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The Blockchain Balanced Scorecard: An Innovative Approach to Facilitate Strategic Management in Enterprises

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Abstract

Technological and organizational barriers can be significant obstacles to adopting blockchain technology in enterprises. Its introduction regularly creates complex interdependencies and poses a challenge to aligning business processes and information technology. Therefore, it is essential to consider the adoption impact from a technical perspective and take the strategic implications into account. To achieve this, we propose a novel domain-specific extension of the well-established Balanced Scorecard method that explicitly considers blockchain-related aspects on the strategic level of organizations. The application of this method is demonstrated with the help of an industry use case. Practitioners will benefit from adopting the proposed approach and following the described guidelines since it helps them to identify appropriate goals and measures. This paper encourages further efforts in the field of strategic management research and the alignment of blockchain technology and business processes.

Keywords: Balanced Scorecard, Strategic Management, Blockchain, Distributed Ledger Technologies

1. Introduction

In the last decade, blockchain technologies have gained substantial attraction in academia and business (Frizzo-Barker et al., 2020; Themistocleous et al., 2020). While cryptocurrencies such as Bitcoin (Nakamoto, 2009) still receive most of the media attention, numerous use cases have emerged that deploy blockchain as a back-end technology. As of 2024, many of these use cases are still in a proof-of-concept phase and are typically not part of companies' key operations.

To fully integrate blockchain technologies in key business operations, they must also be included in a company's strategic planning process. Previous findings have indicated that integrating blockchain and its key performance indicators (KPIs) at a strategic level is challenging to achieve. Unsuccessful industry projects such as TradeLens have demonstrated this.

Historically, balanced scorecards have been used as a valuable instrument that provides a structured approach to measuring and managing key metrics aligned with strategic goals. Specifically, balanced scorecards are a powerful tool for top-level management to identify goals and assign specific measures to them. This approach has been successfully implemented in numerous industries for decades (Kaplan & Norton, 1992; Swierk & Mulawa, 2015).

The standard Balanced Scorecard (BSC) is a rather generic instrument and only sometimes fits an organization's specific environment. Therefore, many organizations decide to adapt the standard version to better accommodate the needs and characteristics of their particular competitive environment (Lueg & Carvalho e Silva, 2013). Since the unique characteristics of blockchain are not represented in a standard BSC, we propose a domain-specific adaptation by adding a new scorecard perspective. Specifically, we strive to modify the Balanced Scorecard to consider the idiosyncrasies of blockchain technologies. The proposed approach is intended to facilitate strategic management in enterprises where blockchain technology is already an integral part of their business model and enterprises that aim to adopt blockchain technology.

The remainder of the paper is structured as follows: In Section 2, we introduce the necessary foundations of BSC and blockchain, followed by an overview of previous balanced scorecard adaptions in Section 3. In

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Section 4, we present the extended BSC, including a framework for defining blockchain-related goals. In Section 5, we demonstrate the proposed *Balanced Scorecard for Blockchain* by applying it to a real-world use case. Finally, in Sections 6 and 7, we summarize our contribution and outline future research.

2. Foundations

In the following, the building blocks of this research project are briefly introduced: the balanced scorecard as a method for systematic strategic management and the features of blockchain technology that are most relevant for our approach.

2.1. The Balanced Scorecard

The Balanced Scorecard was first proposed by Kaplan and Norton in 1992 to provide senior executives with a complete view of their business. It allows the simultaneous consideration of financial and operational measures and forces management to take a comprehensive look at the company. In a seminal Harvard Business Review article, Kaplan and Norton describe the BSC as ”the dials and indicators in an airplane cockpit”, created to battle the increasing complexity of modern businesses (Kaplan & Norton, 1992, p. 71). The original BSC contains four perspectives for executives to evaluate their business. First, the *Customer Perspective* concentrates on customer relations. Through the use of the BSC, the often fuzzy mission of customer excellence can be translated into specific actions. Second, the *Internal Business Perspective* helps senior executives to identify what the company needs to achieve internally to meet customer expectations and maintain its key competencies (Nair, 2004). The third perspective is about a company's continuous learning and innovation process. This *Innovation & Learning Perspective* ensures that senior executives not only focus on immediate success but also include a long-term view, aiming to improve existing products and bring innovative ideas to market. Finally, the *Financial Perspective* ensures that all initiatives launched with the other three perspectives in mind actually contribute to the financial performance of the company. It thus mimics a shareholder's view of the company (Kaplan & Norton, 1992). Perspectives are structured in dimensions, commonly including *goals*, whose fulfillment advances an organization's mission and *measures* as quantification of these goals. Over the years, the BSC has been used across industries, with Ericsson, HP, and Volvo being just a few of the most famous success stories (Olve et al., 2003).

2.2. Blockchain technology

A blockchain comprises a ledger that stores digitally signed transactions between parties in cryptographically linked blocks. The ledger is distributed among interconnected nodes, forming a peer-to-peer network. A consensus mechanism ensures consistency of the distributed chain and counteracts malicious behavior (Banafa, 2023; Fill & Meier, 2019; Nakamoto, 2009). Some blockchain implementations permit the decentralized execution of deterministic code, commonly called smart contracts. Using these smart contracts, business services can be built that exploit core blockchain properties, such as transparency of records and shared data access. From a business perspective, these features can be highly disruptive factors for business models (Curty & Fill, 2024; Curty et al., 2023). From a technical standpoint, the transparency of the information is determined by network access policies. This distinction allows for the identification of three archetypal blockchain networks, each differing regarding the accessibility of the ledger. In (i) *public* blockchain networks, no access restriction is in place. That is, everyone can acquire a copy of the ledger and the information contained. Importantly, this does not imply that everyone can participate in the consensus process. In (ii) *consortium* blockchain networks, access to the ledger is restricted to authorized parties. Therefore, information on the ledger is only available to those who have been granted access by the network authorities. Lastly, (iii) *private* blockchain networks are typically controlled by a single authority that retains complete control over the blockchain's governance.

The ISO standard 23635 on blockchain governance specifies that blockchain-based applications must adhere to a set of principles designed to ensure their effective, efficient, and acceptable use (ISO/TC 307 Technical Committee, 2022). These principles advocate the support of openness and transparency so that all parties involved can observe and audit the system. Further, appropriate security mechanisms must be implemented, and privacy impacts caused by the inherent transparency of ledger records must be considered.

3. Related work

Over the years, the standard BSC has been adapted to match the specific needs of business units or whole companies. For example, Jahankhani and Ekeigwe proposed an adapted BSC specifically for IT security, and the authors believe that this was the starting point for the strategic recognition of the topic. The strategic alignment of all IT functions, specifically IT security functions, and identifying KPIs assessing information security would not have been possible with conventional BSCs (Jahankhani & Ekeigwe, 2005).

Malina and Selto conducted an empirical study to evaluate a BSC adapted to sales within a US Fortune 500 company. In their case, the four existing perspectives of the BSC were completely discarded and measures were used that better reflected the company's needs and values. Elements from the customer and internal process perspectives were combined in a *competitive advantage* perspective, and parts of the internal process and financial perspectives were integrated into a *profitability and growth* perspective. Another modification included transferring elements from *innovation and learning* into the *investments in human capital* perspective. This study also highlights the need to include *corporate citizenship* into a BSC to accommodate the specific needs of distributors (Malina & Selto, 2001).

Figge et al. developed a sustainability-focused BSC to integrate environmental and social goals and their respective measures into a company's strategic considerations. This solves the problem that traditional market mechanisms frequently ignore environmental and social aspects. The authors proposed three approaches for integrating social and environmental goals within the BSC, which range from reusing existing perspectives to defining an additional or deriving an entirely new BSC with custom-made perspectives (Figge et al., 2001).

The adaptations made to existing BSCs illustrate the method's flexibility and encourage its application for blockchain-based use cases, given their substantial impact on existing corporate structures and processes. The method's adaptability has been confirmed by an extensive literature analysis of BSC modifications for better fitting a specific environment (Lueg & Carvalho e Silva, 2013).

4. Extending balanced scorecards for blockchains

Our proposed BSC for Blockchain uses the four perspectives of the standard BSC as a starting point and integrates a novel *Blockchain Perspective*. The goals of the reused perspectives remain unchanged. Figure 1 shows the Balanced scorecard template with the added *Blockchain Perspective*.

This new perspective integrates blockchain-specific components, goals, and measures that relate to one of three layers: *Governance*, *Economy*, and *Technology*. This structure is based on the holistic enterprise architecture modeling language ArchiMate and its layered representation of an enterprise (Lankhorst et al., 2009). When a blockchain-related component, goal, or measure would traditionally fit into a standard perspective but conceptually relates to one of the aforementioned layers, it is added to the *Blockchain Perspective* regardless. This complete segregation of blockchain-related aspects from the existing perspectives allows for careful consideration of the impacts of this technology on strategic management goals. This will help to gain new insights regarding technological change since the successful adoption and integration of blockchain technology in an organization is often hampered by its complexity, the need for new knowledge acquisition, as well as regulatory and organizational barriers (Clohessy et al., 2019). Importantly, a clear separation of blockchain-related objectives facilitates communication and understanding regarding the impact of these objectives on overall strategic management efforts.

4.1. Derivation of blockchain-related goals and measures

The first challenge lies in the integration of blockchain-related goals and measures into the BSC. To achieve this, an extension based on a general domain model for blockchains is proposed, as shown in Figure 2. A domain model, as defined by Guizzardi and Proper (2021), is a social artifact for representing an abstraction of a domain for a particular purpose. In line with this definition, a concept is an abstraction of an aspect of the domain under examination. Our model is a condensed version of the domain model presented by Curty and Fill (2023) for distributed ledger technologies — an umbrella term that also includes blockchains — and has been adapted to assign blockchain concepts into one of three layers representing the three fundamental building blocks *Governance*, *Economy*, and *Technology*, which align with the aforementioned enterprise layers. It is not possible to consider the concepts in isolation, as they are interdependent. In this model, dependencies can be expressed as relations between concepts, which can span layers. In the following, we will outline a set of example measures for each layer that can be employed to facilitate the formulation of actions for the strategic management of a specific organization. Further, we will elaborate on the derivation of the example measures on basis of the model concepts and their relation to each other.

4.2. Governance layer

The *governance layer* contains concepts related to the decision structure of blockchain-based systems. The *Governance* concept represents the governing body.

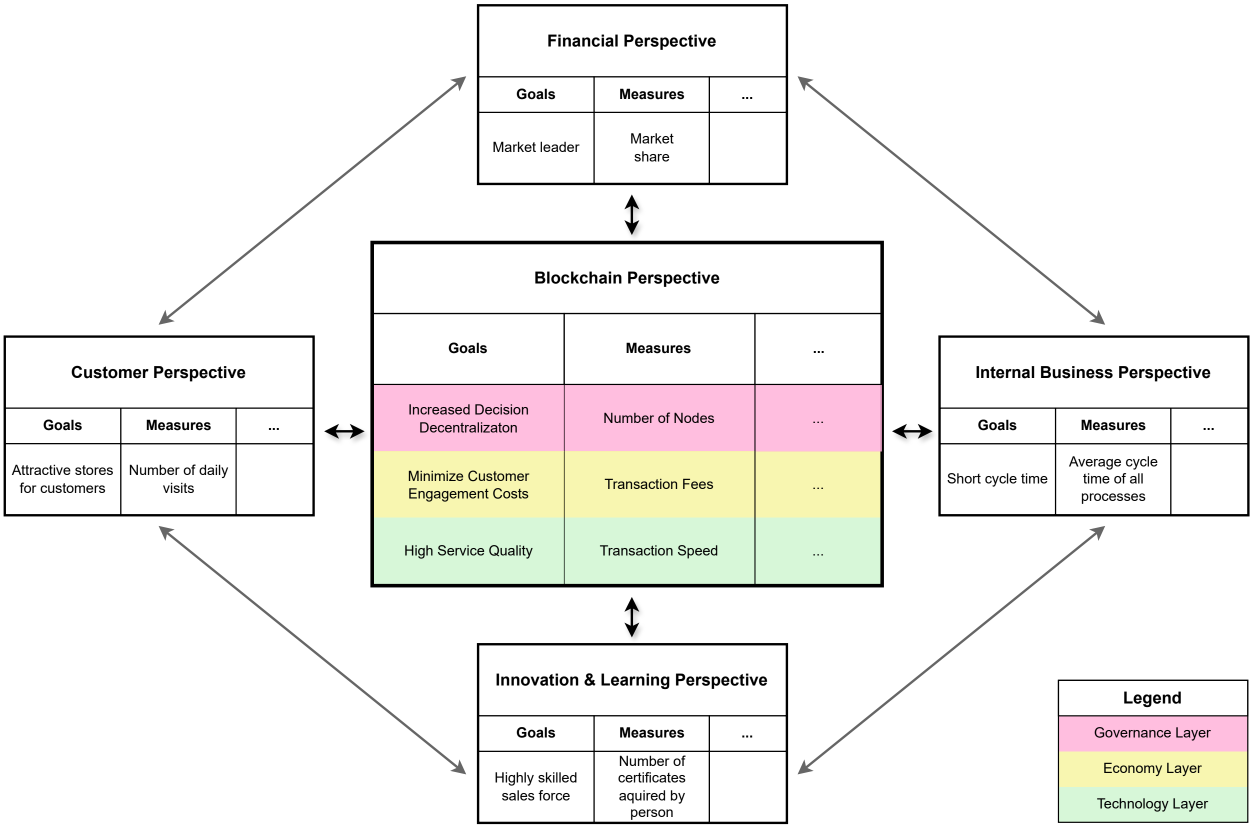

Figure 1. Balanced Scorecard template with an added blockchain-specific perspective.

Actors, organizations, and other parties that are part of the governing body are represented each by an *Identity*. The *Governance* body defines the system's *Consensus* structure, which is an agglomeration of all decision processes. This includes any *Voting* that has been proposed. A *Voting* is a proposal of initiatives that may affect specific parts of the system or the system as a whole. For a successful adoption, the decision structures of the blockchain and the organization must be aligned (Janssen et al., 2020), such that the respective governance models are compatible. In centralized governance, the decision power is held by an authorized party, in which case the alignment of system and organizational governance is straightforward. If governance is decentralized, as is the case in public and consortial blockchain networks, the decision power is distributed among several parties. In a consortial blockchain the parties are known and authorized to join the network, which is not the case in public blockchains where the governance body is pseudonymous. In either case, it is imperative to closely monitor decisions and the evolution of the system, as this allows for the timely identification of any adverse impact that may result from of the governance model. Such an impact could render the governance model incompatible with the organization's goals and negatively impact the business model. One example measure includes the change in the degree of decision decentralization, represented by the number of authorized parties partaking in governance processes and the distribution of decision power among them. One can measure the degree of decision decentralization as the number of identities involved in governance or as the number of identities that partake in voting. Another feature is the inertia of the system, and decision makers need to decide whether they prefer a fast changing and reactive or a stable system. For this, appropriate indicators can be the number or the frequency of votes.

4.3. Economy layer

On this layer, the focus lies on the system's cryptoeconomic principles in regard to the production and distribution of assets, as well as the costs of interacting with specific service offerings. Thereby, the framework within which value can be produced and exchanged in a blockchain system is represented as its *Economic Structure*, defined and influenced by the

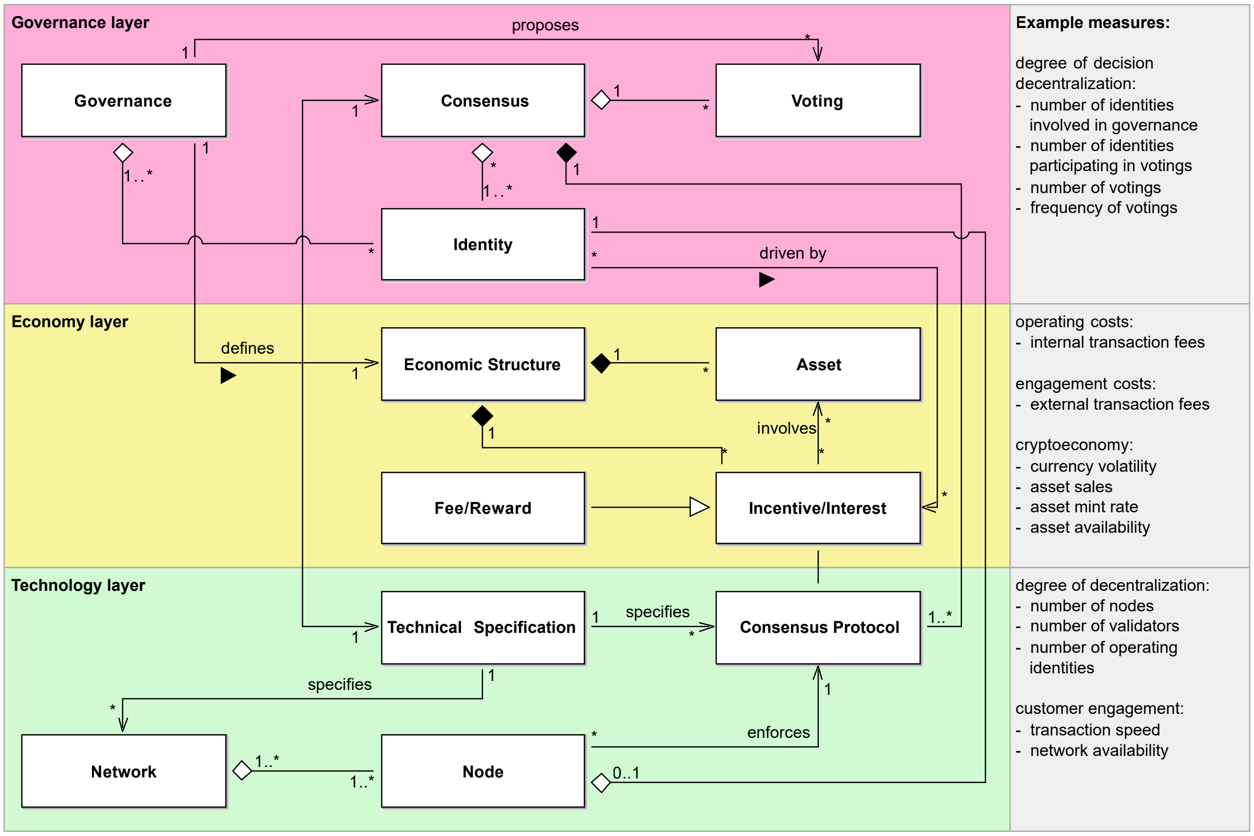

Figure 2. Simplified domain model of distributed ledger technologies, based on Curty and Fill (2023).

system's *Governance*. It is comprised of an *Asset* or *Incentive/Interest*. In this context, an *Asset* includes any kind of (non-)fungible token or cryptocurrency. A manifestation of an *Incentive/Interest* is a *Fee* or *Reward* that is part of the *Economic Structure*. This is especially relevant for facilitating interactions: An interaction, in the form of a transaction on a blockchain network, might incur a *Fee* to be paid by the sender, and then distributed to the executing party as a *Reward* for the provided service. Such an economic *Incentive/Interest* is a motivational driver for identities partaking in the system.

A fee/reward mechanism is typically employed in public blockchains as an *Incentive* for identities to partake in network operation. In public blockchains, participants do not need to be authorized to join the network. Thus, it is necessary to implement appropriate economic incentives to prevent malicious behavior. Transaction fees can therefore be considered as a measure of operational costs, such as those associated with the management of smart contracts. It is possible to reduce these internal transaction fees by optimizing smart contract deployments or switching to alternative blockchain systems. Additionally, external transaction fees represent a measure for engagement costs that a customer must pay in order to consume a blockchain-based service offering. Example measures regarding crypto assets include sales numbers (e.g., of tokens), their mint rate (i.e., rate of production) and the dispersion rate. If a business model involves a tradeable cryptocurrency, the volatility of the currency also needs to be considered. The latter can be measured as the change of the exchange rate to a stablecoin over time. In this context, a stablecoin is defined as a cryptocurrency whose value is pegged to a fiat currency.

4.4. Technology layer

The *Technology layer* comprises the technical structure of the system according to a *Technical Specification* that is defined by the *Governance* body. Here, the blockchain is represented, in a simplified form, as a *Network* of interconnected *Nodes* that enforce a *Consensus Protocol*. Thereby, each *Node* is assigned an *Identity* representing the *Node's* operator entity. This *Identity* can be motivated by *Incentives* in the form of *Rewards* given for securing the system, which are awarded in accordance with the underlying rules of the *Consensus Protocol*. Example measures on this layer primarily relate to service quality, such as network availability and transaction speed. Both criteria significantly impact the experience quality of a service offering. Another example is the degree of decentralization, which translates into system resilience and security metrics. This can be measured by the number of nodes in a network and the number of identities that operate nodes. These numbers can differ since an identity can operate multiple nodes. More specifically, the number of validators, that is, the number of nodes that are eligible to enforce the consensus protocol, can serve as measure for the degree of decentralization of the ledger in terms of resilience to misconduct. From a strategic viewpoint, technology-oriented measures are relevant in case technical issues can impact a business case, or if they can generate a competitive advantage through technological development and innovation (Ivanova et al., 2019).

4.5. Technological fit of measures

The goals and measures that are relevant for an enterprise's strategic management not only depend on the business case but also on the blockchain system in place, its concrete properties, and available features. The network type of a blockchain system (see Section 2.2) implies common structures in regard to governance, economy, and technology. Figure 3 shows a mapping between the three blockchain network types and the discussed example measures. A *strong fit* indicates that a measure is appropriate for a majority of instances of the associated network type. A *weak fit* indicates that a measure can be appropriate, but is not commonly so. Measures that do not fit a specific network type may still be appropriate in an atypical instance of the network type. This mapping can serve as a guide to ascertain the fit of a similar measure for the employed blockchain system in terms of network type. For example, governance-related measures are appropriate for many public and consortium blockchains. However, for private blockchains, such measures do not fit because these blockchains are typically controlled by a single authority.

5. Use Case — Application of a balanced scorecard for blockchain

In this section, we demonstrate the applicability of the proposed *Blockchain BSC* with a real-world use case. The scorecard is applied to one existing organization that employs blockchain technology as

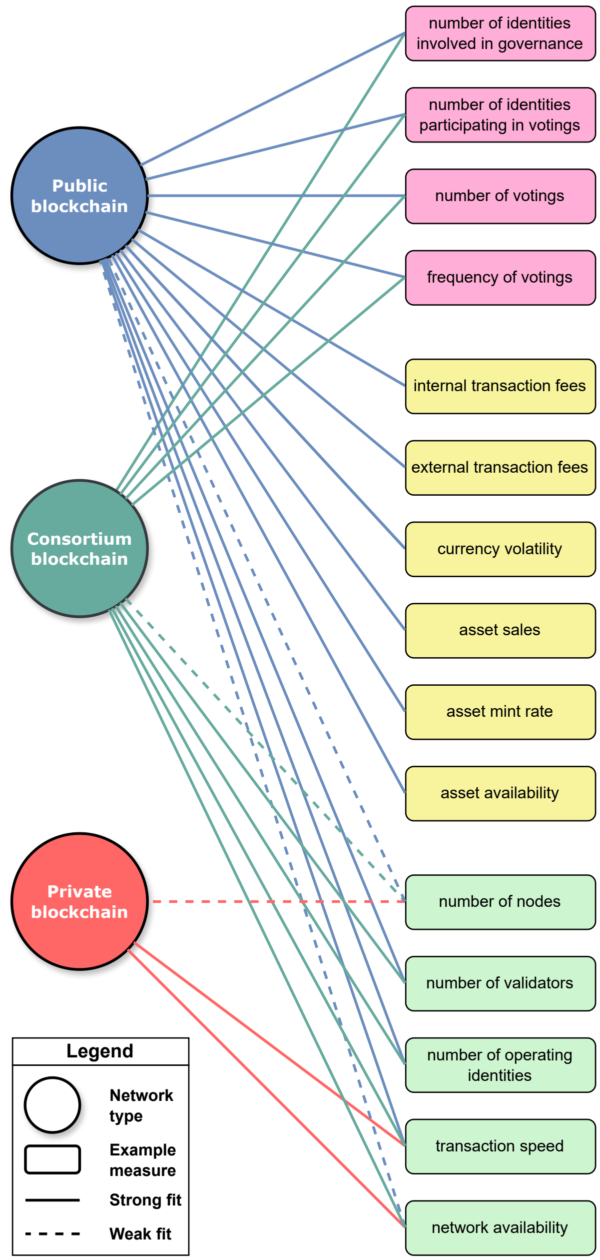

Figure 3. Technological fit of example measures and blockchain network types.

a core part of its business model. This example shows how the extended BSC can be used as a tool to increase the understanding and incorporation of blockchain technology on a strategic level. In this demonstration, the completed scorecard includes three dimensions: *goals*, whose fulfillment advances an organization's mission, *measures* as quantifications of goals or metrics, and *initiatives* that are undertaken to achieve the respective goals. The scorecards have been filled out by the researchers and validated together with key stakeholders of the organization. In this case, this is the first application of a BSC within the organization.

Metapeace[1] is a non-profit organization with the mission to advance proliferation of knowledge and peace through the metaverse. Their goal is to create a freely accessible metaverse that serves as a cornerstone for peace and provides access to high-quality educational content. The term metaverse refers to virtual worlds that enable social interactions between users via avatars. Some metaverses integrate blockchain technology for trading in-world assets such as virtual land parcels or clothing items for avatars. Thereby, the digital ownership of an asset is commonly represented as a non-fungible token (NFT) that can be traded on dedicated marketplaces using cryptocurrencies. Metapeace relies on such a metaverse to offer an experience, where users can learn about the work of Nobel laureates through playing quests. The goal of this gaming experience is to convey knowledge in an accessible format and to connect users with external learning institutions that offer high-quality knowledge resources. The funding of Metapeace is secured through the acquisition of donations and grants as well as by selling NFTs of themed in-game items. When it comes to the use of blockchain technology, Metapeace relies on the blockchain-based marketplace that is provided as service from the metaverse.

Table 1 shows the completed balanced scorecard for Metapeace. The goals of the *Financial Perspective* comprise the acquisition of funds through sponsorships and grants, split into two goals. First, general funding acquisition is measured by the percentage of operating expenditure covered. Fundraising and the application for grants are two options to acquire the necessary funds. Second, the acquisition of development-related funds is measured by the percentage of covered game development costs. Funding for this can be acquired by winning project competitions and innovation grants. These two related goals are here separated, as the latter may involve funding requirements in the form of concrete milestones to be reached.

The *Customer Perspective* is about quality goals and measures regarding the game experience. This includes the engagement of players measured by the number of players of an experience, bolstered by social media campaigns. Similarly, the goal of providing high-quality experiences can also be measured by the number of players and ratings. Quality assurance and testing processes need to be implemented to ensure that the quality standards are met. The goal of facilitating connections between players and external educational resources, provided by accredited institutions, can be evaluated through the effective enrollment of students. The implementation of smooth cross-media linking further encourages the interaction with external resources.

The *Internal Business Perspective* comprises goals and measures related to supporting processes. Acquiring Nobel laureates as endorsers increases visibility and is measured by the number of endorsements received. Outreach initiatives serve to connect with laureates. A core task is the integration of Nobel laureates' research into game elements and mechanics for the player to experience. The goal of achieving knowledge-to-quest translation excellence expresses the aspiration for high-quality standards. A measure for this goal is the ratio of players who completed an experience to those who started. Playtesting, as part of the quality assurance process, helps ensure that the desired quality standards are met.

Future and ongoing business developments are outlined in the *Innovation & Learning Perspective*. Having a comprehensive overview of current and emerging metaverses is a prerequisite for launching additional business services. One measure to create such an understanding is the number of metaverses that have been identified and analyzed as part of research projects and taxonomy developments. To diversify metaverse platforms and audiences, existing experiences can be adapted. This is supported by partnerships that bring in the necessary technical knowledge. Ultimately, the collective body of knowledge within the organization is intended to serve as the foundation for a certification service for external metaverse experiences.

Four main goals have been identified and assigned to the *Blockchain Perspective*. These relate to the *economy* and *governance* layers of the domain model. In this specific use case, no goals were derived from the *technology layer*. That is, technical concerns related to service quality or the degree of ledger decentralization were not identified to be strategically relevant for this use case. An important issue was that NFT sales resulted in cryptocurrency revenue. Some expenses of Metapeace can be paid directly in cryptocurrency, but others require fiat money. While cryptocurrency can be exchanged for fiat money, the price can be highly volatile. The goal of crypto-revenue stability expresses the necessity to reduce the risk of asset loss and maintain the ability to cover expenses with revenues from NFT sales. The measures for this goal have been defined as the exchange rate of the cryptocurrency to a stablecoin, and the ratio of high-risk to low-risk assets. In-game items sold as NFTs are unique or limited in number with individual identifiers. In this regard, not only the perceived value of the underlying asset

[1]Metapeace — https://metapeace.xyz/

Goals/Objectives	Measures	Initiatives
	Financial Perspective	
Funding acquisition	Percentage of expenditure covered	Application to funding organizations, fundraisers, sponsorship requests
Development funds acquisition	Percentage of estimated development costs covered	Application to innovation funds and project competitions
	Customer Perspective	
Experience engagement	Number of players	Social media campaign
High quality experience	Number of players, player ratings	Quality assurance and testing
Connecting players with external learning resources	Number of accredited student enrollments	Linking within experience
	Internal Business Perspective	
Acquisition of official endorsers	Number of endorsements by laureates	Outreach, networking
Knowledge-to-quest translation excellence	Ratio of players completing the experience	Quality assurance, external audit
	Innovation & Learning Perspective	
Acquisition of comprehensive overview of Metaverses	Number of metaverses analyzed	Research, taxonomy development
Adaption of experiences to other metaverses	A launch in another metaverse	Partner acquisition, networking
Experience certification service	Launch of an experience certification service	Research, partner acquisition
	Blockchain Perspective	
Crypto-revenue stability	Exchange rate to stablecoin, ration of high-risk to low-risk assets	Exchange cryptocurrency to low-risk assets
Sustainable NFT distribution and sales	Number of sales, sales rate, trade prices	Adjustments to mint amount and individual asset category pricing, NFT promotions
Minimize marketplace fees	Minting fees, sales fees, trade fees, transaction fees	Assess alternative markets, NFT asset optimization
Ensure platform governance alignment	Number of transparent votings and initiatives, number of voting parties	Diversify platform providers, assessment of accepted initiatives and changes

Table 1. Blockchain balanced scorecard for Metapeace.

but also factors such as the number of minted tokens influence the valuation of an NFT. These issues are summarized in the goal sustainable NFT distribution and sales, which refer to the total mint amount and the initial placing on the market. Both factors must be taken into consideration for launching a successful series that appeals to stakeholders. Trades on the marketplace incur costs in the form of blockchain transaction fees for minting and transferring NFTs, and sales fees for the marketplace operator. These fees diminish profit margins from sales and present a barrier for users. The goal to minimize marketplace fees addresses that issue from a cost controlling and optimization viewpoint. Then, the goal to ensure platform governance alignment is derived from the *governance layer* of the domain model. This goal encompasses the compatibility of the blockchain network and the metaverse operator's governance with the organization's values and mission. Measures for the degree of compatibility are the number of transparent voting or initiatives to evolve the network and the number of parties involved in voting. These measures also serve as indicators for the degree of network centralization. The continuous assessment of decision making, including changes made on the marketplace, reveals if a platform solution aligns with an organization's mission and values.

6. Discussion of results

In this paper we demonstrate how strategic blockchain considerations can be integrated into the existing BSC. Our recommended approach supplements the existing BSC with an additional perspective that considers the idiosyncrasies of blockchain technologies.

The presented framework has multiple benefits for an organization. First, the approach is, just like the existing BSC, whiteboard compatible. This means that the Blockchain BSC can be applied without any equipment in a collaborative process. Second, the BSC are already widely adopted and the newly integrated blockchain perspective can be applied naturally and blends in the application process of conventional BSCs. Third, the separation and categorization of all blockchain-related aspects enables a differentiated and comprehensive analysis of the strategic business aspects of any blockchain-enabled business model. Fourth, the framework, based on the general domain model, facilitates the derivation of blockchain-related measures, and enables the assessment of their technological fit to a blockchain system in terms of access policies.

Our suggested approach has some limitations and necessary prerequisites. First, we currently provide no tool support for applying the Blockchain BSC. Therefore, we can not explicitly show the cause-effect relationship of goals, measures and initiatives. Second, the definition of strategic goals is a hard task to accomplish. The approach doesn't solve this crucial issue but facilitates the integration of the strategic goal-setting process for blockchain aspects. The simplification of the definition process for general strategic goals is beyond the scope of this research. Third, we only used a single use case for verification, and further applications are needed to validate the general applicability. Nevertheless, the practical application of the Blockchain BSC in a real-world context already confirms its potential utility. Fourth, the Blockchain BSC requires extensive blockchain knowledge within the organization. For effective strategic management, the involvement of individuals with the requisite expertise is a necessity in any case.

In summary, our research identifies the Blockchain BSC as a potentially useful instrument for incorporating blockchain aspects on a strategic level and it helps to systematically derive goals and measures. The explicit consideration of blockchain-related goals allows technology-savvy organizations to conduct an in-depth assessment of the impact of blockchain technology on their strategic orientation and business model.

7. Conclusion and outlook

In this paper, we follow the call from previous research to address pending problems in blockchain adoption and to close the gap between an innovative technology and its potential business applications (Treiblmaier et al., 2021). Specifically, we show how blockchain can be integrated on a strategic level using the Blockchain BSC. We illustrate the benefits of a dedicated Blockchain perspective within the existing BSC and how to derive blockchain-related goals and measures based on a domain model of distributed ledger technologies, and principles from enterprise architecture. With this, goals and measures can be assigned to one of three blockchain-related building blocks: governance, economy, or technology. Using the real-world example of Metapeace, we demonstrate the practicality of our approach and that the adapted BSC can be easily applied. Overall, this paper illustrates that the explicit consideration of blockchain-related goals and measures deepens the understanding of blockchain's impact on an organization's business model.

Future research needs to evaluate the proposed Blockchain BSC with additional use cases. This verification allows for further refinements and improvements regarding the derivation of goals and measures. Moreover, the Blockchain BSC must be integrated into a modeling tool in order to construct cause-and-effect relationship diagrams, such as those created by ADOscore (now part of ADONIS). The use of cause-effect-relationship diagrams enables a more profound comprehension of the interdependencies between goals and associated measures, thereby facilitating their assessment from a strategic standpoint.

In summary, our research paves the way for the integration of blockchain into firms' business models and a better understanding of the resulting economic implications.

Acknowledgments

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