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Christina Di Valentin
German Research Center for Artificial Intelligence (DFKI), Christina.Di_Valentin@dfki.de

Andreas Emrich
German Research Center for Artificial Intelligence (DFKI), Andreas.Emrich@dfki.de

Dirk Werth
German Research Center for Artificial Intelligence (DFKI), dirk.werth@dfki.de

Peter Loos
German Research Center for Artificial Intelligence (DFKI), loos@iwi.uni-sb.de

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Christina Di Valentin
German Research Center for Artificial Intelligence (DFKI)
Christina.Di_Valentin@dfki.de

Andreas Emrich
German Research Center for Artificial Intelligence (DFKI)
Andreas.Emrich@dfki.de

Dirk Werth
German Research Center for Artificial Intelligence (DFKI)
Dirk.Werth@dfki.de

Peter Loos
German Research Center for Artificial Intelligence (DFKI)
Peter.Loos@dfki.de

Abstract

A rapidly changing economy and peer pressure amongst competitors lead business to continuously reconsider and readjust their current business models. Thus, business models must be flexible and adaptive towards external changes and should be controlled and managed dynamically. This paper develops a conceptual framework for adaptive business models, which enables decision makers in strategy and IT management to intertwine business models with strategy and business processes, in order to analyze the complex relationships amongst these different description levels of an enterprise. Based on the core elements of business models, the interplay of these elements with aspects from enterprise strategy and business processes are investigated and potentials for IT innovations are being identified to live up to the vision of adaptive business models. For each of the innovations, key measures are considered and improvement possibilities within an enterprise's IT infrastructure are being identified. The paper concludes with an outlook on possible implementations and future research.

Keywords

Business Models, Dynamic Enterprise, Business Model Framework, Adaptive Business Models.

1. Introduction

"Competition is no longer between products or services, it's between competing business concepts" (Hamel, 2002).

According to IBM's Global CEO study, CEO's are increasingly forced to adapt their business models to dynamic factors for staying competitive within the continuously changing business environment (IBM, 2010). As diffusion of innovations from information technology into

business has become a crucial success factor, the business model concept has proven to be increasingly important (Magretta, 2002). Thereby, the business model concept is not only popular in the e-business area, but also in the research fields of strategic management and information systems (Osterwalder & Pigneur, 2010). These developments evoke the demand of a consistent concept which is capable of explaining the adaptation of a company's business model and the consequences that are elicited from modifying individual elements of a business model. When specific components of a business model are affected by external or internal incidents, enterprises should be able to take appropriate countermeasures. By this means, business models have to be flexible enough to adapt their strategies and business processes to changing factors to stay competitive. So far, existing approaches in most cases focus on static aspects, not sufficiently taking into account the huge amount of dynamic factors that influence a company's business model (Chesbrough & Rosenbloom, 2002; Bouwman, de Vos, and Haaker, 2008). With static aspects, we mean the isolated consideration of business models without taking into account the internal interrelations and external forces that influence a company's business model (De Reuver, Bouwman, and MacInnes, 2009).

Nevertheless, knowledge on business models, particularly on dynamic business models, is still quite fragmented. Despite the fact that business models have already been addressed by many scientists so far, research on business models has been mainly conducted in isolation, not considering the interdependencies between the constituent parts of a business model and its correlations to strategy, business processes and information and communication technologies (Zott, Amit, and Massa, 2011).

To achieve progress in research, a framework should be derived which is capable of explaining all existing dependencies between a company's different divisions, reaching from strategic level to business process level. By this means, implications which are caused by external dynamic factors can be deduced. Thus, a basis for the development and improvement of business models can be offered.

This paper follows a design-oriented methodology (Wilde & Hess, 2007). A systematic literature review on approaches dealing with business model dynamics forms the basis for the establishment of a typology of dynamic aspects for business models. Based on this typology, shortcomings of the current approaches are collected as requirements. These requirements serve as foundation for the development of a conceptual framework for adaptive business models. It takes into account the relevant dependencies between a business model and all enterprise levels, reaching from strategic level to the level of business processes. In addition, key performance indicators are considered, as they reveal the efficiency of the analyzed interplays.

To derive the above mentioned framework, the paper is organized as follows. Section 2 gives an overview of existing approaches dealing with dynamic aspects on business model research. Consequently, a framework for adaptive business models is going to be introduced in section 3. This framework represents theoretical aspects within adaptive business models. Section 4 summarizes the paper and gives an outlook to future research to validate the proposed framework.

2. Literature Analysis

The major objective of this section is to identify related approaches dealing with dynamic business model research. Based on a comprehensive literature review, the constituent parts of a business model are derived which form the basis for the underlying framework. Moreover,

dynamic aspects in business models are analyzed and collected in a typology and serve as a starting point for defining requirements for adaptive business models.

2.1 Dynamic Aspects on Business Models

Research literature dealing with business models is basically characterized by two different methodological approaches: A general approach and a web-based approach. However, the focus on dynamic aspects of business models is rather scarcely within both approaches. Linder and Cantrell's (2000) Change Models and Chesbrough's (2006) Open Business Models represent prevalent examples for the general approach. The main aspect about Change Models is the identification of business transformation for staying competitive. First, the impact of change is identified, by deducing the extent of required change on the underlying business model. Then, organizational efforts can be arranged according to the specific Change Model. Change models are classified in Renewal Models, Realization Models, Extension Models and Journey Models, whereas the latter comprises the most revolutionary change on an underlying business model.

Open Business Models enable the generation of new paths to market through fostering collaboration with suppliers and customers. This type of business models continuously enable the incorporation of external ideas as well as the provision of unexploited resources to a company's external environment. Hence, companies can live up to their economic potential by being part of a dynamic and collaborative network (Chesbrough, 2006).

Tapscott's Business Webs ("B-Webs") describe a network consisting of suppliers, distributors, customers and commercial service providers who are all connected to each other via the Internet and other electronic media. By this means, customers and shareholders perceive an increased benefit, as each participating company is able to concentrate on its core competencies (Tapscott, 2000).

Papakiriakopoulos' (2001) framework for e-business models considers both, technology-based and market-oriented developments which affect a company's business model. First, one dimension should be examined. Based on these observations, implications can be derived for the second dimension. The main objective of this approach is to avoid a sole concentration on just one dimension. A company only focusing on new technologies without taking attention to market-based aspects will not be able to accomplish the aspired business objectives in a satisfying way. For this reason, both dimensions have to be considered. The following table shows to which extent current approaches cover different aspects of dynamics in business models.

Dynamic Business Model Aspects	Linder & Cantrell (2000) „Change Models"	Chesbrough (2006) „Open Business Models"	Tapscott (2000) „Business Webs"	Papakiriakopoulos (2001) „E-Business Models"
1. Dynamic Adaptation across Model Layers	□	■	■	■
1.1. Strategy	□	■	■	■
1.2. Business Model	□	■	■	■
1.3. Business Processes	□	■	□	□
2. Automatic Propagation of Change	□	□	□	□
3. Open Parameter Configuration	■	□	□	□

Legend:
■ present
□ absent

Table 1: Dynamic Business Model Aspects

Table 1 shows that present approaches mainly rely on ex-post analysis. For this reason they are not appropriate for the analysis of dynamic factors. Although dependencies and influences are taken into account by most approaches, so far, no statements about automated adjustments of business models are made (see criterion "Automatic Propagation of Change").

2.2 Business Model Components

Each business model consists of several components that form the basis for making statements about certain adaptation factors within a company's business model. Hence, an analysis of each single business model component helps to determine the entire combination of a business model. By breaking down a business model into its constituent parts, dynamic factors can be better considered. Thus, an exact analysis about the interdependencies of business model components can be carried out (Demil & Lecocq, 2010). Table 2 presents the constitutive elements of a business model that have been derived from a comprehensive literature review on scientific articles dealing with the underlying components of a business model. The review shows that in literature there is a large consensus that a business model is composed of the following components: Architecture of Value Creation (AoVC), Value Proposition (VP), Revenue Model (RM) and Resources (R). The Architecture of Value Creation contains information about several channels of information flow and also the required products and activities for translating a specific business model into practice. Thus, it represents a company's structural basis including technological as well as organizational aspects with regard to infrastructure (Al-Debei & Avison, 2010). The Value Proposition describes the perceived value that is promised to a company's customers regarding the fulfillment of customer needs (Kotler and Armstrong, 2012) whereas the Revenue Model refers to the different ways in which revenues are being generated (Hitt, Amit, Lucier, and Nixon, 2002). After all, Resources refer to a company's performance potential by

describing the required basis to gain competitive advantages.

Authors	Business Model Components			
	Architecture of Value Creation (AoVC)	Value Proposition (VP)	Revenue Model (RM)	Resources (R)
Afuah & Tucci (2004)	■	■	■	■
Amit & Zott (2001)	■	□	□	□
Betz (2002)	□	□	■	■
Chesbrough & Rosenbloom (2002)	■	■	■	□
Hamel (2002)	■	■	□	■
Linder & Cantrell (2000)	■	■	■	□
Mahadevan (2000)	■	□	■	□
Petrovic et al. (2001)	■	■	■	■
Osterwalder & Pigneur (2010)	■	■	■	■
Schief & Buxmann (2012)	■	■	■	■
Stähler (2001)	■	■	■	□
Timmers (1999)	■	■	■	□
Σ	11	9	10	6

Legend:
■ present
□ absent

Table 2: Elements of a Business Model

The table above shows the most common approaches within business model definitions based on the number of references to each of these aspects. The majority of authors concerning about business models agree about these four constituent parts of a business model. These components serve as a basis for deriving the framework. Figure 1 illustrates the derived components and their underlying interdependencies.
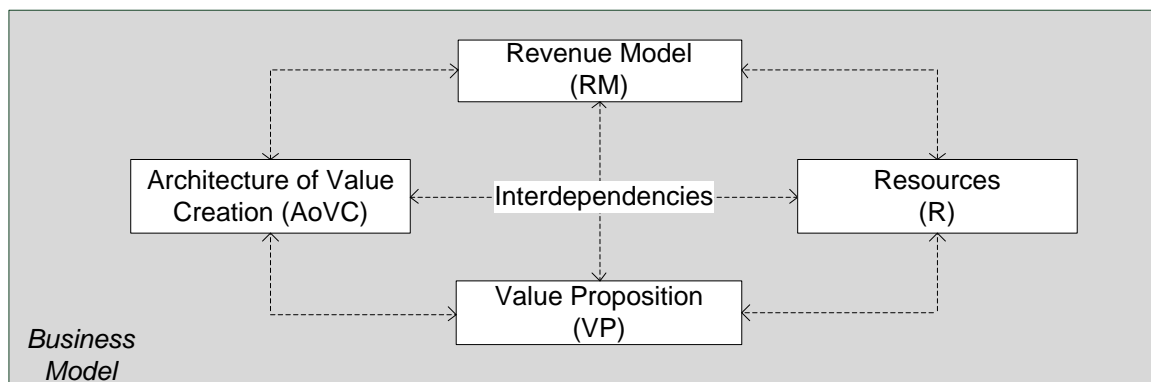

Figure 1: Interdependencies between Business Model Components

3. Conceiving Adaptability

3.1 Interactions between Business Model and Strategy

As the terms "business model" and "strategy" are often used synonymously, a clear differentiation of both concepts has to be made (Magretta, 2001). Chandler (1969) explains strategy as the determination of a company's strategic goals including the provision of resources and activities that are needed to achieve these defined goals. Information gained by the **Architecture of Value Creation** can be used on strategic level to optimize decision support and control of strategic consistency with the rest of the organizational structure. As the **Value Proposition** is strongly focused on a company's strategic positioning (Richardson, 2008) it has to be generated for each market segment (Teece, 2010). In order to carry on boosting a company's business model, the Value Proposition must be designed to continuously offering customers an added value. Revenues within the **Revenue Model** can be determined by calculating financial key measures such as growth in sales within a certain market or customer segment (Kaplan & Norton, 1996). Strategy influences a company's Revenue Model through determining several ways of generating revenues. The way, in which entrepreneurial **Resources** are combined within the resource-representing part of a business model create new possibilities for the introduction of new products and services (Demil & Lecocq, 2010). An ideal and efficient allocation of resources consequently depends on a company's strategy. Thus, existing know-how in terms of a firm's resources can be reflected (Harreld, O'Reilly III, and Tushman, 2007).

3.2 Interactions between Business Model and Business Processes

A business model represents the basis for the implementation of business processes by explaining the way business processes have to be carried out (Osterwalder & Pigneur, 2001). Changing demands within the **Architecture of Value Creation** cause service level agreements to change. In order to bring about the changes which are necessary to provide the services or goods conforming to the service level agreements, the business processes may have to be changed. Besides, the Architecture of Value Creation gets influenced by collaborative business processes. A level-spanning traceability of business model elements and associated business process artifacts allows for (semi-) automatic adaptations of the processes and thus for business model elements. Within the **Value Proposition** processes offer the possibility to align all business activities to the customer's preferences, which results in a higher degree of customer satisfaction. As an efficient realization of customer orientation enables the concentration of a company's core competencies, the result is an increase in entrepreneurial success. The **Revenue Model** focuses on actions being carried out on operative level. If e.g. defined business rules for boundaries of business rule enactments are violated, this may have impact on the respective business model. Furthermore, efficient business processes go along with cost reductions, affecting the revenue part of a company's business model. **Resources** form the basis for the accomplishment of business processes, because on strategic level a decomposition of business processes offers clarity about the required resources for the conduction of certain business processes (Gordjin, Akkermans, and van Vliet, 2000). Outsourcing of business processes facilitates an optimization of resource allocation by encompassing a concentration on a company's core competencies. By this means, already existing resources can be used more efficiently.

3.3 Conceptual Adaptability Framework

Taking into account the aforementioned dependencies offers the possibility to obtain synergy effects and a maximum in efficient business activities. It must be considered, that each element of a business model is characterized by interdependencies amongst each other. Figure 2 depicts the previously discussed dependencies.
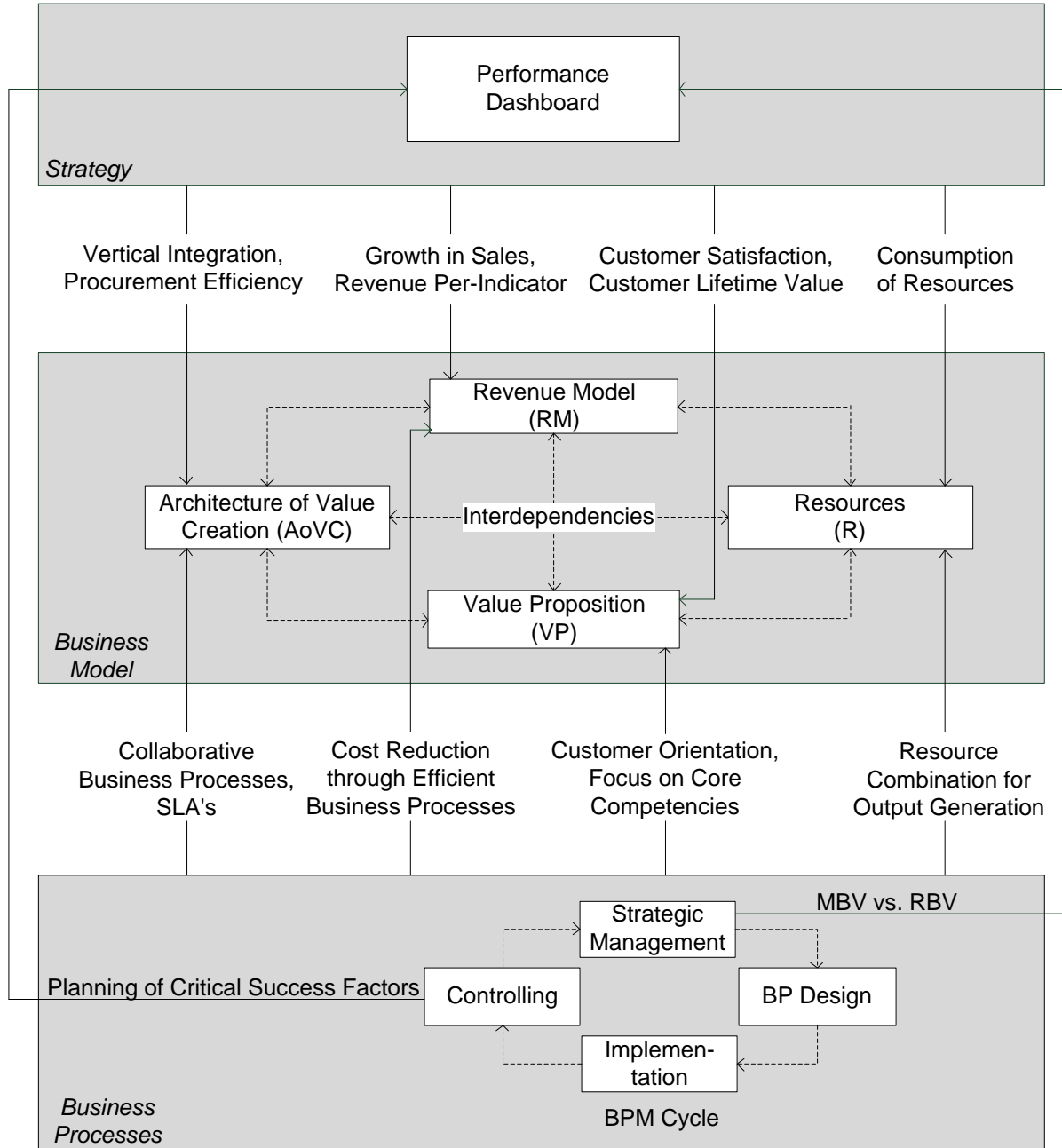
Figure 2: Conceptual Framework for Adaptive Business Models

The figure above shows the business model in a mediating role between strategy and business processes. For this reason, business model analysis has to be conducted both, top-down and

beginning from business process level. For describing the interplays between a company's strategy and its business processes, we use the business process management (BPM) cycle which is embedded on business process level. **Strategic Management**, as part of the BPM cycle, implies an embedding of business process management into strategy, either based on resource based view (RBV) or on market based view (MBV). The Resource Based View focuses on the generation of specific resources to achieve advantages over competitors whereas the Market Based View is characterized by taking into account a certain industry. **Business Process Design** contains both the definition of key measures and the identification of all relevant business processes. **Implementation** intends an enterprise wide realization of the planned business processes and its relevant information systems which are responsible for carrying out these processes. Finally, **Controlling** of business processes comprises the development and coordination of strategic objectives and key measures for control purposes. The collected and analyzed key measures can be evaluated and displayed by performance measurement systems (performance dashboards) such as Balanced Scorecard to support several evaluation mechanisms.

As the given description clearly depicts, the criteria named in section 2.1 are all considered in this approach: The explicit consideration of both strategic and operative (BPM) level allows for a layer-spanning adaptation of the respective models. For this purpose clear adaptation paths are identified. The concept of open parameter configuration is crucial to allow for an evolutionary dynamics support by adapting model parameters such as pricing or current offerings. The automatic propagation of change events across model layers can lead the way to a new kind of business model adaptability: By monitoring relevant key measures for the integration of these layers, associated rule sets can be derived, in order to define automatic adaptation measures (e.g. in not very complex scenarios, such as a change of a distribution procedure) or to provide the data basis for subsequent analysis and recommendations. The following section shows, how certain key performance indicators could influence the customization and configuration of respective enterprise information systems.

3.4 Mapping Adaptive Business Models to Information Systems

Information systems support the monitoring of key performance indicators and thus the adaptation of business model components by enabling real-time support. We will show for each business model component exemplary key performance indicators and corresponding information systems which enable an efficient collection of key performance indicators.

3.4.1 Architecture of Value Creation

Key Performance Indicators

Determining the indicator of Vertical Integration enables the generation of information about the concentration of core competencies which is useful on strategic level. Hence, decisions about the outsourcing of certain process steps can be made. As this key measure is very closely linked to make-or-buy decisions, it also shows a close connection to a company's strategy. The outsourcing of several parts of an enterprise's value chain, e.g. in terms of Business Process Outsourcing (BPO) goes often along with a decline in Vertical Integration. Another key measure represents Procurement Efficiency, which is closely linked to structures and processes within entrepreneurial procurement processes. It represents the basic requirement for changes within the market cultivation and the development of a company's suppliers. Key measures that are determined within Procurement Efficiency (e.g. Adherence of Schedules or Quote of Delays in

Production Processes) can be used for optimizing purchase. An efficient procurement is a starting point for a successful development of suppliers as well as efficient market cultivation.

Possible Impact on Enterprise Information Systems
Supply chain management systems enable a real-time simulation of scenarios and a simultaneous optimization of capacities and requirements within the value creation process. Thus, decision support on strategic level about the adaptation of several business model components is facilitated. This is carried out by ensuring accurately timed actions and an exact determination of the right number of products that should ideally be produced within a certain period. Enterprise resource planning systems support a company-wide integration and incorporation of key measures that provide information about the efficiency of the existing business model. Thus, information about the Architecture of Value Creation that is gained by an efficient use of enterprise resource planning systems can be used for the adaptation of each business model component. Furthermore, these systems facilitate the implementation of several strategy concepts by providing adequate information about make-or-buy decisions. Integrating key measures about Procurement Efficiency into business information systems also enable an accurately timed identification of potential risks which supports the determination of outsourcing inefficient business processes.

3.4.2 Value Proposition

Key Performance Indicators
The Customer Satisfaction Index (CSI) makes statements about the quality and efficiency of the realized Value Proposition (Krause & Arora, 2010). Hence, it is a key measure of strategic significance, because it contains information about the accomplishments of the main business objectives. Another customer oriented key figure is the Customer Lifetime Value (CLV). This measure is closely associated to valuable management implications as it enables the segmentation of a company's customers. Determining the Customer Lifetime Value goes along with an operationalisation of management decisions by providing decision support on strategic level. Monitoring customer related measures supports the identification of potential trends either within a whole market segment or just within specific customer groups (e.g. purchases and compliant management).

Possible Impact on Enterprise Information Systems
The aforementioned exemplary key performance indicators suggest that there is a need to connect the Value Proposition to customer relationship management systems, customer fulfillment, or front desk services, etc. Combining these trends with model traceability features (Emrich, Ganz, Werth and Loos, 2010) enables to adapt associated business model aspects in real-time (e.g. for Renewal Models), or at least to provide this information to the respective decision makers (e.g. for Journey Models). On strategic level, customer relationship management systems facilitate the generation of customer profiles and customer segments. By integrating Customer Satisfaction Index and Customer Lifetime Value into customer relationship management systems, information about possibly churn rates can be gathered which goes along with proactively warning respective key account managers.

3.4.3 Revenue Model
Key Performance Indicators
Information gathered by Growth in Sales can be used on strategic level to adapt prices for specific products and services. Another measure on strategic level is the Revenue Per...-Indicator, a controlling tool for coordinating several corporate entities (Krause & Arora, 2010). This key measure can also be used for external compares about industry-wide average as well as for in-house reports for identifying optimization potentials.

Possible Impact on Enterprise Information Systems
Key measures concerning Growth in Sales that are contained in enterprise resource planning systems have a special focus on revenues and price indices. Particularly the generation of data referring to unsteady information such as price indices evokes several technological aspects supporting the collection and analysis of external data. Enterprise resource planning systems also consider key measures that are related to customers. A combination of enterprise resource planning systems with customer relationship management systems is possible to optimize customer orientation which at the same time affects the generation of revenues and the determination of prices. It is important to consider (external) real-time data, e.g. unpredictable changes of exchange rates, prices and interest rates or services such as "Yahoo Finance". Challenges for IT are an integration of early-warning systems that offer the possibility to rapidly adapting organizational aspects to changing external events by gathering and processing real-time data.

3.4.4 Resources
Key Performance Indicators
Consumption of Resources ensures on strategic level an efficient allocation of resources and a deduction which business processes require a higher degree of resource consumption. Making sense of monitored resource and machine allocations enables the identification of bottlenecks in production and preemptively reacting to such situations just-in-time. A collaborative BPM approach could help to support such scenarios in the above mentioned B-Webs.

Possible Impact on Enterprise Information Systems
Supply chain management systems support a simultaneous planning of resources and demands. Thus, short term reductions of inventory can be enabled, which is associated with a higher degree in flexibility within the business model component of resources. In addition, supply chain management systems support forecasting of future sales volumes to enable to focus planning on key markets.
To gain a clear understanding about the aspects to be modeled, business process design should begin with the determination of a company's business model, because modifications on an existing business model affect a company's business processes (Harmon, 2009). An analysis that begins with the level of business processes helps to identify important aspects which have to be considered for the design of a business model. On the other hand, there exists a dynamic relationship between a company's business processes and their underlying information and communication technologies. An analysis of a company's business processes e.g. comprises the outsourcing of certain business processes that constrains the efficiency of a company's business model. Therefore a top-down and bottom-up approach is necessary to explore the interrelations between strategy, business models and business processes.

4. Conclusion and Outlook

This paper has developed a framework for adaptive business models, in which core elements of business models are analyzed regarding their dependencies with aspects of strategy and business process design. Besides, a conceptual analysis of dependencies and the impact of such aspects have been identified to allow for an industrialized, automated way of propagating changes in a complex business model environment. In a nutshell, this framework enables a tight and automated integration of business models with the underlying IT infrastructure and thus, makes it more flexible to adapt to changes in the business ecosystem.

The analysis has clearly shown that contemporary approaches for business models do not cover the automated monitoring, controlling and analysis of key performance indicators and service level agreements. Nevertheless, this aspect proves to be vitally important to support a runtime adaptation of business models and to provide up-to-date information to the strategic management.

Future work should focus on the implementation and evaluation of the described framework to bring about the described changes for adaptive and flexible business models. Key performance indicators, service level agreements as well as associated business rules should be seamlessly reflected in an integrated information system architecture and should be configured in a simple manner, which is supported by associated business intelligence insights gained from monitored business transactions of the enterprise.

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