Finding Balanced Scorecards for Business Driven IT Service Portfolio Management:
A Literature Review

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ABSTRACT

During the last decades information technology (IT) management has changed significantly. Starting from being a costly and rare resource in its very beginnings IT has evolved into a vital enabler for almost any kind of business today. This development demands for highly flexible management concepts allowing the business to actively control and govern IT performance. A meanwhile widely used approach for multi-dimensional performance measurement in the context of IT management is the Balanced Scorecard (BSC). With this article we aim at investigating the state of the art of IT BSC use through a comprehensive literature analysis. Moreover, we evaluate the adaptability of the different types of this concept to the most recent developments in IT management. Our findings show that even though an opulence of IT BSCs exists, they do not reflect recent developments of increased business orientation in IT management. We suggest that two new BSCs utilizing such business metrics need to be developed: A generic BSC for IT services and IT service portfolios.

Keywords: IT Balanced Scorecard, Business-driven IT Management, IT Performance Measurement, IT Service Portfolio, Literature Review

INTRODUCTION

IT management has evolved significantly since its early stages and is just now undergoing yet another evolutionary step. Initiating from the reactive "firefighting" on an individual infrastructure device level (resource orientation), it grew into the management of domains of resources (domain orientation) and has now reached the stage where end-to-end services are

designed and operated proactively to fulfill user requirements (user orientation) (Machiraju, Bartolini, & Casati, 2005). Today's IT service management (ITSM) frameworks (e.g. Information Technology Infrastructure Library (ITIL) (Cartlidge et al., 2007) and ISO/IEC 20000 (ISO, 2005)) address the challenges associated with implementing standardized and automated service portfolios spanning multiple technological silos (Winniford, Conger, & Erickson-Harris, 2009). "However, ITSM is mostly using technical metrics" (Sauvé, Moura, Sampaio, João, & Radziuk, 2006) while "in order for IT to help the business achieve its goals, ITSM decisions must be steered by business-oriented measures and objectives" (Bartolini, 2009). This caused the further development of ITSM to evolve towards a Business-driven IT Management (BDIM) heralding the beginning of business orientation of IT. BDIM essentially is ITSM with business metrics. This allows IT-related decisions to be taken from a business perspective (Sauvé, et al., 2006). To achieve this, BDIM extends current ITSM approaches by a business process centric view and dynamic cause and effect models between IT resources, services, and business processes (Bartolini, 2009).

However, the essential aspect of BDIM-the linkage of business and IT metrics for decision support, alignment and cost justification purposes-has been already addressed by tools like the Balanced Scorecard (BSC) for IT (Cram, 2007). Due to the wide variety of adaptions within different domains, we will employ the term "IT BSC" to summarize BSCs implemented to manage, any kind of IT domain. Although the IT BSC is available since almost two decades the novelty today is that the maturation of Business Process Management (BPM) allows the detailed measurement of business performance (Rosemann, Fielt, Kohlborn, & Korthaus, 2009). It now becomes possible to evaluate the cause and effect relations of IT and business performance not from a departmental view but holistically on the business process and IT services level at reasonable cost. Hence this article explores the question to what extent BSCs for IT can or already have been applied to link business processes and IT performance.

Given the extensive use of the IT BSC and the currently advancing topic of BDIM, this review contributes to the adaption of the IT BSC within the domain of BDIM by addressing the following questions:

1. What is the state-of-the-art in IT BSCs?
2. Which IT BSCs support the concept of BDIM?

Previous reviews have addressed the evolution of the IT BSC (Cram, 2007), performance management frameworks (Abran & Buglione, 2003) and capital investment-appraisal techniques (Milis & Mercken, 2004) thus describing performance management from a generic viewpoint. As of today, only two articles are available to address the differences in IT BSC applications, i.e. Sedera et al. (2001) and Györy et. al. (2012). The article at hand builds upon and extends the results of the latter to reflect the current state-of-the-art for the IT BSC from a BDIM viewpoint.

This paper proceeds as follows: Before presenting the applied research methodology, the next section briefly revisits the concepts of the BSC and BDIM. Our research findings are then

synthesized in section four. Subsequently, we discuss our findings and suggest a research agenda. The paper finally concludes with a brief summary, an outline of its limitations, and an outlook on future research.

CONCEPTUALIZATION OF THE TOPIC

To understand how an IT BSC may contribute to the concept of BDIM we first clarify our understanding of both concepts in this chapter. While the BSC is a precisely described management tool there are differences to the level of detail to which it is described in literature. Unfortunately, the recent management concept of BDIM is less accurately formulated.

For this article we adapt the definition proposed by Sauvé et al. (2006): *"BDIM refers to a new culture and a set of new tools and decision-making processes that explicitly focus on making IT help the business. BDIM attempts to gauge the impact that IT has on the business and aims at rethinking IT management from this perspective, be this in an operational, tactical or strategic context."* While BDIM encompasses a whole new IT management culture, for this review we focus on how an IT BSC can support the new business-driven *strategic decision-making* processes only. More precisely, we focus on decisions regarding the strategic core of any ITIL-driven organization: The IT service portfolio. IT service portfolio management steers a pipeline of future and a catalog of existing IT services by deciding over: (1) the introduction of new IT services, (2) the renovation, and (3) the retirement existing IT services (Iqbal & Nieves, 2007). In contrast to ITIL, decisions regarding the (4) choice of IT service providers (e.g. vendor selection and sourcing of IT services), may become part of the portfolio managing with increasing business orientation. For our review we therefore aim at identifying IT BSCs that are or could be employed to support the four decisions mentioned above based on a business strategy and business performance measures.

The IT BSC has been derived from the original BSC by multiple authors (Martinsons, Davison, & Tse, 1999; Van Grembergen, 1997). Originally, the BSC has been developed by Kaplan and Norton in 1992 to give corporate "managers complex information at a glance" including more than just financial measures (Kaplan & Norton, 1992). The original design encompasses four perspectives (customer, internal business, innovation and learning, and financial), each containing typically 15 to 20 measures (Maltz, Shenhar, & Reilly, 2003). By adding or altering individual measures and perspectives the BSC can be tailored to suite the strategy of any organization (Erek, 2011). It has subsequently been enhanced by Kaplan and Norton through the inclusion of a method to strategically align and develop its measures (Kaplan & Norton, 1993) and strategy maps (Kaplan & Norton, 1996b). Today, a full-featured BSC may contain: An overall vision and strategy, a strategy map, and different performance perspectives containing key performance indicators (KPIs). The overall vision sets the long-term goal the enterprise strives to achieve, while the derived strategy describes how this goal is going to be reached. The perspectives and measures are designed to reflect how well the strategy is

implemented within the organization. Each perspective may contain a perspective-centric goal, initiatives, and measures. Each measure may contain: A current value, a target value, and a benchmark value. The assumptions of cause and effects that are made during strategy formulation may be described in a strategy map. This links operational and strategic measures and/or perspectives according to their expected interrelations.

For a BSC to be applied to business-oriented IT service portfolio decisions it must gauge a certain IT subject (preferably an Information System (IS) or a portfolio thereof) towards a defined goal, with interlinked business and technical KPIs. We hence classify the discovered IT BSCs in Figure 7 according to these criteria (i.e. subject, goal, perspectives, KPIs and KPI-linkage) to select the most appropriate BSCs.

The next chapter describes the method used to identify the available articles containing IT BSCs in current scholarly literature.

RESEARCH METHODOLOGY

To identify the current state-of-the-art for IT BSCs, we verify and update the results put forward by Györy (2012). Hence, we follow the same methodology of a systematic literature review used by many senior scholars (e.g. (Bartolini, 2009; Cooper, 1988; Graeser, Pisanias, & Willcocks, 1998; Webster & Watson, 2002)). The process of a systematic literature review consists of five steps (vom Brocke et al., 2009): (1) Definition of review scope, (2) conceptualization of the topic, (3) literature search, (4) literature analysis and synthesis, (5) research agenda. While step (2) has been presented in the previous chapter, this section describes steps (1) and (3) while steps (4) and (5) are presented in the subsequent chapters.

Review scope

Before conducting the literature review we clearly defined the boundaries of our endeavor. We did this by applying the established taxonomy suggested by Cooper (Cooper, 1988). This taxonomy contains six constitutive characteristics as shown in Figure 1. Each characteristic contains certain categories. Thereby focus, goal, organization and audience can be independently combined, while perspective and coverage are mutually exclusive (vom Brocke, et al., 2009).

Characteristics	Categories			
Focus	Research Outcomes	Research Methods	Theories	Applications
Goal	Integration		Criticism	Central Issues
Organisation	Historical		Conceptual	Methodological
Perspective	Neutral Representation		Espousal of Position	
Audience	Specialized Scholars	General Scholars	Practitioners	General Public
Coverage	Exhaustive	Exhaustive & Selective	Representative	Central/Pivotal

Figure 1. Review scope

Figure 1 shows the characteristics of the review we provide in this article. The focus lies on identifying the usage of the BSC for IT management within scientific literature. We thereby pursue the goal of integrating and structuring the properties of the identified scorecards. We organize the BSCs historically in Figure 6 and Figure 9 and conceptually in Figure 7 and Figure 9 from a neutral perspective. This allows general scholars to see the big picture of IT BSC applications and specialized scholars and practitioners to find available solutions relevant to their work. Although we aim to be as exhaustive as possible within the boundaries of our review, the literature we examined is just a grain of sand compared to the available sandcastle of knowledge. Hence, this review has a representative character.

Literature search

We recreated and updated the two phase approach conducted in March 2011 by Györy (2012) by completing the same two phase approach (depicted in Figure 2) in March 2012:

1. We addressed the articles directly available through a primary source (step a – d)
2. Conducting a backward references search, we identified and analyzed the references of the relevant articles from step 1 (step e).
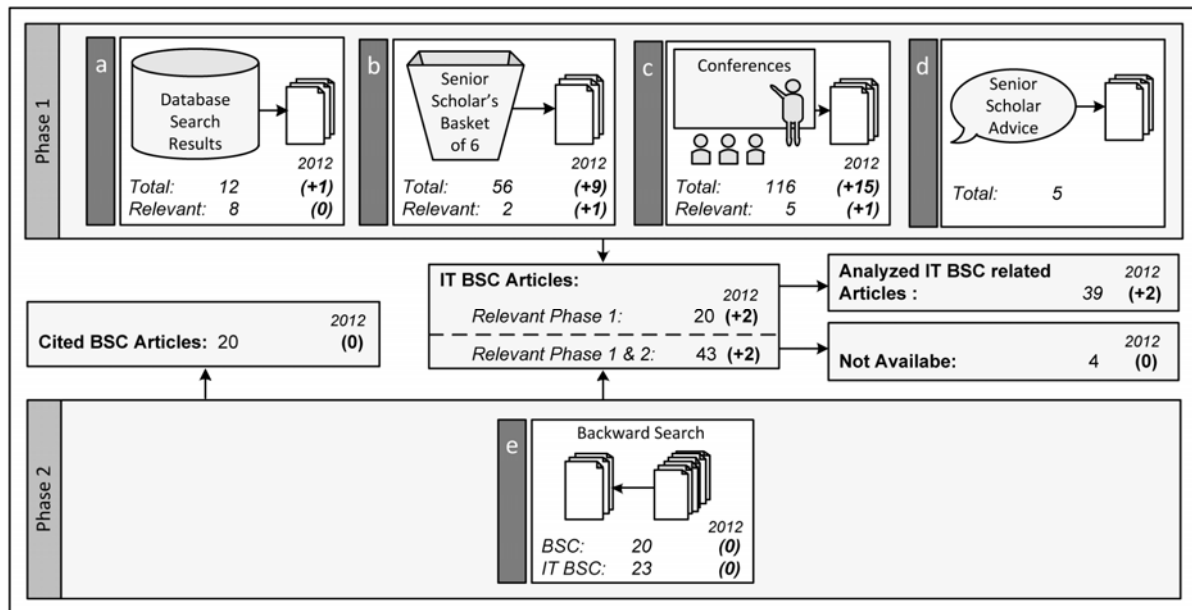
Phase 1

a — Database Search Results
2012
Total: 12 (+1)
Relevant: 8 (0)

b — Senior Scholar's Basket of 6
2012
Total: 56 (+9)
Relevant: 2 (+1)

c — Conferences
2012
Total: 116 (+15)
Relevant: 5 (+1)

d — Senior Scholar Advice
Total: 5

Cited BSC Articles: 20
2012
(0)

IT BSC Articles:
2012
Relevant Phase 1: 20 (+2)
Relevant Phase 1 & 2: 43 (+2)

Analyzed IT BSC related Articles:
2012
39 (+2)

Not Availabe:
2012
4 (0)

Phase 2

e — Backward Search
2012
BSC: 20 (0)
IT BSC: 23 (0)

Figure 2. Literature search process

In the first step we collected a basket of 20 relevant articles through four different sources, namely: (a) database search, (b) AIS Senior scholars' basket of six journal search, (c) international conference proceedings search and (d) articles advised by senior scholars. The diversity of sources addresses the following challenges: (1) Often IS are being evaluated by BSCs outside of the typical IT/IS domain (e.g. construction industry (Stewart & Mohamed, 2001)) (→ database search), (2) leading journals have a lag of time from writing till publishing (→ conference search), (3) a rigorous search by keywords often does not include already available literature (→ seniors scholar advice) and (4) capturing the mainstream IT research streams (→ AIS senior scholars' basket of six journal search).

For the three searches we used the following keywords: (1) "Information Technology", (2) "Information Technologies", (3) "Information System", and (4) "Balanced Scorecard". Keywords were combined with following logic: (1 OR 2 OR 3) AND 4. This allowed us to identify literature concerning IT and the BSC at the same time. Drawing on results of exploratory searches preceding this review we excluded the acronyms "IT", "IS", and "BSC" from our keywords. This is due to the fact that many search engines interpret "IT" as "it" and "IS" as "is" (e.g. Ebscohost), while the term "BSC" carries multiple meanings besides "Balanced Score Card" (e.g. "binary symmetric channel" or "best supportive care"). To filter irrelevant articles at an early stage and to offer consistent search results across the different databases we only used full terms as keywords.

Every search result was first cleansed from duplicates (including previous results) and then filtered according to two criteria to assure that a contribution to the research question can be derived: (1) only articles that were written or translated into English and (2) only articles concerning the adaption of the BSC for IT evaluation and not the use of IT in implementing a

BSC were considered relevant. The authors note that articles suggesting alternative frameworks but drawing a parallel to the IT BSC were also included.

The database search encompassed the following databases: Ebscohost, Proquest, ISI Web Of Knowledge, JStor, and ScienceDirect. The query encompassed all available journals, without a limitation to the field of IT/IS. The keyword combination (described above) was required to appear in the title, the subject or keywords, and the abstract of each article. The strict restriction of the keywords appearing in all fields allowed us to focus on articles most likely to be relevant while searching through a multitude of domains. This yielded a total of twelve results of which eight were considered relevant. Compared to 2011 results increased by one article while no new relevant articles could be added.

The AIS senior scholars' basket of six includes the major journals of the IS field, namely: (1) European Journal of Information Systems (EJIS), (2) Information Systems Journal (ISJ), (3) Information Systems Research (ISR), (4) Journal of the Association for Information Systems (JAIS), (5) Journal of Management Information Systems (JMIS) and (6) Management Information Systems Quarterly (MISQ). The search within these journals was carried out with the keyword combination required to appear anywhere in the full text of the articles. Due to the fact that this search was limited to IS journals the less rigid keyword search (full text search) has been chosen to grasp the full extent to which this topic has been discussed in the IS domain. This yielded a total of 56 results of which two were considered relevant. Compared to 2011 results increased by nine articles while one new relevant article could be added.

We also recreated the searches within the proceedings of international conferences. For this we included the following established conferences in the IS domain: a) Hawaiian International Conference on System Sciences (HICSS), b) European Conference On Information Systems (ECIS), c) International Conference On Information Systems (ICIS), and d) Americas Conference on Information Systems (AMCIS). Again, moving within the IT/IS domain we required the articles to contain the keyword combination anywhere in their full text. This yielded a total of 116 results of which five were considered relevant. Compared to 2011 results increased by 15 articles while one new relevant article could be added.

Finally, we were not advised to any further IT BSC articles since 2011 so the results of step d) remain unchanged at five articles. The unfiltered results of the basket after the first phase hence contained a total of 184, while after filtering we were left with 20 relevant articles (two more than 2011).

To also find the articles relevant but outside the reach of our primary sources, a backward literature search has been conducted (as suggested by (Cooper, 1988) & (Levy & Ellis, 2006)), departing from the initial 20 articles. To also identify the most frequently cited core BSC publications we identified all articles containing the keyword "Balanced Scorecard" in its title. Through this procedure we identified 43 additional articles of which 20 were focusing purely on the BSC and 23 on IT BSCs. The 2012 update of this backward search confirms that a stable

foundation of BSC and IT BSC articles has been reached. Newly added articles like (Kasiri, Sharda, & Hardgrave, 2012) do not contribute additional references to this foundation of literature.

Our final basket of literature therefore contains 63 articles (BSC & IT BSC) out of which 39 are analyzed in detail within the next section. For completeness, the authors note that this number reflects the fact that four sources (Chand, Hachey, Hunton, Owhoso, & Vasudevan, 2005; Durraui, Forbes, & Carrie, 2000; Graeser, et al., 1998; Van Grembergen & Timmerman, 1998) were not available to the authors during the time of research.

SYNTHESIS OF THE RESEARCH FINDINGS

Before elaborating on the available IT BSCs we highlight the most frequently cited BSC (Figure 3) and IT BSC (Figure 4) literature within the reviewed basket of articles. This supplies novice researchers with the basic references that allow the understanding of the BSC and IT BSC concept and its development. Furthermore, as these articles are the most commonly cited sources, they offer the foundation to conduct future forward searches (as described in (Levy & Ellis, 2006)) in the field of the BSC as well as its applications in the IT/IS domain.

Citations	Title	Reference
34 / 59	The Balanced Scorecard: Translating Strategy Into Action	(Kaplan & Norton, 1996a)
32 / 59	The balanced scorecard: Measures that drive performance	(Kaplan & Norton, 1992)
13 / 59	Using the balanced scorecard as a strategic management system	(Kaplan & Norton, 1996b)
12 / 59	Putting the Balanced Scorecard to Work	(Kaplan & Norton, 1993)

Figure 3. Foundation of BSC literature

Citations	Title	Reference
11 / 39	Alignment is not enough: Integrating business and information technology management with the balanced business scorecard	(Van der Zee & Jong, 1999)
9 / 39	Linking the IT Balanced Scorecard to the Business Objectives at a Major Canadian Financial group	(Van Grembergen, Saull, & De Haes, 2004)
7 / 39	Monitoring the IT process through the balanced score card	(Van Grembergen & Timmerman, 1998)
7 / 39	The Balanced Scorecard and IT Governance	(Van Grembergen, 2000)

Figure 4. Most cited IT BSC literature

Having identified the core BSC and IT BSC articles we continue to review the literature concerning the IT BSC. To summarize the data of our findings in a compact way we use two conceptual matrices (Webster & Watson, 2002) containing different characteristics: (1) demographic characteristics and (2) content related characteristics. To make this data more easily

accessible we visualize the data in the following chapter in form of a timeline (see Figure 9). The following paragraph briefly explains the applied characteristics of the matrices, while the results are outlined in Figure 6 and Figure 7. The articles added with the 2012 update are printed in bold.

To compactly visualize the high number of articles on the limited space available, we employed numeric identifiers, each representing one article. Each identifier is mapped to its corresponding article in Figure 5.

Article ID	Reference	Article ID	Reference
[1]	(Abran & Buglione, 2003)	[35]	(Martinsons, et al., 1999)
[2]	(Asosheh, Nalchigar, & Jamporazmey, 2010)	[38]	(Meyerson, 2001)
[3]	(Atkinson, 2004)	[39]	(Milis & Mercken, 2004)
[4]	(Kasiri, et al., 2012)	[43]	(Rosemann, 2001)
[5]	(Györy, et al., 2012)	[45]	(Rosemann & Wiese, 1999)
[10]	(Cram, 2007)	[46]	(Saull, 2000)
[13]	(Eickelmann, 2001)	[48]	(Sedera, et al., 2001)
[14]	(Erek, 2011)	[49]	(Simon, 2005)
[15]	(Ferguson, Leman, Perini, Renner, & Seshagiri, 1999)	[50]	(Son, Weitzel, & Laurent, 2005)
[17]	(Hagood & Friedman, 2002)	[52]	(Stewart & Mohamed, 2001)
[18]	(Hu & Huang, 2005)	[53]	(Stewart & Mohamed, 2003)
[19]	(Huang & Hu, 2004)	[54]	(Van der Zee & Jong, 1999)
[20]	(Ibáñez, 1998)	[55]	(Van Grembergen, 1997)
[22]	(Jain, Benbunan-Fich, & Mohan, 2011)	[56]	(Van Grembergen, 2000)
[24]	(Kaplan & Norton, 1992)	[57]	(Van Grembergen, 2003)
[25]	(Kaplan & Norton, 1993)	[58]	(Van Grembergen & Amelinckx, 2002)
[26]	(Kaplan & Norton, 1996a)	[59]	(Van Grembergen & Haes, 2005)
[27]	(Kaplan & Norton, 1996b)	[60]	(Van Grembergen & Saull, 2001a)
[28]	(Keyes, 2005)	[61]	(Van Grembergen & Saull, 2001b)
[29]	(Lee, Chen, & Chang, 2008)	[62]	(Van Grembergen, et al., 2004)
[31]	(Lewis, 2000)	[67]	(Corporate Executive Board, 2003)
[33]	(Mair, 2002)		

Figure 5. Article ID References

The demographic analysis – summarized in Figure 6 – explores the origins of the articles by three mutually exclusive characteristics. We hence evaluate for each article the time span it was published in, the regional origin of writing, and the type of outlet it was published in. To offer an easy overview, broad categories have been chosen.

Characteristics	Categories			
Time Span (Total: 39)	**1994 – 1999 (6)** 15, 20, 35, 45, 54, 55	**2000 – 2005 (26)** 1, 3, 13, 17, 18, 19, 28, 31, 33, 38, 39, 43, 46, 48, 49, 50, 52, 53, 56, 57, 58, 59, 60, 61, 62, 67		**2006 + (7)** 2, **4, 5,** 10, 14, 22, 29
Region (Total: 39)	**Europe (15)** 3, **5**, 14, 20, 39, 50, 54, 55, 56, 57, 58, 59, 60, 61, 62	**Americas (15)** 1, **4,**10, 13, 15, 17, 18, 19, 22, 28, 33, 46, 49, 52, 67	**Asia (3)** 2, 29, 35	**Australia (5)** 31, 43, 45, 48, 53	**Africa (1)** 38
Outlet Type (Total: 39)	**Journal Article (21)** 1, 2, 3, **4**, 10, 17, 19, 22, 29, 33, 35, 39, 46, 49, 50, 52, 53, 54, 56, 57, 59	**Conference Proceeding (9)** **5**, 14, 18, 31, 45, 48, 55, 58, 60	**Book (6)** 13, 28, 38, 43, 61, 62		**Other (3)** 15, 20, 67

Figure 6. Demographic matrix of the 39 analyzed articles

The second matrix categorizes the publications by their content, allowing us to compare the characteristics of available BSCs. The results of this classification are presented in Figure 7.

Our first goal was to identify IT BSCs within the available literature. Therefore, we separated publications according to the artifacts they contain (articles containing more than one artifact appear in multiple categories). We distinguished generic IT BSCs, to determine the fundament for further BSC adaption, from applied IT BSCs−which serve as a source of KPIs. Additionally−we identified methods and maturity models for IT BSCs and filtered reviews and alternate frameworks from further evaluation. Since IT BSCs differ widely in their application we secondly categorized the articles according to the subject of the described BSC to identify the closest match for a BDIM application. While IT BSCs in most cases are applied to manage the performance of an IT department, they are also used to manage certain sub-functions like IT Governance (Van Grembergen, 2000), Software Development (Ibáñez, 1998) or Service Level Management (SLM) (Van Grembergen, 2003) (summarized under "IT Function"). Furthermore, they are employed to support evaluation of IT projects and recently also IT project portfolios. IT BSCs are additionally applied to support the management of investment intensive IS (such as Human Resources (HR) systems (Hagood & Friedman, 2002), Enterprise Resource Planning (ERP) systems (Rosemann, 2001; Rosemann & Wiese, 1999) and web-services (Huang & Hu, 2004)).

A further aspect of the diverse usage of IT BSCs becomes visible if one outlines the goals of these scorecards. The most commonly described purpose is the usage as tool for monitoring, measuring, evaluating, and reporting performance (summarized under "Evaluation"). Closely related are publications suggesting the BSC's use for performance improvement. Some articles suggest a usage as a business IT alignment tool, while others see BSCs as an opportunity to define and spread the corporate strategy (summarized under "Strategy"). A relatively new approach is to use a BSC to balance or prioritize projects, initiatives or contracts (summarized under "Prioritization").

Characteristics	Categories (Number of articles)					
Artifact (Total: 39)	**Generic IT BSC (6)** 20, 35, 55, 60, 62, 67	**Applied IT BSC (26)** 2, 3, **4**, 13, 14, 15, 17, 19, 22, 29, 33, 38, 43, 45, 46, 49, 50, 52, 53, 56, 57, 58, 59, 61, 62, 67	**Non IT BSC Concept (3)** 31, 51, 54	**Method (7)** 1, 2, 18, 20, 29, 31, 54	**Maturity Model (5)** 14, 59, 60, 61, 62	**Review (5)** **5**, 10, 28, 39, 48
IT BSC Analysis (Total: 39)	**Analyzed IT BSCs (30)** 2, 3, **4**, 13, 14, 15, 17, 19, 20, 22, 29, 33, 35, 38, 43, 45, 46, 49, 50, 52, 53, 55, 56, 57, 58, 59, 60, 61, 62, 67			**Excluded Articles (9)** 1, **5**, 10, 18, 28, 31, 39, 48, 54		
Subject of BSC (Total: 30)	**IT Department (11)** 14, 29, 35, 49, 50, 52, 53, 55, 60, 62, 67	**IT Function (9)** 13, 15, 20, 33, 46, 56, 57, 59, 61	**IS (6)** 17, 19, 38, 43, 45	**IT Project (6)** 3, 22, 35, 39, 55, 58	**IT Project Portfolio (1)** 2	**Technology (1)** 4
Goal of IT BSC (Total: 30)	**Strategy (4)** 15, 19, 60, 61	**Evaluation (22)** 2, 3, **4**, 13, 17, 29, 33, 35, 38, 43, 45, 46, 49, 50, 52, 53, 55, 58, 59, 60, 61, 62, 67	**Alignment (6)** 15, 19, 22, 56, 59, 62	**Performance Improvement (6)** 14, 15, 20, 33, 57, 62	**Prioritization (4)** 2, 29, 57, 62	
Generic IT BSC Perspectives (Total: 30)	**Business Contribution (28)** 2, 3, **4**, 13, 14, 15, 19, 20, 22, 29, 33, 35, 38, 43, 45, 46, 49, 50, 52, 53, 55, 56, 57, 58, 59, 60, 61, 67	**User Orientation (30)** 2, 3, **4**, 13, 14, 15, 17, 19, 20, 22, 29, 33, 35, 38, 43, 45, 46, 49, 50, 52, 53, 55, 56, 57, 58, 59, 60, 61, 62, 67	**Operational Excellence (29)** 2, 3, **4**, 13, 14, 15, 17, 19, 20, 22, 29, 33, 35, 38, 43, 45, 49, 50, 52, 53, 55, 56, 57, 58, 59, 60, 61, 62, 67	**Future Orientation (27)** 2, 3, 13, 14, 15, 17, 19, 20, 22, 29, 33, 35, 38, 46, 49, 50, 52, 53, 55, 56, 57, 58, 59, 60, 61, 62, 67		
Additional Perspectives (Total: 30)	**Resource (6)** 2, **4**, 13, 17, 52, 53	**Sustainability (2)** 14, 22	**Project Portfolio (1)** 67	**Uncertainty (1)** 2	**Security (1)** 67	
Linkage (Total: 30)	**Metrics (26)** 2, 3, **4**, 13, 14, 15, 17, 29, 33, 35, 38, 43, 45, 46, 49, 50, 52, 55, 56, 57, 58, 59, 60, 61, 62, 67	**Business & IT Metrics (26)** 2, 3, **4**, 13, 14, 15, 17, 29, 33, 35, 38, 43, 45, 46, 50, 52, 53, 55, 56, 57, 58, 59, 60, 61, 62, 67	**Strategy Map (8)** **4**, 13, 17, 33, 45, 49, 52, 62			

Figure 7. Content related matrix of 39 articles and 30 analyzed IT BSCs

To identify which scorecards link business and IT performance measures-a central facet of BDIM-we took a closer look at the perspectives of the IT BSCs. Since the original BSC suggested by Kaplan and Norton has been adapted to IT independently by multiple authors a zoo of similar perspectives with different titles is now available. We therefore derived a mapping, as shown in Figure 8 that allowed us to group perspectives according to the four perspectives of the generic IT BSC (Van Grembergen & Saull, 2001a). We use the generic IT BSC for two reasons: (1) the mapping to the original perspectives is explicitly defined (Saull, 2000) and (2) the generic IT BSC perspectives match the analyzed BSCs to a wider extent than the traditional. To establish this mapping we identified for each adapted IT BSC perspective its original counterpart. Where

this linkage was not explicated we attempted to recreate the link according to the perspectives and contained metrics. In cases where no appropriate BSC perspective could be identified we introduced additional perspectives to the classification. These were subsequently considered as categories for other perspectives unmatchable to the generic IT BSC. We therefore distinguish between four generic IT BSC perspectives and five additional perspectives.

Looking at the first set of perspectives it's obvious that almost all IT BSCs still encompass the traditional four perspectives. As these contain business and IT performance measures almost all IT BSCs fulfill the basic precondition to support BDIM. Additional perspectives are applied to host strategically important aspects. A recent example is the topic of sustainability for which already an individual IT BSC perspective has been implemented. Scorecards containing mostly business metrics are in some cases extended by an additional "resource" perspective to include technical measures. Furthermore, there are single examples of IT BSCs containing perspectives for evaluating project portfolios, uncertainties, and security.

Generic IT BSC (Van Grembergen & Van Bruggen, 1997)	Original BSC (Kaplan & Norton, 1992)	Mapped Perspectives
Business Contribution	Financial	▪ Corporate Contribution (Milis & Mercken, 2004) ▪ Benefits (Machiraju, et al., 2005)
User Orientation	Customer	▪ Client & Community relationships" (Kaplan & Norton, 1996b)
Operational Excellence	Internal Process	▪ IS Process (Jain, et al., 2011)
Future Orientation	Learning & Growth	▪ Talent Management ▪ Strategic Competitiveness (Machiraju et al., 2005)

Figure 8. Mapping of BSC perspectives

To further evaluate the adaptability of IT BSCs to BDIM we examined the linkage between business and technical measures within the selected literature. For this we first selected all IT BSC that provided measurable metrics (summarized under "Metrics"). We continued by selecting IT BSCs from the previous results that contained both business and IT KPIs (summarized under "Business & IT Metrics"). Finally we narrowed down the selected BSCs to those containing a strategy map linking the previously identified measureable business and IT performance measures.

By identifying the available literature on IT BSCs and classified it according to various characteristics we have updated and verified the established current state of the art in IT BSCs. In the following chapter we now continue to fuse this data to identify those IT BSCs that are most relevant for the adoption of the IT BSC for BDIM.

DISCUSSION AND RESEARCH AGEND

We build our analysis on a combination of the "Time Period" characteristic (in a more detailed manner) from Figure 6 and the "Subject of IT BSC" characteristic in Figure 7 resulting in the

timeline depicted in Figure 9. The shapes in the diagram group the analyzed IT BSCs according to their subjects while their sizes represent the number of publications. This allows us to judge the relevance of IT BSC subjects not only by the total number of articles but also by their reoccurrence over time. Within this representation we explore the evolution of the IT BSC, assess its application to business-oriented IT portfolio management and supply a research agenda.
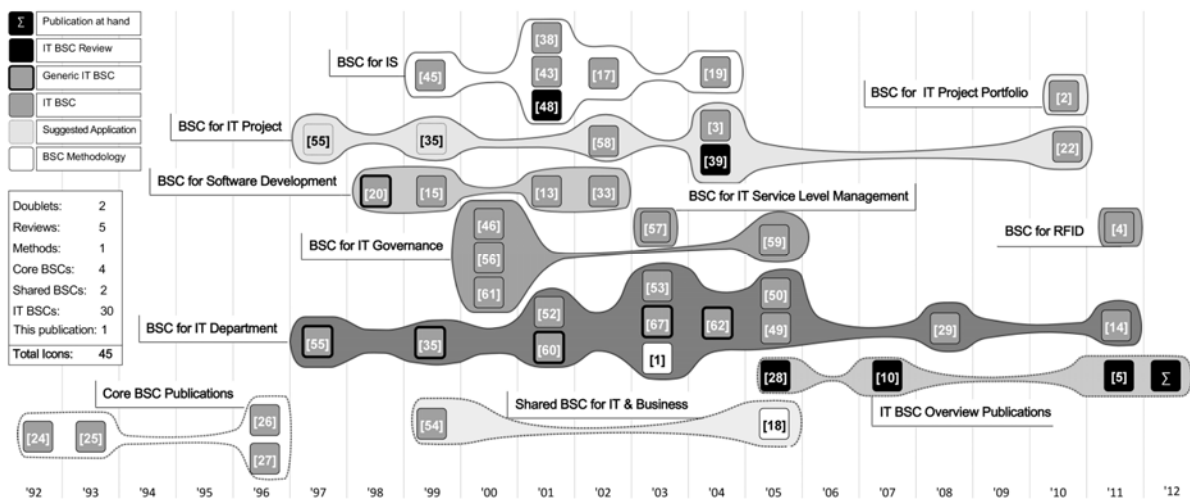

Figure 9. Timeline of BSC Articles

Evolution of the IT BSC

After the four core BSC articles had been published, the first IT BSCs were developed in 1997 for IT departments and IT projects. These remained the most vital and mostly researched applications of the BSC in IT until today. With growing attention and the proposal of a generic IT BSC and a maturity model for its implementation between 1999 and 2005, the IT BSC has been implemented zealously as a management tool in for multiple new subjects. However, these applications have lost attention in the recent years leaving only the original two IT BSC applications (managing projects and departments) as persistent fields of research behind. Taking a distant view at the overall timeline we see a strong decrease in the application of the IT BSC between 2006 and today. A possible explanation might be the IT BSC is going through the "trough of disillusionment" of a hype cycle as proposed by Cram (2007). However, recent publications regarding the use of the BSC for new technologies (Kasiri et al., 2011) may indicate the beginning of the "slope of enlightenment" and again an increasing attention to the usage of the BSC in IT. Furthermore, the current topic of sustainability (Erek, 2011; Jain et al., 2010) may further fuel this development and needs to be considered accordingly for new IT BSCs.

IT BSC for Business Oriented IT Portfolio Management

To assess the extent to which the IT BSC can be adapted within a business-oriented portfolio management we identified the following groups as relevant sources:

1. BSCs supporting the management of IS
2. BSCs supporting the management of the IT project portfolio
3. Generic IT BSCs

BSCs supporting the management of IS allow the assessment of existing IT services and support the decisions regarding the renovation (2) or retirement (3) of a service. Such articles predominantly focus on evaluating certain IS, presenting its business value and justifying its cost (Hagood & Friedman, 2002; Meyerson, 2001; Rosemann, 2001; Rosemann & Wiese, 1999). Only one article suggesting to use the BSC to improve the alignment of an IS the business processes (Huang & Hu, 2004) fails to supply adequate KPIs. To shed some light on what kind of measures are available in mentioned IT BSCs we supply a representative sample of frequently used KPIs.

Business Contribution:

- Cost / Compliance with budget (Rosemann & Wiese, 1999; Stewart & Mohamed, 2003)

User Orientation:

- Coverage of business processes (Rosemann & Wiese, 1999)
- Percentage of covered transactions valued good or fair (Rosemann, 2001)
- Data entry error rate (Hagood & Friedman, 2002)
- Help desk performance (Hagood & Friedman, 2002)
- User satisfaction (Hagood & Friedman, 2002; Sedera et al., 2001)

Operational Excellence:

- System availability/ downtime (Rosemann, 2001; Rosemann & Wiese, 1999)
- Total number of applications in system (Hagood & Friedman, 2002)
- Average response time (Rosemann, 2001)

Future Orientation:

- Number of new users / costumers (Rosemann & Wiese, 1999)
- Number of releases per year (Rosemann & Wiese, 1999)
- Number of consultants per module (Rosemann & Wiese, 1999)

It is evident that measures lack business performance measures and thus a business-centric view. However, there are first signs of business orientation, especially within the user orientation dimension, where business process relevant KPIs are described. To apply such an IT BSC to support business-driven IT portfolio decisions, business performance measures will need to be

added. Furthermore, all IS scorecards are tailored to a specific IS. A generic scorecard that can be customized to a wide variety of IS can further support the usage of the IT BSC within BDIM.

So far only Asosheh et al. (2010) proposed a BSC model to rank future IT projects according to multiple criteria. It is suggested that projects and project alternatives are evaluated to a fixed set of weighted criteria. Since IT projects may include the introduction of new (1), renovation (2) and retirement (3) of existing IS this model can be universally applied to business-oriented IT service portfolio decisions. However, this approach only allows for prioritizing previously defined IT projects but it cannot support the identification of new IT projects.

For developing a new BSC for BDIM generic IT BSCs may prove especially helpful in offering easy adaptability to new subjects. Generic IT BSCs are highlighted in Figure 9 by a thicker outline. The broadly cited generic IT BSC proposed by Van Grembergen (2004) has been employed multiple times for IT department BSCs. It is important to note that none of the generic IT BSCs supply a strategy map. This may be due to the fact that strategy maps are specific for a certain application of a BSC. But since highly sophisticated strategy map examples are available for IS (Hagood & Friedman, 2002) these should be considered when linking business and technical KPIs.

Research agenda

To support business oriented IT portfolio management with an IT BSC we identified BSCs for IS, a BSC for IT project portfolio management and generic IT BSCs as the best starting points. However each of these BSC types has certain limitations and needs further research to provide useful IT portfolio decision support. Additionally there is no BSC available that allows to aggregate metrics form BSCs for IS into one overall IT service portfolio scorecard, which measures the performance of the sum of all existing IT services and allows identification of improvement potentials. We thus propose the following future paths of research:

- Further adaption of business process centric performance metrics for IT BSCs.

- Development of a generic BSC for IT services based on the available BSCs for IS and the generic IT BSC incorporating business centric metrics.

- Development of an overall IT service portfolio BSC, which allows the aggregation of the metrics of individual IS.

Having outlined our research agenda we now conclude this paper with the limitations of our research and a glance at the future.

CONCLUSION, LIMITATIONS AND OUTLOOK

With BDIM we are witnessing yet another shift in the IT management paradigm. As IT services are becoming increasingly critical for daily operations the general management demands more transparency and control. However, there are only limited tools available today that can evaluate the IT service portfolio according to the strategic goals of a company from a business perspective. To identify possible IT BSCs that can be adapted for this task we established the state-of-the-art of IT BSCs. We then continued to identify the relevant starting points for the development of new IT BSCs for BDIM. Finally, we sparked the idea of a generic IT BSC for IT services and the IT service portfolio.

Although this paper is based on a rigorous literature search we cannot guarantee for its completeness. We are aware that more literature is available on the use of BSCs in IT. If this review was to be extended it could be done so by including and analyzing the results of other reviews (Sedera et al., 2001), conducting a forward search or updating the conducted searches with results published beyond March 2012. Furthermore the possibilities of analyzing the data collected in this paper are far from exhausted. More insights could be gained by correlating different characteristics identified in Figure 7.

We hope that our work can support other scholars and practitioners in finding appropriate literature on IT BSCs and wish to have inspired further research regarding the development of the IT BSC.

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