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Do KPIs used by CIOs Decelerate Digital Business Transformation? The Case of ITIL

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Completed Research Paper

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Abstract

This study provides a critical assessment of the current KPI-driven steering practices carried out by Chief Information Officers (CIOs). It explores how the use of ITIL KPIs affect the IT Service Management (ITSM) organization's learning behavior and how this behavior impacts on Digital Business Transformation. The results indicate that, when used to steer the ITSM organization, ITIL KPIs will reduce the organization's willingness to transform the current ITSM environment (i.e. current processes, work routines, services, policies and technologies) into the digital era. The findings suggest that, in order to successfully manage Digital Business Transformation, CIOs will need new types of management techniques which would endorse the organization's norm-challenging and innovative learning abilities but also assure the operative effectiveness of the ITSM environment.

Keywords: Digital Business Transformation, CIO, ITIL, KPI, Organizational Learning

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Introduction

Today, Chief Information Officers (CIOs) are using performance metrics to control and steer their IT Service Management (ITSM)[1] organizations. These performance metrics, known as Key Performance Indicators (KPIs), measure the ITSM organization's ability to operate various processes and procedures in the ITSM environment. For example, CIOs use these KPIs to reveal whether their ITSM organizations (their own or outsourced) achieve process-related quality and effectiveness targets. As these KPI-driven management practices are defined by a handful of widely known ITSM frameworks, such as the Information Technology Infrastructure Library (ITIL), and have proven to be a relatively simple and straightforward way to steer ITSM organizations, they have, over the years, almost gained an institutionalized position determining how CIOs should steer their ITSM organizations.

> *(1):* **IT Service Management (ITSM)** *refers to the entirety of activities – "directed by policies and structured and organized by processes and supporting procedures" – that are performed by an organization to plan, deliver, operate and control IT services offered to customers (FitSM Standards*

However, the ongoing exploitation of new digital technologies is bringing entirely new types of management challenges for CIOs, affecting also their current KPI-driven steering practices. These new management challenges are closely related to the changing role of CIOs in their organizations. CIOs are simply expected to extend their roles from technologists to business strategists while spending less time managing IT and more time deploying new business innovations and improvements enabled by the new digital technologies (Peppard 2010; Broadbent and Kitzis 2004; Carter et al. 2011; Gartner Inc. 2014; Kettinger et al. 2011; Leidner and Mackay 2007; Weill and Woerner 2013). As CIOs are expected to take responsibility for deploying these new digital initiatives, they are also expected to transform the company's existing ITSM environment into the digital era to support and operate these new digital innovations and improvements. Transforming the ITSM environment means changes to the existing processes, work routines, services, technologies, policies, targets and know-how, implemented in such a way that both new and initial business services can be operated side by side.

Earlier studies have defined Digital Business Transformation (or Digital Transformation for short) as the use of digital technologies to radically improve the company's performance (Fitzgerald et al. 2013; Westerman et al. 2014; Horlacher and Hess 2016). The definition describes the phenomenon at a company level, directed to the general public, whereas this paper focuses on studying the phenomenon more technically from the CIO's and the ITSM department's point of view. This means that the focus is on how Digital Business Transformation affects the company's existing ITSM environment. That is, CIOs who want to successfully manage Digital Business Transformation must be capable of leading the transformation of their existing ITSM environments into the digital era to support and run both new business services (enabled by new digital technologies) as well as their initial business services.

In order to manage Digital Business Transformation, CIOs must ensure that their ITSM organizations (in collaboration with other units in the organization) will learn to question existing ways of working, innovate, experiment; and, most of all, be willing to make required changes to the ITSM environment. This paper assesses whether the current steering practices of CIOs (based on the KPIs defined in ITSM frameworks such as ITIL) will enable the innovative organizational behavior required for success in Digital Business Transformation.

KPIs have previously been studied in relation to the CIO role, focusing for example either on the CIO's contribution to the firm's efficiency (Li and Ye 1999; Johnson and Lederer 2005 and 2010; Hu et al. 2014;

Taylor et al. 2015) or on the CIO's own efficiency (Smaltz et al. 2006; Wu et al. 2008; Chun and Mooney 2009; Peppard 2010; Chen and Wu 2011). KPIs have also been studied in various outsourcing contexts. For example, Herz et al (2013) studied various ITSM frameworks in order to provide a set of essential KPIs to monitor IT suppliers. Fitoussi and Gurbaxani (2012) studied how KPIs influence outsourcing contracts and concluded that outsourcing contracts should include both measurable goals and those that are less measurable. Saleh and Almsafir (2013) studied how ITIL adoption correlated positively with an organization's KPI achievements. The ITIL itself has also been studied over the years in various contexts (Marquis 2006; Pollard and Cater-Steel 2009; Iden and Langeland 2010; Iden and Eikebrokk 2015; Kabachinski 2011; Liu et al. 2011; Hoerbst et al. 2011).

Considerably less Information Services (IS) research has been conducted on how KPIs affect organizational learning. Wang et al (2010 and 2011) studied how KPIs influence e-learning whilst Malik et al (2012) studied the relations between market-based organizational learning and the firm's quality management capabilities. However, Wang et al limited organizational learning to e-learning whilst Malik et al focused only on market-based organizational learning by reporting case study findings without deeper examination of the underlying causes. This current paper, in contrast, focuses on the underlying reasons for the ITIL KPIs' influence on organizational learning abilities.

The primary objective of this study, therefore, is to contribute to the IS research on organizational learning and the CIO role, and to the KPI studies in an ITSM context, by setting the following research question: "*What kinds of organizational learning abilities do the ITIL KPIs measure and how does the use of these learning abilities affect Digital Business Transformation?*" To investigate this question, the author first needed to analyze what organizational learning abilities the ITIL KPIs measure of the ITSM organization. This was done by drawing from the organizational learning theory of Argyris and Schön (1974). Next, the author used the goal setting theory of Locke and Latham (2002) to analyze how the ITIL KPIs that measure specific learning abilities influence the ITSM organization's learning abilities and how the use of these learning abilities affects Digital Business Transformation.

The rest of this paper is organized as follows. The IT Service Management section describes the purpose of the ITSM frameworks and how CIOs use KPIs today to control their ITSM organization. The Theoretical Foundation section describes single- and double-loop learning methods and the goal setting theory which provide theoretical lenses to analyze the research question. The sections on Research Methodology and Analysis Findings describe the analysis methodology and research findings. The Discussion and Conclusion section provides the overall conclusions of this research.

IT Service Management and Collaborative Digital Business Transformation

This section describes the structure and purpose of the ITSM frameworks such as ITIL and its KPIs, and describes how CIOs currently use KPIs to manage their ITSM organizations. The section also outlines the principles of the collaborative Digital Business Transformation.

The ITSM Environment and Frameworks with Embedded KPI Portfolios

IT service management (ITSM) refers to the entirety of activities – "*directed by policies and structured and organized by processes and supporting procedures*" – that are performed by an organization to plan, deliver, operate and control information technology (IT) services offered to customers (FitSM Standards Committee 2016). ITSM as a discipline "*is focused on providing a framework to structure IT-related activities and the interactions of IT technical personnel with business customers and users*" (Orta et al. 2014, p.36).

Over the years several ITSM frameworks have been created to guide CIOs and their ITSM organizations on how to build and run their IT operations. These IT Service Management frameworks describe the best practices to design, deliver, manage and improve the ways in which information technology and services are used within an organization. They include, for instance, rules for setting up business processes and establishing ITSM roles with responsibilities. The frameworks normally also include a set of Key Performance Indicators (KPIs) to secure high quality services in the ITSM environment. These Key Performance Indicators are attached to various activities, procedures and processes in the ITSM environment to reveal whether the ITSM organization (their own or outsourced) operates these processes,

procedures and activities as required. KPIs can reveal, for example, if the ITSM environment suffers from a decrease in efficiency, stability, availability, capacity or accuracy.

CIOs' Current KPI-driven Controlling Practices

CIOs select a set of KPIs to control whether their ITSM organizations (their own or outsourced) are able to reach continuously the targets assigned to them. As many CIOs have outsourced large parts of their ITSM environments, they have included a set of KPIs in their outsourcing contracts. These KPIs have often been copied directly from ITSM frameworks such as ITIL.

In order to control whether the ITSM organization reaches the targets assigned to it, the CIO gathers the results of the KPI measurements via various reports produced by the ITSM organization. The KPI measurement results are then analyzed by the CIO, together with specialists, in order to plan, if necessary, various improvement activities to correct the discovered deviations in the existing ITSM environment. This reporting practice is carried out monthly or even weekly throughout the whole contract period, often over several years.

Collaborative Digital Business Transformation

Typically, the new business innovations are still created inside the value chain organizations (e.g. design, production, sales or support). On the other hand, more technical type of innovations (directed to improve IT efficiency, e.g., by using new digital technologies), are mostly innovated inside the ITSM organization. Regardless of which unit or units together *initiate(s)* a new innovation, the ITSM organization is in the "gate keeper's role" to decide whether this new innovation will be implemented into the ITSM environment or not. The ITSM organization has namely (still) the privilege to "throw a spanner in the works" by claiming, e.g., that the certain changes to the ITSM environment (i.e. process, technology or infrastructure changes) would be too risky to implement, e.g., due to the increased security threats. The unwillingness to change the ITSM environment can therefore be "camouflaged" into the technical explanations.

The extent of these ITSM changes can be anything from simple structural upgrades to a single database, to the fundamental revamping of the existing ITSM environment. The larger the changes are, the more common it is to run complex and massive IT transformation programs to ensure the required numerous changes to ITSM environment are correctly coordinated and implemented through several IT-projects. These IT transformation programs entail paradoxes (Robey 1997; Gregory et al. 2015). One of these paradoxes, which is also discussed in this paper, is how the ITSM organization is able to simultaneously execute these complex IT transformation programs (to transform parts of the ITSM environment) and at the same time assure the stability and effectiveness of the rest of the ITSM environment. According to Robey and Boudreau (1999) "*paradoxes require problem solving and creative thinking about how opposing elements can logically or meaningfully coexist*". The question remains, whether the CIO's current KPI-driven steering practices (based on ITSM frameworks such as ITIL) are able to motivate ITSM organizations towards this type of innovative learning behavior during Digital Business Transformation, and most of all, if the ITSM organizations are willing to co-operate with the rest of the organization in order to deploy new digital business innovations.

Theoretical Foundation

This section introduces single- and double-loop learning methods derived from the organizational learning theory of Argyris and Schön (1974). The single- and double-loop learning methods are used later (in the Research Methodology section) to categorize the ITIL KPIs depending on whether they measure the ITSM organization's specific single-loop or double-loop learning abilities. This section also describes the principles of the goal setting theory which provides a theoretical lens to analyze (in the Analysis Findings section) how the ITIL KPIs used by CIOs to steer their ITSM organizations affect the ITSM organization's ability to transform the ITSM environment into the digital era.

Single- and Double-loop Methods

"In order to correct a problem, one must be able to create an accurate description of the problem" (Argyris 1976, p.364); one must also have the ability to ask sensitive organizational questions (Argyris 1976, p.367). Based on this learning philosophy, Argyris and Schön (1974) created the learning loop concept, which describes an organization's ability to learn from its mistakes via recursive loops. Argyris and Schön used an everyday example, a thermostat, to describe what they meant by single-loop and double-loop learning. *"A thermostat is programmed to turn on if the room is cold, or turn off the heat if the room becomes too hot"* (Argyris 2002, p.206). This is typical single-loop learning behavior of a student (a thermostat). A student (or a thermostat) uses double-loop learning *"if it questions why it is programmed to measure temperature, and then adjusts the temperature itself"* (Argyris 2002, p.206). The following introduces these two learning methods used in different organizational environments.

Single-loop Learning and Related Organizational Model

"Single-loop learning occurs when errors are corrected without altering the underlying governing values" (Argyris 2002, p.206). By underlying governing values, Argyris meant organizational policies, targets and limitations (Argyris 1977, p.116). These could be related to products, processes, tasks or quality, for example (Argyris and Schön 1978, p.19). Single-loop learning therefore remains within the accepted boundaries as shown in Figure 1 (Argyris 2003, p.1179; Argyris 1976, p.367; Argyris and Schön 1978, pp.18-19). Single-loop learning is *"concerned primarily with effectiveness – that is, with how best to achieve the existing goals and objectives and how best to keep organizational performance within the range specified by existing norms"* (Argyris and Schön 1978, p.21). Although single-loop learning provides stability in the organization, it also inhibits learning in fundamental organizational issues, goals and activities (Argyris 1976, p.367).
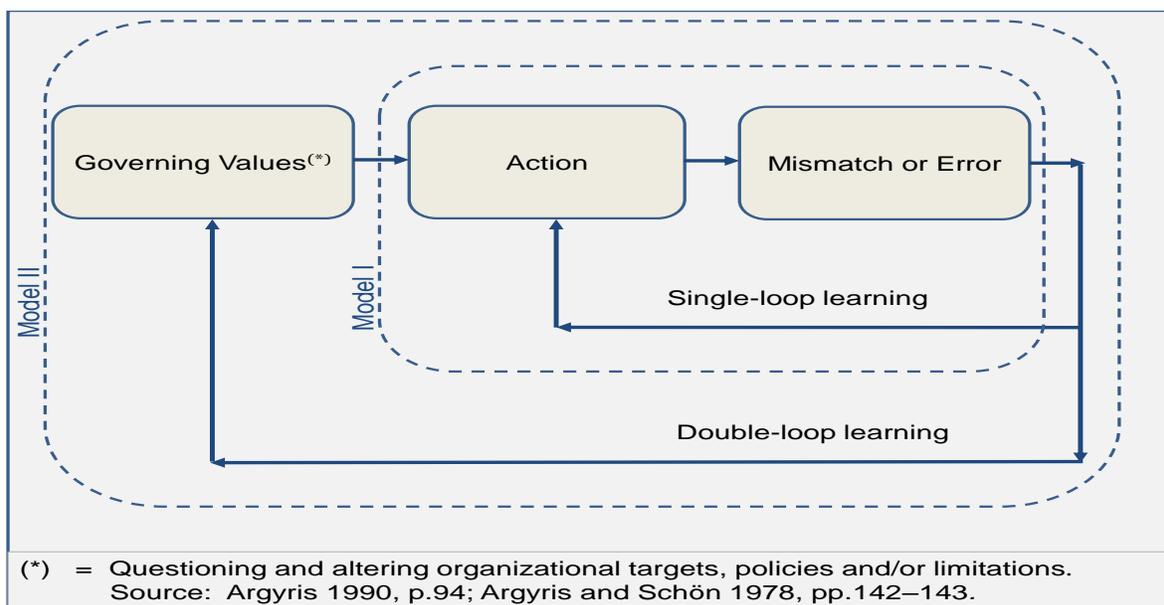

Figure 1. Single- and double-loop learning methods in the organizational environment.

The organization is in single-loop mode (in Model I), when the organization only is allowed for single-loop learning. In the Model I environment, the members are encouraged to undergo a routinized type of learning (single-loop learning) but not to question the fundamentals of governing values (company policies, targets and limitations) (Argyris and Schön 1978, pp.65-110). In the Model I environment the organization is not allowed to think "out-of-the-box" solutions and the development will be more or less "correcting the existing" and "fine-tuning already functioning solutions".

In the ITSM context, the ITSM organization is in single-loop mode (in Model I) when the ITSM organization is mainly measured on its ability to achieve specific single-loop targets. In other words, the

ITSM organization is measured on its ability to secure the following aspects (within the current organizational targets):

- Routine corrections to fix the detected errors in the *existing* ITSM environment,
- The effectiveness and stability of the *existing* ITSM environment (either measured after the process execution or audited in advance) and
- Routine improvements to increase the stability or effectiveness of the *existing* ITSM environment.

Double-loop Learning and Related Organizational Model

"Double-loop learning occurs when errors are corrected by changing the governing values and then the actions" (Argyris 2002, p.206). This means that double-loop learning requires that new routines will first be created to match a different conception of the world (Argyris 2003, p.1179), as shown in Figure 1. Double-loop learning is concerned primarily with resolving conflicts related to *"incompatible organizational norms by setting new priorities and weightings of norms or by restructuring the norms themselves together with associated strategies and assumptions"* (Argyris and Schön 1978, p.24). Double-loop learning presents a new, more experimental and norm-challenging attitude towards learning.

The organization is in double-loop mode (in Model II) when the organization is allowed to question the fundamentals of the governing values, as organizational rules can be changed and conclusions can be publicly tested (Argyris and Schön 1978, pp.142-143). The Model II environment enables both routine and innovative learning to occur (Argyris and Schön 1978, pp.142-143). The model enables organizations to take risks, create trust, and enables a higher freedom for choices (Argyris 1990, pp.104-105; Argyris 1976, p.369; Argyris 1977, p.123). Model II decreases organizational defensiveness and increases organizational commitment as the unilateral (top-down) control is rejected and power can be shared *"with anyone who has competence, and with anyone who is relevant in deciding or implementing the action, in the definition of the task, or the control over the environment"* (Argyris 1976, p.369). This produces more valid information when errors occur as failures can be communicated openly and the organization can learn from the feedback (Argyris 1976, p.369). Therefore, the organization that is allowed to think outside of the existing norms and boundaries will be more effective in solving problems and finding new innovative ways of working.

In the ITSM context, the ITSM organization is in double-loop mode (in Model II) when the ITSM organization is *also* measured on its ability to achieve specific double-loop targets. In other words, the ITSM organization is measured on its ability to question and alter the current ways of working by inventing and deploying (outside of the current organizational targets):

- New practices, processes, services, policies or technologies (which can, but do not necessarily need to, correct a failure or a deviation in the existing ITSM environment).

The Goal Setting Theory

According to the goal setting theory of Locke and Latham (2002), goals serve a directive function; they direct attention and effort toward goal-relevant activities and away from goal-irrelevant activities. This effect occurs both cognitively and behaviorally. In the ITSM context, the goals are KPIs (used by CIOs) which direct the ITSM organization's attention and effort toward goal-relevant activities (activities which are rewarded via KPIs) and away from goal-irrelevant activities (not measured by the KPIs). The goals, as KPIs, therefore direct an organization's behavior towards goal-relevant activities and away from goal-irrelevant activities. If these goal-relevant activities mainly support routinized-learning behavior (single-loop learning), then this is what the organization aims at.

Sometimes, however, organizations have difficulties in managing situations where their employees are – on the one hand – encouraged to take initiatives, to think of the organization as a whole and think beyond the present, whereas –on the other hand –they are measured and rewarded not to violate rules, not to step into someone else's area of responsibility, and to perform based on present (not future) targets (Argyris and Schön 1978, pp.125-126). However, employees tend ultimately to behave according to what they are measured for, and if they are not measured against innovativeness, this is not what they aim at.

Research Methodology

In order to answer the research question set in this paper, the author first selected the analysis object, the KPI portfolio, which has a high relevance to the majority of CIOs when steering and controlling their ITSM organizations (see the Analysis Objects section). Next, the author analyzed what kinds of organizational learning abilities the selected KPIs actually measure (see the Analysis Process section) and whether the organizational learning abilities being measured contribute to a successful Digital Business Transformation (see the Analysis Findings section).

Analysis Objects

As the objects for analysis, the author chose the KPIs embedded in one of the most well-known and widely used ITSM frameworks, the IT Infrastructure Library (ITIL® 2011). ITIL, which was originally developed by the UK Government's Central Computer and Telecommunications Agency (CCTA), is part of a suite of best-practice publications for IT Service Management (ITSM): "*ITIL provides guidance to service providers on the provision of quality IT services, and on the processes, functions and other capabilities needed to support them*" (Office of Government Commerce 2011, p.3). The Web Help Desk for ITIL, managed by SolarWinds®, says that ITIL is not a tool or a solution, but a framework of best practices that offers a means an end: "*Implementing ITIL can definitely help you better align your ITSM processes, and measure, govern, and report on your support activities in accordance with your business goals and globally accepted ITSM standards*" (SolarWinds® 2016). ITIL does this by focusing on the ITSM lifecycle (Nabiollahi et al. 2011). Currently, ITIL includes 97 KPIs measuring five different process groups, each of which corresponds to a service lifecycle stage in the ITSM environment (see Table 1).

Table 1. The service lifecycle stages measured by various ITIL KPIs.		
Service lifecycle stage:	Purpose: (Ref: Office of Government Commerce 2011)	No. of KPIs:
Service strategy	*"To design, develop and implement service management as an organizational capability and as a strategic asset"*	16
Service design	*"To design appropriate IT services to meet current and future agreed business requirements"*	32
Service transition	*"To deliver services that are required by the business into operational use"*	25
Service operation	*"To deliver services to agreed levels and to manage the applications, technology and infrastructure that support service delivery"*	15
Continual service improvement	*"To align IT services with changing business needs by identifying and implementing improvements to IT services that support business processes"*	9
	Total No. of KPIs:	97

The reasons for choosing the ITIL KPIs were as follows. Firstly, these KPIs have achieved an almost institutionalized position in many organizations and have been very widely adopted by IT practitioners (Jantti and Hottil 2016; Melendez et al. 2016). Secondly, as the author of the present paper possesses a foundation-level certificate in ITIL and has several years of practical experience working with ITIL in a large international IT organization, the KPIs of ITIL were also suitable and familiar analysis objects from this perspective. Thirdly, it was nearly impossible to obtain a real-life KPI portfolio used in real companies as KPIs are considered almost as strategic assets of the firms.

Analysis Process

In order to specify the organizational learning abilities which the ITIL KPIs are measuring, the author used the following 3-step analysis methodology. In Step 1, Systematic Concept Analysis (Nuopponen 2010) was chosen as a means to select, as a theoretical lens, the learning concepts (see Table 2). These learning concepts would be converted in Step 2 into ITSM KPI category definitions by using the Concept Derivation method of Walker and Avant (2011). The KPI category definitions would then represent four different measurement types (see Table 3). In Step 3, each ITIL KPI was then mapped onto one of four

KPI categories (see Table 4), revealing whether the KPI measured specific single- or double-loop targets in the ITSM environment.

The Systematic Concept Analysis used in Step 1 starts with a selection of the literature domain, and continues to gain knowledge by acquiring and compiling the material from the selected domain (Argyris and Schön 1974) in order to create a preliminary learning concepts framework. The framework is then subjected to systematic elaboration to form the final selection of learning concepts and their characteristics (see Table 2). The Concept Derivation used in Step 2 differs from traditional Concept Analysis in that Concept Derivation "*employs an analogy or metaphor to transpose concepts from one field of inquiry to another*" and also has "*no exact rules for selecting a field from which to derive concepts*" (Walker and Avant 2011, p.81). This method was originally introduced by Walker and Avant (2011) in the nursing field, but its use is also applicable to other fields. In this paper, the method is used to "translate" the selected learning loop methods into the ITSM field.

Step 1 (Choosing the Learning Concepts)

The author started the analysis by searching for a theoretical lens which could be used to categorize the KPIs according to what they were measuring of the ITSM organization. The author ended up using the two learning loop methods (single- and double-loop learning) created by Argyris and Schön (1974). The reasons were as follows. Firstly, organizational learning theory – from which the single-loop and double-loop methods were derived – had been well tested in practice over several decades and had been created for the organizational environment (needed in this study) and not for the individual learning environment. Secondly, the single-loop and double-loop learning methods could easily be used as theoretical lenses to categorize the KPIs into explicit groups depending on which learning loop abilities the KPIs measured. The final selection of single-loop and double-loop learning concepts are described in Table 2.

Table 2. Definitions for single-loop and double-loop learning methods.		
Concept:	Concept definition:	Source:
Single-loop learning method #1	"*Single-loop learning occurs when errors are corrected without altering the underlying governing values*"	Argyris, C. 2002. "Double-Loop Learning, Teaching, and Research," *Academy of Management Learning & Education* (1:2), pp.206-218. Page 206.
Single-loop learning method #2	Single-loop learning is "*concerned primarily with effectiveness – that is, with how best to achieve the existing goals and objectives and how best to keep organizational performance within the range specified by existing norms*"	Argyris, C. and Schön, D.A. 1978. *Organizational learning: A theory of action perspective*. Addison-Wesley. Page 21.
Double-loop learning method #1	"*Double-loop learning occurs when errors are corrected by changing the governing values and then the actions*"	Argyris, C. 2002. "Double-Loop Learning, Teaching, and Research," *Academy of Management Learning & Education* (1:2), pp.206-218. Page 206.

Step 2 (Converting Selected Learning Concepts into KPI Categories)

Next, the author converted the selected learning concepts into KPI category definitions. (The translation logic is documented in Appendix 1.) The results of Step 2, four KPI categories translated into the ITSM environment, are presented in Table 3.

Table 3. Translated KPI categories.
Correction-target (measurement type #1): Measurements which measure the amount of corrections made to fix the deviations in the existing ITSM environment without changing the current organizational targets.[1]
Stable-effectiveness-target (measurement type #2): Measurements which measure the amount of completed actions or achieved results to assure the stability and/or effectiveness of the existing ITSM environment without changing the current organizational targets.[1] Note: The actions being measured can also include pre-activities such as reviews or simulations, whose aim is to assure the stability and/or effectiveness. The measurement can also measure anti-effectiveness or anti-stability (violations). The measurement differs from Correction-target since it does not measure the corrections completed, but actions *assuring* effectiveness and/or stability.
Improvement-target (measurement type #3): Measurements which measure the amount of improvement proposals to increase the effectiveness and/or stability of the existing ITSM environment without changing the current organizational targets.[1]
Innovation-target (measurement type #4): Measurements which measure the amount of innovation proposals (new processes, services, products etc.) to be implemented in the ITSM environment without obeying the current organizational targets.[1]
(1)   *Current organizational targets (governing values) include any existing organizational goals, norms, or limitations assigned to processes, routines, structures, plans, services, products, projects, or artifacts in the existing ITSM environment.*

Step 3 (Mapping Individual ITIL KPIs into KPI Categories)

Next, the author mapped all the individual ITIL KPIs into the translated KPI categories as shown in Table 4. If an ITIL KPI matched two KPI categories, both categories were mapped but given only a half weight (½ point). The mapping results are also presented in the form of percentages (see Figure 2). For more detailed mapping results, see Appendix 2.

Table 4. Measurement targets of ITIL KPIs (ITIL v.2011).		
Translated KPI category:	Concept (lens):	ITIL KPIs:
Correction-target	Single-loop target	7/97
Stable-effectiveness-target	Single-loop target	83/97
Improvement-target	Single-loop target	3.5/97
Innovation-target	Double-loop target	3.5/97

Analysis Findings

The analysis revealed that the current ITIL KPIs (ITIL v.2011) mainly measure specific single-loop learning abilities. As shown in Figure 2, the ITIL KPIs measure a total of 96.4% purely single-loop learning abilities of which 85.6% are plain stability and efficiency achievements. In contrast, only 3.6% of the ITIL KPIs measure specific double-loop learning abilities. This means that CIOs using the ITIL KPIs will steer their ITSM organizations based on their ability to achieve specific single-loop targets. This leadership style will affect the ITSM organization (their own or outsourced) in the following ways.

Firstly, the ITSM organization will, according to the goal setting theory of Locke and Latham (2002), direct its attention and effort toward goal-relevant activities that are measured with KPIs (for example, to ensure efficiency, stability or correctness of the existing ITSM environment) and away from goal-irrelevant activities that are not measured with KPIs or measured only on a few occasions (for example, innovativeness). This will constrain the ITSM organization to focusing mainly on ensuring the

effectiveness, stability and correctness of the *existing* processes, services, policies and technologies. Secondly, over time the ITSM organization will form an organizational environment based on single-loop learning, where certain ways of working, problem solving and developing are accepted and others not. In this single-loop mode (Model I) the organization is not allowed to question the current ITSM-related norms, values or limitations and even less to alter them and then invent new ways of working (Argyris 1976, p.367). In other words, the ITSM organization will be less flexible in considering whether to remove or replace existing parts of the ITSM environment (such as processes, work routines, services or technologies) in order to deploy new business innovations enabled by new digital technologies, especially if the KPIs measure excellent results in the existing environment. Thirdly, in the single-loop environment, the focus is on routines, which can foster the attitude of why change something that already works: "*The focus on routines leads to reinforcing the status quo. For example, if it works, don't fix it or question it*" (Argyris 1996). In the single-loop environment, great possibilities would therefore not be recognized, much less be deployed.
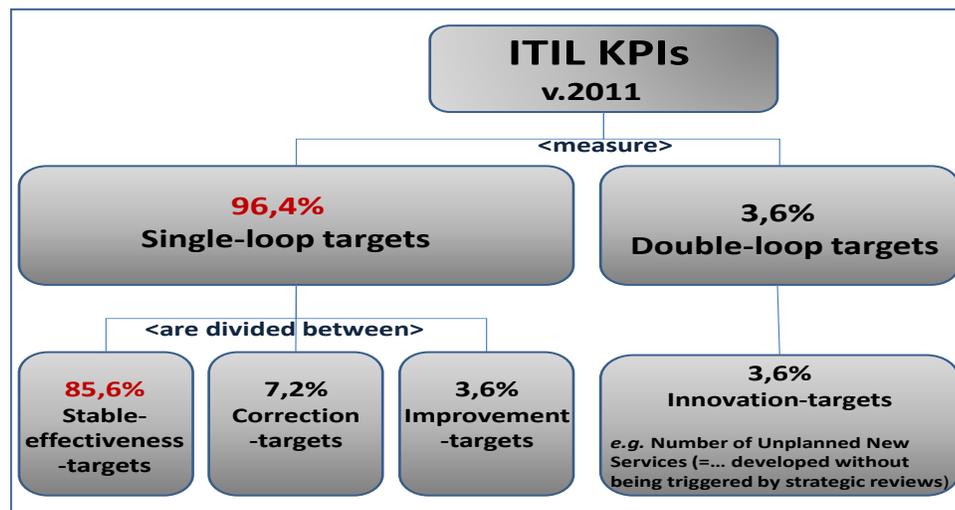

Figure 2. Measurement targets of ITIL KPIs presented in percentages.

Discussion and Conclusion

The objective of this study was to answer the question: "*What kinds of organizational learning abilities do the ITIL KPIs measure and how does the use of these learning abilities affect Digital Business Transformation?*" To investigate this question, the author first needed to analyze what organizational learning abilities the ITIL KPIs measure of the ITSM organization. This was done by drawing from the organizational learning theory of Argyris and Schön (1974). Next, the author used the goal setting theory of Locke and Latham (2002) to analyze how the ITIL KPIs that measure specific learning abilities influence the ITSM organization's learning abilities. The author went on to analyze how the use of these abilities affects the ITSM organization's willingness to co-operate with the rest of the organization during Digital Business Transformation.

Based on the findings (see the Analysis Findings section above), we can conclude as follows. As long as CIOs continue to use predominantly the institutionalized ITIL KPIs to steer their ITSM organizations (their own or outsourced), the single-loop type of behavior in ITSM organizations will be reinforced (as shown in Figure 1) and the Model I organizational environment will dominate. This will reduce the ITSM organization's willingness to alter the current ITSM environment (i.e. current processes, work routines, services and technologies) and hence deploy new business innovations enabled by new digital technologies. The answer to the research question is therefore: "The ITIL KPIs used by CIOs to steer their ITSM organizations are measuring the ITSM organization's single-loop type of learning abilities and encouraging a single-loop type of behavior, which decelerates Digital Business Transformation in the company".

Gregory et al (2015, p.72-73) concluded similarly in their study of paradoxical IT transformation programs that "*there is an organizational tendency to drift toward short-term IT-demands*" (such as achieving the performance targets) and that resolving paradoxical tensions between short-term IT efficiency and longer term IT innovation and replacement contributions (e.g. ITSM changes) is found to be difficult (Gregory et al. 2015). Alvesson's and Spicer's (2012) study of organizational cognitive skills led to similar results. In their study they concluded that, inter alia, the use of power and domination (by management) causes the organization's unwillingness or disability to apply their cognitive and reflective capacities to anything other than narrow and safe terrain.

To start solving this paradox of balancing between efficiency targets and innovativeness, CIOs should remind themselves that the ITIL KPIs are only able to determine whether some already existing processes or services are effectively operated for the purpose they are designed for, and are unable to answer the crucial question as to whether these processes or services, overall, are needed. Even the use of ITIL KPIs such as Innovation-target or Improvement-target will not guarantee a successful Digital Business Transformation as, when the company promotes the organization's innovative behavior by measuring the amount of new ideas proposed, there is a real danger of fabricating new ideas with low quality, unrealism or copy-effect. The partial solution could be to temporarily turn-off those ITIL KPIs which are measuring that part of the ITSM environment, which is being under transformation, and turn these metrics on after the transformation is finished. This would however not solve the CIO's challenge of being able to create an innovative and co-operative working environment, but it rather just gives a "work peace" for the ITSM organization during the transformation.

Thus Digital Business Transformation will not benefit from an organization's single-loop type of learning abilities, but will instead require a presence of the double-loop learning environment (see Figure 1). In this type of environment (Model II), the employees are free to question the fundamentals of the firm's governing values (policies, targets and limitations) since the organizational rules can be changed, conclusions can be publicly tested (Argyris and Schön 1978, pp.142-143), failures openly communicated (Argyris 1976, p.369), and risks taken, all of which creates trust and enables a higher freedom for choices (Argyris 1977, pp.118-123). Hence in order to succeed in Digital Business Transformation, CIOs must assure this Model II type of organizational climate where employees are encouraged to step outside of their traditional "safe zones" and to learn new ways of working and problem solving.

Contribution to IS Research and Practice

The aim of this study was to contribute to IS research on the role of the CIO, to the KPI studies in an ITSM context, and to research organizational learning in IS, by analyzing the reasons as to why the traditional KPI-driven control mechanisms prevent ITSM organizations succeeding in Digital Business Transformation. There are two primary contributions of this study. First, this paper extends the learning-loop theory to IS research by revealing what organizational learning abilities the ITIL KPIs actually measure. Second, this study extends the goal setting theory of Locke and Latham (2002) to IS research by showing the negative impact of the ITIL KPIs on the ITSM organization's willingness and ability to transform the existing ITSM environment into the digital era. As a practical contribution, the paper assists CIOs and other practitioners to understand the steering effect of the ITIL KPIs on the ITSM organization's learning abilities and hence the underlying behavioral factors affecting Digital Business Transformation in the company.

Limitations and Future Research

The study is limited to examining the effects of the ITIL KPIs on organizational learning. Any other ITSM framework with embedded KPIs could just as well have been used but, for the sake of simplicity, only one ITSM framework, ITIL, was chosen as the object of analysis. The study, however, provides insights that are also likely to be true when using other frameworks. Furthermore, the results of this paper could be further examined by conducting an empirical study where the actual relationship of KPIs and Digital Business Transformation efforts could be demonstrated in practice.

The future challenge for CIOs will be to create an organizational environment where the ITSM organization (together with the rest of the organization) can freely question, experiment, and, when required, change existing ways of working. Therefore, future research could also look for new CIO leadership techniques which would both endorse the organization's norm-challenging and innovative learning abilities and also assure the operative effectiveness of the ITSM environment.

Appendix 1: Converting selected learning concepts into KPI categories

Concept definition:	Translation:	Translated KPI category:
<u>Single-loop learning method #1:</u> *"Single-loop learning occurs when errors are corrected without altering the underlying governing values"*	*"The underlying governing values"* were translated into the ITSM context as existing organizational targets including any goals, norms, or limitations assigned to processes, routines, structures, plans, services, products, projects, or artifacts.	**Correction-target** *(measurement type #1):* Measurements which measure the amount of corrections made to fix the deviations in the existing ITSM environment without changing the current organizational targets.[1]
<u>Single-loop learning method #2:</u> *Single-loop learning is "concerned primarily with effectiveness - that is, with how best to achieve the existing goals and objectives and how best to keep organizational performance within the range specified by existing norms"*	*"Concerned primarily with effectiveness"* was translated to measure any kind of effectiveness (or anti-effectiveness), whereas *"how best to keep organizational performance"* was translated to measure the stability (or anti-stability). *"Within the range specified by existing norms"* was translated without changing the current organizational targets. The measurement differs from Correction-target since it does not measure the amount of completed corrective actions, but actions *assuring* the stability and/or effectiveness.	**Stable-effectiveness-target** *(measurement type #2):* Measurements which measure the amount of completed actions or achieved results to assure the stability and/or effectiveness of the existing ITSM environment without changing the current organizational targets.[1] Note: The actions being measured can also include pre-activities such as tests, simulations, reviews or audits whose aim is to assure the stability or effectiveness. The measurement can also measure anti-effectiveness or anti-stability (violations of current organizational targets).
	Measurement type #3 was added to emphasize that *"how best to achieve the existing goals..."* as it can also mean producing new ideas or improvement proposals related to existing products, services, processes or artifacts.	**Improvement-target** *(measurement type #3):* Measurements which measure the amount of improvement proposals to increase the effectiveness and/or stability of the existing ITSM environment without changing the current organizational targets.[1]
<u>Double-loop learning method #1:</u> *"Double-loop learning occurs when errors are corrected by changing the governing values and then the actions"*	Measurement type #4 generalizes the meaning of *"...changing the governing values..."* to mean any new ideas proposed to be implemented outside of the current organizational targets (not obeying the current organizational targets), but not necessarily correcting any detected errors. The measurement differs from Improvement-target since the latter only measures improvement proposals related to existing environment to be implemented within the current organizational targets.	**Innovation-target** *(measurement type #4):* Measurements which measure the amount of innovation proposals (new processes, services, products etc.) to be implemented into the ITSM environment without obeying the current organizational targets.[1]
(1): Current organizational targets (governing values) include any existing organizational goals, norms, or limitations assigned to processes, routines, structures, plans, services, products, projects, or artifacts in the existing ITSM environment.		

Appendix 2: The mapping results of the ITIL KPIs

Service stage	ITIL v.2011 KPI with definition Retrieved from: http://wiki.en.it-processmaps.com/index.php/ITIL_Key_Performance_Indicators#ITIL_KPIs_Service_Strategy	Mapped KPI category (target) Note: If an ITIL KPI matches with two KPI categories, both categories are mapped.
Strategy	Number of Planned New Services (=Percent of new services which are developed following a strategic review)	Improvement-target (The KPI measures the amount of new ideas to increase the stability and/or effectiveness of the ITSM environment without changing the current organizational targets. Here are measured the number of planned new services defined (and limited) by the strategic review).
	Number of Unplanned New Services (=Percent of new services which are developed without being triggered by strategic reviews)	Innovation-target (The KPI measures the amount of new services developed outside of the current organizational targets. Here are measured the number of unplanned new services which are not triggered or limited by the strategic reviews.)
	Number of Strategic Initiatives (=Number of strategic initiatives launched from the Service Portfolio Management process)	Improvement-target & Innovation-target (Strategic initiatives can be defined to be conducted either within or outside of the current organizational targets. As we cannot know the content of these initiatives, both KPI-categories are mapped.)
	Number of new Customers (=Number of newly won customers)	Stable-effectiveness-target (The KPI measures the effectiveness of the ITSM organization, particularly the sales organization's effectiveness.)
	Number of lost Customers (=Number of customers which were lost to competing service providers)	Stable-effectiveness-target (The KPI measures inefficiency of the ITSM organization, particularly the sales organization's inefficiency.)
	Adherence to Budgeting Process (=Percent of projects using the standard IT budgeting process)	Stable-effectiveness-target (The KPI measures the effectiveness and/or stability of the ITSM organization, particularly the project organization's effectiveness.)
	Cost-/ Benefit Estimation (=Percent of project files containing cost-/ benefit estimates)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the project cost estimations) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Post Implementation Review (=Percent of projects where costs and benefits are verified after implementation)	Stable-effectiveness-target (The KPI measures the effectiveness and/or stability of the financial management process for projects by measuring the percent of projects following the current organizational targets.)
	Adherence to Approved Budget (=Percent of IT expenses exceeding the approved budget)	Stable-effectiveness-target (The KPI measures the effectiveness and/or stability of the ITSM organization.)
	Adherence to Project Resources (=Percent of expenses exceeding the planned budget for a project)	Stable-effectiveness-target (The KPI measures the effectiveness and/or stability of the ITSM organization.)
	Proposals for Cost Optimization (=Number of proposals by Financial Management for the optimized use of financial resources)	Improvement-target & Innovation-target (The KPI measures the amount of new ideas to be conducted either within or outside of the current organizational targets. As we cannot know the content of these proposals made by Financial Management, both KPI categories are mapped.)
	Number of Customer Complaints (=Number of received customer complaints)	Stable-effectiveness-target (A high number indicates an ineffective ITSM environment).
	Number of accepted Customer Complaints (=Number of received customer complaints which were accepted as justified)	Correction-target (The KPI measures the amount of corrections made to fix deviations within the current organizational targets. Here deviations are complaints which are corrected by accepting them as justified.)
	Number of Customer Satisfaction Surveys (=Number of formal Customer Satisfaction Surveys carried out during the reporting period)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the customer surveys) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Percent of returned Questionnaires (=Percent of questionnaires returned, in relation to all questionnaires being sent out)	Stable-effectiveness-target (The KPI measures the effectiveness of the Business Relationship Management process.)
	Customer Satisfaction per Service (=Average measured customer satisfaction for each Service (including standard deviation), determined by means of Customer Satisfaction Surveys)	Stable-effectiveness-target (A high value indicates an effective and stable ITSM environment.)
Design	Services covered by SLAs (=Number of services covered by Service Level Agreements (SLAs))	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)
	Services covered by OLAs/ UCs (=Number of Services where SLAs are backed up by corresponding Operational Level Agreements (OLAs) or Underpinning Contracts (UCs))	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)
	Monitored SLAs (=Number of monitored Services/ SLAs, where weak-spots and counter-measures are reported)	Stable-effectiveness-target (A high value indicates an unstable ITSM environment. Notice: Correction-target is not mapped as the weak-spots are only reported but not corrected.)
	SLAs under Review (=Number of Services/ SLAs which are regularly reviewed)	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)
	Fulfilment of Service Levels (=Number of Services/ SLAs where the agreed service levels are fulfilled)	Stable-effectiveness-target (A high value indicates a stable and effective ITSM environment.
	Number of Service Issues (=Number of issues in the service provision, which are identified and addressed in an improvement plan)	Improvement-target & Innovation-target (The improvement issues can be defined to be conducted either within or outside of the current organizational targets. As we cannot know the content of these improvement issues, both KPI categories are mapped.)
	Service Availability (=Availability of IT Services relative to the availability agreed in SLAs and OLAs)	Stable-effectiveness-target (The availability which is same or higher than the agreed availability indicates a stable and effective ITSM

		environment.)
	Number of Service Interruptions (=Number of service interruptions)	Stable-effectiveness-target (A high value means an unstable ITSM environment.)
	Duration of Service Interruptions (=Average duration of service interruptions)	Stable-effectiveness-target (A short duration indicates a stable and effective ITSM environment.)
	Availability Monitoring (=Percent of services and infrastructure components under availability monitoring)	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)
	Availability Measures (=Number of implemented measures with the objective of increasing availability)	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)
	Incidents due to Capacity Shortages (=Number of incidents occurring because of insufficient service or component capacity)	Stable-effectiveness-target (A high value indicates an unstable ITSM environment.)
	Exactness of Capacity Forecast (=Deviation of the predicted capacity development from actual course)	Stable-effectiveness-target (A high deviation indicates an unstable ITSM environment.)
	Capacity Adjustments (=Number of adjustments to service and component capacities due to changing demand)	Stable-effectiveness-target (A high value indicates an unstable ITSM environment.)
	Unplanned Capacity Adjustments (=Number of unplanned increases to service or component capacity as result of capacity bottlenecks)	Stable-effectiveness-target (A high value indicates an unstable ITSM environment.)
	Resolution Time of Capacity Shortage (=Resolution time for identified capacity bottlenecks)	Stable-effectiveness-target (A short resolution time indicates a stable and effective ITSM environment.)
	Capacity Reserves (=Percent of capacity reserves at times of normal and maximum demand)	Stable-effectiveness-target (A balanced percent indicates a stable and effective ITSM environment.)
	Percent of Capacity Monitoring (=Percent of services and infrastructure components under capacity monitoring)	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)
	Business Processes with Continuity Agreements (=Percent of business processes which are covered by explicit service continuity targets)	Stable-effectiveness-target (A high percent indicates a stable and effective ITSM environment.)
	Gaps in Disaster Preparation (=Number of identified gaps in the preparation for disaster events - major threats without any defined counter measures)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of identified gaps found in disaster preparations) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Implementation Duration (=Duration from the identification of a disaster-related risk to the implementation of a suitable continuity mechanism)	Stable-effectiveness-target (=A short duration indicates a stable ITSM environment.)
	Number of Disaster Practices (=Number of disaster practices actually carried out)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of disaster practices) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Number of identified Shortcomings during Disaster Practices (=Number of identified shortcomings in the preparation for disaster events which are identified during practices)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of identified shortcoming) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Number of implemented Preventive Measures (=Number of preventive security measures which were implemented in response to identified security threats)	Correction-target (The KPI measures the amount of corrections made to fix the deviations within the current organizational targets. Here deviations are the identified security threats which are corrected using preventive security measures).
	Implementation Duration (=Duration from the identification of a security threat to the implementation of a suitable counter measure)	Stable-effectiveness-target (A shorter duration indicates a more stable ITSM environment.)
	Number of major Security Incidents (=Number of identified security incidents, classified by severity category)	Stable-effectiveness-target (A high number of major security incidents indicates an unstable ITSM environment.)
	Number of Security-related Service Downtimes (=Number of security incidents causing service interruption or reduced availability)	Stable-effectiveness-target (A high number indicates an unstable ITSM environment.)
	Number of Security Tests (=Number of security tests and trainings carried out)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of security tests) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Number of identified Shortcomings during Security Tests (=Number of identified shortcomings in security mechanisms which were identified during tests)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of identified shortcomings in security mechanisms) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Number of agreed UCs (=Percent of contracts underpinned by UCs)	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)
	Number of Contract Reviews (=Number of conducted contract and supplier reviews)	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)
	Number of identified Contract Breaches (=Number of contractual obligations which were not fulfilled by suppliers - identified during contract reviews)	Stable-effectiveness-target (A high value indicates an unstable ITSM environment.)
Transition	Number of Major Changes (=Number of major changes assessed by the CAB (Change Advisory Board))	Stable-effectiveness-target (A high value indicates an unstable ITSM environment.)
	Number of CAB Meetings (=Number of CAB (Change Advisory Board) meetings)	Stable-effectiveness-target (A stable frequency of meetings indicates a stable ITSM environment.)
	Time for Change Approval/ Rejection (=Average time from registering an RFC with Change Management until a decision on the RFC is reached - i.e. until it is either approved or rejected)	Stable-effectiveness-target (A short average time indicates an effective and stable ITSM environment.)
	Change Acceptance Rate (=Number of accepted vs. rejected RFCs (Request For Changes)	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)

	Number of Emergency Changes (=Number of Emergency Changes assessed by Emergency Change Advisory Board)	Stable-effectiveness-target (A high value indicates an unstable ITSM environment.)
	Number of Projects (=Number of major release rollouts under the control of Project Management)	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)
	Percent of Projects with Project Charters (=Percent of projects which are started with a signed Project Charter in place)	Stable-effectiveness-target (A high value indicates a stable ITSM environment.)
	Number of Changes to Project Charter (=Number of changes to the Project Charter after project start)	Stable-effectiveness-target (A high value indicates an unstable ITSM environment.)
	Adherence to Project Budget (=Actual vs. planned consumption of financial and personnel resources)	Stable-effectiveness-target (A high budgetary exceeding indicates an ineffective ITSM environment.)
	Project Delays (=Actual vs. planned project completion dates)	Stable-effectiveness-target (Short project delays indicate an effective ITSM environment.)
	Number of Releases (=Number of releases rolled out into the productive environment, grouped into Major and Minor Releases)	Stable-effectiveness-target (A high value indicates an effective ITSM environment.)
	Duration of Major Deployments (=Average duration of major deployments from clearance until completion)	Stable-effectiveness-target (A short duration indicates an effective ITSM environment.)
	Number of Release Backouts (=Number of releases which had to be reversed)	Correction-target (The KPI measures the amount of corrections made to fix deviations within the current organizational targets. Here the deviations are defected releases which are corrected by reversing the releases.)
	Proportion of automatic Release Distribution (=Proportion of new releases distributed automatically)	Stable-effectiveness-target (A high automation percent indicates an effective ITSM environment.)
	Percent of failed Release Component Acceptance Tests (=Percent of release components which fail to pass acceptance tests)	Stable-effectiveness-target (A high percent indicates an unstable and ineffective ITSM environment.)
	Number of identified Errors (=Number of identified errors during release testing per release)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of identified errors found in release tests) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Time for Error Fixing (=Time until re-submission of fixed release components)	Stable-effectiveness-target (A short time indicates an effective and stable ITSM environment.)
	Incidents caused by New Releases (=Number of Incidents attributable to new releases)	Stable-effectiveness-target (=A high number indicates an unstable and ineffective ITSM environment.)
	Percent of failed Service Acceptance Tests (=Percent of Service Acceptance Tests which fail to obtain the customer's sign-off)	Stable-effectiveness-target (=A high percent indicates an unstable and ineffective ITSM environment.)
	Verification Frequency (=Frequency of physical verifications of CMS contents)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the frequency of verifications) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Number of Incidents owing to inaccurate CMS Information (=Number of Incidents reported where the underlying cause of the Incident is the result of inaccurate configuration management information)	Stable-effectiveness-target (A high number indicates an unstable ITSM environment.)
	Effort for CMS Verifications (=Average work effort for physical verifications of the CMS contents)	Stable-effectiveness-target (Low average work effort (e.g. compared to the industry average) indicates an effective ITSM environment.)
	CMS Coverage (=Percent of configuration components for which data is kept in the CMS)	Stable-effectiveness-target (A high percent indicates a stable ITSM environment.)
	Number of unauthorized Changes detected automatically (=Number of unauthorized changes identified as a result of audits performed using automatic configuration update software)	Stable-effectiveness-target (A high number indicates an unstable ITSM environment as the current organizational targets (norms, policies or objectives) have not been obeyed in the change process.)
	Number of CMS Errors (=Number of errors found in the CMS as a result of an audit)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of CMS errors found in audits) to assure in advance the stability and/or effectiveness of the ITSM environment.)
Operation	Number of repeated Incidents (=Number of repeated Incidents, with known resolution methods)	Stable-effectiveness-target (A high number indicates an ineffective ITSM environment as incidents are being repeated.)
	Incidents resolved Remotely (=Number of Incidents resolved remotely by the Service Desk - i.e. without carrying out work at user's location)	Correction-target (The KPI measures the amount of corrections made to fix deviations within the current organizational targets. Here the deviations are incidents which are corrected remotely.
	Number of Escalations (=Number of escalations for Incidents not resolved in the agreed resolution time)	Stable-effectiveness-target (A high number indicates an ineffective ITSM organization as incidents had to be escalated e.g. to specialists to be solved.)
	Number of Incidents (=Number of incidents registered by the Service Desk grouped into categories)	Stable-effectiveness-target (A high number indicates an unstable ITSM environment.)
	Average Initial Response Time (=Average time taken between the time a user reports an Incident and the time that the Service Desk responds to that Incident)	Stable-effectiveness-target (A short average time indicates an effective ITSM organization.)
	Incident Resolution Time (=Average time for resolving an incident grouped into categories)	Stable-effectiveness-target (A short average time indicates an effective ITSM organization.)
	First Time Resolution Rate (=Percent of Incidents resolved at the Service Desk during the first call grouped into categories)	Stable-effectiveness-target (A high percent indicates an effective ITSM organization.)
	Resolution within SLA (=Rate of incidents resolved during solution times agreed in SLA grouped into categories)	Stable-effectiveness-target (A high rate indicates an effective ITSM organization.)
	Incident Resolution Effort (=Average work effort for resolving Incidents grouped into categories)	Stable-effectiveness-target (A low average work effort indicates an effective ITSM organization.)
	Number of Problems (=Number of Problems registered by	Stable-effectiveness-target (A high number indicates an unstable ITSM

	Problem Management grouped into categories)	environment. Notice: The target for the organization is to find root causes for problems causing incidents.)
	Problem Resolution Time (=Average time for resolving Problems grouped into categories)	Stable-effectiveness-target (A short average time indicates an effective ITSM organization.)
	Number of unresolved Problem (=Number of Problems where the underlying root cause is not known at a particular time)	Stable-effectiveness-target (A high number indicates an unstable ITSM environment as several problems remain unsolved.)
	Number of Incidents per Known Problem (=Number of reported Incidents linked to the same Problem after problem identification)	Correction-target (The KPI measures the amount of corrections made to fix deviations within the current organizational targets. Here the deviations are the incidents, which are corrected by linking them to same identified (and solved) problem.)
	Time until Problem Identification (=Average time between first occurrence of an Incident and identification of the underlying root cause)	Stable-effectiveness-target (A short average time indicates an effective ITSM environment.)
	Problem Resolution Effort (=Average work effort for resolving Problems grouped into categories)	Stable-effectiveness-target (A low average work effort indicates an effective ITSM organization.)
Continual Improvement	Number of Service Reviews (=Number of formal Service Reviews carried out during the reporting period)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of service reviews) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Number of identified Weaknesses (=Number of weaknesses which were identified during Service Review, to be addressed by improvement initiatives)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of weaknesses identified in service reviews) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Number of Process Benchmarkings, Maturity Assessments, and Audits (=Number of formal Process Benchmarkings, Maturity Assessments, and Audits carried out during the reporting period)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of benchmarks etc.) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Number of Process Evaluations (=Number of formal Process Evaluations carried out)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of formal process evaluations) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Number of identified Weaknesses (=Number of weaknesses which were identified during Process Evaluation, to be addressed by improvement initiatives)	Stable-effectiveness-target (The KPI measures the amount of (or results of) tests, simulations, reviews or audits of any type of solution (here the number of weaknesses identified during process evaluations) to assure in advance the stability and/or effectiveness of the ITSM environment.)
	Number of CSI Initiatives (=Number of CSI initiatives for processes, resulting from identified weaknesses during Service Reviews and Process Evaluations)	Improvement-target & Innovation-target (CSI initiative can be defined to be conducted either within or outside of the current organizational targets. As we cannot know the content of these initiatives, both KPI categories are mapped.)
	Number of completed CSI Initiatives (=Number of CSI initiatives for processes which were completed during the reporting period)	Correction-target (The KPI measures the amount of corrections made to fix deviations within the current organizational targets. Here deviations are identified weaknesses which are corrected via completing CSI initiatives).
	Number of CSI Initiatives (=Number of CSI initiatives for services, resulting from identified weaknesses during Service and Process Evaluation)	Improvement-target & Innovation-target (CSI initiative can be defined to be conducted either within or outside of the current organizational targets. As we cannot know the content of these initiatives, both KPI categories are mapped.)
	Number of completed CSI Initiatives (=Number of CSI initiatives for services which were completed during the reporting period)	Correction-target (The KPI measures the amount of corrections made to fix deviations within the current organizational targets. Here deviations are identified weaknesses which are corrected via completing CSI initiatives).

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