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## Cascading ISO/IEC 38500 based Balanced Score Cards to improve board accountability

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### Abstract

On one hand, with the standardization of Information Technology (IT) governance through ISO/IEC 38500, in the last decade, a good number of organizations have implemented IT governance (ITG) frameworks, although it is not a fully extended practice, yet. On the other hand, the use of Balanced Score Cards (BSC) on ITG is not an unknown practice, either. However, what has been given less importance is the application of BSC in the implementation of ISO/IEC 38500, since it normally appears as just examples of good practices. This work not only explains why the BSC's applicability to align IT with business in ISO/IEC 38500 implementations is not included in the standard, but also justifies the importance of BSC to report to the board or senior executive team in a clear way, without the details of the particular implementation framework of the standard.

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*Keywords:* Governance of IT, ISO/IEC 38500, Balanced Score Card, IT Alignment, Cascading

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## 1. Introduction

Many organizations are adopting BSC, as the foundation for their strategic management system. [1] claimed that the BSC emerged as a decision support tool at the strategic management level, more precisely in performance management. BSC are the result of [2] proposal as a means to evaluate organization performance from four different perspectives: the financial perspective, the internal business process perspective, the customer perspective, and the learning and growth perspective. This article justifies why the main difficulties to implement the ISO/IEC 38500 [3] come from the absence of concrete instruments for ITG in organizations. Particularly, the nature of the standard does not reference how to direct, monitor and evaluate IT assets, since the standard is concerned of what to govern and do not concerned in the same manner in how to do it. In fact, the main contribution of the ISO/IEC 38500 standard is to make possible harmonizing the governance of any of the business assets. Such harmonization should come from using similar decision-making mechanisms across all types of assets as the core between strategic alignment and business performance measurement. Once there should be no longer any doubts about the necessity of ITG [4], the problem arises once it is attempted to implement the IT alignment monitoring in the organization. The main cause is that ISO/IEC 38500 standard did not emerge as a set of processes to be applied, whereas this is the common case with the IT management (ITM) standards. But being the ISO/IEC 38500 a behaviour-based standard, there is commonly an interface gap in the IT assets' governance-management harmonization. This is due to a vicious circle in its applicability that only the CIO can undo. On the one hand, IT managers are used to applying standards based on processes, procedures and best practices, but they are not belonging of top management structures. On the other hand, top management teams not only expect their strategy to be executed by IT managers but also expect measurable performance results that are directly related to the key performance indicators (KPIs) or key global indicators (KGIs) to control that execution. However, top managers may do not have the IT performance information in understandable business controls. This is what we define as the interface gap between governance and management, i.e., how to move from "what to do" to "how to do it" in IT, and particularly, how to feed the KPI into management measures. The latter is the main purpose of building BSCs in the layers of governance, management and operations. Thus, cascading processes of BSCs from governance layer to management layer (and even to the operational layer) and backwards, seem essential for implementing ITG [5]. But cascading BSCs are process-based instruments, not behaviour-based, as ISO/IEC 38500 was originally designed and developed. This paper is aimed to understand how to bridge the gap between governance and management in explaining an ITG framework using the BSC concept. We detail how the BSC can serve as a decision support tool for boards and senior executives, in private and public organizations implementing the ISO/IEC 38500. In addition, we believe that this is not sufficiently emphasized in any standard implementation guide document. As [1] claimed, BSCs can be applied not only to assess the contribution of a specific information system or IT project, but also to assess performance and guide the activities of functional IT departments, e.g. IT services.

## 2. Background

### 2.1. BSC

A BSC can be defined as a framework that helps top management to select a set of measures that provide a cohesive look at an organization by allocating a list of measurable items into four different viewpoints: Financial, Customer, Internal Business Processes, and Learning and development. The isolation of both financial and non-financial components enabling organizational performance evaluation is not a novel idea. Back in the early XX century, dashboards suggested by Taylor and around fifty years after that, the French *Tableau de Bord* of the sixties could be, together with the Performance Measurement Matrix [6] the precursors of BSC. In any case, the BSC foundational work [2], has become one of the most accepted Performance Management Models in organizations. These authors emphasized the need to tie measurements to a well-developed strategy, resulting in a 'top down' model of measurement and control. It is important to note that, reasonably the BSC concept has evolved dynamically, in that elements in its content have changed between the time when the BSC was introduced in 1992 and its more widely known presentation in 1996 [2]. The importance of BSC led to its adaptations to different scenarios. And the broad field of IT is not out of this move. Thus, [1] developed a balanced scorecard for

information systems that measures and evaluates IS activities from four different viewpoints: business value, user orientation, internal process, and future readiness. There are also efforts devoted to control IT expenditures by means of BSC [7] or to assess IT projects [8]. However, maybe the most important and relevant application of BSC in the IT field is the IT business alignment. Efforts started in the last decade of XX century, but the most relevant contributions are coming from the works of Van Grembergen e.g. [9]. This author and his colleagues proposed a specific BSC to be applied to IT including four different perspectives: corporate, customer, operational excellence and future. In some cases, BSC has also been applied as a valid tool for ITG, as underlined in next section.

## 2.2. IT Governance

The increasing importance of IT in all kinds of organizations calls for a specific focus on ITG [10]. The importance of the topic lead to a panoply of definitions. A good review on the definitions and orientations on ITG can be found in the works of [4,11]. In order to give an integrated view on the topic, authors adopt the definition provided by the ITG Institute as follows: “ITG is the responsibility of the Board of Directors and executive management. It is an integral part of enterprise governance and consists of the leadership and organisational structures and processes that ensure that the organisation’s IT sustains and extends the organisation’s strategy and objectives”. Literature reported a series of efforts on ITG and initiatives including “COBIT: Control Objectives for Information and Related Technologies” of the American “Information System Audit and Control Association” [12] and “MIT: Massachusetts Institute of Technology” approach for ITG [13]. The importance of the topic also leads to the definition of a standard for the topic. Thus, the ISO38500:2008 corporate ITG launched in May 2008 adopted the approach defined in the Australian Standard for Corporate Governance of Information and Communication Technology AS8015-2005 published in January 2005. The standard presents a framework including three different tasks for ITG, namely: 1) Assess the use of IT; 2) Preparation and implementation of plans and policies and 3) Monitor conformance to policies and performance against the plans.

This standard and the subsequent and complementary or evolutionary efforts show the maturity of a discipline that is growing in interest and impact [3]. One of the topics that are crucial for ITG is the alignment of IT strategy and corporate strategy. Literature has reported several efforts on the topic, being the works of Luftman, with his Strategic Alignment Maturity Model (SAMM), maybe the most important ones in the topic [14] after the pioneering work by [15]. One of the tools proposed by the industry to achieve this goal is the one we can find in COBIT 5. In this initiative, the needs each interested party in the corporation must be transformed into useful and customized business goals, IT related goals and specific catalyst goals. This is known as the COBIT Goal Cascade. This artefact has been used widely in the ITG and ITM literature e.g. [16,17]. Literature has also reported cases in which BSC has been employed in SAMM settings and even applying some of the concepts developed in the COBIT Goal Cascade in real scenarios [18]. Literature also reported cases on the use of a cascade of BSC to create a linkage between the business BSC and different levels of IT BSCs [9]. However, to the best of authors’ knowledge, there is not an effort devoted to integrate BSC and ITG standard 38500 by means of cascading.

## 3. BSC as part of the governance-management interface gap

To govern, or not to govern IT is no longer a choice for any organization [4], since IT is a major instrument of business change in both private- and public-sector organizations. But with the inception of the standard ISO/IEC 38500, some of these conflicts are disappearing. ISO/IEC 38500, was deliberately aligned with the definition of “corporate governance” in the Cadbury report [19]. Since well before release of ISO/IEC 38500, and even before, many organizations have confused ITG and ITM. This confusion is exacerbated by efforts to integrate some aspects of governance in common de facto standards for ITM, resulting in these aspects of governance being described in management systems terms. On the one hand, ITG is concerned with directing and controlling IT-related activities across an organization, i.e. governing IT is about strategic planning in line with the objectives of the organization and the oversight of all IT-issues. Weill and Ross [13] explained that ITG involves specifying the decision rights and accountability framework to produce desired behaviour in the use of IT in the organization. Governance of IT must provide clear and consistent visibility of how IT is used, supplied, and acquired for everyone in the organization, from board members to business customers, from IT staff members to business units [20]. On the other

hand, ITM is concerned with the application of ITG through the implementation policies, processes and procedures, building projects and maintaining services. The action of the board (or senior executives) to direct and control IT activities and to build a decision-making model combined including the action of the ITM teams to develop and support IT systems, processes and procedures, result in the development of ITG framework [5]. Therefore, an ITG framework is based on the different, but complementary activities, of ITM and ITG. The ITM activities in building and supporting IT assets are based on the very well-known cycle Plan-Do-Check-Act (PDCA), the iterative four-step management method used in business for the control and continual improvement of processes, products and services. However, the ITG activities are three, corresponding to Evaluate-Direct-Monitor (EDM). These EDM activities are fully explained in the ISO/IEC 38500 model, in which the governing body (board or senior executives) is responsible and accountable for the strategic direction (Direct), the evaluation (Evaluate) of business proposals and the performance and conformance (Monitor) of the organization for all ITM activities. While ISO/IEC 38500 makes clear the role of the governing body, it also includes delegation of some detail to ITM. There is an implicit expectation that the governing body will require ITM establish policies, processes, procedures to plan, build, and run the IT-enabled organization [21]. Thus, the ITG implementation model should connect the ITM activities (PDCA) with the ITG ones (EDM).

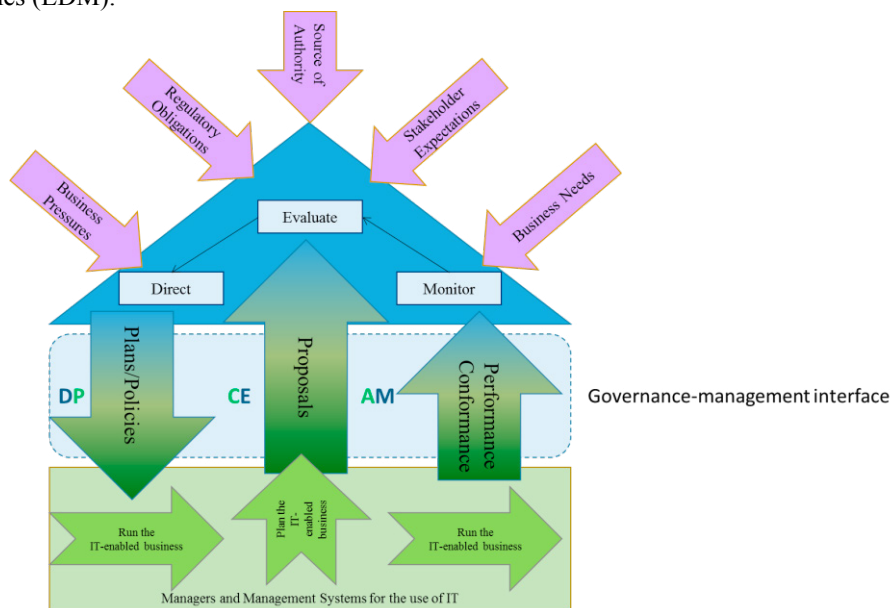


Fig. 1. Governance-management interface based on ISO/IEC 38502 as appears in (Juiz and Toomey 2015).

Until almost the appearance of the AS8015 standard and subsequent ISO/IEC 38500, ITM activities worked in isolation (at least in a formal way) from the organization governance. Thus, PDCA activities may work isolated from the governance activities. The result of this possible unfortunate behaviour is that the organization is immature for ITG, so that EDM activities was never performed or unconsciously delegated into ITM. However, ITG involves evaluating and directing the use of IT to support the organization and also monitoring this use to achieve business value. As defined in ISO/IEC 38500, ITM drives the ITM framework, requiring appropriate behaviour, clear accountability and responsibility for all stakeholders, and recognition of the interests and behaviours of stakeholders beyond the control of the organization. The connections between the governing body and the ITM close the governance-management interface as the standard ISO/IEC 38500 shows in its model (see interface in figure 1). The three connections (arrows) between ITG and ITM are different but complementary. ITG instruments may be different when connecting the Direct and Plan activities (DP), from those of connecting Check with Evaluate activities (CE) and, of course, those of connecting the Act and Monitor ones (AM). For example, an IT strategic plan coming from senior management can cover the connection between the Direct and Plan activities for ITM to implement, but the control of the plan comes from other connection in the governance-management interface (CE).

The governance of the portfolio of projects and programs and their prioritization is also an example of the connection between the CE activities, in which the governance body selects the solutions that can produce more value between the proposals coming from the IT managers and the business units. But again, the value realization through monitoring is also included in another connection in the interface (AM). In this work, we focus on the BSC as an example of the connection between the AMs, to support the previous DP and CE connections through performance and conformance indicators (see figure 1). Most importantly is that the importance that the BSCs have been given in the implementation models of ISO/IEC 38500, both theoretical documents and practical implementations is relatively small. Next sections are devoted to justify our findings about this apparent lack of importance of BSCs in ITG, since this work tries to illustrate how to deal with the nature of BSCs in ISO/IEC 38500 implementations.

#### **4. The behaviour-oriented governance of IT in ISO/IEC 38500**

The almost absence of real examples of the use of BSCs in the implementation of the ISO/IEC 38500 standard is due, mainly, to the genesis of the standard and its interpretation to build ITG frameworks. Van Grembergen [22] defined governance of IT as the organizational capacity exercised by the board, executive management, and ITM to control formulation and implementation of IT strategy, ensuring fusion of business and IT. Governance consists of leadership, organizational structures, and processes that ensure the organization's IT sustains and extends the organization's strategy and objectives. This definition is more oriented to processes, structures, and strategy than the behavioural side of governance of IT. This definition has driven the design of governance frameworks based on COBIT 5 [23]. In [13], authors defined governance of IT as specifying the decision rights and accountability framework to produce desired behaviour in the use of IT in the organization. Thus, governance of IT must thus include a framework for organization wide decision rights and accountability to encourage desirable behaviour in the use of IT. These decision rights define mainly who makes decisions delegated by the governing body and what decisions they make, along with how they do it. Focusing on decision rights intrinsically defines behavioural rather than process aspects of governance of IT. Even COBIT is a process-oriented de facto standard for managing IT, the latest version of COBIT (COBIT 5) adopted and adapted the ISO/IEC 38500 model for the first time. However, there is a quite fundamental and significant difference between ISO/IEC 38500 (de jure standard) and COBIT 5: whereas ISO/IEC 38500 takes a behavioural stance, offering guidance about governance behaviour, COBIT 5 takes a process stance, offering guidance about process, mainly suggesting auditable performance metrics rather than process descriptions. More precisely, COBIT 5 defined five processes of corporate governance called EDM (from the three activities, namely Evaluate, Direct and Monitor) processes to connect the three ISO/IEC 38500 activities with a large number of ITM processes.

The behavioural approach of ISO/IEC 38500 standard is less influenced by and less dependent on processes. It is conducted through decisions of governance structures and proper communication and is much more focused on human communities and accountabilities for decision makers in governing bodies than is proposed by any process-oriented ITM model. This apparent advantage of behaviour-oriented governance versus process-oriented governance collides with the automatic construction of BSC to monitor the behaviour of IT managers. Thus, at first glance, it would seem simpler to build BSCs following process-oriented governance frameworks. In the next section, we will see that BSC construction has not been precisely a primary objective either for the de jure standard (ISO/IEC 38500) or for a particular implementation as de facto standard, e.g. COBIT 5.

#### **5. The ISO/IEC 38500 and the BSC**

BSC traditionally groups four types of activities for reporting purposes, namely, financial, customer, internal and learning and growth [2]. But the crucial question is firstly, how to build a BSC that helps the governing body make IT-related decisions, mainly to support Monitor activity (AM). And secondly, how to build BSCs in action to drill down from ITG to ITM (and even IT operation) and reversely, how to feed into backwards, i.e. from ITM (and even IT operation) to ITG (see AM in figure 1).

In the case of COBIT 5, its appendix B shows an example of how to translate corporate (enterprise) goals to IT goals only for the ITG. COBIT 5 defines 17 enterprise generic goals and their relationship to the three main

governance objectives in COBIT 5 framework—benefits realization, risk optimization and resource optimization[23]. Achievement of enterprise goals requires several IT-related outcomes, which are represented by the IT-related goals. IT-related stands for information and related technology, and the IT-related goals are structured along the dimensions of the IT balanced scorecard (IT BSC). COBIT 5 defines also 17 IT-related goals. The mapping table between IT-related goals and enterprise goals is also included in appendix B of COBIT 5, and it shows how each enterprise goal is supported by several IT-related goals. Thus, achieving IT-related goals requires the successful application and use of several enablers. Enablers include processes, organizational structures and information, and for each enabler a set of specific relevant goals can be defined in support of the IT-related goals. Processes are crucial enablers, and appendix C of COBIT 5 contains a mapping between IT-related goals and the relevant COBIT 5 processes, which then contain related process goals. In short, COBIT 5, even though is compatible with ISO/IEC 38500, it is a process-oriented governance framework since the enterprise goals BSC should be translated to IT goals BSC, through a BSC mapping depending on predefined processes, structures and information (which are ITM activities). The example provided in COBIT 5 in annexes illustrates how to build BSC and how to map BSC enterprise goals to IT goals, and even to cascade to ITM processes but, unfortunately, they are only examples in annexes. In the case of ISO/IEC 38500, the benefit of a behaviour-oriented standard is that becomes a principle-based standard. Therefore, it can identify the outcomes of applying the principles without specifying explicit methodologies, structures, processes and techniques. This enables the development of guidance that can be applied on a consistent basis without prescribing particular organizational structures or processes. The ISO/IEC 38500 is based on having a clear established system of governance involving both the actions of the governing body (or delegates) and the actions of management operating within a governance framework (38504). Therefore, as behaviour-based standard, the set of principles should describe the fundamental concepts or propositions that underpins the system of governance for the domain being addressed within an organization. This is compatible with the first type of decisions that governing body should make [13]. Each principle should be stated with sufficient detail to ensure that there is clarity about its implication for ITG. In ISO/IEC 38500 this was expressed by stating that “The principles express preferred behaviour to guide decision making.”

However, underpinning the guidance in a behaviour-based standard for governance of IT is the expectation that there is a relationship between the applications of the governance principles and the achievement of business outcomes. Hence, there should be a relationship between the application of the governance principles and, in our research objectives, the corresponding IT BSC for monitoring whether the enterprise outcomes are achieved or not. This is precisely the governance-management gap for BSC building in ISO/IEC 38500: there is no explicit BSC guidance to monitor performance strategy achievements. The current development of ISO/IEC 38504 suggest that one option that can be taken is to express the relationship in generic terms as a basis for guidance. However, when establishing the principles for ITG and in communicating principles-based guidance, the potential relationship between the desirable governance behaviours, the desirable IT related enablers and possible business outcomes should be understood and articulated to the fullest extent possible as a basis for developing guidance for the implementation of ITG. Thus, the three basic mechanisms of governance, namely structures, communication and alignment, should be articulated in some way to implement this guidance: governing body (and senior executives) as governance structures should articulate some communication to guide the strategy alignment from strategy principles to business outcomes achievement, as figure 2 shows.

ISO/IEC 38504 provides an example of how to inspire the cascading from principles to outcomes in ISO/IEC 38500. For instance, three possible implications of the application of the principles (strategy) that the governing body should ensure, among others are:

- The governing body working with and advised by executive managers should provide leadership in developing strategies (DP) for obtaining value from the use of IT (AM).
- The governing body should ensure that the organization’s external and internal environment are regularly monitored and analysed (AM) to determine if there is a need to review (CE) and, when appropriate, revise the strategy for IT and any associated policies (DP).
  - The governing body should understand the business readiness for any major changes proposed as part of the business strategy for IT (CE) and ensure that there is a commitment and capability within the organization to undertake required changes (AM).

In last example, developing BSC for ITG is not a mandatory instrument (strategic maps maybe another instrument), but BSC could help to ensure the implications of cascading the strategy to get business outcomes. The different strategic initiatives in the BSC coming from the governing body direction should be planned into objectives (DP) that are monitored and analyzed (AM) comparing measurements with current targets to determine if there is a need to review (CE) these strategic initiatives. To sum up, there should be clearly defined mechanisms for monitor the use of IT in the organization but not necessarily BSC. The inescapable conclusion is that ISO/IEC 38500 is a meta-framework of ITG that models “what to do” but does not model “how to do it”, in the same way that governance is different from managing through best practices (figure 3).

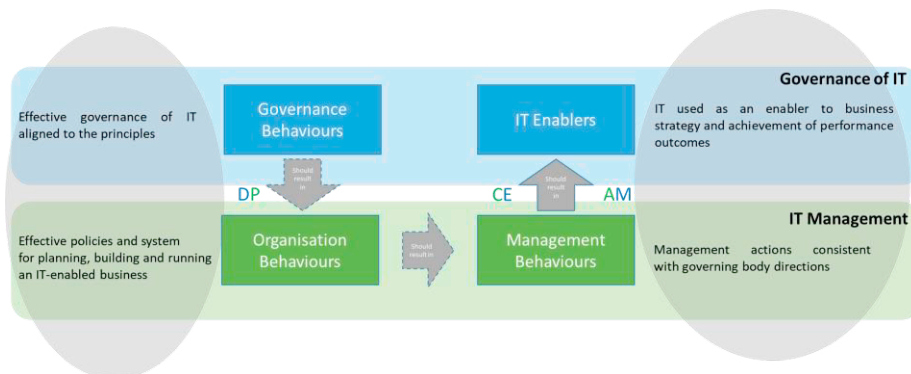


Fig. 2. From principles to outcomes, own model based on ISO/IEC 38504.

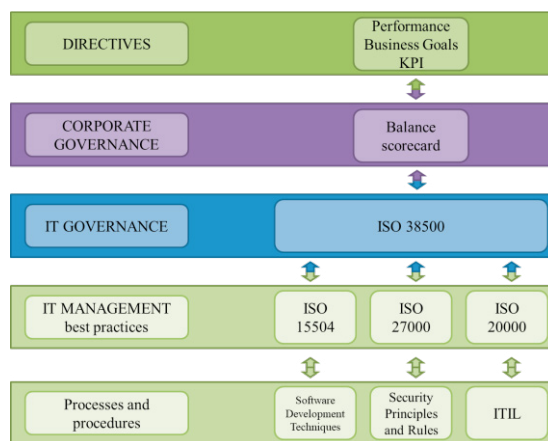


Fig. 3. ISO/IEC 38500 as an interfacing framework between governance and management, adapted from [24].

## 6. Conclusions

In this study, authors used ISO/IEC 38500, the ITG standard, to show how to reinterpret the governance-management interface and, particularly, how to fill the gap between governance of IT and ITM in IT BSC settings. Firstly, we locate the connections Direct->Plan (DP), Check->Evaluate (CE) and Act->Monitor (AM), corresponding to the three ways to interface ITG and ITM. Secondly, we remind that ISO/IEC 38500 takes a behavioural stance, offering guidance about governance behaviour instead having a process-oriented design. Thus, the apparent advantage of freedom to define own instruments, in a particular implementation of behaviour-oriented governance versus process-oriented governance, collides with the construction of IT alignment tools to bridge the governance-management interface gap, which is crucial to implement any BSC for governing bodies. However, underpinning the guidance in a behaviour-based standard for ITG is the expectation that there is a relationship

between the applications of the governance principles and the achievement of business outcomes. Hence, there should be a relationship between the application of the governance principles and the corresponding actions for monitoring whether the enterprise outcomes are achieved or not through BSC. We use the example provided in ISO/IEC 38504 to illustrate how the DP, CE and AM connections are involved in any particular implementation of BSC using IT principles and producing IT behaviours to contribute to the business outcomes. Governance behaviours should refer to best practices rather than the existence of specific processes. However, this not implies not using specific processes to implement best practices, it means that the organization should select the alignment tools that fit better to move from principles to outcomes implementing the desired governance behaviours. This is the crucial difference of behaviour-oriented and process-oriented ITG. Given the importance of governing technology, understanding the interactive relational mechanisms between governance and management is crucial for any practical implementation of an ITG framework. We hope that our insights based on ISO/IEC 38500 to improve board accountability in organizations through cascading BSC, prove to be of interest to scholars and practitioners alike as public and private organizations engage with new ITG methods, techniques and tools.

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## References

- [1] Martinsons M, Davison R, Tse D. The balanced scorecard: a foundation for the strategic management of information systems. *Decis Support Syst* 1999;25:71–88. doi:10.1016/S0167-9236(98)00086-4.
- [2] Kaplan RS, Norton DP. *The Balanced Scorecard: Translating Strategy Into Action*. Harvard Business Press; 1996.
- [3] ISO/IEC. 38500 - Information Technology — Governance of IT - For the organization 2015;2015.
- [4] Juiz C, Toomey M. To govern IT, or not to govern IT? *Commun ACM* 2015;58:58–64. doi:10.1145/2656385.
- [5] Holt AL. *Governance of IT: An Executive Guide to ISO/IEC 38500*. vol. 53. Swindon: BCS Learning & Development Limited; 2013. doi:10.1017/CBO9781107415324.004.
- [6] Keegan DP, Eiler RG, Jones CR. Are Your Performance Measures Obsolete? *Manag Account Montvale* 1989;70:45.
- [7] Kim C, Davidson LF. The effects of IT expenditures on banks’ business performance: using a balanced scorecard approach. *Manag Finance* 2004;30:28–45. doi:10.1108/03074350410769100.
- [8] Asosheh A, Nalchigar S, Jamporazmey M. Information technology project evaluation: An integrated data envelopment analysis and balanced scorecard approach. *Expert Syst Appl* 2010;37:5931–8. doi:10.1016/j.eswa.2010.02.012.
- [9] Grembergen WV, Saull R, Haes SD. Linking the IT Balanced Scorecard to the Business Objectives at a Major Canadian Financial group. *J Inf Technol Case Appl Res* 2003;5:23–50. doi:10.1080/15228053.2003.10856015.
- [10] De Haes S, Van Grembergen W. An Exploratory Study into IT Governance Implementations and its Impact on Business/IT Alignment. *Inf Syst Manag* 2009. doi:10.1080/10580530902794786.
- [11] Mohamad S, Toomey M. A survey of information technology governance capability in five jurisdictions using the ISO 38500:2008 framework. *Int J Discl Gov* 2016;13:53–74. doi:10.1057/jdg.2015.5.
- [12] COBIT 5: A Business Framework for the Governance and Management of Enterprise IT 2017. <http://www.isaca.org/cobit/> (accessed March 15, 2017).
- [13] Weill P, Ross JW. *IT Governance: How Top Managers Manage IT Decision Rights for Superior Results*. Harvard Bu. Harvard Business Press; 2004.
- [14] Luftman J. Assessing It/Business Alignment. *Inf Syst Manag* 2003;20:9–15. doi:10.1201/1078/43647.20.4.20030901/77287.2.
- [15] Henderson JC, Venkatraman H. Strategic alignment: Leveraging information technology for transforming organizations. *IBM Syst J* 1993;32:472–84. doi:10.1147/sj.382.0472.
- [16] Bartens Y, Schulte F, Voß S. Business/IT Alignment in Two Sided Markets: A Study of COBIT 5 for Internet Based Business Models. *Int J ITBusiness Alignment Gov IJITBAG* 2014;5:27–43. doi:10.4018/ijitbag.2014070102.
- [17] Oliver D, Lainhart J. COBIT 5: Adding Value Through Effective Geit. *EDPACS* 2012;46:1–12. doi:10.1080/07366981.2012.706472.
- [18] Ahuja S. Strategic Alignment Maturity Model (SAMM) in a cascading Balanced Scorecard (BSC) environment: Utilization and challenges. *Lect. Notes Bus. Inf. Process.*, 2012. doi:10.1007/978-3-642-31069-0\_47.
- [19] Cadbury A. *The Financial Aspects of Corporate Governance*. *Comm Financ Asp Corp Gov UK* 1992:90. doi:ISBN 0 85258 913 1.
- [20] Juiz C. New engagement model of IT governance and IT management for the communication of the IT value at enterprises. *Commun. Comput. Inf. Sci.*, 2011. doi:10.1007/978-3-642-22603-8\_13.
- [21] Toomey M. *Waltzing with the Elephant*. 2009.
- [22] Grembergen W Van. *Strategies for Information Technology Governance*. vol. 3. 2004. doi:10.4018/978-1-59140-140-7.
- [23] Isaca. *COBIT: A Business Framework for the Governance and Management of Enterprise IT*. 2013.
- [24] Fernández C, Piattini M. *Modelo para el gobierno de las TIC basado en las normas ISO*. 2012.