

Working Paper

Leveraging Business Driven Innovation within the Application Lifecycle:
Introducing an Adaptive Business IT Alignment Model

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Contents

1	Executive Summary	3
2	Introduction.....	3
3	Related Work	5
4	Research Methodology	6
5	IT Capabilities as Mediators between BITA Approaches and SAL stages	6
6	Classification of BITA Approaches.....	8
7	Classification of SAL Stages	9
8	Unified Model: Adaptive BITA for AM.....	11
9	Practitioner Evaluation of the SAL based flexible BITA Model.....	14
10	Implication for IS research and practitioners.....	15
11	Conclusion, limitations and research agenda.....	16
12	References.....	16

1 Executive Summary

The disruptive changes that Information Technology (IT) has brought to many industries are now requiring organizations to redefine themselves to include IT as driver of every aspect of their business. The resulting demand for innovating business processes places massive pressure on IT departments who have been focusing on efficient operation in the last decades. This paper develops ways in which business and IT can cooperate in such turbulent times to allow the exploration of new technologies to improve business processes and at the same time not jeopardize existing operations. The resulting adaptive Business IT Alignment (BITA) model divides the lifecycle of an application into four stages and associates three distinct forms of BITA. A first evaluation has shown that similar models of controlled imbalance between business and IT are already being applied in practice, however, lacking guidance from scholarly research.

2 Introduction

Information systems (IS) have dramatically evolved in the last decades, entering almost every aspect of our professional and private life. While advances in Information Technology (IT) have enabled smaller devices, higher processing powers, larger storage capacities, faster data connections and a wide array of new sensors, the core functions remain the same: recording, processing, presenting, storing and distributing data (Lyytinen & Yoo, 2002). Hence, from an IS point of view, the most significant evolutionary changes have taken place not within the core IT functions but in their form of application for business and private purposes (Lyytinen & Rose, 2003). Although IT innovation is generally motivated by a specific need, its usage tends to spread to previously unanticipated domains. With the rise of personal computing, more recently fueled by smartphones and tablets, device manufacturers, software vendors and (web-) service providers have recognized the value of the consumer market and have invested heavily to provide innovations to the broader public (IDC, 2011). Today there can be no doubt that in many cases the usability and functionalities available to consumers excel those available to users of corporate infrastructures. This “Consumerization” marks an essential turning point in IS research history: It is the first time that even non tech-savvy employees are able to choose between their personal and corporate infrastructure to support their business processes (Ridder, Ambrose & Rold, 2010). This has led to the wide spread and obvious user-question: *“Why use the cumbersome corporate solution when there are faster and/or more comfortable consumer solutions?”*

At the same time consumer solutions inevitably pose a serious threat to corporate data security as they generally provide lower data security standards (Behrens, 2009).

To the grief of the users, companies have since often reacted with strictly regulating the access and usage of personal IT solutions by technological and organizational means (RSA Security Inc., 2007). This however has shut down any chance of innovating business processes through new technologies from the consumer sector (Györy, Cleven, Uebernickel & Brenner, 2012).

Hence a new question arose: *“How can corporate data be secured while allowing user and business driven innovations?”*

Prime examples where this question has already being fruitfully addressed are Bring-Your-Own-Device (BYOD) campaigns (Lai, 2011). While IT departments secure corporate data through encapsulating it in services or virtualized environments, users are allowed to use personal computing devices of their choice. This has highly increased mobile productivity and user satisfaction (Escherich, 2011).

Although this provides a foretaste of how business can profit from consumer innovations, BYOD campaigns only seem like a small step in the much broader picture of the ongoing re-definition of the way business and IT cooperate. With innovations now emerging in both business and consumer markets alike, IT departments will need to establish new forms of Business IT alignment (BITA) to harness the potential of state-of-the-art consumer and business oriented technologies to innovate their business processes and IS landscape.

At the same time it is essential to provide an overall roadmap to allow innovative solutions to unfold their full potential during their evolution in the organization. There are four major business opportunities that an application can enable during its lifespan: IT resource optimization, business process optimization, business process innovation and providing a competitive advantage (Ward & Peppard, 2002, p. 301). However, individual forms of cooperation between business and IT support each of these opportunities differently (e.g. strict IT domination may lead to lower IT expenses and better security but diminishes the chance of business driven innovation (Györy, Seeser, Cleven, Uebernickel & Brenner, 2014)).

While redefining their business IT relationship, practitioners are confronted with challenge of selecting the most effective IT governance measures to support their business goals. Limiting ourselves to application management this leads to our primary research question:

“Which forms of BITA allow leveraging the business opportunities emerging during the evolution of an IS within an organization?”

To find an answer this research combines dominant BITA approaches with the stages of the strategic application lifecycle (SAL) model. This allows the identification of appropriate BITA forms, depending on the opportunities an application offers within a certain lifecycle stage.

Before this paper introduces the resulting adaptive BITA model, it gives a brief overview of related work and outlines the research methodology. It afterwards describes the model’s implications for both practitioners and research and concludes with the limitations of the presented results and an outlook on further avenues of research.

3 Related Work

The research presented in this article stems from the roots of two established IS research domains. At its core it interweaves the topics of BITA (including IT Governance) and Application Management (including Application Lifecycle and Portfolio Management). These are briefly described in the following section to outline the previous research that this article builds upon.

Business IT Alignment and IT Governance

BITA (considering “alignment” as a state not an activity) is the momentary ability of an organization to address business needs with IT capabilities (Henderson & Venkatraman, 1993) and to harness these capabilities to achieve its business goals (Luftman & Kempaiah, 2007).

The ideal state of BITA, where all business needs are fulfilled and all IT potentials are leveraged to the full extent is hard to accomplish in practice (Cleven, 2011). In order to fuse IT and business (De Haes & Van Grembergen, 2009) and ensure returns on IT investments (Webb, Pollard & Ridley, 2006) organizations have deployed IT Governance (ITG) instruments containing a mix of structures, processes and relational mechanisms (Weill & Ross, 2004). The goal is to reach the highest level of alignment maturity as described by Luftman (Luftman, 2000), which will foster the ideal state of BITA.

A recent publication (Györy et al., 2012) shows that these measures are used to achieve different forms of alignment. Organizations apply these forms differently throughout their IT landscape to allow individualization and innovation where desired and ensure efficiency, continuity and data security where required (Györy et al., 2012).

Application Management

Application Management (AM) as a research domain encompasses the development, continuous improvement, maintenance, and retirement of single software applications (Bennett & Rajlich, 2000; McKeen & Smith, 2012) as well as the overall alignment and health of the application portfolio (McKeen & Smith, 2010; Weill & Vitale, 1999).

Recently, the pressure on IT departments to renew, replace or retire legacy applications has fueled practitioners’ and scholars’ interest in Application Lifecycle Management (ALM) (Capgemini, 2014). The early mindset is now being revised to include the possibility of termination due to internal and external factors like changing business requirements or unsustainable technology (Swanson, 2000). While viewing the application lifecycle from a strategic business point of view was common in the initial approaches to application management (McFarlan, McKenney & Pyburn, 1983) today it is commonly used to describe an operational cycle of requirements engineering, design, development & testing, rollout, operation and optimization. In a recent case study the concept of a strategic application lifecycle (SAL) has been revisited to explain the successful achievement of emerging business opportunities during the evolutionary stages of an IS at BMW (Györy et al., 2014).

4 Research Methodology

This article follows the design science research (DSR) approach for IT (March & Smith, 1995). It focuses on the development of effective solutions for practical problems, i.e. on accomplishing utility (Hevner, March, Park & Ram, 2004).

DSR projects begin with an actual challenge or opportunity found in a practitioner environment, and hence is always of relevance to a certain group of stakeholders. To address this challenge DSR draws from previous knowledge, experience and expertise from related application domains with rigorous research (Hevner et al., 2004). At the core of DSR is the creation of an artifact suited to address the identified challenge. This can be understood as an iterative process encompassing requirements engineering (step 1), constructing or refining an artifact (step 2) and evaluating the artifact (step 3). These steps are then repeated until the desired quality of the artifact is reached.

The research at hand has identified the challenge of IT departments to effectively incorporate business innovation into their application management in chapter 2 (step 1). To address this challenge it draws from two related research streams of BITA and AM (in chapter 3) to construct the artifact of the adaptive BITA model in chapters 5 to 8 (step 2). In the end, the resulting model is evaluated with practitioners from the field (step 3) and their feedback is summarized in chapter 9 to support a future iteration of the DSR cycle to improve the model

5 IT Capabilities as Mediators between BITA Approaches and SAL stages

In order to identify the best BITA approach for a certain SAL stage we mediate their connection by IT capabilities. BITA approaches are described to support certain IT capabilities while SAL stages require a particular configuration of IT capabilities to unfold their full potential. This leads to the cause and effect research model depicted in Figure 1.

The mediating IT capabilities have been selected by the following criteria:

- Represent the current business requirements
- Affected by BITA approaches
- Required by SAL stages

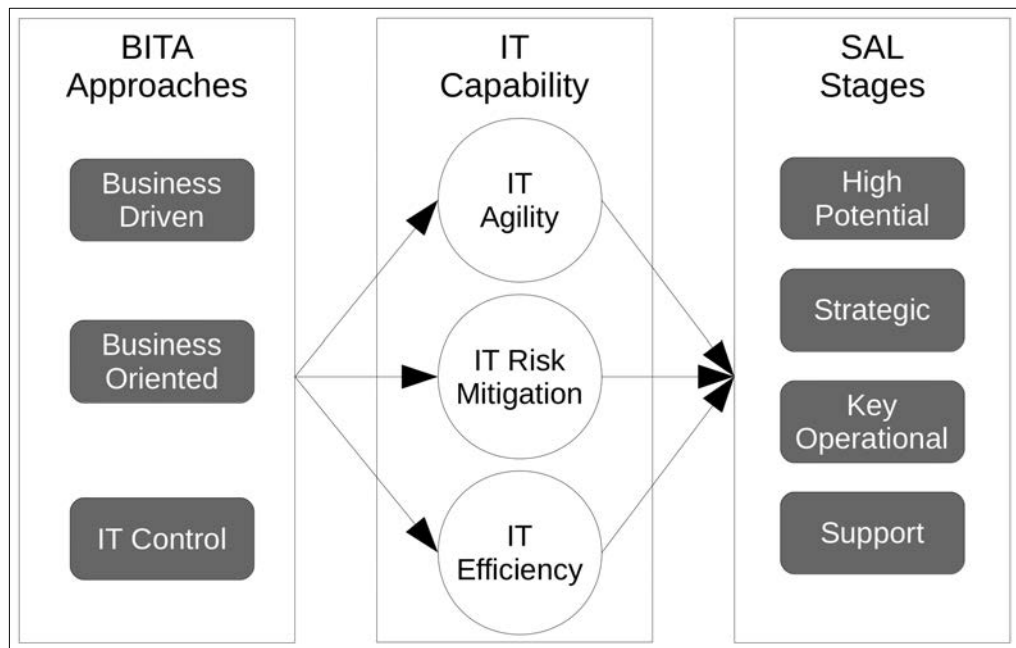


Figure 1: Cause and Effect Research Model

In the following passage we describe the identified IT capabilities that will be applied to characterize and connect both BITA approaches and SAL stages.

IT Agility

The tension between business demand for innovation and the limitations due to the inflexibility of software applications and IT departments is described by Van Oosterhout et al. as an agility gap (van Oosterhout, Waarts & van Hillegersberg, 2006). This article adapts the term *IT Agility* as the degree to which an IT artifact (department, policy, application or set thereof) supports and enables business requested change (products, processes, resources).

IT Risk Mitigation

With the growing internal and external compliance requirements (such as SOX or ISO 27001) regarding data and system security and availability, IT departments have invested heavily into their capability to mitigate or even eliminate the risks of data loss or critical system failure (Loch, Carr & Warkentin, 1992). *IT Risk Mitigation* hence describes to what extent the IT department is able to mitigate the risk of failure, data theft and loss for a certain system or set thereof. Because business criticality of data and systems is already represented within the SAL, criticality is thus disregarded (all data is regarded equally important). Other risks, such as project failure or technology obsolescence are excluded.

IT Efficiency

The industrialization of IT in the past decade has lead to a multitude of lean and standardized systems, processes, portfolios and highly controlled environments (Zarnekow, Brenner &

Pilgram, 2006). *IT Efficiency* therefore represents the ability of the IT department to sustainably maintain agreed service levels with minimal resources. It encompasses the ability to establish business processes that deploy the provided services effectively and effectively.

6 Classification of BITA Approaches

Three BITA approaches have been identified in recent research (Györy et al., 2012), which describe the dominant distribution of decision rights witnessed in practice today:

- *IT Control*: Full responsibility and decision rights reside on the IT side
- *Business Orientation*: Shared responsibility and decision rights between business and IT along defined boundaries
- *Business Driven*: Full responsibility and decision rights reside on the business side

Each approach positively affects two of the identified IT capabilities while impeding the third (see Figure 2). These relationships are outlined in the following paragraphs.

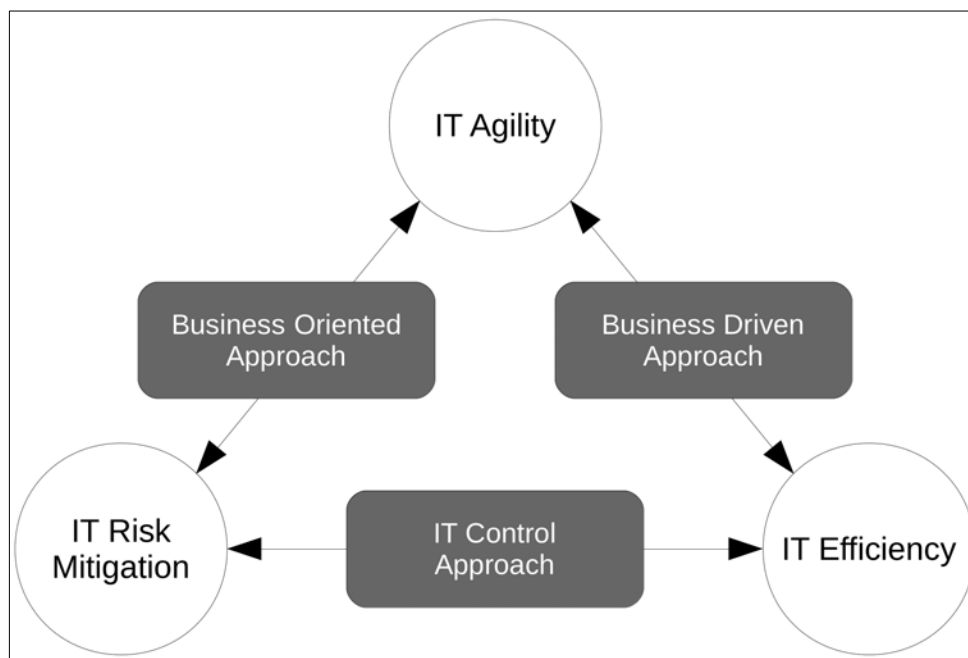


Figure 2: IT Capabilities Supported by BITA Approaches - as described in (Györy et al., 2012)

IT Control

This approach focuses on a controlled and compliant IT landscape. The goal is to guarantee total transparency over all IT solutions implemented within the organization to fulfill internal and external compliance, drive *IT Efficiency* and maximize *IT Risk Mitigation*. Since all IT innovations must be evaluated and implemented by the IT department, it quickly becomes the bottleneck through which only a small set of business requests will fit. In this sense it hinders the

business from making full use of its innovation potential and therefore is regarded as inhibitor of *IT Agility*.

Business (or User) Oriented

The goal of this approach is to support business-driven innovations and at the same time *mitigate IT risk*. IT departments offer security, support and continuity for a set of applications. Business can build upon these services to implement individual solutions at their own risk. If such implementations become mission critical, control and responsibility is transferred to the IT department through a defined process. This provides *IT Agility* while involving high set-up, management and integration costs inhibiting *IT Efficiency*. It must be mentioned at this point that the influence on the IT capabilities heavily depends on the ratio between IT supported and business driven applications. For this research a balance between both types is assumed, while unbalances can be represented by shifts towards one of the other two approaches.

Business (or User) Driven

This extreme approach, found in startups and loose organizations with empowered individuals, places all responsibility for IT on the business side. The goal is to boost the effectiveness of IT usage by offering maximum *IT Agility* in supporting whatever solution the business and individual users see fit best. Although *IT Effectiveness* is regarded high because applications are sourced and maintained by the business, the ability to *mitigate IT risks* through this advisory role of the IT department is very limited.

7 Classification of SAL Stages

The SAL in its recent form (Györy et al., 2014), which is based on the classification scheme suggested by Ward (Ward & Peppard, 2002) and earlier by McFarlan (McFarlan et al., 1983), revolves around a two by two matrix based on the dimensions future business potential and business criticality (see Figure 3). This allows a classification of applications from a business perspective and the representation of an evolutionary application lifecycle. The stages of this lifecycle are not necessarily sequential, however transitions, so called evolutions, are limited to neighboring quadrants. The SAL takes into account the sociomaterial nature of IS success (Cecez-Kecmanovic, Kautz & Abrahall, 2014) and does not presume a predictable progression. Instead it highlights combinations of IT capabilities that support leveraging the business opportunity of each SAL stage (displayed in italics in Figure 3) and the dominant path observed for successful applications. The following paragraphs describe these stages in more detail.

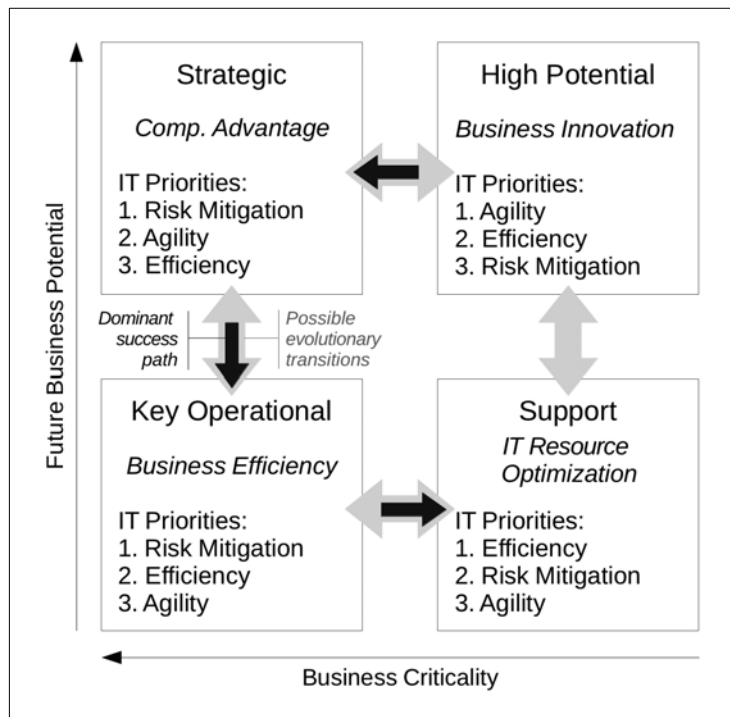


Figure 3. SAL stages - based on (Györy et al., 2014)

High Potential Stage

This is the entry point for innovative software projects, which offer a high future business potential. They require high *IT agility* to allow adaption to constantly changing business processes and requirements while determining the best-suited implementation for an organization. Because of the uncertainty of such projects, short-term incremental goals with associated limited budgets are suggested as means to support innovation but *control IT costs*. The goal at this stage is to prove the feasibility of an idea in the context of the organization by affecting a growing number of voluntary users. The low business dependency on these experimental applications demands for little *mitigation of IT risks*.

Strategic

As soon as a high potential application reaches a business critical status – it is regarded strategic. Strategic applications have already proven their business value but offer further potential to become a competitive weapon. This drives business readiness to invest in this type of applications. Business requirements need to be carefully moderated across the organization and multiple stakeholders. *IT agility* is therefore required in establishing common requirements sets and implementing them. The top priority, however, is to *mitigate IT risks* that would have a serious impact on business strategy and operation at this stage. The focus on these two capabilities prioritizes *IT efficiency* as least important goal also supported by the higher chance of extended budgets.

Key Operational

Applications that drive business operations but do not provide a competitive advantage or are regarded as commodity are summarized as key operational.

The stabilization of business processes of the previously strategic application now allows their standardization and optimization throughout the organization, which demands high *IT efficiency*.

Strategic Lifecycle Stage	High Potential			Strategic			Key Operational			Support		
Opportunity	Business Innovation			Competitive Advantage			Business Efficiency			IT Efficiency		
IT Capabilities	Agility	Risk Mitigation	Efficiency	Agility	Risk Mitigation	Efficiency	Agility	Risk Mitigation	Efficiency	Agility	Risk Mitigation	Efficiency
Suggested configuration	+	-	○	○	+	-	-	+	○	-	○	+
IT Control Approach	-	+	+	-	+	+	-	+	+	-	+	+
Business Oriented Approach	+	+	-	+	+	-	+	+	-	+	+	-
Business Driven Approach	+	-	+	+	-	+	+	-	+	+	-	+

Figure 4. Unified Model – Mapping of BITA approaches and SAL stages (matches are showed in gray color)

The focus shifts from adapting to business to adapting the business dropping the need for *IT agility*. The top priority remains to *mitigate IT risks* that could affect key operational systems and lead to substantial losses.

Support

Changes in business and IT strategy as well as new applications often render existing applications obsolete. While these may still provide unique functionalities used by a limited audience, they are generally not regarded as business critical any longer. This provides the opportunity to reduce resources used by these applications by means of improving *IT efficiency*. As some critical data may still reside on these systems requiring continued effort to *mitigate IT risks*.

8 Unified Model: Adaptive BITA for AM

Having established a shared interface we can now combine the BITA approaches and SAL stages by means of mapping supported and required IT capabilities. This result in the unified model, highlighting BITA approaches for each SAL stage (visualized in Figure 4). In the following paragraph we explore the resulting matches.

Business Driven High Potentials

To enable business driven innovations, IT departments need to take the role of an advisor and support the business in experimenting with different service, software and infrastructure options to find the most adequate solution for a new or optimized business processes. At the same time the business side needs to take full responsibility for the developed solution and has to be prepared to hand over an application to the IT department when it can no longer guarantee the required security and service levels. In terms of user management this implies administrator rights to install third party software, write and compile code and uncensored access to web-services. From a governance point of view, innovative business units are allowed extended IT decision rights and a limited IT budget to make use of new software packages, external providers, cloud services or any other form of technology. It remains the IT department's responsibility to inform about potential security hazards, compliance issues integration costs and support technological evaluations when requested. The most appropriate development method for high potential applications, are agile approaches with short review cycles, to allow maximum control over the development by the business and to maintain the ability to terminate unsuccessful project early.

Today this approach can often be observed in specialized business functions (e.g. trading, risk management or software development). These units heavily rely on applying new technologies and individually developed software to provide faster and more accurate business information.

This approach however requires a high degree of responsibility and awareness by the management and employees. In cases where this responsibility shift is not acceptable, the business oriented approach can be implemented, which will ensure security of critical applications but at a higher costs and a narrower field of innovation.

Business Oriented Strategic Applications

To capitalize on an application that has successfully evolved within an organization, it is necessary to retain and secure its key elements while further tailoring or expanding its features. At this stage an IT department (or external service provider) needs to partner with the business to establish and maintain a consistent set of goals and requirements to be implemented. With the increasing strategic impact and growing number of stakeholders the change and requirements management becomes a complex and time-consuming task. Due to the top management visibility, however, there is a chance to access a wider set of resources. In terms of user management, the usage of the new application and improvement suggestions are encouraged. Alternate solutions are monitored but not supported. From a governance perspective, decision rights and financing are tied to the corporate management.

Until recently, examples of such strategic applications have become rare since the competitive advantage provided by the IT function has been questioned (Carr, 2003) and financial crisis have led to continued IT budget cuts. The emerging of new electronic markets and technological opportunities like web-services and social media have fueled a variety of individually developed IS

projects like social CRM, consumer apps and other value adding services are beginning to prove their competitive value (Piskorski, 2014).

In scenarios where the budget does not allow an extensive corporate requirements engineering, the business driven approach may be applied. Since this will limit the available knowledgebase and possibly endanger critical business data and systems, it should only be used as bridge until criticality becomes apparent and appropriate funding is granted.

IT Control for Key Operational Applications

As new business processes mature and gain constancy, the opportunity arises to establish a unified set of optimized processes throughout the organization. The IT department has the ability to drive this optimization by overseeing all related processes and establishing standards (including workflows, data, decision rights, communication channels) with the business. These processes are then embed into the application (or a vendor based alternative if available) and enforced throughout the organization. Alternate solutions need to be integrated or retired. User training must be provided for the optimized and unified processes, which are enforced through technical and organizational policies. From a governance perspective the decision rights are transferred to the IT department.

Famous examples for such projects are ERP software rollouts where off the shelf software is customized according to engineered requirements, implemented and enforced to optimize business processes. A possible explanation for the frequent delays and failures of such implementations is that organizations directly try to establish key operational applications through an IT control approach without allowing an application and its users to evolve through the upstream SAL stages cutting short multiple innovation, evaluation and learning processes which are essential to successful IS projects.

Where central IT control over an application cannot be imposed (e.g. where decision rights are dispersed) a business oriented approach can be chosen. This, however, is unlikely to achieve the same depth of synergies and is likely to cause higher long-term costs through less rigorously implemented IT optimizations.

IT Control for Supported Applications

As applications become less critical to the daily business operations, IT departments have the opportunity to relocate invested resources. Continuous improvement and non-critical maintenance efforts can be reduced and infrastructures consolidated. With further declining usage the application must ultimately be scheduled for retirement. Users are encouraged to transfer to other applications, while from a governance perspective all decision rights reside with the IT department, who finances all applications in this SAL stage from a fixed budget.

Typical examples are individually developed IS whose functions have been rendered largely obsolete by the rollout of an integrated software packages but still provide functions to limited

group of users (e.g., functions of individually developed management information and financial accounting systems being replaced by SAP).

In a scenario in which a business unit is unwilling to migrate to a new system but is willing to accept responsibility for its operation it can be removed from the portfolio of the IT department and transferred to the business, adapting a business driven approach. Although this comes at a higher IT risk, this risk poses a lower overall business impact.

9 Practitioner Evaluation of the SAL based flexible BITA Model

A first evaluation was conducted with a focus group of selected practitioners from different backgrounds (one CIO, three application portfolio managers, two enterprise architects and three application owners for CRM and ERP applications). After the adaptive BITA model for AM was presented to the group, each member was requested to describe the advantages and challenges he would face implementation this model in his organization. Results were summarized and then discussed openly. The results are shown in Table 1 and 2.

Most frequently anticipated advantages	Frequency
Ease of use: Business and IT can share same comprehensible application LC model	8 of 9
Obvious business opportunities ease access to IT investment justification	6 of 9
Allows non-critical business driven innovation to take pace outside the IT department	6 of 9
Identifies misalignment between goals, investments and policies	4 of 9
Evolutionary approach reflects organizational learning and social dynamics	3 of 9

Table 1. Advantages of the Adaptive BITA Model

While four participants said they already are using similar adaptive approaches to govern applications depending on their business impact five preferred a single policy and granting exceptions. However, none of the participants had an established strategy to allow and integrate business innovations beyond the support for individual databases (e.g., MS Access), complex spreadsheets and scripting (e.g., Visual Basic Scripts). At the same time seven participants admitted that integration of software developed or sourced by the business poses a regular challenge.

Most frequently anticipated challenges	Frequency
Internal and external compliance restrictions limit distribution of responsibilities	9 of 9
Not all business units are ready or willing to take responsibility for IT innovations	6 of 9
Four different (for each SAL stage) compliance policies will overwhelm the business	5 of 9
Missing measurable criteria to determine lifecycle stage of an application	5 of 9
Lack of representation of architectural dependencies among applications	2 of 9

Table 2. Challenges of the Adaptive BITA Model

Overall the model has been deemed useful for evolutionary management of applications where the business is capable and willing to assume partial IT responsibility. This first evaluation however revealed that for the model to be applied in practice it needs to be supplemented with indicators and methods to determine the SAL stage of an application and a scalable and easily understandable regulatory framework.

10 Implication for IS research and practitioners

The scientific discourse about different forms and methods of BITA has been on research agendas for over two decades with the goal of reaching optimal balance between IT and business. This article takes on a different point of view, suggesting that a controlled form of imbalance may be a desirable instrument for IT management. Hence, misalignment is regarded as a driver to achieve certain business opportunities. This results in the challenge to identify, classify and prioritize the multitude of potential opportunities. This contribution focuses on capitalizing on those opportunities that arise during the evolution of software applications and applies the SAL stages to identify and classify them. A first evaluation with practitioners has shown that similar adaptive BITA approaches are already in practical use for AM while at the same time current literature on adaptive goal oriented BITA is rare. Therefore we highlight this lack in current research and suggest a possible research gap.

For practitioners the implications of this model is twofold. Organizations struggling to balance between driving innovation, securing mission critical information systems and maintaining a healthy application landscape, the adaptive BITA model may provide assistance in shaping future governance mechanisms to selectively distribute responsibilities. Where such an adaptive BITA approach is already in place, this contribution offers a reference point for evaluation and improvement.

Especially with the currently growing business demand for innovation, and many IT departments just recovering from a decade of budget cuts, this form of adaptive BITA allows IT departments to pass on parts of their workload to the business.

11 Conclusion, limitations and research agenda

In this article we have identified appropriate BITA approaches for each SAL stage to create a flexible model in order to harness the potential of business driven innovation. While it proves helpful in identifying and verifying potential solutions, changes have to be increasingly moderated and controlled by the business side to unfold the full potential of an application in an organization.

The proposed model provides a main and an alternate BITA approach for each SAL stage. The identified approach can be applied to plan a single application or to manage an overall portfolio.

An evaluation with a focus group has highlighted the usefulness of the model while also establishing further requirements before it can be applied to change application management processes. At its current stage it has been deemed useful in classifying alignment approaches for different application classes and evaluating if these approaches support the desired goals. A further insight is that participants still doubted the willingness and readiness of the business side to take over IT responsibilities.

Above the shortcomings of the adaptive BITA model already pointed out by the practitioners in chapter 9, the validity and applicability of the results presented in this article are bound by a set of research related limitations. The conducted evaluation needs to be supplemented by further practical implementations and a review by a broader audience to provide a deeper understanding of the practical implications. Furthermore, the results present a generic model, which although may serve as a reference point, needs to be expanded with more detailed application lifecycle and BITA or IT governance concepts to increase practical value. Theoretical research in this field may continue to redefine and advance the adaptive BITA model through incorporation of other AM and BITA approaches. Practical research may focus on further evaluations of the model or tailoring it to a certain use case. By establishing an adaptive BITA model this research has provided a possible answer to the question when to apply which form of BITA to support business opportunities emerging during the lifecycle of an innovative application.

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