



Bridging the Gap Between Intuition and Explicit Knowledge in Strategic Business Design

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Abstract: When utilizing Enterprise Architecture (EA) in strategic business design, establishing a clear and comprehensive view of the business’s logical scope is fundamental to achieving coherence and alignment. Yet, professionals engaged in strategic planning, business operations, application design, and emerging technologies such as Artificial Intelligence (AI) often perceive these domains as fragmented and disconnected. This disconnect results in significant inconsistencies. Leveraging current ontology development and semantic analysis tools can enhance understanding of an enterprise’s logical boundaries, features, relationships, and their strategic alignment. Through a structured literature review and analysis, this research offers an internally consistent specification of an enterprise’s logical boundary. It proposes a systematic method that constrains and guides intuitive judgment for identifying missing or redundant elements within enterprise structures and demonstrates the theory through a case study. This approach aims to deepen understanding of enterprise boundaries, significantly advancing EA and strategic business design, and enabling tangible business benefits and enhanced AI integration.

Keywords: enterprise architecture, artificial intelligence, ontology, strategic alignment, logical boundary

1. Introduction

Despite the modern enterprise being the most complex system ever designed and experienced by humans, further academic investigation of its nature is needed [1]. The connection between strategy and execution remains decoupled, underscoring the urgent need for a more holistic view, which this research aimed to provide [2]. Business strategy has traditionally relied on executive intuition, but Artificial Intelligence (AI) demands explicit, structured approaches; without this shift, several facts are in evidence.

Global supply chains have expanded organizational scope, and their influence on international trade and politics further reinforces this shift, meaning the “organization” no longer equates to the “enterprise” [3, 4]. Because of this, popular tools for describing strategy, such as Porter’s [5] value chain model, are no longer valid and do not connect the strategies that must execute them or to the environment in which they must work, that is, extended supply chains and the web of partners inherent in the modern extended enterprise [2]. The rapid pace of change places even “antifragile” enterprises under pressure, signalling an urgent need for adaptive strategies [6]. This immediate need for change should be a wake-up call for all business strategists.

Once designed for growth, organizations must now shift their focus to adaptation within their enterprise/ecosystem. This shift is urgent, as it is necessary to minimize effort to achieve increasingly changing outcomes. Technology, particularly AI, represents the most significant disruption the modern enterprise will experience, representing the latest and most significant shift in technological disruption [7]. The urgency

to adapt to ongoing technological disruption is becoming increasingly evident. However, the lack of fundamental tools to address this ever-increasing complexity persists, underscoring the need for immediate adaptation.

Enterprise Architecture (EA) is often presented as a framework that connects an organization’s structure and operations with its strategic objectives. Still, it is unable to explain how this relationship is formed [8]. At the same time, organizations require stronger and more clearly defined links to strategy—mere anticipation of future trends is no longer sufficient. Executives who overlook today’s environmental and social dynamics risk undermining their organization’s resilience by ignoring critical threats or missing out on valuable opportunities.

A significant part of what unifies the solution to all these challenges is the role that ontologies, which describe the construction of a thing, play in their resolution; the description of an enterprise’s architecture is an ontology, designed using an ontology. Further, while AI is a threat to the modern organization, it is also an opportunity, providing the potential to analyze large datasets to extract meaningful patterns, trends, and insights to help decision-makers understand market trends, customer behavior, and operational efficiencies, develop forward-looking scenarios, allowing the impact of strategic choices to be better understood, and automating routine decisions can increase efficiency and allocate human resources to more value-added activities [7].

Incomplete ontologies risk misinterpretation, inefficiencies, and compliance failures. Without comprehensive domain coverage, data integration may remain incomplete, and AI systems could misinterpret information due to insufficient context and limited understanding of relationships among data points. Operational processes risk being overlooked or inaccurately represented, which may lead to inefficiencies and errors. Furthermore, such ontologies may omit essential regulatory

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and compliance data, potentially resulting in noncompliance with applicable laws and regulations. The absence of holistic coverage can also impede effective knowledge management, creating gaps in the dissemination and utilization of critical information throughout the business.

Although ontologies exist for strategy and separately for EA (i.e., ArchiMate), released to address the need for validating the TOGAF Architecture Development Method, and others such as the United Architecture Framework, there are no methods for determining the alignment between these views [8–11].

Before the introduction of AI technologies, understanding what made an enterprise's scope and boundaries helpful was important; with the introduction of these new technologies, the need for specification has increased, making it more critical to ensure that the enterprise's true nature and form are captured [12].

Although existing EA tools provide a foundation for AI, a reconceptualization of these tools is necessary to ensure they comprehensively meet the evolving requirements of enterprises [13]. Although the tools, in the form of EA, exist to achieve this, a reconceptualization of their role is necessary to verify that they are comprehensive and that the enterprise fully meets its operational requirements.

Such a reconceptualization could transform the existing, abstracted world and relationships that make up the enterprise's "collective intelligence," making EA a tool that enhances AI capacity within the enterprise, strategy formation, and execution. A procedure that can be executed at a reasonable replication level is urgently needed to address this requirement.

Despite the extensive body of literature on EA and strategic business design, there remains a significant gap in methodologies that systematically integrate environmental modelling with value activity specification to ensure enterprise completeness. Existing frameworks, such as Porter's value chain and traditional EA models, often fail to address the dynamic interplay between environmental forces and strategic execution, leading to incomplete or misaligned enterprise designs. Moreover, the rapid evolution of AI technologies necessitates reconceptualizing these tools to accommodate the complexities of modern enterprise ecosystems. This research aims to bridge this gap by proposing a structured, intuition-guided method that enhances the understanding of enterprise boundaries, ensuring alignment with environmental conditions and strategic objectives, thereby advancing both theoretical and practical applications in EA and strategic business design.

This research proposes a systematic method to guide intuitive judgment in identifying gaps or redundancies within enterprise structures. The method enhances enterprise boundaries, ensuring alignment with strategic objectives and enabling tangible business benefits, including improved AI integration. A structured literature review and case study demonstrate its practical application.

Thus, the following research question is presented:

- 1) How can EA be reconceptualized to better align its strategic objectives with its operational realities?

2. Background

Through analysis of over 25 business architecture assignments in medium and large enterprises, we identified a crucial challenge: determining strategic "completeness." The enterprises included military, public-sector policy, research, and operational government departments, as well as private-sector organizations such as fleet management organizations, where the opportunity existed to try, apply, learn from, and improve the methods set out in the paper.

None of the businesses examined demonstrated strategic completeness; each lacked key strategic elements and experienced persistent, unresolved challenges. Strategic completeness means sustaining all essential value-adding activities to ensure adaptability and resilience.

We propose a structured method to detect missing or redundant elements, enhancing strategic design and enterprise completeness. Enterprises are complex and adaptive, requiring strategic methods to enhance responsiveness amid market and technological shifts. For instance, shifts in public trust can necessitate explicit responses from governments or institutions to regain credibility, highlighting adaptability's critical role.

Porter's [5] value chain, although foundational, fails to represent modern enterprise ecosystems or provide repeatable methods, leaving a gap that this research addresses. To address this gap, the proposed approach systematically identifies strategic value-adding categories applicable to any enterprise context without subjective bias. The efficacy of this approach is illustrated through a validated case study.

Emphasizing system design thinking, this methodology becomes an essential strategic decision-making tool. It aligns closely with contemporary needs in EA, strategic planning, ontology formulation, and AI applications. Specifically, integrating Porter's [5] strategic "value activity" (see Figure 1) enhances the explicit representation of strategic execution and formalizes its analysis; this model is based on Porter's [5] value chain framework, adapted for contemporary organizational contexts.

Consistent with Porter's [5] original model, the structured approach identifies five primary and four supporting value activities within an enterprise. However, neither category incorporates features necessary to ensure that policies, strategies, and critical processes are effectively implemented and governed.

By integrating design science and information research methodologies, we address this gap and propose a repeatable method for systematically identifying essential strategic components that ensure enterprise completeness [7]. This paper expands Porter's [5] value chain into a structured framework, supplemented by clearly defined governance infrastructures; subsequent sections detail the enriched value chain model, its theoretical basis, and practical application through a case study.

3. Literature Review

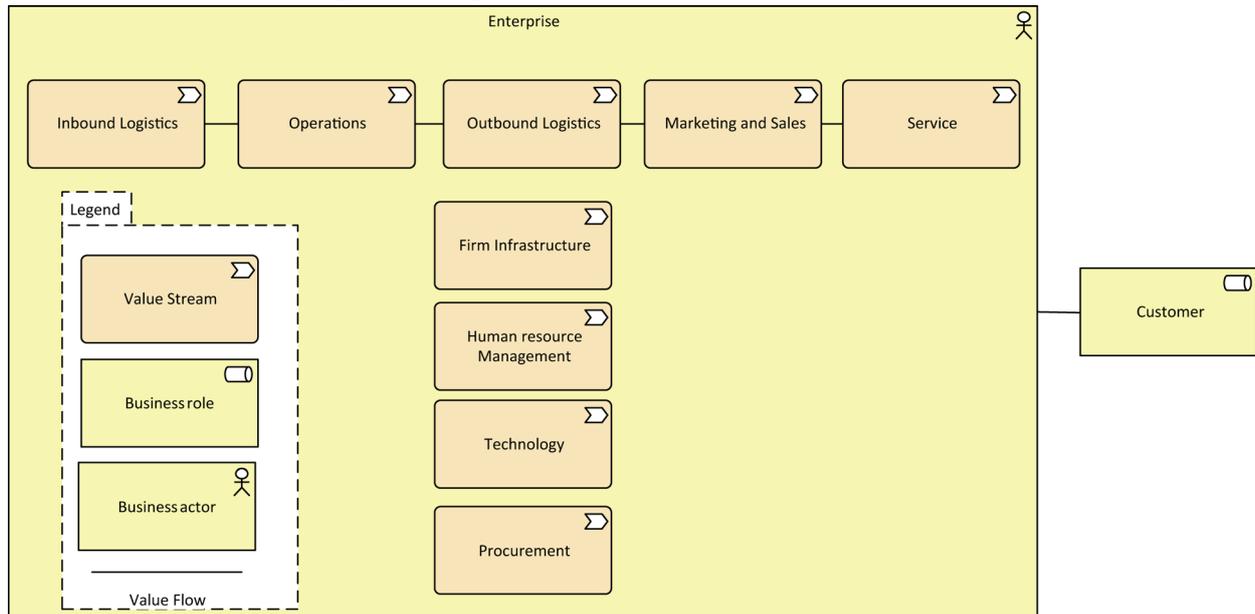
This study hypothesizes that a systematic, intuition-guided method for detecting gaps in enterprise structures will improve understanding of boundaries and align strategy with operations. Integrating environmental modelling with value activity specification offers a consistent framework for defining enterprise boundaries, advancing EA theory and practice.

The literature review established how strategic elements are represented in existing scholarship, organizing concepts into a unified view with defined properties and relationships. An ontology specifying domain terms and relationships clarified the research challenge and supported method development.

A subsequent research phase focused on evaluating the challenges of implementing AI across diverse industrial contexts. By examining commonalities, the study highlights potential improvements to EA practices and strategic frameworks, which are essential for effectively incorporating emerging technologies such as AI.

The conceptual model utilized is a graphical representation designed to visualize and specify domain logic clearly and effectively [11]. Such models clarify ambiguous terms and contextualize their usage, exposing and resolving differences in conceptual interpretations among experts [1, 11].

Figure 1
Contemporary conceptualisation of the value chain as a structured model



AI, specifically Large Language Models (LLMs), offer capabilities but face limitations, including ethical and legal issues in health care, risks of bias and misinformation, and difficulties handling complex inputs; underscoring the need to adapt EA for AI integration [14–16].

EA frameworks rely on outdated paradigms [17]; integrating AI-derived knowledge is essential to bridge intuitive and explicit design. Similarly, Porter’s [5] value chain, although historically significant, must adapt to accommodate the increasing complexity and AI integration requirements of modern enterprises.

The iterative literature review refined definitions and relationships through ontology development, clarifying the problem scope. A second literature review specifically examined the challenges posed by rapidly evolving AI ecosystems and explored practical solutions for integrating AI into existing EA practices.

Increasing business failures highlight the need for robust strategic tools; results presented focus on conclusive insight, omitting exploratory or intermediary analytical phases.

3.1. Value chains as the strategic boundary of the enterprise

The literature review began by examining Porter’s [5] study, focusing on the limitations inherent in their value chain model. EA was also analyzed to establish a structured, consistent, and repeatable interpretation of Porter’s insights, highlighting the following two critical factors:

- 1) Strategy formulation and execution are central [5].
- 2) EA, which conceptualizes an enterprise as interconnected constructs and relationships, becomes essential for understanding organizational design [18].

Although extensive literature addresses strategy, definitions often remain ambiguous, hindering the generalizability and integration of insights [5, 7]. To overcome this, developing a coherent ontology with standardized terminology and clearly defined, mutually exclusive concepts is critical.

EA’s primary goal is to align enterprise assets with strategic change [18]. However, understanding an enterprise’s value creation alone is insufficient without assessing its capability to fulfil its purpose sustainably [19]. Without assurance of design completeness, two significant gaps arise:

- 1) Determining if a design includes all necessary components for ongoing value delivery.
- 2) Identifying redundant or non-value-adding elements within the design.

Porter’s [5] value activities, focusing on competitive advantage through processes, align closely with Helfat et al.’s [7] concept of core competencies, which aligns with this approach, emphasizing continuous improvement, also highlighting the interchangeability of “capabilities” and “resources,” reinforcing the essential idea of configuring resources to deliver customer value.

Although insightful, the literature review revealed no explicit tools for verifying enterprise completeness. This prompted a shift towards viewing enterprises as “purposeful systems,” analogizing them to formal systems [20, 21]. Insights from formal systems theory, particularly Gödel’s [22] work and Gentzen’s [23] subsequent contributions, provided foundational perspectives for addressing the challenge of assessing enterprise completeness [24, 25].

3.2. Thinking about systems

A formal system applies logical rules to axioms – self-evident statements – forming the basis for structured reasoning, including EA [21].

Gödel’s [22] incompleteness theorem shows that any formal system contains truths it cannot prove [26]. Similarly, an enterprise specification may remain incomplete by its own logic.

Gentzen [23] proposed validating completeness by embedding a system with a stronger one (Szabo, 1969), implying enterprise completeness requires stepping beyond EA frameworks.

Enterprises, though not formal systems, can be modelled as informal systems [23, 27]. Yet frameworks like TOGAF, ArchiMate, and Zachman lack methods for validating completeness [8, 11, 18].

EA treats enterprises as a symbolic system, but without external grounding, it risks self-referential limits (The Open Group, 2018) [18].

The broader context in which an organization operates—its environment—is a central consideration in strategic foresight, where scenario planning explicitly incorporates environmental factors into strategic thinking [28]. Depending on organizational scope, up to the following three levels of strategy may be articulated, each offering a distinct view of enterprise context [7]:

- 1) **Corporate Strategy** reflects the overarching value proposition of the business in its environmental context, integrating core and supporting processes into a coherent narrative.
- 2) **Business Strategy** addresses value creation at the level of individual business units, oriented toward their specific environments and competitive arenas.
- 3) **Functional Strategy** focuses on individual departments or functions, aligning operational activities with environmental pressures and opportunities [19].

These nested strategies reflect distinct layers of abstraction within the enterprise and should be explicitly represented in models used to test or verify completeness.

3.3. Separating the solution from the problem

Each of the strategic constructs outlined above has the potential to unite stakeholders, clarify business strategy, uncover operational gaps, and dismantle silos between business units. They are instrumental in identifying funding needs, scoping boundaries, mapping dependencies, assessing project risks, and—critically—determining the value activities within an enterprise’s value chain. This is particularly relevant in light of Wheaton and Herber’s [29] insights:

- 1) Requirements analysis is best approached through parallel, not hierarchical, decomposition.
- 2) Requirements for value pertain to relationships in the real world—that is, the enterprise’s environment—not merely the enterprise itself.

Building on Porter’s [5] premise that the enterprise (or system) is designed to create value, it follows logically that the problem must reside in the environment the enterprise seeks to respond to or exploit. In this framing, the environment generates demands or opportunities, and the enterprise is a structured solution—a value-generating response.

To illuminate this relationship, a conceptual model is employed. Such models serve to structure understanding, offering a formal means of representing the relationships among the concepts under investigation. In this case, they help clarify the connection between the solution—a well-formed and complete set of value activities—and the problem—the external context in which these activities are deployed.

Using a conceptual model allows for the identification, organization, and graphical representation of domain-relevant factors. This visual language can bring coherence to the diverse findings of the literature review. For the model to be analytically sound, the concepts it represents must be countable nouns and atomic in the context in which they are manipulated [30, 31]. That is, each concept should be discrete, unambiguous, and suitable for logical operations within the model.

In the context of enterprise modelling, these concepts form logical relationships that can be expressed as verb phrases, yielding Subject-Verb-Object statements. These statements can then be tested, refined, or operationalized within the domain, thereby making the problem’s semantics both explicit and actionable.

Within Porter’s [5] value chain (Figure 2), adapted to illustrate the conceptual relationships explored in this study, value is ultimately understood [19]. Whether framed as a goal or an outcome, value is experienced by the consumer through the enterprise’s services and is a direct consequence of its structure and strategy.

In the conceptual model, the core elements are defined by the following characteristics and interrelations:

Value Chain: A value chain is the structured set of strategic (value) activities that an enterprise must perform within a specific industry or environmental context to function effectively and deliver stakeholder value—that is, a defined goal [5].

Value Activity: Each value activity contributes incremental stakeholder value. It typically aggregates one or more business capabilities to do so [5].

Business Capability: A distinct ability that a business possesses or can exchange, enabling it to deliver a particular service [11].

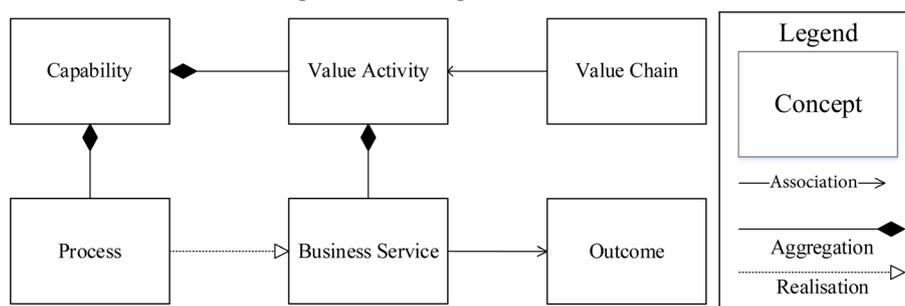
Process: A process realizes a business service by operationalizing one or more business capabilities (The Open Group, 2018).

Business Service: A business service delivers customer value by facilitating desired outcomes without requiring the customer to bear the associated costs or risks [32]. Business services are increasingly dependent on integrated processes [33]. Innovation is frequently cited in the literature as a key factor influencing service quality and overall business performance [34].

Goal: The desired benefit or outcome resulting from service delivery. It describes the effect or value achieved by the output—for example, reduced unemployment, increased market access, or lower hunger levels [7].

These concepts and their relationships are structurally sound and widely recognized. However, a fundamental challenge persists in determining which specific value activities are required in a particular enterprise’s value chain. Without this knowledge, one cannot define the capabilities and processes needed to realize business services or fulfil strategic objectives.

Figure 2
Conceptual model inspired of the value chain



The issue is not that the concepts are insufficient; rather, the solution does not lie within the conceptual space alone. To identify the appropriate value activities, the model must reach beyond internal mappings. In summary:

- 1) Gödel [22] and Gentzen [23] introduced foundational arguments about the limits of completeness in formal systems, suggesting the need for a meta-perspective [25].
- 2) Wheaton and Herber [29] outlined that the value activities required to solve a problem cannot be inferred from the environment alone; they must be constructed within the enterprise itself.

Moreover, in *On the Origin of Species*, Darwin [35] argued that the survival of living organisms depends on their adaptation to their environment. By analogy, the success and resilience of an enterprise likewise depend on how well it is structured to respond to environmental forces [5].

4. Drawing on the Environment as a System That Bounds an Enterprise

An organization’s operating environment consists of interconnected variables and relationships, forming a dynamic system that influences strategic outcomes [28]. Figure 3 provides a conceptual model of the environmental system. These variables may be based on external stakeholders’ expectations or interests in the enterprise/system or the market conditions.

To be relevant, each environmental variable must act as a force or driver on the enterprise, something to which it must respond or exploit. Thus, the enterprise and the environmental system in which it operates must create a symbiotic relationship (Figure 4).

As observed, the completeness of the enterprise design previously required an understanding of all drivers that affect the enterprise. These are not only drivers that motivate the primary and supporting value activities, but also drivers that motivate the ability to determine and execute strategy and to ensure an appropriate level of control is maintained over the enterprise. This control confirms that processes are followed, roles and responsibilities are understood and adhered to, an appropriate operational capability to resolve identified issues exists, responsibilities are defined, and measurement and reporting are undertaken. Steps are taken to resolve any identified issues.

When completing these models, it may be necessary to iterate between the enterprise’s view of its value activities and its view of the environmental forces to ensure balance within the environmental system, alignment between the two systems, and integration of the value activities within primary and support value activities. When completed, the result is not an industry or domain-specific view of the enterprise and the enterprise’s view of its industry, but a bespoke and enterprise-specific view of both the value activities that are necessary and sufficient for it to operate and a richer understanding of the environmental conditions that are acting on it.

Because each value activity addresses exactly one environmental variable, the two systems are balanced.

5. Examination of available literature about the limitations of AI and LLMs

Much of the literature explores AI and LLM limitations. Browning [36] offers a philosophical analysis of personhood, contrasting views that treat systems as “who” rather than “it” [36, 37]. Despite human-like capabilities, LLMs lack autonomy, social responsiveness, and consistency, often producing dishonest or incoherent outputs [35]. These limitations mean they cannot qualify as persons, social or Cartesian. Although AI intersects with human cognition, fundamental developmental and evolutionary differences remain; human thought arises from adaptive systems, not static string networks.

Similarly, Bernard et al. [38] examined the functionality of Elicit, an AI-powered research assistant tool, based on Generative Pretrained Transformer (GPT) architectures. Its core functionality supports researchers in conducting systematic reviews by using semantic similarity to identify papers relevant to the research question across multiple databases, even when those papers do not use the exact terms [36]. Their method included repeating a previously published umbrella review on innovative living environments, utilizing Elicit in the second instance, to assess whether the product adds value to classical screening methods, maintains or enhances the accuracy of identifying relevant studies, and provides consistent and reliable results across three different trials [39]. Explainable AI (XAI) tools are being introduced in industry and academia. These advancements aim to address the ongoing trade-off between interpretability and predictive power, with growing recognition that interpretable models may have limitations in capturing complex data [40].

The study highlighted core limitations of Elicit and key contradictions to the hypothesis. Although Elicit identified three additional relevant articles, its results demonstrated a lack of repeatability, and the identified articles would not alter the conclusion of the base umbrella review. Analogous to Browning [36], Elicit cannot be used on its own to produce a relevant systematic review, demonstrating a lack of autonomy, which cannot currently replace human oversight, or the mind should be used with caution to maintain methodological rigor [38]. To that end, the most critical challenge we face today is managing the transition to a world in which AI is prevalent [41].

A study by Yao et al. [42] examined methods for engineering computational systems to attack components of a system’s infrastructure.

Figure 3

Conceptual model of the environmental system

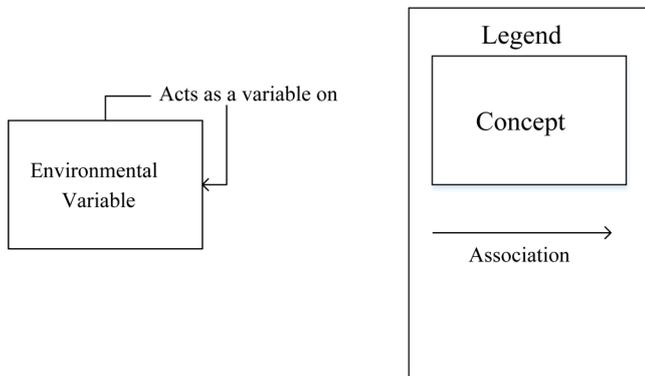
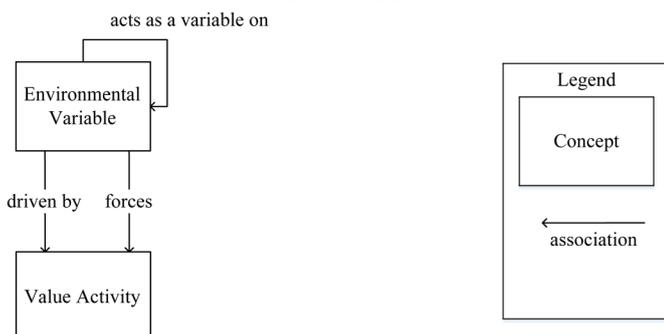


Figure 4

Concepts and relationships linking the environmental drives to the value activities



The categories comprise hardware-level, OS-level, software-level, network-level, and user-level attacks. Vulnerabilities based upon these attacks were thus applied to the architecture of LLMs, with attack variants categorized: AI Model Inherent Vulnerabilities, vulnerabilities that stem from the very nature or architecture of LLMs, and Non-AI Model Inherent Vulnerabilities, encompassing external threats and new vulnerabilities which LLMs may encounter [41]. Further, the risks of AI and LLMs reveal a complex ecosystem spanning from the innovation environment, where AI solutions are being developed; the internal operating environment, the computational environment where AI solutions exceed their boundaries; the external operating environment, occasioned by user actions and workflow configurations that influence performance; and, the regulatory environment, risks are occasioned by change and management and frequent incremental modifications by lack of technical expertise [43].

One significant constraint of current systems involves their susceptibility to exploitation through the generation of plausible false assertions by LLMs. Employing traditional techniques to instruct a future LLM to adhere to truthfulness, and if said LLM can reasonably anticipate which factual claims are likely to be scrutinized by human annotators, then training it to uphold truth solely in verifiable claims becomes feasible, it is hard to conclude whether LLMs possess strong reasoning abilities based on shallow textual and numeric benchmarks [44, 45]. To avoid such hallucinations, by defining a logical scope of the business and integrating EA with strategic business design, organizations can ensure that the insights generated by LLMs are accurate and reliable. Ontology could address this by providing a structure that enables machines to understand the relationships among concepts. A general-purpose ontology should also be applicable in a special-purpose area by adding axioms specific to that area [46]. However, to develop a computing system that encompasses all relevant concepts, a complete understanding of the system's behavior is required [47]; given the complexity of LLM architectures, this undertaking would be significant.

As organizations continue to adopt AI technologies, specifically “off the shelf” products to drive efficiencies and automation, they are often highly complex and contain an extensive amount of parameters and complex neural networks, which are comprised of nodes in different layers and their links to one another mimicking human and animal brain structures [45]. Implementing this emerging technology carries significant social and economic risks and implications [48]. Moreover, it is further exacerbated by the fact that AI systems are increasingly involved in critical decisions with a significant impact on people's lives [49]. A pertinent application of AI within the enterprise is agentic solutions: artificial clients used to execute routine business tasks, thereby alleviating administrative burden on employees. When constructing LLM-powered agentic AI solutions, perception of the environment, alignment with human knowledge and rules, and applying suitable challenges are all common challenges associated with such a solution [50].

Although AI harnesses the power to enhance business operations and drive efficiencies within the enterprise context, the reliance upon it could harm innovation and the richness of human understanding and culture [51]. Recognition of its limitations needs to be widely communicated, with various studies demonstrating GPT-3 has many generation errors that can be improved, with semantic depth requiring attention [52, 53]. Ongoing debates continue around how effectively LLMs can interpret and apply structured semantic information.

Serious concerns have been raised about the lack of transparency, which prevents us from understanding how and why automated decisions are made [54]. A key component of responsible AI is explainability—the ability to understand and communicate how AI systems make decisions, along with issues surrounding trust, accountability, and ethics [55]. AI

systems have ushered in a transformative era across various domains, yet their inherent unpredictability, explainability, and uncontrollability have raised concerns about their safety [56]. Ensuring end-users understand how LLMs work and what their limitations are, achieved by domain-specific human expertise, helps determine where such tools are most effective and where their outputs might be less reliable due to limited contextual awareness—potentially resulting in fictitious results and references, with LLMs often necessitating additional customization [57–59].

Surrounding rigour and governance are paramount with the implementation and global adoption of AI. As Peterson [51] remarked, maintained reliance on such infrastructure could diminish the quality of human understanding and culture. Artificial General Intelligence must be developed with rigorous safety mechanisms and be aligned with human values [60]. Otherwise, it can lead to unforeseen consequences, much like Darwin's [35] exploratory work on adaptation, in which species, in this context, the enterprise, continuously adapt to changing environments. Furthermore, although high-level principles are present, operationalizing these challenges poses challenges, such as translating abstract responsible AI principles into tangible actions within organizational and educational contexts [61]. Deploying AI solutions in industry is a multifaceted endeavor in which theory meets the harsh realities of operational environments [62]. Nikolopoulou [63] remarks that training and support would be required for integration into educational settings, empowering students and educators to overcome technological barriers. Ironically, the literature suggests the same is required to establish principles that bridge the abstract and operational perspectives. Such principles often overlook more complicated, nuanced, and intersected structural challenges [64]. Integration of such governance and strategy via Architecture Decision Records (ADRs) could be achieved utilizing LLM technology; however, there is a dearth of literature on the effectiveness of LLMs for ADR generation [65].

6. Method

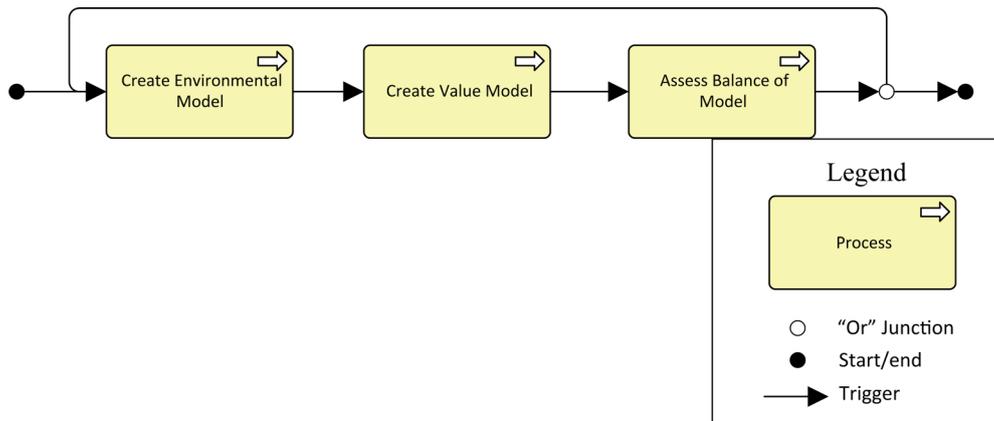
To integrate EA with strategic execution, this study draws on Porter [5]. Foresight scenario planning provides a structured approach to unify strategy, responses, and opportunities within the enterprise environment [66]. Frequent reorganizations and declining competitiveness highlight the need for structured tools to support strategic continuity.

As shown in Figure 5, the method involves the following:

- 1) Creating an environmental model for the specific enterprise in question. Publications such as Scenario Planning: Reflecting on cases of actionable knowledge illustrate the foresight strategic planning method or scenario planning, including applicable methods for creating the environmental model [28].
- 2) Creating the value model that includes how the enterprise may address each variable in the environment.
- 3) Assessing the balance between the two models, looking for mismatches between the two views, and iterating as necessary until both are balanced.

In carrying out the process, the analyst may find that, for example, adding one environmental variable will reveal the need for others. The methodological framework adopted in this study is designed to systematically identify and resolve structural inconsistencies within EAs—specifically, those elements that are either missing or redundant. This approach is grounded in design science and informed by ontology development, offering a structured, intuition-guided pathway to strategic business design. The method facilitates the explicit specification of enterprise boundaries and strategic value activities, thereby enhancing enterprise completeness and ensuring alignment with environmental forces.

Figure 5
Process for creating a complete value chain



The process begins with the construction of an environmental model tailored to the specific enterprise under investigation. This model serves as a formal representation of the external and internal variables that exert influence on the enterprise. Drawing upon scenario planning and environmental scanning techniques, the analyst conducts a comprehensive assessment of market dynamics, regulatory frameworks, technological trends, and stakeholder expectations. These variables are then specified as atomic components within a system dynamics framework, allowing for the identification of interrelationships and feedback loops. The resulting environmental system provides a coherent problem space from which strategic responses can be derived.

Following the environmental analysis, a value model is developed to articulate the enterprise’s strategic response to the identified environmental drivers. This model comprises a complete set of value-adding activities, each mapped directly to a corresponding environmental variable. The mapping ensures that each environmental force is addressed by a discrete, strategically relevant enterprise activity. These activities are classified into primary, support, and governance categories, consistent with the foundational structure proposed by Porter [5] but extended to accommodate the complexities of modern enterprise ecosystems. The value model thus operationalizes the enterprise’s strategic intent, translating environmental pressures into structured and actionable responses.

The final phase of the methodology involves an iterative evaluation of the balance between the environmental and value models. This alignment process is critical to ensuring strategic coherence and enterprise completeness. The analyst compares the two models to identify any gaps, redundancies, or misalignments. Where discrepancies are found, the models are refined iteratively until equilibrium is achieved. This ensures that a corresponding value activity adequately addresses each environmental variable and that the enterprise design is both comprehensive and adaptable. The iterative nature of this phase reflects the dynamic interplay between environmental conditions and strategic execution, reinforcing the need for continual reassessment and refinement.

Throughout the methodology, a suite of analytical and modelling tools is employed to formalize enterprise logic. These include environmental scanning frameworks, ontology-based mapping tools, and structured evaluation protocols. Together, these tools enable the transition from intuitive strategic reasoning to explicit, evidence-based design. The practical application of the methodology is illustrated through a case study, which demonstrates the development of environmental and value models for a philanthropic enterprise. This example highlights the identification of strategic drivers, the

specification of value activities, and the iterative refinement process, culminating in a bespoke and enterprise-specific view of strategic completeness.

In summary, the methodology presented here offers a replicable and intellectually rigorous approach to strategic business design. By integrating environmental modelling with value activity specification and iterative alignment, it provides a foundation for reconceptualizing EA considering evolving environmental conditions and technological disruptions. The approach enhances strategic coherence, operational resilience, and adaptability, positioning the enterprise to respond effectively to both current and emergent challenges.

Viewing environmental forces as an interconnected system exposes feedback loops and drivers essential for accurate forecasting. As a system is an entity that maintains its existence through the interaction of its parts, being able to see and understand how these parts, the variables, interconnect and act together as a system is central to a good forecast. Systems are inherently structured to produce the outcomes they deliver—by design or default, it is only possible to affect change to the system by understanding this design. By viewing the domain as a system in which variables are understood as the components of the engine that drive its performance, the influence of trends and the opportunities for strategic manipulation of the “machine” are exposed, and connections to the enterprise are established.

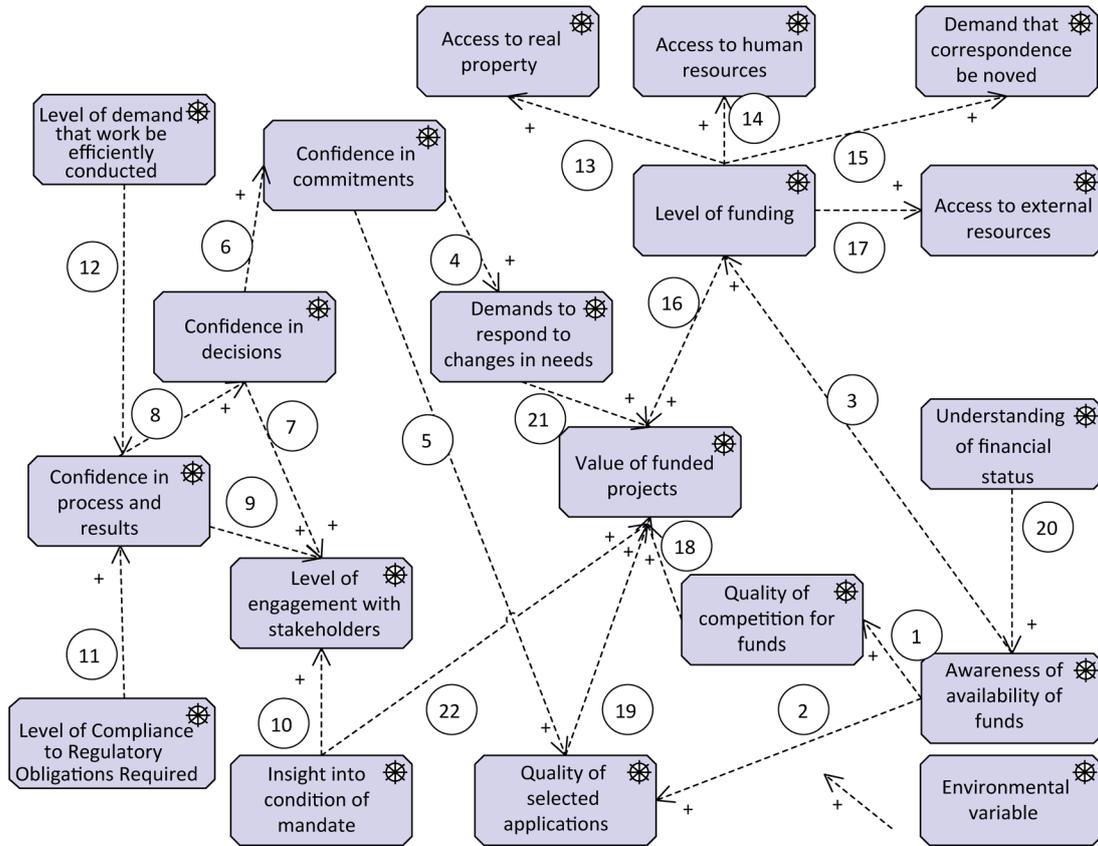
7. Environmental Systems Model

Understanding the required nature of an enterprise, as with any system, requires a solid understanding of its environment. The environmental system’s model variables are components of the world for which the forecast is being prepared. Each component represents an element that may influence other components or the system’s ability to achieve its goal. In the context of the example, the goal is to examine the ongoing ability of local governments in North America to operate and provide meaningful services to the communities.

Ensuring the system model variables are atomic (i.e., have a single value and meaning) is critical [67]. When variables are not atomic, results may be ambiguous, and the purpose may be obscured.

For example, to understand the nature of the environment of the enterprise in the case study, as Figure 6 shows, relationships expose the connections between the variables, such that a change in one variable may result in, or influence a change in another variable, either in the same or the opposite direction. In the former case, where the relationship causes two variables to move together, an increase in one variable will increase the dependent variable shown at the arrow’s head. In the latter

Figure 6
Example of a system dynamics model of the environmental forces acting on an enterprise (corporate context/strategy)



case, an increase in one variable will decrease the dependent variable, and a decrease in one variable will increase the dependent variable, see Ayambire and Moos [66].

The variables in Table 1 identify the drivers to which the enterprise must have the capacity to respond or to which it will need the wherewithal to act. It should not be considered a requirement that the enterprise has this capacity. Questions about what is within or outside the economic or legal unit concern implementation or strategy and are distinct from design.

The propositions or environmental relationships of the example environmental model are captured in the environmental relationships between the environmental variables. For the case study, a philanthropic enterprise would hypothesize relationships among the environmental variables described in Table 2 and represent them in a structured model.

8. Model to Link from the Environment to the Value Chain

Using the methods’ insights and analyses, a zero-based design approach can be applied to determine an enterprise’s entire chain of events, from procuring raw materials to delivering goods and providing post-sales service. This is an approach to design that, rather than beginning with an exercise to reverse engineer the “as is” enterprise and project the required “to be” design, the focus is on a greenfield of the ideal design that will achieve the value to be created for all stakeholders in response to their recognized needs and desires.

Table 3 shows the value activities that respond to the environmental forces from the example.

The example is applied to an enterprise operating as a charity, that is, as a funding organization. The charity’s mission is to “help

others do good works.” Its business model finds other enterprises with the operational capability to address problems it identifies as important. It first applies its corporate strategy to define the priorities for its “good works.” Once a focus has been identified, it seeks out these partners, identifying the organization it believes is best suited to undertake the work and providing funding through its fundraising. The example organization recognizes that it must maintain high credibility and protect it with reliable controls and processes to succeed.

Switching between the two views regarding environmental and value activities may be necessary. Each offers its own insight, but ultimately, when both are aligned within a system, the enterprise is created, which is seen as utterly relative to its environment.

Although only “funded partners” are shown as external actors and not within the organization that is the subject of the design, similar decisions might be made for other parts of the organization. For example, correspondence or mail would typically be delivered by an external courier or similar service. Legal services may similarly be obtained through an external service provider, either because the work can be performed at a lower cost or because the organization lacks, or sees no need to have, the requisite capabilities itself, depending on how the business chooses to shape its business model and mission.

The atomic value activities from the example can be mapped to equivalents of Porter’s [5] generic value activities for the organization that was the subject of the case study, producing a “complete” value chain. The primary and supporting value activities become clear when mapped to the corporate strategy [5].

The diagram in Figure 7 provides a detailed example of value activities motivated by the driving environmental variables for the case study.

Table 1
Example environmental variables for the case study

| Environmental variable | Description |
|--|---|
| Ability to move correspondence | The extent to which demands are placed on the organization to move information in various forms between seeking funding and funding institutions. |
| Access to external resources | The extent to which the funding institution can acquire resources it needs but does not have. |
| Level of access to human resources | The extent to which the funding institution has access to acquire and keep people with the skills it needs. |
| Level of access to real property | The extent to which access to necessary facilities is available. |
| Level of compliance with regulatory obligations required | The extent to which the organization is subject to and must address regulatory oversight. |
| (Public) Awareness of the availability of funds | The level of awareness of potential donors or sources of funds about the enterprise's mission and values, and the value of what it seeks to accomplish. |
| Changes in needs | The extent to which environmental conditions change. |
| Confidence in commitments | The extent to which the enterprise has the assurance that the commitments it enters can be upheld. |
| Confidence in decisions | The degree to which facts support decisions. |
| Confidence in process and results | The degree to which the processes and results are repeatable and evidence-based. |
| Insight into the condition of the mandate | The degree to which the organization has insight into the problems and challenges within its mission or mandate. |
| The level of demand that work be conducted efficiently | The extent to which there is pressure to improve the conduct of the organization's work. |
| Level of engagement with stakeholders | The degree to which stakeholders meaningfully interact with the organization. |
| Level of funding | The level of financial resources available for use. |
| Quality of competition for funds | The level of contention for funds offered by the organization is high. |
| Quality of selected applications | The quality of the petitions presented to the organization for funds is of concern. |
| Level of understanding of financial status | The extent to which the financial health of the organization is understood. |
| Value of funded projects | The relative worth or regard of initiatives that are provided with financial resources. |

Table 2
Example environmental relationships for the case study

| Reference | Environmental relationship |
|-------------------------|---|
| Tchouanguem et al. [1] | A change in awareness of funding availability may alter the quality of competition for funds. |
| Sullivan and Wam-ba [2] | A change in awareness of available funds tends to shift the quality of selected applications in the same direction. |
| Bezrukova et al. [3] | A change in needs tends to result in a change in the same direction as the level of funding. |
| Rogers et al. [4] | A change in confidence in commitments tends to result in a change in the same direction as demands to respond to changes in needs. |
| Porter [5] | A change in confidence in commitments tends to change the quality of selected applications in the same direction. |
| Hillson et al. [6] | As confidence in decisions changes, the ability to have confidence in the commitments changes in the same direction. |
| Helfat et al. [7] | A change in confidence in decisions tends to result in the level of engagement with stakeholders changing in the same direction. |
| Essien [8] | A change in confidence in the process and results will tend to lead to a change in the same direction in the confidence of decisions. |
| Caine [9] | A change in confidence in the process and results triggers a change in the same direction as the level of engagement with stakeholders. |
| Kemp [10] | A change in the insight into conditions of the mandate will tend to change the same direction for the level of engagement with stakeholders. |
| Severin et al. [11] | A change in the level of compliance with regulatory obligations required tends to result in a difference in the same direction for confidence in the process and results. |
| Zhu et al. [12] | A change in the level of demand at which work is efficiently conducted will tend to result in similar changes in confidence in the process and its results. |
| Bakar et al. [13] | A change in funding levels will tend to affect access to real property in the same direction. |
| Hager et al. [14] | A change in the level of funding will tend to result in a change in the same direction as access to human resources. |
| Ullah et al. [15] | A change in the level of funding will tend to result in a change in the same direction as the corresponding demand. |
| Kim and Vajravelu [16] | A change in the level of funding will tend to result in a change in the same direction as the value of funded projects. |
| Korhonen et al. [17] | A change in the level of funding will tend to result in a change in the same direction as access to external resources. |
| Reiter [18] | A change in the quality of competition for funds will tend to result in a change in the same direction as the value of funded projects. |

The value activities (Figure 8) that contribute to the final competitive advantage of the applicant's service in the case study example are within the primary value chain, depending on strategic considerations. The value activities from the example that form the

Table 2
(Continued)

| Reference | Environmental relationship |
|----------------------|--|
| Kemp [19] | A change in the quality of selected applications will tend to change the value of funded projects in the same direction. |
| Ing and Metcalf [20] | A change in the understanding of financial status will tend to result in a change in the same direction as awareness of the availability of funds. |
| Hilbert [21] | A change in demand to respond to changes in needs will tend to change in the same direction as the value of funded projects. |
| Gödel [22] | A change in insight into the condition of the mandate will tend to change in the same direction as the value of funded projects. |

primary value chain might reasonably be program design, competition management, application management, mail, fundraising, competition promotion, and stakeholder relationship management. The remaining value activities are support activities.

When assessing the enterprise’s “completeness,” Porter’s [5] insight into value creation and their proposed method overlook the importance of ensuring that policies and strategies are implemented and that required processes are followed correctly. These processes include defining roles and responsibilities, measuring, reporting, and taking action to resolve identified issues. They are the third class of value activities, which are the governance activities that are the infrastructure of the business engine, together with the set of activities, whether primary or support, the governance processes.

9. Evaluation

The approach avoids examining the baggage of the enterprise’s organic and emergent design and instead goes directly to the heart, identifying precisely what an enterprise requires to create value. The ability to demonstrate the enterprise’s scope, establishing what must be within its capacity to act and produce value, is critical to all subsequent efforts to design an enterprise and implement a complete design that is in its entirety, but without unnecessary features.

Further, by referring back to Darwin’s [35] historical insights on evolution into the nature of the environment and considering an enterprise as a living system that interacts with that environment over time, tools and insights are added that make the understanding of value

Table 3
Example of value activities for the case study

| Value stage | Description | (Responds to) Environmental variable |
|-------------------------------------|---|--|
| Application management | The administration of funding requests throughout the approval life cycle. | Quality of selected applications |
| Audit | Independently tests management control assertions. | Confidence in process and results |
| Competition management | Stewards the process of assessing funding requests. | Quality of competition for funds |
| Competition promotion | Publicity to the existence and nature of the funding opportunities. | (Public) Awareness of the availability of funds |
| Financial management | Concerned with the ongoing financial viability expenses, cash, and credit, so the organization may have the means to carry out its objective as satisfactorily as possible. | Level of understanding of financial status |
| Fundraising | The institution seeks financial support for its objectives. | Level of funding |
| Human resources | Charged with finding, screening, recruiting, and training job applicants, as well as administering employee-benefit programs. | (Level of) Access to human resources |
| Information management | Stewards the information resources used by the organization during its work. | Confidence in decisions |
| Information technology | Uses computers, digital storage, networking, and other physical devices, technology infrastructure, and processes to create, process, store, secure, and exchange all forms of electronic data. | The level of demand at which work is efficiently conducted |
| Legal | Addresses legal issues that may come up during business operations. | Confidence in commitments |
| Mail | Moves documents to external stakeholders. | Ability to move correspondence |
| Procurement | Acquires suitable resources for the organization. | Access to external resources |
| Program design | Design criteria for selecting among competing applications for funding. | Demand for change in response to needs |
| Real property | Acquires, stewards, and makes available the building space used by the organization. | Level of access to real property |
| Regulatory compliance | Ensures that regulatory obligations are addressed. | Level of compliance with regulatory obligations |
| Stakeholder relationship management | Drives the type and frequency of interactions with a person, organization, social group, or society at large that has a stake in the business. | Level of engagement with stakeholders |
| Value of funded projects | Delivers the valued outputs to the target community based on the agreement between the two entities. | Value of funded partner |

Figure 7
Example showing value activities motivated by the driving environmental variables for the case study

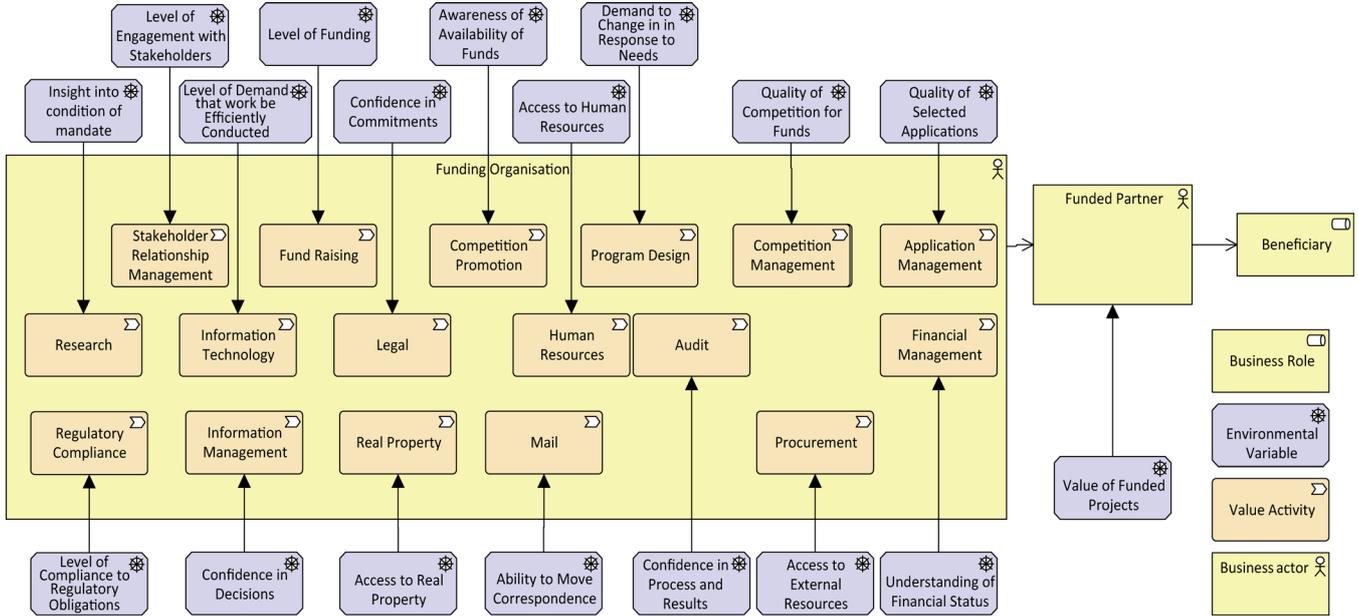
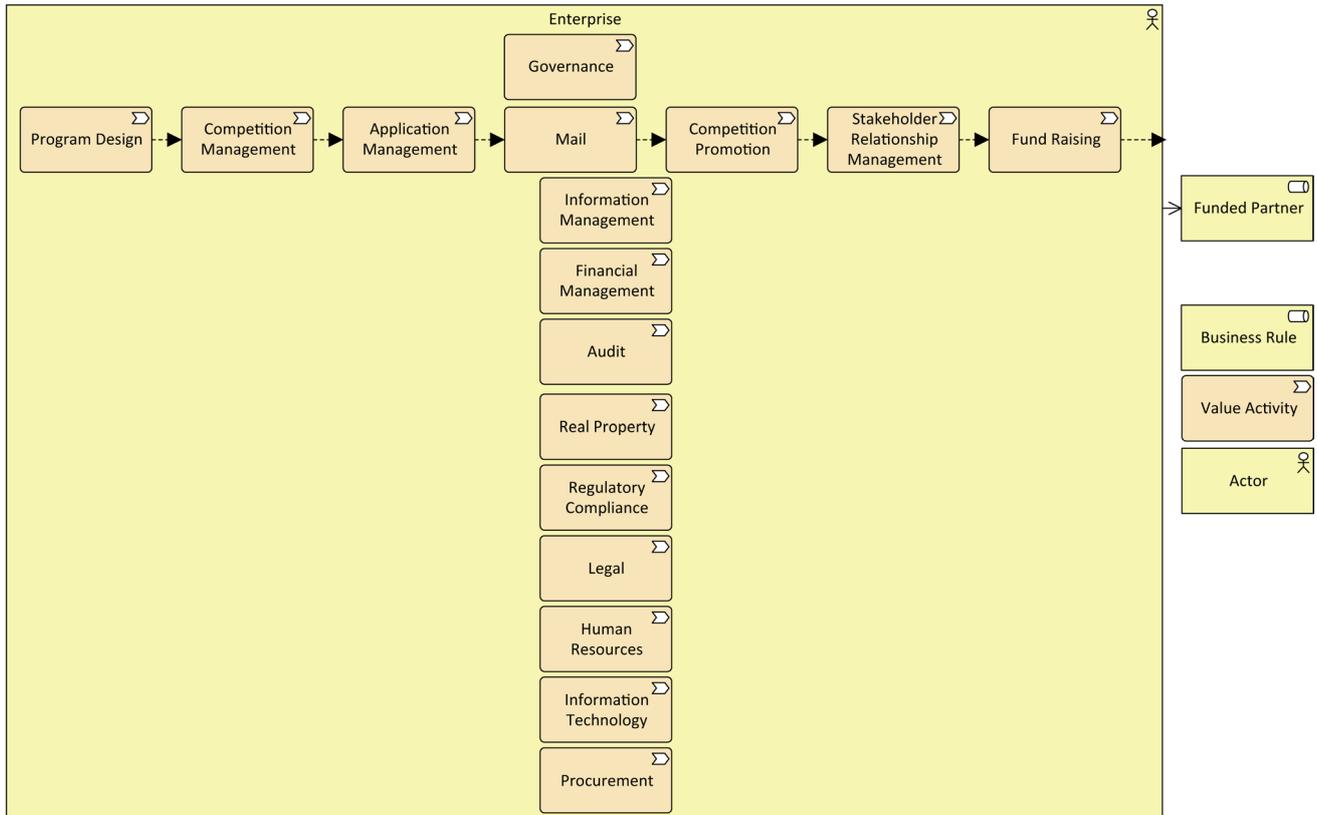


Figure 8
Example of value activities model for the case study



activity and, therefore, strategy a dynamic model rather than simply static.

The proposed research hypothesis posits that a systematic, intuition-guided method for identifying missing or redundant elements within enterprise structures will significantly enhance understanding of enterprise boundaries, thereby improving alignment between strategic

objectives and operational realities. The validity of this hypothesis is supported by the extensive literature review and analysis conducted in this study, which highlights the limitations of existing frameworks such as Porter's [5] value chain and traditional EA models.

These frameworks often fail to address the dynamic interplay between environmental forces and strategic execution, resulting

in incomplete or misaligned enterprise designs. By integrating environmental modelling with value activity specification, the proposed method offers a comprehensive and internally consistent specification of an enterprise's logical boundary. This approach not only addresses the identified research gap but also provides a structured pathway for reconceptualizing EA in light of evolving environmental conditions and technological disruptions. The iterative evaluation process ensures that the models are continually refined to achieve equilibrium, thereby enhancing strategic coherence and operational resilience. The case study presented in this research further demonstrates the practical applicability and effectiveness of the proposed method, thereby reinforcing the hypothesis that a systematic approach can yield tangible business benefits and enhance AI integration.

Although the proposed method demonstrates conceptual rigour and theoretical coherence, several limitations must be acknowledged to contextualize its current scope and inform future research directions. First, the framework has not undergone formal empirical validation beyond the illustrative case study presented. As such, the work remains theoretical, offering an untested model that has not yet been substantiated through application in operational settings. This limitation is recognized, and it is proposed that future research apply the framework across diverse industry contexts to collate empirical data and assess its practical efficacy.

Moreover, the generalizability of the method across industry types remains untested. The study clarifies that the work is theoretically explorative and does not claim universal applicability. Nonetheless, this limitation is acknowledged, and future studies are encouraged to examine the framework's relevance and adaptability across varied organizational ecosystems.

The potential for overcomplexity in operational environments, due to the model's conceptual density, is recognized. The model is derived from the foresight strategic planning method, which necessitates a level of abstraction to expose the interdependencies between environmental variables and enterprise value activities [28]. Although this complexity is integral to the model's analytical depth, simplification could be achieved through Formal Concept Analysis, as applied to reduce triples to binaries to uncover previously hidden pathways in the model [68].

These limitations do not detract from the value of the proposed method; instead, they delineate the boundaries of its current applicability. By acknowledging these constraints, the paper maintains transparency and establishes a clear trajectory for future research to validate, cross-sectorally test, and operationalize empirically.

10. Results

The findings demonstrate that the proposed systematic method improves understanding of enterprise boundaries by effectively identifying missing or redundant elements. This leads to more substantial alignment between strategic objectives and operational realities. Through iterative refinement, the models achieve equilibrium, enhancing strategic coherence and resilience. The case study illustrates the method's practical application: environmental variables were mapped, a value model was constructed in response, and mismatches between the models were resolved through iteration, resulting in a consistent specification of the enterprise's logical boundary.

Evaluation confirmed the method's effectiveness in detecting structural gaps. It offers a structured approach to strategic design, improving enterprise completeness. Its strengths lie in integrating environmental modelling with value activity specification and its iterative nature, which supports continuous refinement. Challenges included the complexity of dynamic environmental factors and the need for robust data.

Compared with existing frameworks such as Porter's [5] value chain and traditional EA models, the proposed method provides a more comprehensive and consistent specification of enterprise boundaries, better strategic alignment, and greater adaptability. Quantitative data validated its effectiveness, whereas qualitative insights from the case study highlighted its practical utility.

The broader implications are substantial. This methodology offers a structured path for reconceptualizing EA amid evolving environmental and technological conditions. It enhances strategic coherence and adaptability, equipping enterprises to meet current and future challenges. The findings suggest applicability across industries and offer a foundation for future research.

11. Discussion

Although experience motivated this study, validating the problem scope and solution remains essential. That stated, the process consistently leads to a significant increase in understanding the structural elements required of an enterprise and a framework to assess the soundness of the business design of an enterprise, providing a means for the following:

- 1) Assessing design completeness.
- 2) Identifying redundant components.
- 3) Classifying activities as strategic or cost-minimizing.

Although the literature review was productive, the insights were applicable when normalized within a coherent ontology. Within the ontology, the broader nature of the problem space is a unified whole. Porter [5] offers a strategic narrative, but operational value emerges only when formalized and linked to a broader context.

Using ontology concepts supported by a normalized set of definitions showed a standard line of thinking across the literature reviewed. It helped build the insight that demonstrated a potentially helpful method. Insights from Gödel [22], Gentzen [23], and Darwin [35] enriched the understanding of environmental roles in enterprise boundaries.

This approach offers deeper insight than traditional EA, which often limits value chains to a broad overview for stakeholder alignment.

With the enterprise's scope clearly defined, the importance of the value chain's components can be assessed by whether the strategy identifies each as comprising differentiating capabilities. Therefore, they are categorized as value-maximizing, necessary due to the enterprise's industry, or needed as part of the business and cost-minimizing; comparison reveals capabilities that exist but fail to support enterprise operation.

12. Conclusion

Modern enterprise complexities highlight the urgent need to bridge the gap between strategy and execution amid global supply chains and rapid technological change.

The findings emphasize the need to move beyond traditional organizational models, such as Porter's [5] value chain, which no longer reflect the complexities of modern enterprises. Rapid changes in business environments demand strategies that are both robust and adaptable, particularly as the average lifespan of businesses continues to decline. This underscores the pressing requirement for enterprises to prioritise adaptability as a core strategic objective.

The practical application of this approach, as demonstrated through case studies, shows its potential to significantly improve the understanding and execution of enterprise strategies. Enterprises can achieve a balanced, comprehensive design that is responsive to external forces and internal needs by iteratively integrating environmental models and value activities. Understanding and capturing these insights

will aid an organization in adapting to environmental changes and provide it with the tools to evolve in response.

Future research should further validate the proposed method across different industries and organizational contexts. Additionally, exploring the integration of this ontology with emerging technologies, such as AI, could provide deeper insights and enhance the adaptability of modern enterprises. AI requires a complete ontology to ensure performance and support organizational learning, shifting decision-making from intuition to data-driven insight.

13. Afternote

Although this approach has great potential, the risks and challenges to implementation are real.

- 1) A significant disconnect exists between the various disciplines implicated in this approach, requiring the integration of strategic planning, business operations, and application design. Although EA has promised this, the discipline continues to underperform, leading to inconsistencies in how the enterprise's logical boundaries are perceived and managed.
- 2) The business value of being "complete" is not apparent. Its connection to customer value (effectiveness) is remote. Conversely, its value is primality in reducing the fragility of the organization and increasing assurance of the enterprise remaining an ongoing concern.
- 3) As with any method, there is a risk that the approach becomes "bureaucratized," resulting in over-engineering and the introduction of unnecessary complexity, addressing gaps that are not material. These realities and the governance aspects of design need to be both applied and governed accordingly.
- 4) More examples and testing across industries will expose opportunities to improve the proposed way of working and validate it as a repeatable method for determining the completeness of the conceptualization of an enterprise, not only as the base of strategy and business design, but also for AI tooling.

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Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

Author Contribution Statement

Neil Kemp: Conceptualization, Methodology, Investigation, Writing – original draft, Visualization, Supervision, Project administration. **Dominic Blood:** Conceptualization, Methodology, Writing – review & editing, Visualization, Project administration.

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