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CIO Performance Measurement

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Abstract
Over the last decades, the academy and the community of practice have described the differences in CIO profiles recognizing that the challenges posed by the technological development and the evolution of business models require a wide array of abilities and skills that not always match companies and individuals. If the classic idea of 'what you measure is what you get' is also true in IT, then a possible explanation of the misalignments of IS/IT units may lie in the wrong measurement of the expected performances and results of CIOs. This conceptual article explores and describes the effects of performance management and analyzes how it could affect the performance of the CIO.

Keywords
CIO, IT performance measurement, IT alignment, performance management.

1. Introduction
The role of the CIO as the person responsible for the IS/IT results has gained attention in the academia over the last decades. Some articles prescribe the role as a bridge between business and technologies and as an IT person that makes business-driven decisions(Banker, Hu, Pavlou, & Luftman, 2011).Empirical descriptions promote the debate about the directive quality, effectiveness and technological biases originated in the technical background of the CIO(Carter, Grover, & Thatcher, 2011; Enns, Huff, & Golden, 2003; Karanja & Zaveri, 2012). In a way the CIO effectiveness has been questioned since the IT paradox onwards, and there is a perception that many top management teams (TMT) or the C-Level are not getting what they want from the CIOs and CIOs claim to receive little support and unclear statements of what the TMT needs for the development and alignment of the IS/IT architectures and services(Potter, 2003). The principal-agent theory indicates that to align the agent's behavior with the interest of the principal, the principal can design a contract that motivates the agent to perform accordingly with the principal's objectives. This theory follows the premise that *what you measure is what you get*, indicating that individual's performance can be motivated and incentivized towards the desired results by setting and monitoring the right objectives, but also means that the wrong or missing performance measurement, would not obtain the target business results and performances. Then the motivation of this article is to explore what are the types of performance measurement applied to the CIOs and to illustrate the impact of measurement and monitoring of performance and results on the CIOs.

Recent literature describes different types of CIOs according to their skills and performance(Chun & Mooney, 2009; La Paz, 2017). It could be argued that CIO performances can be influenced by the incentives and compensation schemes, but even though the area of performance management has produced many theories and frameworks, very few research articles have approached the topic related to the top IT executive. Some research has discussed

what the TMT wants from the CIOs and defined the ideal position as a bridge between IT and business, and stated that CIO performance depends not only on their own background and capabilities but also on other C-level factors and corporate perspective towards IT (Peppard, 2010). However, no conceptual framework, theory or documented evidence was found during the development of the present article to explain how TMT actually assess the CIOs to incentivize their performance as the top executive responsible for the strategic planning and use of the IS/IT resources to achieve business objectives.

It is important for the CIOs and their organizations to analyze the effects that the measurement and compensation schemes may have over performance, since the metrics chosen may affect the behavior and can be an alignment mechanism, but also using the wrong indicators to measure performance would produce misalignments and departure from the business focus (Broadbent & Laughlin, 2009; Lebas, 1995), and consequently dissatisfaction of the CEOs and frustration for the CIOs. The former means that performance measurement can be a vehicle for motivation and effective alignment if the metrics are valid, but could alternatively explain part of the misalignments in the wrong measurement of performance and the consequent use of indicators into incentives schemes (Otley, 1999). So the aim of this article is twofold. First, to identify the types of performance measurement applicable to the different types of CIO expected performances, and, second, to explore the links between the type of measurement applied by the companies, and the type of CIO performance associated from the individuals. The research question that the article aims to answer is: how could the performance measurement help to align the behavior of CIOs with the business needs?

To answer the research question, the authors introduce a conceptual framework to map and classify the types of measurement applied in different CIO responsibility areas, used also to explore the linkages between measurement type and CIO performance.

2. Performance measurement and management in IS/IT

Measuring performance implies two difficult problems to solve for it to be effective. The first is to define performance and the second is to define measures (Lebas, 1995). A good definition of both is expected to influence behavior and align the use of resources towards the accomplishment of goals and objectives, but a deficient or incorrect definition would misdirect the efforts towards objectives different to those pursued (Broadbent & Laughlin, 2009; Johnston, Brignall, & Fitzgerald, 2002).

The emergence of scientific management is based on the idea of measuring performance to study the past, set baselines, define goals and strategies, and assess results. Managerial accounting contributed to the study of measurement and performance by extending the areas of measurement from the financial and economic to the behavioral aspects as well as with systems to plan and control management (Otley, 1999). Information systems and technologies have had an important role in the monitoring and reporting of metrics (Chapman & Kihn, 2009), and still present huge possibilities with the development of more technologies like IoT and methods to collect, store and process data such as business analytics or artificial intelligence. In spite of its relevant role and potential, IS/IT still lacks guidance to define what is the performance expected in different organizational contexts, and how to measure it.

The strategic alignment model (SAM) (Henderson & Venkatraman, 1993) and its derivatives describe the importance of aligning the IT and business strategies while connecting the corresponding operations in business processes and IS/IT. The strategic information systems planning (SISP) process is also recognized as one of great importance for the alignment and

effectiveness of IS/IT (Mangalaraj, 2014), but at the same time regarded yet as a black box (Peppard, Galliers, & Thorogood, 2014; Teubner, 2007). Several proxies have been used to describe the value of IT and its contribution to users, processes and business models, however, on one hand, the isolated measures are not appropriate to all contexts, and, on the other hand, many measures and objectives used to assess IS/IT effectiveness are associated with technical aspects rather than business objectives. For example, tools, alignment frameworks, and research studies have been designed to understand the dependent variable (DeLone & McLean, 1992; Ray, Barney, & Muhanna, 2004; Trice & Treacy, 1988), the financial assessment of IS/IT investments (Lewis, Snyder, & Rainer, 1995), the demonstration of the value of IS/IT (Chan, 2000; Dong, Xu, & Zhu, 2009; Kohli & Grover, 2008), and lately the role of the CIO as the person responsible for the results of the technological resources (Carter et al., 2011; Chun & Mooney, 2009; Earl & Feeny, 1994; La Paz, 2017; Lundquist, 2005; Nash, 2008). In spite of the active debate and the publication of descriptive and prescriptive theories (Aversano, Grasso, & Tortorella, 2012; Henderson & Venkatraman, 1993; Kearns & Sabherwal, 2006; Nolan & McFarlan, 2005; Teo & Ang, 1999),still the rates of failure in the implementation of IS/IT projects are high and the return on IT investments seem to be low or at most unknown, harming the CIO-CEO relationship (Krotov, 2015).

3. Exploring the CIO performance measurement

The industrial application of the first computer systems to store and process financial-accounting information made it simple to state the objectives and expectations on the IS/IT departments and their heads (Krotov, 2015). The rapid increase in storage and processing capacity, along with the reduction of the prices of computers and peripherals brought the use of computer technologies and networks to a massive increase and to innovative uses of IS/IT in all kinds of organizations, functions and levels that dramatically transformed the context of organizations and the expected performances and results of IS/IT for the business. It has been documented how the role of CIOs, as the responsible person for the planning and use of IS/IT resources has also evolved along with the evolution of technologies, as well as with the growing dependency of organizations on IS/IT (Chun & Mooney, 2009; Krotov, 2015; La Paz, 2017).

An IT paradox identified in the 90's negative returns and at least low contribution to business value from the IT investments, which has been later clarified as the use of the wrong metrics to represent the business value of IS/IT (Brynjolfsson & Hitt, 1996). Hereafter, the IS/IT community of research and practice studied and documented an array of socio-technical definitions of the dependent variable of IS/IT, alignment and governance methods and models to improve the value added by the exponentially increasing investments in IS/IT projects and services. Still, it is not always clear what to expect from the IS/IT, how to measure its performance and impacts, and the effects of such measurement. Traditional measures defined the utilization of IS as a key variable of system's success, indicating that the more the systems are used, the more benefits the organization obtains. Such logic reinforced the study of technology acceptance models (TAM and its derivatives) to learn why/how people adopt IS/IT, creating a herd effect in the number of research papers published until recently. At the firm level, IT payoff has come closer to capture in more detail variables such as inventory levels and holding costs, return on assets and equity as well as sophisticated financial metrics based on the cost, income or return per IT employee or the non-IS labor expenses to conclude that IT has led to productivity, profitability, quality and customer surplus to demonstrate the value of IS/IT. It is again, not clear the mechanism by which these metrics improve the alignment of the CIO and the unit s/he represents, or why to choose the different indicators to measure the performance of the IS/IT unit and its top executive.

CIO Responsibility area	Description	Classic models & frameworks (Authors)
Alignment	Alignment is a goal and a continuous process. As a goal, it seeks to achieve the harmony between the IT strategies and resources with the business strategies and goals. As a process, alignment seeks to improve the degree by which the IS/IT services and resources bridge the information production to fit and support business process excellence, and hence achieve outcomes such as profitability, efficiency, effectiveness and agility.	- Strategic Alignment Model (Henderson & Venkatraman, 1993) - Information Systems Framework (Leek, 1997) - Framework for Information Management (Rowley, 1998) - Alignment maturity (Luftman, 2003, 2004) - ITIL (Sailer, 2005)
Design	Design implies technical decisions about the architecture of applications, infrastructure and data, but also managerial choices on priorities to build business capabilities, model and norm the information flows and the interactions of users and systems. The decisions craft the adequate support of IS/IT to the requirements of core business processes at the operational, tactical and strategic levels.	- Soft systems design (Hevner, March, Park, & Ram, 2004) - Service Oriented Architecture (Perrey & Lycett, 2003; Zhang, Zhang, & Cai, 2007) - Resource Based View (Wernerfelt, 1984) - Dynamic Capabilities (Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997)
Implementation	Systems development, acquisition, installation, testing, data migration, users training are some of the implementation activities. These activities are usually the most visible and criticized of the IS/IT units because of its consumption of resources and are typically perceived as a black box.	- PMBOK (Duncan, 1996) - PRINCE2 (Commerce, 2009) - SCRUM (Cervone, 2011; Lyytinen & Rose, 2006) - Change management (Kettinger & Grover, 1995) - Unfreeze-move-refreeze (Lewin, 1951)
Usage	The use of IS/IT is regarded as a key variable to represent the implementation success. When systems and technologies in place have been well designed and implemented, users find them useful and see them as tools to improve their own performances on their daily tasks. Achieving high use rates requires not only the technical aspects but also the political domain for the change management.	- Critical Success factors (Boynton & Zmud, 1984) - Adaptive Structuration Theory (DeSanctis & Poole, 1994) - Task Technology Fit (Goodhue & Thompson, 1995) - TAM (Venkatesh & Davis, 2000)
Reporting	There is an increasing interest and need to measure, monitor, visualize, analyze and provide opportune information about cost, quality, speed, efficiency, productivity, security, and any other business area where informed decisions are required. To measure performance, collecting, processing and distributing information is key, as well as the role of IS/IT to achieve opportune measurement.	- TQM (Barata & Cunha, 2017) - Six sigma (Davis, 1989) - Task Technology Fit (Goodhue & Thompson, 1995) - Balanced Scorecard (Kaplan & Norton, 1996) - Business Intelligence / KDD (Fayyad, Piatetsky-Shapiro, & Smyth, 1996; Wirth & Hipp, 2000)

Table 1. CIO responsibility areas and classic models per area

The areas of IS/IT performance have been studied and modeled under particular approaches but isolated from each other. Insulated indicators of performance may induce particular effects, but the overall IS/IT and business performance is a complex phenomenon that integrates

responsibilities of the CIO and its team in a wide array of socio-technical areas, where the unattended variables may hamper the overall corporate performance. Table 1 synthesizes the main responsibilities that companies assign to the CIOs and the principal theories associated to these areas, generically identified here as alignment, design, implementation, use and reporting.

The areas of responsibility are themselves interconnected and can be linked with the emphases of CIO performances according to the business objectives. The responsibility for the alignment could be regarded as the most strategic, since it takes involvement and collaboration of all the C-suit to define the business model and focus on priority business objectives requiring IS/IT. The strategic definitions require tactical plans and decisions that shape the architectural design of the IS/IT including applications, infrastructure, data, information flows, user profiles, norms of use, privacy policy, etc. The blueprints and architectural ideas are then put into practice by the development, acquisition, contracting of systems and services that materialize the IS/IT architecture and implement the nervous system to capture, process, and mobilize the information supporting the business processes and the end users. Once implemented, the IS/IT need to become the stable and robust tools for the operational performance of users on the business processes and tasks that produce and consume data and information. Finally, the tactical and decisional levels receive the feedback from performance to contrast the meeting of business goals with the execution of the IS/IT investments and consider re-alignment.

Figure 1 illustrates an association of the CIO responsibility areas with corresponding areas of performance and results measurement. Ideally, a CIO would take responsibility and commit to objectives in all areas, however, the top IT executive could be specialized in some areas but not trained in others and companies may be tempted to monitor what is easy or simple to measure, leaving key areas unattended and missing the opportunity to set the right incentives for the performance of the CIO and his unit. Yet it is necessary to define a method to choose *what* and *how much* is expected from the IS/IT to establish the appropriate measurement.

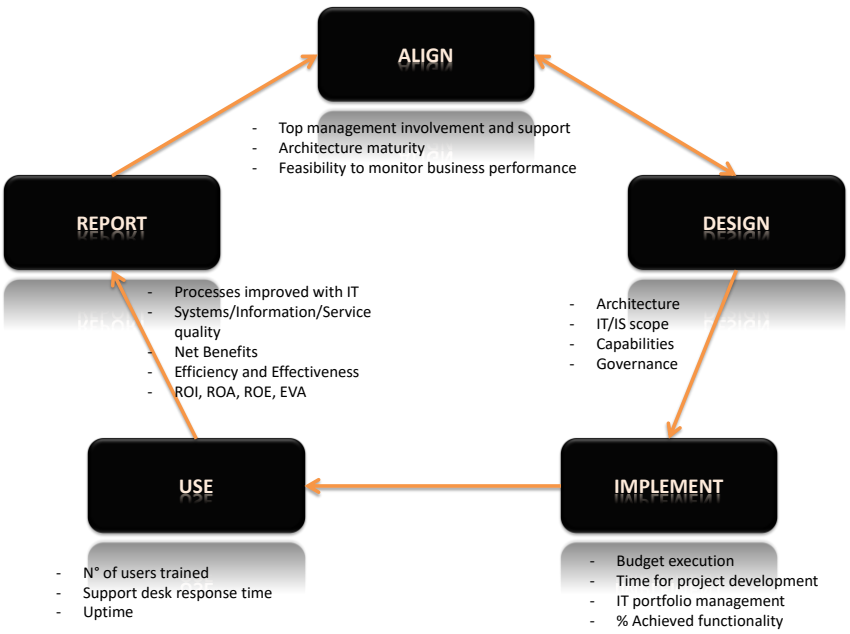

Figure 1: Association of CIO functions with areas of responsibility

4. Clarifying the performance–measurement–objectives issues

Modern business strategies are based on strategic planning processes, thus providing useful concepts as business scope and strategic objectives (Kaplan & Norton, 2008). As an alignment method, the process of defining the right measurement will have as input the core business definitions prior to the measurement definition. Business planning and IT alignment models tend to be generic identifying a link between the business and the IT strategy (Baets, 1992), but do not acknowledge the sequence provided by the strategic planning processes. The first step when defining performance and measurement should be to define the IS/IT scope, that is, where IS/IT support the business processes, and in our specific case, what would be the areas of responsibility and performance for the CIO. Looking at the CIO responsibilities table, companies could choose which of these areas suit better to the business model needs and set the boundaries and baseline for the IS/IT actions. Second, a fluid communication process between the TMT and the CIO takes place to clarify which are the business results expected by the organization and the role of IS/IT to achieve those goals. Having declared the organizational expectations and business targets, leads to the association of a measurable performance definition. While business core elements may not vary, the metrics applied to the measurement of performance could be expected to be different over time, meaning that IS/IT focus is determinant for the achievement of outcomes because it adds context on what to expect next.

4.1 Staged process for performance measurement definitions

We now further develop the process of performance measurement definitions associated to the areas of responsibility for the CIO following a five-stage scheme (Figure 2), from business strategic definitions to measurement definition.

Stage 1: Strategic Business Definitions

The strategic definition should not correspond to the CIO or the TMT, at least not unilaterally. It can be expected to first state basic definition for the business model, scope and objectives in a given organization that hires a CIO. The business definitions go beyond the scope of this article, and although several research articles deal with the topic of CIO participation in strategic definitions, we will regard it as an input for the performance management in the IS/IT as long as they are, indeed, defined.

Stage 2: IS/IT Scope Definition

As stated before, strategic definitions are present in almost every organization, not being usually the case for IS/IT. To define the IS/IT scope it is necessary to determine the role of technologies in two areas:

A) To state the IT Role companies must answer: Where in the business model will IS/IT be present? Which business processes must be supported with the IS/IT resources? What are the internal/external IT relationships on which the business depends on?

B) To define the CIO responsibility organizations need to define: What are the core processes on which strategic objectives depend on the IS/IT functioning? What is the level of control and decision of the CIO over the IS/IT assets?

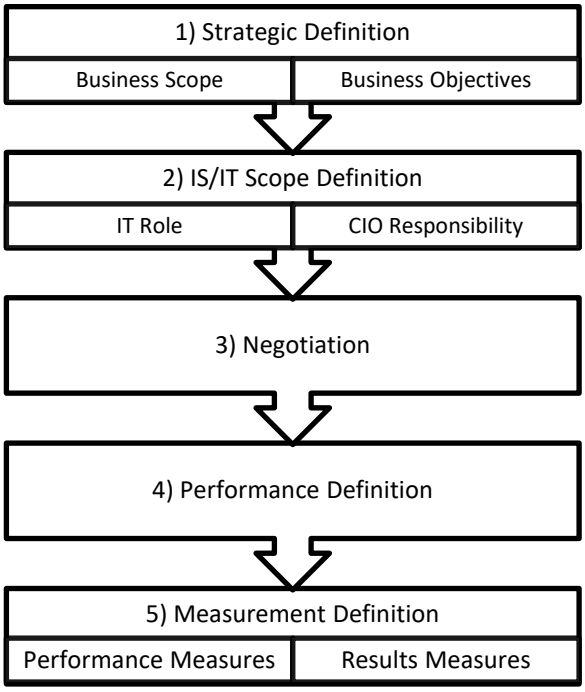

Figure 2: Staged scheme for performance measurement

Stage 3: Negotiation

Once stages 1 and 2 are well defined and we know *what we want to measure*, a mixed instrumental and communicational process to define performance and measures takes place. Negotiation is the communicational process that ensures that C-level requirements are formalized and understood by the IT executive, and the CIO educates the TMT on the capabilities and impact of IS/IT, avoiding the usual perception of '*black box'* with unknown impact of the IS/IT assets and investments. For the negotiation process to be successful, the C-level requirements must realistically meet the IS/IT scope defined earlier.

Stage 4: Performance Definition

Looking at Lebas (1995) definition *"Performance is about deploying and managing well the components of the causal model that leads to the timely attainment of stated objectives within constraints specific to the firm and the situation"* We recognize the components of performance:

- Objectives and deliverables: Defined by C-level and clarified on negotiation step
- Causal model and resources: Establish an activity plan to achieve those objectives
- Time: Agreement on deadlines for the activities in the plan declared to the C-level

The C-level (including the CIO) define the expected performance on each component indicating how and why they add value and can be considered as good or bad outcomes for the business.

Stage 5: Measurement Definition

Finally, we select from an array of metrics which of them suit better *what to measure*, providing traceability on partial achievements and performances, as well as revealing the final contributions of IS/IT to the business objectives. The set of measures should relate to performance as an overall system that indicates contributions and deviations from the IS/IT activity plan on the scope defined and negotiated at the C-Level.

4.2 Illustration of the 5 stage scheme for the CIO performance measurement

This section applies the scheme to illustrate the definition and selection of performance measures for two types of CIO (Figure 3), namely utilitarian and strategic (Sobol & Klein, 2009). The Utilitarian-CIO scope will be characterized as operational-technical oriented whereas strategist-CIO scope will aim to an improvement on the business value through innovation and optimization of the business processes and model.

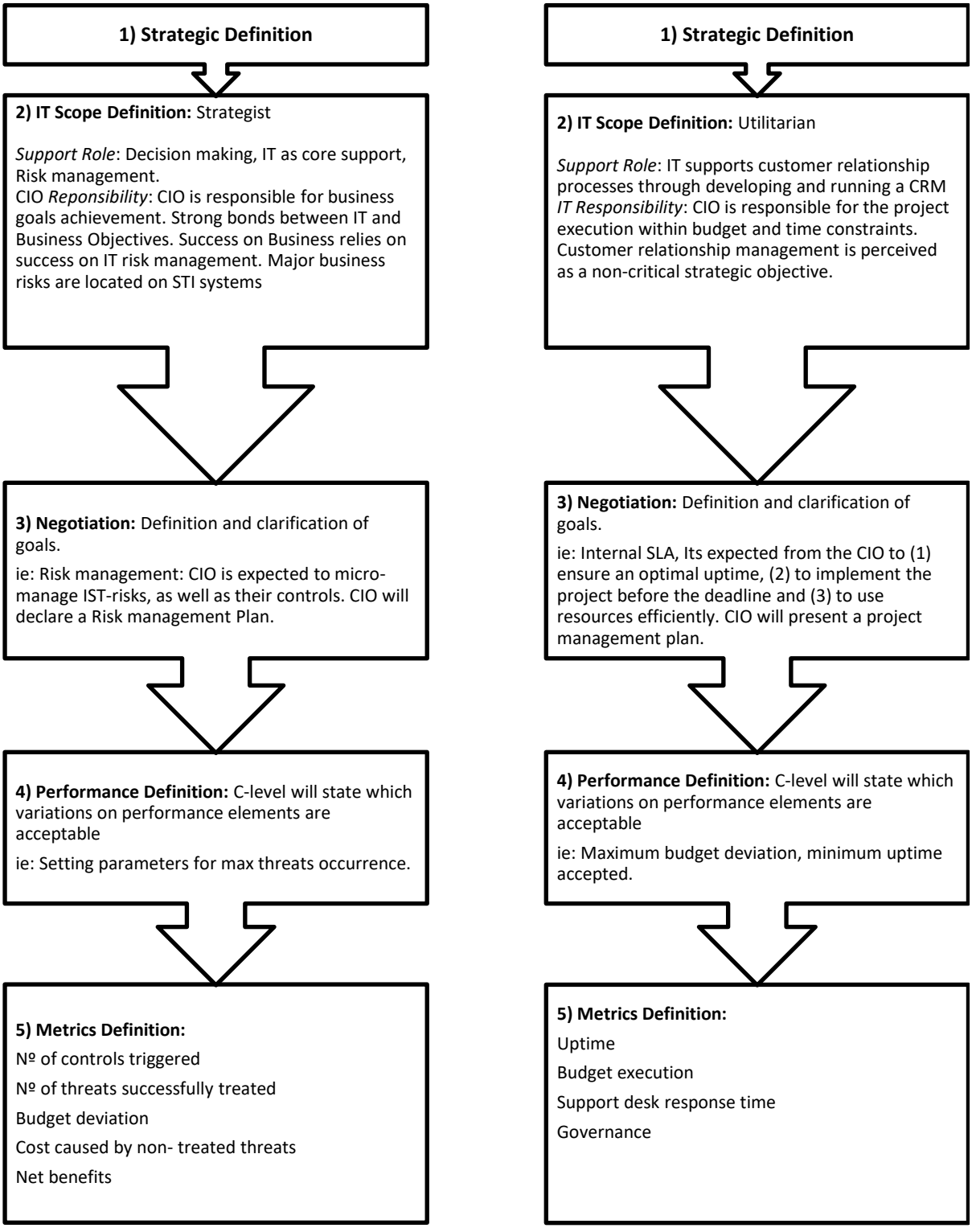

Figure 3: Illustration of the 5 stage scheme for performance measurement

5. Conclusions

Performance management in IS/IT is rarely studied, and many questions about what is IS/IT performance, or how to measure it, still remain unsolved. Even though there is no single answer for those questions, the article highlights the relevance of performance management and introduces a conceptual framework with responsibilities of CIOs and a scheme to define the

measurement and emphases on performance management that shed light on the definition of performances and measures.

This article constructively criticizes the lack of models and myopia in developing measures and metrics for IS/IT management and alignment. Traditional indicators like uptime, time to market, IT budget execution may be easy to measure and, even though it is true that too bad values in these measures would indicate value destruction, meeting reasonable levels in these metrics not necessarily results in business value added. Similarly, measuring the performance of CIOs and compensating them based on indicators associated only with routine operations would induce to a utilitarian rather than strategic performance. Alternatively, compensation schemes based on measures originated from the definition of business objectives and revealing contributions to business value with IS/IT could be more effective to align the efforts of the CIO and his team. There are, however, important barriers to solve in the definitions of performance and measurement, like sharing a company vision about the role of IT in the business by CIOs and TMT, unifying the concept of business value between the technical and the managerial perspectives, or establishing an appropriate reporting structure for the CIO (Krotov, 2015). Also challenging is the validation of measures that reveal strategic contributions of the CIO and his team, which not only takes the effort to induce the metrics from a staged scheme like the one we introduced, but also needs to monitor the metrics over time to assess its effectiveness in aligning the IS/IT with the business model.

References

Aversano, L., Grasso, C., & Tortorella, M. (2012). A literature review of Business/IT Alignment Strategies. *Procedia Technology, 5*, 462-474.

Baets, W. (1992). Aligning information systems with business strategy. *The Journal of Strategic Information Systems, 1*(4), 205-213.

Banker, R. D., Hu, N., Pavlou, P. A., & Luftman, J. (2011). CIO reporting structure, strategic positioning, and firm performance. *MIS quarterly*, *35*(2), 487-504.

Barata, J., & Cunha, P. R. (2017). Synergies between quality management and information systems: a literature review and map for further research. *Total Quality Management & Business Excellence*, *28*(3-4), 282-295.

Boynton, A. C., & Zmud, R. W. (1984). An assessment of critical success factors. *Sloan management review*, *25*(4), 17-27.

Broadbent, J., & Laughlin, R. (2009). Performance management systems: A conceptual model. *Management Accounting Research, 20*(4), 283-295.

Brynjolfsson, E., & Hitt, L. (1996). Paradox Lost? Firm-level Evidence on the Returns to Information Systems Spending. *Management science, 42*(4), 541-558.

Carter, M., Grover, V., & Thatcher, J. B. (2011). The emerging CIO role of business technology strategist. *MIS Quarterly Executive, 10*, 19-29.

Cervone, H. F. (2011). Understanding agile project management methods using Scrum. *OCLC Systems & Services: International digital library perspectives, 27*(1), 18-22.

Chan, Y. E. (2000). IT value: The great divide between qualitative and quantitative and individual and organizational measures. *Journal of Management Information Systems, 16*(4), 225-261.

Chapman, C. S., & Kihn, L.-A. (2009). Information system integration, enabling control and performance. *Accounting, organizations and society, 34*(2), 151-169.
Chun, M., & Mooney, J. (2009). CIO roles and responsibilities: Twenty-five years of evolution and change. *Information & Management, 46*(6), 323-334.
Commerce, O. o. G. (2009). *Managing successful projects with PRINCE2*: The Stationery Office.
Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.
DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information systems research, 3*(1), 60-95.
DeSanctis, G., & Poole, M. S. (1994). Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. *Organization Science, 5*(2), 121-147. doi:10.1287/orsc.5.2.121
Dong, S., Xu, S. X., & Zhu, K. X. (2009). Research note—information technology in supply chains: The value of it-enabled resources under competition. *Information systems research, 20*(1), 18-32.
Duncan, W. R. (1996). A guide to the project management body of knowledge.
Earl, M. J., & Feeny, D. F. (1994). Is Your CIO Adding Value? *Sloan management review, 35*(3), 11.
Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they? *Strategic management journal*, 1105-1121.
Enns, H. G., Huff, S. L., & Golden, B. R. (2003). CIO influence behaviors: the impact of technical background. *Information & Management, 40*(5), 467-485.
Fayyad, U., Piatetsky-Shapiro, G., & Smyth, P. (1996). The KDD process for extracting useful knowledge from volumes of data. *Communications of the ACM, 39*(11), 27-34.
Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS quarterly*, 213-236.
Henderson, J. C., & Venkatraman, H. (1993). Strategic alignment: Leveraging information technology for transforming organizations. *IBM systems journal, 32*(1), 472-484.
Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS quarterly, 28*(1), 75-105.
Johnston, R., Brignall, S., & Fitzgerald, L. (2002). 'Good enough'performance measurement: A trade-off between activity and action. *Journal of the Operational Research Society*, 256-262.
Kaplan, R. S., & Norton, D. P. (1996). *The balanced scorecard: translating strategy into action*: Harvard Business Press.
Kaplan, R. S., & Norton, D. P. (2008). *The execution premium: Linking strategy to operations for competitive advantage*: Harvard Business Press.
Karanja, E., & Zaveri, J. (2012). IT Leaders: Who Are They and Where Do They Come From? *Journal of Information Systems Education, 23*, 143-163.
Kearns, G. S., & Sabherwal, R. (2006). Strategic alignment between business and information technology: A Knowledge-Based view of behaviors, outcome, and consequences. *Journal of Management Information Systems, 23*, 129-162.
Kettinger, W. J., & Grover, V. (1995). Special section: toward a theory of business process change management. *Journal of Management Information Systems, 12*(1), 9-30.
Kohli, R., & Grover, V. (2008). Business value of IT: An essay on expanding research directions to keep up with the times. *Journal of the association for information systems, 9*(1), 23.
Krotov, V. (2015). Bridging the CIO-CEO gap: It takes two to tango. *Business Horizons, 58*(3), 275-283.

La Paz, A. (2017). How to Become a Strategist CIO. *IT Professional*, *19*(1), 48-55.
Lebas, M. J. (1995). Performance measurement and performance management. *International journal of production economics*, *41*(1-3), 23-35.
Leek, C. (1997). Information systems frameworks and strategy. *Industrial Management & Data Systems*, *97*(3), 86-89.
Lewin, K. (1951). Field theory in social science: selected theoretical papers (Edited by Dorwin Cartwright.).
Lewis, B. R., Snyder, C. A., & Rainer, J. R. K. (1995). An empirical assessment of the information resource management construct. *Journal of Management Information Systems*, *12*, 199-223.
Luftman, J. (2003). Assessing IT/business alignment. *Information Systems Management*, *20*(4), 9-15.
Luftman, J. (2004). Assessing business-IT alignment maturity. *Strategies for information technology governance*, *4*, 99.
Lundquist, E. (2005). What it takes to be CIO. *eWeek*, *22*(3), 26-26.
Lyytinen, K., & Rose, G. M. (2006). Information system development agility as organizational learning. *European Journal of Information Systems*, *15*(2), 183-199.
Mangalaraj, G. (2014). *Strategic information systems planning: A literature review*. Paper presented at the MWAIS.
Nash, K. S. (2008). What it takes to succeed now as a CIO. *CIO Magazine, December 11, 2008*. Retrieved from http://www.cio.com/article/470377/What_It_Takes_to_Succeed_Now_as_a_CIO
Nolan, R., & McFarlan, F. W. (2005). Information technology and the board of directors. *Harvard business review*, *83*, 96-106.
Otley, D. (1999). Performance management: a framework for management control systems research. *Management Accounting Research*, *10*(4), 363-382.
Peppard, J. (2010). Unlocking the performance of the chief information officer (CIO). *California Management Review*, *52*(4), 73-99.
Peppard, J., Galliers, R. D., & Thorogood, A. (2014). Information systems strategy as practice: Micro strategy and strategizing for IS. *The Journal of Strategic Information Systems*, *23*(1), 1-10. doi:http://dx.doi.org/10.1016/j.jsis.2014.01.002
Perrey, R., & Lycett, M. (2003). *Service-oriented architecture*. Paper presented at the Applications and the Internet Workshops, 2003. Proceedings. 2003 Symposium on.
Potter, R. E. (2003). How CIOs manage their superiors' expectations. *Communications of the ACM*, *46*(8), 74-79.
Ray, G., Barney, J. B., & Muhanna, W. A. (2004). Capabilities, business processes, and competitive advantage: choosing the dependent variable in empirical tests of the resource-based view. *Strategic management journal*, *25*(1), 23-37.
Rowley, J. (1998). Towards a framework for information management. *International Journal of Information Management*, *18*(5), 359-369.
Sailer, M. (2005). *Towards a service management information base*. Paper presented at the IBM PhD Student Symposium at ICSOC05.
Sobol, M. G., & Klein, G. (2009). Relation of CIO background, IT infrastructure, and economic performance. *Information & Management*, *46*(5), 271-278.
Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic management journal*, 509-533.
Teo, T. S., & Ang, J. S. (1999). Critical success factors in the alignment of IS plans with business plans. *International Journal of Information Management*, *19*(2), 173-185.
Teubner, R. A. (2007). Strategic information systems planning: A case study from the financial services industry. *The Journal of Strategic Information Systems*, *16*(1), 105-125.

Trice, A. W., & Treacy, M. E. (1988). Utilization as a dependent variable in MIS research. *ACM SIGMIS Database, 19*(3-4), 33-41.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science, 46*(2), 186-204.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic management journal, 5*(2), 171-180.

Wirth, R., & Hipp, J. (2000). *CRISP-DM: Towards a standard process model for data mining.* Paper presented at the Proceedings of the 4th international conference on the practical applications of knowledge discovery and data mining.

Zhang, L.-J., Zhang, J., & Cai, H. (Eds.). (2007). *Services computing*: Tsinghua University Press, Beijing and Springer-Verlag Berlin Heidelberg.