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IT strategy Implementation Framework – Bridging Enterprise Architecture and IT Governance

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ABSTRACT

It's increasingly acknowledged that firms cannot be competitive if their IT strategies are not implemented methodically. A number of proposals have been made to prioritize strategic IT plan executions and determine the most appropriate models and architectures. While IT governance primarily focuses on day-to-day IT operations, enterprise architecture primarily focuses on designing the future state of architecture in support of business. Despite still being a major concern for business and IT executives, there is little published research that bridges both and therefore attempts to give methodological support from a holistic perspective. Additionally it seems that governance needs to be investigated in terms of implementing IT strategies on different levels of abstraction. This article therefore proposes a framework to analyze institutions and guide IT-strategy implementation in order to analyze, monitor and control the desired results. Due to the underlying theories and applied interviews the model is potentially generalizable.

Keywords (Required)

Enterprise architecture, IT governance, IT strategy, IS strategy, IT-strategy implementation, Multi project management, Method engineering

INTRODUCTION

IT-strategy related issues are steadily among the highest ranking topics on management agendas (Brown, 2004, Mocker and Teubner, 2005). Numerous approaches consider strategic IT plans and try to provide support for implementing IT strategies from different perspectives. There is wide acceptance of the need for strategic IT planning (e.g. Cobit processes P01). IT governance (e.g. ITIL, Cobit) is often used to define policy development, to integrate best practices for IT control and to implement compliance, all determined by a strategic IT plan (Peterson, 2004). The focus is primarily on running daily IT operations but lacks a methodology on how alignment to business can be achieved and in particular, how IT-strategy can be implemented. In contrast enterprise architecture (EA) primarily focuses on designing the future state of architecture in support of business (strategy); but it does not consider IT-strategy (Winter and Fischer, 2007). Furthermore multi project management (MPM) as a central driver for change in organizations focuses primarily on the choice and successful execution of projects but neglects IT governance (ITG) and EA aspects (Dammer, 2008). However, EA allows for such a choice of projects but provides no support in executing these.

To implement strategic IT plans for determining the most appropriate models and architectures can be hard without a supporting tool. In this paper, we therefore propose an approach based on existing EA, ITG and MPM theories to allow for a methodological support. Hence, we construct an IT-strategy implementation framework (ITSIF) that bridges EA and ITG by using the technique of MPM in the realm of method engineering (ME). We choose EA, ITG and MPM because we are able to show that all three are indispensable components for methodological IT-strategy implementation.

In the next section we give an overview of our research methodology. Section three comprises some background on IT-strategy, depicts the need for an ITSIF and deduces theoretical underpinnings and requirements. In line with the requirements, we propose an integrated framework in section four and illustrate detailing artifacts on a micro level. In the last section, the results are discussed and further proceedings in our ongoing research process are depicted.

RESEARCH METHODOLOGY

The basis of this paper is build upon the idea of design science in IS research (Nunamaker, Chen and Purdin, 1991, March and Smith, 1995). In particular a design approach for an IT-strategy framework following Hevner et al. (2004, 2007) was

developed. At first a relevance cycle was conducted by identifying related problems in an organizational environment (fig. 1). In this phase expert interviews and a first review of scientific literature led to the requirements presented in section 3.

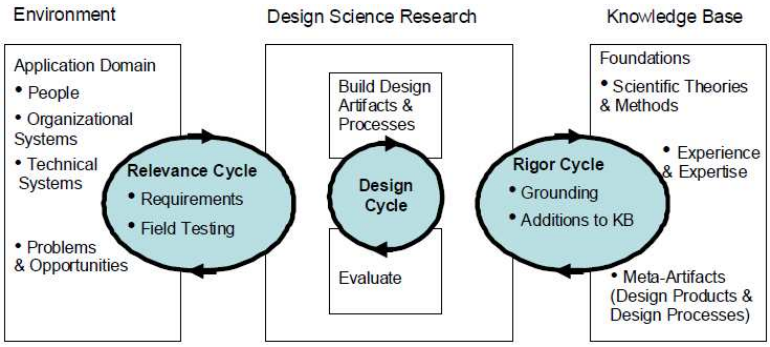

Figure 1. Three cycle view of design science research (Hevner, 2007)

In the second phase a rigor cycle has been conducted by reviewing relevant scientific literature regarding existing approaches (Webster and Watson, 2002). The results of the relevance and rigor cycles served as a basis for the initial design cycle. In the following design cycles valuable contributions from subject-matter experts were used to refine and extend the framework (section 4). A first test for the construct validity, as proposed by Lee (1991), was conducted by having IT-strategy experts validate the elements of the framework.

THE NEED FOR AN IT-STRATEGY IMPLEMENTATION FRAMEWORK

Background on IT-strategy

IT-strategy related issues are steadily among the highest ranking topics on management agendas and are discussed by practitioners on numerous conferences and magazines (Luftman et al., 2006, Gartner, 2007). But most scientific work in Strategic Information Systems Planning (SISP) seems to focus on the IS planning process itself rather than on the implementation (Teo and Ang, 2000). The latter can be differentiated into transformation and execution (Mack, 2004). Execution describes the implementation of strategies within the line management boundaries (activities/processes), whereas transformation depicts the implementation by projects (Cameron, 2005). Brown shows that between 1991 and 2004 only 10% of scientific work in SISP focuses on the implementation of IT-strategy (Brown, 2004). Additionally it seems that IT-strategy is still an arbitrary concept in practice and scientific research is only poorly perceived in practice (Mocker and Teubner, 2005). Numerous papers call for and develop tools or systemic approaches to clarify strategic IT domains and support institutions in implementing their IT-strategy (Shu, 2008, Mocker and Teubner 2005, Okumus, 2003).

Several different IT-strategy approaches and frameworks have been proposed (Salmela and Spil, 2002, Mentzas, 1997, Min et al., 1999, Brenner et al., 2002). Although some frameworks (e.g. Salmela and Spil, 2002) address both, IT-strategy development and implementation, it appears that organizations adopting these overemphasize development. We hold that a more implementation-looking perspective to consider both, effectiveness and efficiency doesn't receive enough attention.

In this paper we do not get into the discussion of the *development* of IT strategies and their interconnection to business strategies. The main focus is on the *implementation* of IT strategies and their interconnection to EA, ITG and MPM. We account for the latter by the following: According to Roush and Ball a strategy will not be successful, if there is no effective mechanism for the implementation: "(…) regardless of the intrinsic merit a particular strategy has, it cannot succeed if an effective implementation procedure is missing." (Roush and Ball, 1980)

Studies show that IT-strategy implementation is important for the following reasons (Chew and Gottschalk, 2009):

- Failure to carry out IT strategies can cause lost opportunities, duplicated efforts, incompatible systems, and wasted resources.
- Extent to which strategic IT planning meets its objectives is determined by implementation.
- Lack of implementation leaves firms dissatisfied with and reluctant to continue their strategic planning.
- Lack of implementation creates problems establishing and maintaining priorities in future IT strategies.

IT-strategy implementation can be defined as the process of completing the activities/processes and "[..] projects for application of information technology to assist an organization in realizing its goals." (Chew and Gottschalk, 2009). Hence, IT Strategies have to comprise a broad variety of aspects, since it is not just an act of implementing projects and systems. Instead, implementing an IT-strategy demands an integrated view in planning numerous aspects. Therefore ITG models or structures as well as EAs to align those activities to the company's business are required to achieve the mission.

Theoretical underpinnings and requirements

The natural first step in implementing IT strategies is to create a structure with relevant layers and dimensions that guide the specifics of necessary activities, decisions, roles and policy making entities (Peterson, 2004, Korhonen et al., 2009). To be consistent with IT-strategy literature (cp. Bartenschlager and Goeken, 2009) and conducted interviews we raise the following criterias and turn to the according literature to address: The ITSIF

- shall allow for efficiency and effectiveness,
- is required to specify a methodological support for IT-strategy implementation, and
- shall consider and specify organizational layers.

The ITSIF shall allow for efficiency and effectiveness

According to Burns and Stalker (1994), mechanistic and organic organizations can be differentiated. Mechanistic organizations aim predictability and accountability, operate like machines and can be engineered in a high-performance system. In contrast organic organizations aim flexibility, adaptability and innovation but provide less specializations and formalization, are less hierarchical and have more lateral communication and coordination.

Efficiency measures resource utilization or the comparison between input and output. Effectiveness refers to the absolute extend to which the goals are accomplished. When the structural form of an organization is functional, the objective is that internal efficiency and strong hierarchical control is necessary to ensure the overall success (mechanistic), but when the form is organized around products and services, the focus is on external effectiveness (organic) (Zmud, 1984). Performance is a function of both - efficiency and effectiveness (Ostroff and Schmitt, 1993). Therefore, an organization pursuing both efficiency and effectiveness must have mechanistic and organic characteristics.

Since a governance structure is an essential part of every strategy, it also needs to be taken into account when implementing IT-strategy (Weill and Ross, 2004). Hence, our framework has to allow for both efficiency and effectiveness. The latter leaves room for adjustments within the established framework.

We argue that EA stands more for efficiency and ITG is more about effectiveness of the information systems function. Moreover, we are in line with Korhonen et al. (2009) and therefore differentiate between *planning* and *execution*. Planning ensures external effectiveness and has an emphasis on EA, whereas execution ensures internal efficiency and has emphasis on ITG.

The ITSIF is required to specify a methodological support for IT-strategy implementation

Both, empirical and prescriptive research studies emphasize the need for improved implementation of IT-strategy (Gottschalk, 1999). According to Brown's (2004) research results, only 7% of the studies have done research on the implementation of IT-strategy. Surprising, given that without the implementation of IT-strategy, the whole planning process is questioned (Brown, 2004). However, the low percentage on IT-strategy implementation illustrates the need for more research in this domain. Furthermore, expert interviews we have conducted in an organization as part of our relevance cycle (cp. section 2) led to the need of a more methodological support of IT-strategy implementation, as also proposed by Shu (2008).

Therefore the relevant literature was identified, analyzed and structured according to Webster and Watson (2002). We found that most approaches give a rather general support relating to IT-strategy implementation (e.g. Min et al., 1999, Mentzas, 1997, Salmela and Spil, 2002). A more formal methodological support is not provided. Thus, we turned to ME literature what we based on McFarland's (2008) research. He compares strategy and software building processes. Software building is a research field of its own, ME originates from. The objective of ME in its origin is to define rules and guidelines for the formulation of methods to allow for a higher quality of information systems. While doing so, processes of software development are structured in components and their interrelationships (Heym, 1993). As a consequence, methods are usually extensive approaches to cover the whole process of information systems development and implementation. They required all

tasks and activities necessary for planning, designing and implementing information systems. It has been evidenced that a method can be described by activities, roles, results, techniques and a metamodel (Gutzwiller, 1994).

An activity is a functional execution unit generating one or more results. Activities can be structured hierarchical and be arranged in a sequence. The whole sequence defines the process model of a method. Roles or organizational units execute activities, whereas roles are an aggregation of activities from an executer perspective. Techniques are detailed instructions on how to generate results. The metamodel describes and structures the conceptional datamodel of all results.

Subsequently, we identified numerous approaches which transfer ME to the formulation and description of economic methods (cp. Thiesse, 2001, Krause, 2008). Goeken and Alter (2008) for instance adapt the approaches of ME on IT-Governance-Frameworks. Both argue that ME is the core of a design science oriented information systems research.

Hence, we transfer the theory of ME and stipulate that an integrated framework shall specify a methodological support for IT-strategy implementation based on the approaches of ME.

The ITSIF shall consider and specify organizational layers

According to Ross and Weill (2006), operating models are more important than business/IT strategies as the latter is often vague, unstable, and short-lived, whereas operating models define a simple but lasting vision of how a firm will survive and grow. Though, to implement and execute operating models a governance structure is needed. Moreover a layered approach is a crucial success factor for governance (Weill and Ross, 2004). In the process of IT-strategy implementation, strategic IT plans need to be refined to lower levels. In line with Korhonen et al. (2009), we state that the theory of requisite organization (Jaques, 1998) provides a feasible basis for such layering. It allows description of architectural artifacts at different levels of abstraction in discrete symbolic terms, referring to ME (e.g. terms such as processes, activities, roles and techniques).

Requisite organization is a theory that focuses on effective managerial hierarchy. The hierarchy reflects the complexity of problem solving. To determine the importance of one's position, the level of work in a role must be measured by 1) determining its responsibility, and 2) determining the decision time-span of the performed role. Jaques differentiates eight different strata, starting with a time range of more than 50 years ranging to a time range of 1 day to 3 month (Jaques, 1998). The highest four strata apply to conceptual-abstract and very long term strategic tasks with a time range from 5 to over 50 years. It is quite common in today's strategic management literature to narrow strategy to a time range of 3 to 5 years. As a result we restrict the scope of interest to the lowest four strata as depicted in table 1.

Stratum	Task type	Time span	Exemplary roles
I	Direct action tasks	1 day to 3 month	First-line manual and clerical work
II	Diagnostic accumulative tasks	3 month to 1 year	First-line managerial work and specialist work
III	Alternative paths	1 to 2 years	Managers of mutual recognition units and senior professionals
IV	Parallel tasks	2 to 5 years	General managers

Table 1: Strata in requisite organization (Jaques, 1998)

Our findings construe the non-existence of a single "best" IT organizational structure or governance arrangement because IT needs to respond to the unique environments within which it exists (Agarwal and Sambamurthy, 2002). Nevertheless, Jacques (1998) lowest four strata need to be considered in our framework and to allow for a complete IT-strategy implementation top-down (Raps, 2008). It leaves room for adjustments within the established framework.

CONCEPTUAL FRAMEWORK

Constituent parts

EA provides the tight cohesion and loose coupling between business and IT artifacts. It is the "glue" that allows both business and IT (applications and infrastructure) to enable and drive each other. Therefore, effective EA is one of the key figures to achieve competitive advantage through IT. It extends traditional IT architecture with more business related artifacts such as organizational goals, products and services, markets and competitors – all, to provide a better business-IT alignment (Winter and Schelp, 2008). Usually, a process layer links IT artifacts with the mentioned business artifacts.

Its distinctive strength is the forward-looking nature, which can only be unleashed by "as-is" descriptions and "to-be" target views. Therefore, we use the following definition (Korhonen et al., 2009): *Enterprise architecture is a holistic, high-level approach to organizational design description and prescription*. Thus, EA focuses on the effectiveness from a planning perspective. The latter turns EA to the first important component of our framework. However, on the one hand, there is no explicit differentiation of IT and business artifacts (which would be necessary for alignment) and on the other hand, there is a lack of methods to implement EA views within the enterprise. Therefore, EA is not sufficient from an IT-strategy perspective.

As the role of IT has gained more importance and developed to an integral part of everyday's business in organizations, a strategic and holistic control was required. Senior management became more involved in the governance of IT due to the integration of business and IT and the intensifying corporate governance regulations (Weill and Ross, 2004). Therefore, since the mid nineties ITG has been increasingly discussed. The definition of ITG is broad and ambiguous and makes assessments difficult and inaccurate. Besides an increasing number of definitions for ITG, several different approaches have been proposed (ITGI, 2003, Weill and Ross, 2004). Despite the approaches that address both conformance and performance related aspects, it still appears that organizations implementing these guidelines overemphasize the conformance and the respective accountability and risk management aspects (Korhonen et al., 2009). In contrast the operational efficiency of the IT function and especially the more future-oriented, strategic dimension does not seem to receive enough attention. We therefore use the following definition: "*IT governance is a set of structures, processes and mechanisms which are used to manage and control the information technology and related assets inside an organizational context.*" (ITGI, 2003) This turns ITG to another important component of our framework.

While EA refers to the linking of IT and business related artifacts, ITG focuses on structures, processes and mechanisms to put this "high-level approach to organizational design" into action by implementing supportive roles and responsibilities as well as IT processes and mechanisms.

We assume that like in systems development, also strategic initiatives have a ‚build time' as well as a ‚run time'. For the transition of an initiative into runtime, special means and techniques will be essential. We argue that MPM is a technique of central importance to achieve the transfer of strategic plans to implementation, as projects are the central driver for change in organizations (Österle, 1994, PMI, 2000, De Haes and Van Grembergen, 2008). There is no general agreement on the definition and content of MPM in scientific and practical literature (Hiller, 2002). Therefore a definition and classification of the terms is made: *Multi project management is the overall umbrella term of a holistic and integral management of a project landscape executed by the according organization structures, methods and processes* (Dammer, 2008).

The implementation of strategy depends on the choice and successful execution of projects (Grundy, 1998, Baumöl, 2007). We therefore adopt the technique of MPM. According to Dammer (2008) and Pohl (2007) MPM is to be understood as a collection of techniques, activities and rules to allocate priorities in organizations for their overall benefit in terms of implementing strategies. It forms the holistic management of project landscapes by the according organizational structures (including roles), methods, processes and incentive systems (Dammer, 2008). Therefore, MPM and its constituent parts comprise a set of artifacts to be taken into account to conduct projects. Hence, ME can provide a helpful support to define MPM methodologies to implement changes in an organization by the *transformation* of *planning* to *execution*. This turns MPM to the third important component of our framework.

IT-strategy implementation framework

IT-strategy so far is more of an "abstract" construct and no framework for the implementation is provided (Bartenschlager and Goeken, 2009). The design of artifacts within the sphere of EA and ITG for understanding of the complex coherences in implementing IT-strategy is needed. *Planning* ensures external effectiveness and emphasizes EA. *Execution* ensures internal efficiency and has emphasis on ITG. Therefore we introduce both dimensions *planning* and *execution* in our framework. However, procedures and support to turn plans into execution is not focused so far. A methodological concept to bridge these two is substantial. Thus, we introduce a third dimension to consider change in terms of converting plans into execution. The dimension *transformation* illustrates the central component in implementing IT strategies. The latter allows for project oriented governance to deal with constantly occurring changes in organizations. The framework also stratifies four decision making levels by adapting Jacques' requisite organization theory, which allows for a description in symbolic: strategic, tactical, operational, and real-time.

Given the described dimensions and constituent parts, the ITSIF is illustrated as shown in figure 2 and is being in line with the aforementioned theoretical underpinnings and covering all three requirements.

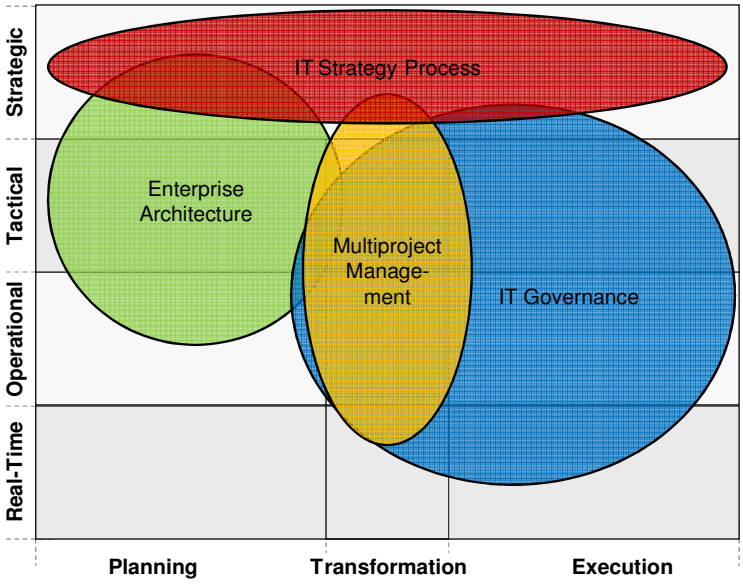

Figure 2. Bridging EA and ITG

The respective roles of EA, ITG and MPM are arranged in the following matrix: The center of gravity in the IT-strategy framework is on the *planning* side at the strategic level (Henderson and Venkatraman, 1994), whereas EA takes place *primarily* on the *planning* side at the tactical level. "Business processes should not be decomposed further than to the sub-process level. Detailed process descriptions including specifications of activities and work steps are out of EA scope and should be maintained by using specialized business process modeling tools and or workflow design tools." (Winter and Fischer, 2007) Therefore EA is not covering the real-time level but constitutes the most relevant part of the alignment between business and IT. Nevertheless, the perspective of EA is organization-wide and attention is to be directed towards external effectiveness. This is the sphere in which peripheral IT activities mainly take place (Shu, 2008). In contrary, the focus of MPM extends to both, tactical and operational levels in the *transformation* dimension, whilst the emphasis of ITG is *primarily* on the operational *execution*, the core IT activities for internal efficiency (ITGI, 2003).

Besides the shared corporate vision, the essential aspect for implementing IT-strategy is in implementing strategy for both, business and IT. In the process of IT-strategy development identified technological issues, however innovations can also enable business strategy. IT-strategy determines the planning and the transformation of strategic IT goals into governance structures, IT processes, applications and infrastructure by adjusting them to the business. "Furthermore, projects aiming at realizing strategic goals should not be decomposed in EA. Project portfolio tools and/or project management tools are more appropriate for this purpose." (Winter and Fischer, 2007) Thus, we state that the main approach for this transformation is MPM as shown in figure 2. We turn MPM into a formal methodological support to implement IT strategies by building on the approaches of ME as stated in section 3. By doing the aforementioned, a more formal methodological and adjustable approach of conducting projects can be provided.

Detailing artifacts

Previously, we introduced an ITSIF on a macro level to describe the coherences. However, the ITSIF does not make a proposition about more detailed artifacts and their interaction, which we call the micro level. Therefore, we pitch on a part and detail it on the basis of formal method first introduced in Bartenschlager and Goeken (2009) and based on the unified modeling language. Given the theoretical frame and an interpretive understanding of empirical phenomena (Lee, 1991), we construct detailed artifacts of ITSIF as depicted in Figure 3.

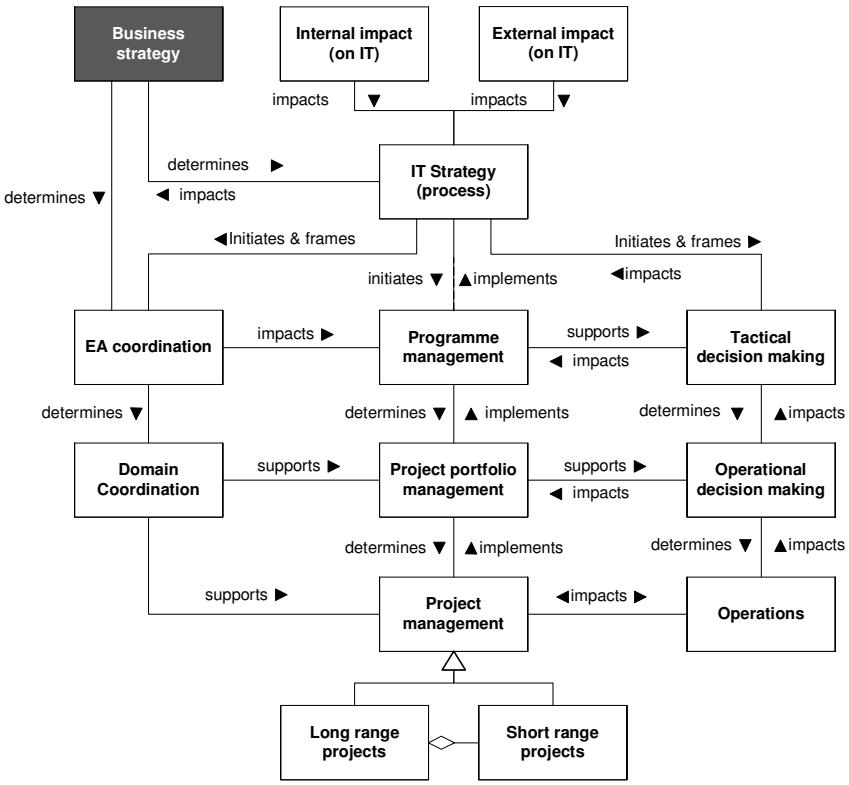

Figure 3. Detailing of the ITSIF

CONCLUSION AND FURTHER DEVELOPMENT

In this paper, three specific requirements for ITSIF have been raised. We are aware that this is a subjective task and further analysis could lead to different requirements. But according to Siau and Rossi (1998) the choice in the given situation needs to be based on the research question and available opportunities.

We meet the requirement of efficiency and effectiveness by combining EA for planning and ITG for execution to allow for both organic and mechanistic organizations. The two components are integrated by the approach of MPM based on a more formal methodology based in ME. By doing that we turn planning into execution artifacts, allow for a formal implementation of IT-strategy and fulfill the second requirement. Finally ITSIF considers and specifies organizational layers to allow for a top down implementation of IT-strategy stipulated by Raps (2008), which complies with the third requirement to consider and specify organizational layers. At the end, the framework still leaves necessary room for adjustments.

The ITSIF can help in identifying weaknesses in a company's IT-strategy implementation processes and identify areas of improvement. In a first case at an energy utility institution, the framework was perceived as an easy to use and helpful tool to consider numerous aspects in implementing IT-strategy. The approach allows for a better understanding of implementing IT-strategy in corporate environments as well as its monitoring and control. In this way it can contribute to the investigation of governance in terms of IT-strategy implementation.

We are aware that it is not an exhaustive framework. But the validity of the artifacts as well as the connections between them was derived on the basis of accepted scientific theories presented in literature as well as expert interviews. Moreover, other approaches consider different components (e.g. Balanced scorecard) or "mechanisms" (De Haes and van Grembergen, 2008). Therefore we will investigate the impact on our framework in terms of further detailing the artifacts on a micro level by using a formal methodology published in Bartenschlager and Goeken (2009).

The constructed model will be used in further case studies. By conducting these in our ongoing research project we will add empirical data to support our framework. Thereafter we fulfill the claim for a practical problem orientation as the basis for an application-oriented science within the field of information systems (Goeken, 2003) and an important guideline which should be followed in design science IS research (Hevner et al., 2004).

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