise modeling methods and model-based Knowledge Management regarding internal ESG activities. Therefore, the research plans the development of two DSR contribution components: **(1)** a methodological one in the form of an ESG-aware enterprise modeling method, consisting of a domain-specific modeling language (DSML) with ESG-specific constructs and semantics-driven reporting mechanisms, and **(2)** a technical contribution in the form of a tool prototype implemented on the ADOxx [17] metamodeling platform. The enterprise modeling method is currently envisioned to be built around BPMN in order to leverage familiarity with the popular standard and to achieve a granular process-centric mapping of ESG concerns, possibly allowing to extend traditional Business Process Management cases with ESG considerations; however, the conceptualization is intended to be further extended to other enterprise architecture layers - the exact semantic scoping is still work in progress, aiming to bridge ESG reporting requirements with more traditional Enterprise Architecture requirements.

We focus on language extension, rather than conceiving new ESG-oriented modeling procedures for legacy modeling languages, because we aim to enable traceability to semantically distinguishable, explicit and specialized constructs (e.g. specific types of flows, tasks, events, roles), thus opening possibilities for machine interpretability through process queries and AI processing of diagrammatic contents. This is partly motivated by an intention to also contribute to the larger scope of a research project proposal [18] that aims for the integration of the hereby planned ESG modeling method with AI

agents, in a model-driven hybrid AI architecture for ESG knowledge management and accountability; in the envisioned system, simply tailoring modeling practices would not suffice, as explicit concepts must be made available to knowledge flows involving knowledge graphs and AI agents.

At this early stage (Year 1) preliminary results comprise an initial structured literature review that confirms the fragmentation of approaches across ESG methods and reporting frameworks, lacking coherent semantic integration by means of conceptual modeling and drill-down traceability to business process or enterprise architecture constructs on convenient levels of decomposition, or along semantic chains of dependencies. Building on this foundation and preliminary work introduced by the doctoral supervisor [11], this paper outlines a prospective PhD plan.

2. Thematic Synthesis of Related Work

The PhD project was recently initiated with a literature review following the following strategy:

(1) search of academic works through Google Scholar, looking for open access or openly accessible publisher repositories available through university memberships (i.e. from CEUR-WS and MDPI to Springer, IEEE, Elsevier, AIS);
(2) consultation of trusted industry and practitioner white papers (e.g., SAP Sustainability Control Tower [19], LeanIX ESG Capability Modeling [20], PwC reports [6]);
(3) multi-stage screening of the identified academic publications.

The complete search and screening protocol was detailed in [21] and is briefly summarized in this section. The initial search looked for general ESG cases and approaches ("ESG methods", "ESG tools", "ESG accounting"), for connections to enterprise modeling ("conceptual modeling for ESG", "domain-specific modeling in ESG", "enterprise modeling for ESG") and to knowledge management ("knowledge management for ESG", "ESG capability", "ESG traceability"). This process initially identified 116 sources (94 academic, 22 industry). After a first refinement round, an intermediate set of 47 works were retained, excluding contributions that only mentioned ESG superficially or lacked methodological detail. From these, a final selection of 15 core contributions - with a focus on ESG methods and tools in relation to a need for conceptualizations, and not only of data reporting - was consolidated as a conceptual foundation subsequently grouped into thematic clusters to highlight emerging themes and research directions:

(1) ESG methods and tools. Contributions in this cluster include works that embed ESG factors into financial valuation models [22], propose AI and natural language processing techniques to generate ESG ratings [23], and develop decision support systems tailored to domain specificities such as oil and gas sectors [24]. While these mechanisms improve measurement and comparability, they remain largely data-driven evaluation tools, with limited integration into enterprise modeling or capability-based perspectives;
(2) Accounting and reporting. This cluster highlights frameworks such as GRI, SASB, CSRD, and ISSB, which consolidate ESG disclosure and comparability. Some contributions show how accountability mechanisms evolve into managerial instruments [10], while others emphasize inconsistencies in reporting that call for more coherent conceptualization perspectives for accounting [25]. Together, these works underline the dominance of compliance-driven reporting and suggest a need to embed ESG constructs directly into enterprise models;
(3) Business Process Management (BPM). Studies in this cluster show how processes can operationalize ESG concerns. Green BPM approaches reduce environmental impact [9], DSMLs support ESG-related accounting [26] and BPM development facilitates extensive organizational adoption [14, 27]. These works demonstrate the anchoring role of business processes, yet they remain fragmented and lack convergence into comprehensive modeling methods that can establish a semantic bridge between BPM and ESG concerns or practices;

(4) **Enterprise Architecture (EA) and capability perspectives.** This cluster emphasizes EA's role in aligning structures, processes, and technologies with sustainability goals [28]. Some contributions link IT capability with environmental outcomes [29], while others highlight capability development as a pathway for improved reporting [30]. EA-focused works [31, 32] together with [28] suggest that capabilities, rather than isolated tools, provide the foundation for embedding ESG into enterprise architectures and sustaining enterprise adaptability;
(5) **Semantic integration and knowledge management.** The final cluster points to semantic and knowledge-based approaches. Enterprise modeling combined with Semantic Web techniques enables traceability [11], knowledge-based frameworks support sustainable supply chains [15], and model-to-graph transformations align conceptual models with knowledge graphs to enable semantic processing of diagrammatic design decisions [33, 34] These contributions indirectly imply that a technical context of enterprise modeling-semantic graphs interplay can elevate ESG reporting into model-driven accountability and management practices, although a tool and a method dedicated to demonstrate this is still not available, outside the preliminary formulation in [11] which was a preamble for this PhD project.

Across these clusters, several conclusions emerge. First, ESG research and practice remain dominated by disclosure frameworks and data collection/analytics tools; secondly, environmental topics receive disproportionate attention compared to social and governance concerns; third, treating ESG as an organizational capability can drive efforts to connect ESG frameworks and indicators to business processes, roles and decisions; capability maps and possibly further propagating across EA layers to inform ESG strategic guidance; finally, conceptual modeling (BPMN/EA/DSML) and semantic techniques can act as a missing bridge between data-centric tools and ESG knowledge work and associated knowledge management capabilities. For this particular PhD project, we employ BPMN as a conceptualization entry point for embedding ESG concerns into business process architecture. This is intended to enable process-centric traceable reporting of ESG at convenient granularities, aligned with the granularity of available process catalogs (e.g. at task level, at subprocess level, at role level).

These insights, together with the doctoral supervisor's early stage proposal to build around ESG a knowledge management capability [11], provide the foundation for the doctoral research plan.

3. Research Problem and Objectives

Managerial perspectives and accounting practices have begun to integrate ESG indicators, while BPM extensions and semantic technologies show potential for embedding sustainability concerns into organizational processes. However, these approaches remain fragmented and do not converge into a single integrative method. This fragmentation leaves a methodological gap: the absence of an enterprise modeling method that incorporates ESG as first-class modeling constructs of all categories (taxonomies, relationships, data attributes). Considering this problem, this research is structured around a set of objectives:

O1. To conceptualize ESG as a knowledge structure that can semantically enrich business process modeling (possibly extending to other enterprise modeling aspects), in order to establish a conceptual foundation for a process-centric ESG knowledge management capability.

O2. To design an ESG-aware enterprise modeling method (with a focus on business processes and extensions to other layers), consisting of a DSML with ESG-specific constructs, mechanisms for reasoning and reporting and a usage procedure for semantic ESG annotations and model-driven reporting generation.

O3. To implement a supporting tool prototype on the ADOxx metamodeling platform, a technological choice based on extensive experience and productivity as members of the OMILAB ecosystem [13], with BPMN extensions for domain-specific purposes [33], and with the ADOxx-to-RDF interoperability plug-in to enable semantic processing of diagrammatic content [34].

O4. To empirically evaluate the modeling method and its associated DSML through a multi-criterial approach that adopts prescriptive approaches from method engineering and domain-specific language

engineering.

The nature of these objectives determines a Design Science Research (DSR) orientation of the doctoral project, in which knowledge is advanced through the creation of both methodological and technical contributions, balancing engineering and empirical tasks, and aiming to produce prescriptive knowledge regarding the conceptual alignment of ESG concerns with aspects/layers involved in general-purpose enterprise modeling.

4. Research Methodology

The Design Science Research methodology is widely used in Information Systems when the aim is to design and evaluate artifacts in a pragmatic context, aiming to generalize prescriptive knowledge out of the artifact engineering effort. DSR provides a structured, iterative approach for addressing complex, practice-oriented problems while grounding the solutions in a scientific knowledge base and at the same time enriching that knowledge base. This PhD research is guided by the process outlined in [16] which structures DSR into six core activities: (1) problem identification and motivation, (2) definition of objectives, (3) design and development, (4) demonstration, (5) evaluation, and (6) communication; activities which are not strictly sequential but are often performed iteratively, with feedback loops ensuring continuous refinement of the designed artifacts. At the current stage (beginning of Year 1), progress has been made mainly in the problem identification phase, consolidated through the literature review summarized in Section 2 and some brief initial design propositions to be highlighted in Section 6 as preliminary ideas.

The DSR stages are planned as follows:

1. **Problem identification and motivation.** At this early stage which is currently on-going, the research focuses on clarifying the problem space. Current literature, as summarized in Section 2, indicates that the topic of ESG accounting is predominantly shaped by reporting and disclosure frameworks, while process-centric, conceptual modeling methods or semantic integration proposals are marginal and fragmented, thus failing to lead to knowledge management approaches over ESG concerns. The motivation for the doctoral research is to investigate how ESG can be integrated with enterprise modeling methods for semantically richer and traceable reporting, in relation to the business processes being impacted by, or having impact on, ESG concerns and activities.
2. **Definition of the objectives.** Objectives will consider requirements originating from European and regional legislation (e.g., CSRD, ISSB), which act both as motivators and constraints for the design of the method and ESG-specific knowledge structures. Building on the identified problem, the doctoral research aims to formulate competency questions and model-driven functional requirements that can guide the design of both the methodological and technical contributions. Both artifact-oriented and empirically-oriented objectives have been formulated in Section 3. Each objective will remain traceable to its source of motivation: O1 emerges from the literature gap, O2 builds on the initial BPMN design decisions introduced in [11], O3 will be aligned with compliance requirements for ESG reporting and O4 will reflect current scientific practices on the evaluation of modeling methods and domain-specific modeling languages as imposed by the DSR engineering-evaluation cycle.
3. **Design and Development.** The methodological contribution is envisioned as an extension of a core business process modeling notation, i.e. BPMN, with ESG-specific constructs and traceable semantic bridges between the two. This will be supported by a prototype tool implemented on the ADOxx metamodeling platform, a technological choice based on extensive experience of the research group and of the PhD student (see [35]) with DSML deployment through ADOxx, as well as the availability of ADOxx-semantic graphs integration [34]. Therefore, the development of the modeling method will follow the principles of Agile Modeling Method Engineering (AMME) [36], ensuring an iterative and agile process of both language and tool refinement, considering the method building blocks as defined by AMME: notation, syntax, semantics, model-driven

mechanisms and usage procedure – i.e. the tool will enable the automated generation of ESG reports from enriched process models. As an initial design decision, the project will conceptually revolve around BPMN, gradually expanding its semantic scope, maintaining alignment with ESG reporting requirements (CSRD, ISSB) to ensure practical relevance.

4. **Demonstration.** The designed contributions are planned to be applied in case scenarios to demonstrate their practicability to represent ESG concerns in enterprise models. A starting point for feasibility demonstration is a business in the food industry owned by the PhD student, to be extended to alternative cases for diversification and generalization.
5. **Evaluation.** The contributions will be evaluated against established quality criteria for modeling methods [37]. This is intended to reflect the VVE (verification-validation-evaluation) distinctions and best practices described in [38], to ensure that the developed method and tool are checked both from conceptual and pragmatic perspectives. One key framework to be investigated is the SEQUAL framework [39] and its dimensions (syntactic, semantic, pragmatic quality). In particular, (1) syntactic correctness will be verified for the metamodel and rules, and is partly guaranteed by enforcements of the ADOxx metamodeling platform; (2) semantic adequacy will be validated against ESG concepts and regulatory requirements; and (3) pragmatic quality will be assessed through usability tests with two categories of stakeholders reflecting the two conceptual categories involved in the DSML: the first category will be BPM practitioners adopting the ESG-specific extensions, the second category will be ESG practitioners adopting a BPM viewpoint.
6. **Communication.** Every DSR iteration will be marked by progress reports and publications according to the doctoral program requirements. It is expected that gradually maturing work will be disseminated along an evolving workshop-conference-journal publication frame.

5. Artifact Evaluation Considerations

The evaluation of the ESG-aware BPMN extension and its supporting prototype must be organized as an iterative and multi-dimensional subprocess, combining established quality frameworks for modeling languages with recent recommendations for method-level assessment.

First, we plan to adopt the SEQUAL framework [39] which differentiates the syntactic, semantic, and pragmatic quality. This provides a foundation for assessing (1) the syntactic correctness of the metamodel and its associated rules, (2) the semantic adequacy of the ESG constructs in relation to sustainability concepts and reporting requirements, and (3) the pragmatic quality of the method as experienced by the stakeholders. Second, the evaluation plan will be aligned with the Verification, Validation, and Evaluation (VVE) theoretical lens for modeling method quality provided in [37]. According to this framework, verification concerns the internal consistency of the method (e.g., metamodel coherence, tool implementation in ADOxx), validation ensures domain adequacy (e.g., alignment with CSRD and ISSB reporting standards, semantic competency, expert feedback from ESG practitioners), and evaluation addresses practical aspects (e.g., usability tests, case applicability). The dimensions will not be treated sequentially but will be integrated into iterative design-demonstration-evaluation cycles, so that each cycle contributes to the method refinement.

Moreover, the evaluation will also take into account community guidelines for building effective modeling methods [38]- i.e. to consider usability, extensibility, and tool support as desirable qualities of a sustainable method. This implies assessing whether the extensions remain comprehensible to BPMN users, whether they can be adapted to evolving ESG regulations, and whether the supporting prototype effectively enables modeling and reporting tasks.

Envisioned evaluation phases are as follows:

Verification Phase to answer "Did we build the method correctly?" cf. [37]- the focus is on internal correctness and consistency of the metamodel and tool implementation. Here we will direct attention to:

- **Metamodel checks**: ensure that ESG-specific constructs (tasks, events, roles, flows, data objects) are formally defined and syntactically integrated with BPMN;

- **Rule enforcement**: implement automated constraints in the ADOxx prototype (e.g., every ESG task must be classified under E/S/G dimensions; ESG data objects must be linked to at least one ESG-related task);
- **Notation consistency**: Test whether the new icons, classifications, and flows integrate coherently with BPMN notation, avoiding conflicts or ambiguous representations, and reflecting notational recommendations from the literature, such as Moody's framework [40];
- **Tool verification**: Confirm that the prototype correctly enforces rules and generates outputs without errors, i.e. mostly a software testing approach.

Validation Phase to answer "Did we build the correct method?" cf. [37]- the focus is on semantic adequacy, checking if the method reflects ESG requirements and domain needs through:

- **Regulatory alignment**: validate constructs against reporting frameworks (GRI, SASB, ISSB, CSRD) to ensure coverage of mandatory ESG indicators.
- **Expert reviews**: conduct structured feedback sessions with ESG specialists to check whether the newly incorporated BPMN taxonomies (e.g., social tasks, governance flows) correspond to real ESG practices.
- **Conceptual mapping**: compare ESG-aware BPMN constructs with concepts from ESG capability maps and industry frameworks (e.g., LeanIX ESG capability model, SAP Sustainability Control Tower) to confirm relevance and align with capability management principles [28].
- **Traceability tests**: verify that ESG constructs can be mapped to reporting needs and relational chains can be followed along semantically rich connections, with the help of the internal ADOxx query language [1] and the ADOxx-to-RDF semantic graph generation [34] to enable a knowledge graph treatment.

Evaluation Phase, to answer "Is the method useful in practice?" cf. [37]- the focus is on pragmatic quality in terms of usability, adoption, and value in real-world scenarios, taking a look at:

- **Stakeholders groups** representing a duality of competences: (a) ability of BPMN practitioners to incorporate ESG extensions into familiar BPMN workflows; (b) the ability of ESG practitioners to align ESG concerns along process-centric viewpoints.
- **Usability tasks**: assign modeling exercises (e.g., model an ESG reporting process) and measure time, errors and ease of understanding.
- **Case-based applications**: apply the method to illustrative scenarios (e.g., an organization's supply chain ESG reporting) to demonstrate practical relevance.
- **Feedback for iterative refinement**: collect qualitative feedback on clarity, usefulness, and completeness, using evaluation feedback to improve all modeling method building blocks – notation, syntax, semantics, rules, model-driven mechanisms and usage procedure.

6. Preliminary Insights and Future Work

At the current stage, the doctoral project is mainly focused on refining the problem formulation and anchoring it in literature gaps on design-oriented research for ESG conceptual modeling. As suggested in the literature review summary of Section 2, we perceive a fragmented state and a weak presence of integrative process-centric methods or knowledge management capabilities, contrasted by a dominance of quantitative data analytics approaches for ESG. The literature survey, with an initial deployment reported in [21], is planned to be expanded as a more comprehensive systematic literature review considering higher quality sources (e.g. no student papers and preprints) and refined inclusion criteria.

In addition to surveying the literature regarding domain-specificity and design proposition gaps, the author is acquiring technical and methodological skills regarding the enablers to be employed: the technological platform (ADOxx) and its possibilities for a knowledge graph treatment, the Agile Modeling Method Engineering approach of OMILAB, the VVE and SEQUAL quality frameworks.

[1] Available at: https://www.adoxx.org/documentation/aql/

Finally, the research builds on an early proposition formulated by the doctoral supervisor in [11] regarding the extension of BPMN to enable a knowledge management capability that combines a model-driven reporting approach with semantic queries and reasoning over knowledge graphs.

Current metamodeling work focuses on a catalog of new constructs that can extend the competency of BPMN towards the ESG specificity, by reflecting the E/S/G pillars as semantic distinctions overlayed on traditional BPMN; therefore, the initial designs focus on the following categories:

- **New Task taxonomies** – introducing new classifications of BPMN tasks, first distinguished by the three ESG pillars, then further taxonomized into types of activities that ESG management enforces to be added to current operations (e.g. ESG reporting, waste handling tasks etc.);
- **New Event taxonomies** – introducing new classification of BPMN events according to ESG pillars and the types of events expected during ESG activities (requests from ESG authorities, incidents to be handled through reactive ESG strategies etc.);
- **New Data object taxonomies** – introducing new classifications of BPMN content according to ESG pillars and the specific content objects created or used during ESG activities (specific types of reports, information to be collected because of ESG policies etc.);
- **New Participant roles** – introducing new classifications of BPMN pools and lanes according to ESG pillars and the typical roles defined by an organizational ESG strategy (ESG officer, authority, supply chain partners imposing ESG relations etc.);
- **New types of Flows and Associations** – introducing new classifications of BPMN relationships according to the content, value and material flows generated by ESG activities (ESG information flows, material waste flows, associations of ESG content objects etc.).

In addition to such BPMN extensions, conceptual extensions originating in ESG practice but not directly related to business processes may also emerge, thus inducing semantic enrichments beyond domain-specific specializations of existing BPMN constructs. This will remain aligned with the requirements originating in ESG reporting obligations (e.g., CSRD, ISSB) at both European and regional levels, which are adopted as possible sources for concept acquisition. This ensures that the proposed method not only tailors BPMN through specialization, but also expands it in response to practical compliance and reporting needs to assure the DSR relevance cycle.

To summarize, this doctoral research aims to advance knowledge and practice in several ways, by following the DSR methodology and evaluation strategies grounded on the VVE theoretical lens and on the SEQUAL quality framework – therefore the contribution is expected to comprise several streamlined artifacts and treatments:

- **Conceptual contribution.** Conceptualizing ESG as a knowledge capability, linking sustainability concerns to enterprise modeling practices towards enabling knowledge management for ESG concerns and their alignment with business processes;
- **Methodological contribution.** Designing an ESG-specific enterprise modeling method, realized through an extension of BPMN with ESG-specific constructs by applying established DSML engineering techniques;
- **Technical contribution.** Developing a prototype tool to deploy the method and its DSML on the ADOxx metamodeling platform;
- **Practical contribution.** Making prescriptive recommendations on how the method should be applied by companies having a Business Process Management and/or a Knowledge Management culture built around enterprise modeling, including empirical insights on how the conceptual, methodological and technical contribution aligns with such practical experiences.

Acknowledgement. This doctoral research is conducted under the supervision of Prof. Robert Andrei Buchmann, within the Business Informatics doctoral program at Babeş-Bolyai University, Romania.

Declaration on Generative AI

During the preparation of this work, the author used ChatGPT to improve clarity and conciseness of phrasing. After using this tool/service, the author reviewed and further adjusted phrasing, and takes full responsibility for the publication's content.

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