

# **Bimodal IT: Business-IT Alignment in the Age of Digital Transformation**

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## **Abstract**

Today, companies face a challenge, which has been coined as “digitalization” or “digital transformation”. As a reaction to this challenge, many companies see the need of establishing a new “digital IT” unit or of shifting responsibility for IT systems to the business units. These changes should allow the business to be better informed, more flexible and faster in adapting its IT as well as its IT-enabled services and products to market opportunities and customer needs. The coexistence of digital IT and traditional IT has been coined as “bimodal IT” or “two-speed IT”. By employing a literature review and a qualitative document analysis, this article clarifies the concept of bimodal IT and identifies implications for the business-IT alignment in organizations. We further describe and contrast the characteristics of “traditional IT” and “digital IT”. In addition, we summarize various approaches for implementing bimodal IT on the architecture, process and organizational level. Finally, we address critical observations raised in respect of the bimodal IT concept.

## **1 Introduction**

With the growing digitalization of “virtually everything” driven by and based on the success of the IT megatrends social, mobile, analytics and cloud computing as the “nexus of forces” (Diallo et al. 2014), enterprises need to pursue digital innovation to improve or change their business models. If they fail to react faster than their competitors, they risk to lose their competitive advantage. As technology change accelerates and new digital solutions emerge, many companies feel the pressure to perform a digital transformation. This pressure increases due to changing preferences and expectations of customers and users.

Many ‘traditional’ organizations struggle with the implications of the digital transformation as it may lead to a loss of control over the customer relationship, increased competition and implies the threat of commoditization and standardization (Ernst & Young 2011). Due to complex and rigid IT infrastructures and inflexible hierarchical organizational silos in business and IT, companies are often not able to achieve the agility and flexibility needed for conducting the digital transformation. Business units increasingly control IT budgets (CFO Innovation Asia 2014a) in order to better solve business challenges with the help of IT. Consequently, well-established concepts like business-IT

alignment (e.g. [Henderson and Venkatraman 1993](#); [Luftman 2000](#)) need to be rethought for this changing business environment.

In some cases, the digital transformation in traditional organizations leads to two different modes of speed (“two-speed IT”). For performing digital innovation, a fast customer-facing and business-oriented IT organization is established in order to react to rapidly changing customer needs. In addition, companies run the ‘classical IT’ with the established IT infrastructure and organization. This part of the IT organization is working in longer cycles and works at lower speed, as it has to run large core systems, which cannot be changed or modified easily. Apart from the different speed modes, both parts operate with different organizational structures and methods. Hence, many companies implement a “bimodal IT” organization with different governance mechanisms, processes and organizational structures to respond to this duopoly of speed. In this paper, we will use the term “bimodal IT” (instead of “two-speed IT”) as it does not only refer to the speed but also includes different architectures, processes and organization in both parts.

If companies establish a fast or bimodal IT as a part of their digital transformation, they need to align this new IT with the existing IT and with the business. Therefore, our research question is: How is business-IT alignment affected by a bimodal IT organization? This question will be addressed in this article by conducting a literature review according to vom [Brocke et al. \(2009\)](#) and [Brink \(2013\)](#). Subsequently, the resulting sources were used as the material for employing a qualitative document analysis ([Bowen 2009](#)). In a first step, the different meanings of bimodal IT will be discussed to illustrate the characteristics of the concept. In a second step, the approaches to implement bimodal IT, will be identified and examined regarding alignment mechanisms employed on the technical and organizational level. Finally, perceived drawbacks of bimodal IT will be discussed.

## 2 Research Approach

For summarizing relevant literature, we conducted a two-step literature review: First, we conducted an unstructured literature search in selected English and German data bases such as ABI Inform, IEEE, SpringerLink, WISO, Google Scholar and Google. Based on the results, we identified nine search terms in English and German related to bimodal IT (see table 1). Subsequently, a structured literature review in twelve high quality information systems and business-related data bases as mentioned by [Knackstedt and Winkelmann \(2006\)](#) has been conducted since bimodal IT affects both research fields. Additionally, Google has been searched to identify academic literature and suitable archival data like white papers, news articles etc. (see table 1). A full text search strategy has been employed and no date filter has been set in order to identify all relevant publications.

For the document analysis, the first 200 search hits per search term for each data base have been reviewed to find out whether the concept of “bimodal IT” was addressed – at least by defining the term or any of its synonyms in the full text. The quantity of two hundred has been selected because higher numbers of results contained multiple duplicates and literature from other scientific areas such as, e.g., physics and chemistry which also deal with “bimodal” and ”two-speed” in their respective fields. 178 documents fulfilled the criteria of our search. While some of these could be identified in academic data bases such as ABI Inform and WISO, the vast majority of 122 documents was found by searching Google. The documents were subsequently analyzed based on their distinct view on the topic (technological vs. organizational) and their personal stance (neutral, optimistic or skeptical). Thereafter, each document was analyzed to highlight characteristics of the

concept as well as approaches addressing the implementation of bimodal IT. Skeptical articles were further reviewed regarding possible drawbacks of bimodal IT and consequent alternative approaches.

Data base \ Search term	<i>ABI Inform</i>	<i>ACM Digital Library</i>	<i>AIS Electronic Library</i>	<i>Elsevier Scencedirect</i>	<i>Emerald Insight</i>	<i>Google Scholar</i>	<i>IEEE</i>	<i>JSTOR</i>	<i>Springer Link</i>	<i>Web of Science</i>	<i>Wiley Online Library</i>	<i>WISO</i>	<i>Google</i>
<i>Bimodal IT</i>	73	3	1	222	316	1150	0	57	122	32	117	3	64200
<i>Bimodale IT</i>	0	0	0	0	0	1	0	0	0	1	0	4	776
<i>Bi mode IT</i>	0	0	0	3	0	5	0	0	0	0	0	0	9
<i>Dual (-) speed IT</i>	0	0	0	0	26	1	0	0	0	0	0	0	5270
<i>IT der zwei Geschwindigkeiten</i>	0	0	0	0	0	1	0	0	0	0	0	7	375
<i>IT of two modes</i>	0	0	0	0	0	0	0	0	0	1	0	0	0
<i>IT of two speeds</i>	1	0	1	0	0	5	0	0	3	0	0	0	5
<i>Two (-) mode IT</i>	3	0	0	567	64	22	0	0	232	1	120	0	57500
<i>Two (-) speed IT</i>	29	0	1	21	218	12	0	0	6	0	12	3	37800

**Table 1 Search Results**

The concept of “bimodal IT” is a recent topic in theory and practice. Since the advisory firm Gartner made the concept public to a broad IT-affine audience in its CIO agenda for 2014 (Aron and McDonald 2013) in late December 2013, bimodal IT became more often discussed in the IT community with 49 publications in 2014 and 119 in 2015 respectively. Only nine out of 178 publications addressed this topic prior to December 2013.

As bimodal IT is intensively discussed in practice, nearly the entire literature we identified in the review process can be categorized as archival data (see table 2). Most of the publications such as blog entries, glossaries, news articles and white papers take a neutral stance in respect of bimodal IT. By drawing on practical cases, scenarios and metaphors, these publications mainly explain the concept and its elements. They also explain how bimodal IT is implemented and its implications on the technical and organizational level. Corporate-owned archival data such as presentations, interviews and corporate dossiers add to this information by providing advice for the implementation of bimodal IT. Companies use this literature for promoting their products and services as a solution to the challenges of bimodal IT. As these publications mostly focus on highlighting bimodal IT in the context the company is operating in, they permit a deeper insight into the concept. Finally, commentaries (as a special form of blog entries) highlight challenges and advantages of bimodal IT by discussing the concept itself and by giving feedback.

Only one publication has an academic background. It was published on the European Conference on Information Systems in 2015 (Bygstad 2015). This paper describes a study of how and to what extent “heavyweight” (e.g. databases) and “lightweight” IT (e.g. mobile app and bring-your-own-device) is used in organizations in the health sector, in which way they enable scaling by adding users to the services and how they facilitate innovation. An integration of light- and heavyweight IT is also discussed. While this publication addresses the use of agile and traditional IT in some

form of coupling, a definition of the concept of bimodal IT and analysis of its implementation is not part of the article. Instead, the author dissociates himself from this concept (Bygstad 2015).

Type of publication	Number of publications	
<i>Academic paper</i>	Case studies	1
<i>Archival data</i>	Blog entry	43
	Commentary	25
	Corporate Dossier	17
	Glossary	2
	Interview	3
	News article	59
	Presentation	10
	White paper	14

**Table 2 Type of Publication in the Set of Relevant Results**

### 3 Bimodal IT as a New Challenge for Business-IT Alignment

In this section, we summarize our results of the document analysis we conducted on the empirical material mentioned in section 2. First, we present the basic characteristics of bimodal IT and the two different modes it comprises. Second, we discuss the need of changing business-IT alignment and governance as a result of the two modes. Third, we describe different ways of implementing bimodal IT on different levels (architecture, methods, organization). Fourth, we address critical observations raised against the concept of bimodal IT.

#### 3.1 Bimodal IT: The Concept and its Characteristics

With 106 direct and indirect references, the concept of “bimodal IT” is inextricably linked to the analyst firm Gartner. Publications from consulting firms like McKinsey (18 references) and Boston Consulting Group (4 references) follow with far less references. According to Gartner, the concept is defined as “the practice of managing two separate, coherent modes of IT delivery, one focused on stability and the other on agility. Mode 1 is traditional and sequential, emphasizing safety and accuracy. Mode 2 is exploratory and nonlinear, emphasizing agility and speed” (Gartner 2015a).

Mode 1, which is also named the “core IT”, “industrial IT” or “traditional IT”, is used to ensure reliably running IT by delivering efficient IT services with high levels of operational excellence (Gartner 2015b). This mode focuses on enabling predictability, scalability, risk aversion and cost savings (Henthorn-Iwane 2015) while driving industrialization of services (Bils 2014). Its operation is based on backend “systems of records”, which are built to provide long term stability and compliance (Bayley and Shacklady 2015). These systems are changed and improved in longer cycles and are usually managed with long-term waterfall project mechanisms (ibid.). In contrast, mode 2 is mainly based on agility and speed. It is also called “digital IT” or “agile IT”. In this new mode, the IT acts like a start-up inside the enterprise in order to follow short term market trends for which adequate digital services are developed in short cycles (Telecom Asia 2014). These client-facing “systems of engagement” are focused on fast innovation based on the proposed requirements by business units, external partners and customers (Kirschner and Kenney 2014). Value creation for business units, customers and partners is therefore the top priority for services operating in this mode (Gartner 2015b). It aims at facilitating personalized business moments for customers and at triggering customer branding (ibid). Because disruption by changing market requirements can occur

at any time, mode 2 operations have to be non-sequential and non-linear based on lean, iterative and agile principles (Bils 2014). The characteristics of both modes are summarized in table 3. In the following, we will refer to mode 1 as “traditional IT” and to mode 2 as “digital IT”.

<b>Traditional IT (mode 1, industrial / core IT)</b>		<b>Digital IT (mode 2, agile IT)</b>
Stability	<i>Goal</i>	Agility & speed
IT-centric	<i>Culture</i>	Business-centric
Remote from customer	<i>Customer proximity</i>	Close to customer
Performance and security improvement	<i>Trigger</i>	Short term market trends
Performance of services	<i>Value</i>	Business moments, customer branding
Security & reliability	<i>Focus of services</i>	Innovation
Waterfall development	<i>Approach</i>	Iterative, agile development
Systems of records	<i>Applications</i>	Systems of engagement
Slow	<i>Speed of service delivery</i>	Fast

**Table 3 Characteristics of Traditional and Digital IT**

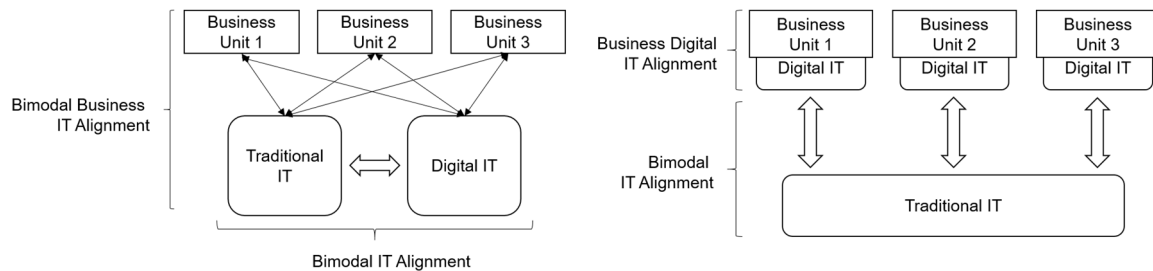
### 3.2 Bimodal IT: Alignment and Governance

Bimodal IT is described as a concept that allows narrowing the gap between what IT provides and what the enterprise needs. Therefore, it affects the core of strategic business-IT alignment as described by Henderson and Venkatraman (1993). Further, bimodal IT necessarily implies an operational alignment between the two modes as the according IS infrastructures, processes, structures, skills, methods and IT architectures have to be integrated.

Literature most often refers to IT governance and leadership as the key for aligning the traditional and digital IS infrastructures with the business counterpart and the strategic level of business and IT. Clear leadership and responsibilities on all levels are fundamental to the success of bimodal IT (Wall Street Journal 2014). At the operational level, the introduction of interdisciplinary, cross-functional teams consisting of business and IT specialists (Q\_Perior 2014) with clear operational lead is a potential solution.

The publications propose various approaches for strategically leading and managing the bimodal IT. Some address the need for a single CIO, who is accountable for both traditional and digital IT to prevent delay and complex coordination difficulties (Wall Street Journal 2014, Andersson and Tuddenham 2014). Other companies, such as travel company Thomas Cook and coffee retailer Starbucks (Francois et al. 2014), favor a chief digital officer (CDO) leading the digital IT (The Economist 2013) who is separate from the CIO heading the traditional IT. For both types of leadership, transparency, resilience, openness to new developments and the ability to adapt and learn from failure are essential for dealing with the digital business (Diallo et al. 2014). Thus, CDOs and CIOs nowadays enhance collaboration with business units, mainly with marketing (Francois et al. 2014). Some CIOs even report to the Chief Marketing Officer (CMO) for stronger alignment (Kirschner and Kenney 2014). Others create even more specialized roles such as business relationship manager or chief marketing technologist who act as the link between the IT organization and the business units (Kirschner and Kenney 2014). As a result, a bimodal IT governance needs to be established, which focuses on compliance and security as well as on agility

and flexibility (Bayley and Shacklady 2015). This requires multiple methods like e.g. creating a separate governance structure for digital IT (LeanIT 2015) or a special governance for cloud solutions in both modes (The Open Group Blog 2015). Further, the “governance clockspeed” (CEB 2015) can be accelerated by introducing lean decision processes (Q\_Perior 2014), reducing the number of decision makers and using judgment instead of analysis for simple decisions (CEB 2015).



**Figure 1 Two Modes of Alignment between Digital IT, Traditional IT and Business**

Consequentially, bimodal IT enforces an extension of the traditional business-IT alignment mechanisms as described by Henderson and Venkatraman (1993) regarding two major changes. First, the two IT modes – traditional and digital – need to be aligned with each other (see figure 1 left, bimodal IT alignment). The most obvious reason for this is that the agile and customer-facing systems often need to access data, which is stored in the systems that are managed by the traditional IT. Hence, the traditional IT has to change its systems and architecture in a way that the digital IT is not slowed down or hindered. Second, the business units need to align their strategic and operational activities with the digital and the traditional IT in a faster and more agile manner. By decentralizing parts of the IT, a significant part of the digital IT might become a part of formerly non-IT business units. It needs to be aligned with the respective business unit (see figure 1 right, business digital IT alignment). New governance and alignment mechanisms need to be developed and established to achieve a good business-IT alignment under these changed conditions. The alignment should also be achieved in the mindset of IT leaders and IT personnel to adopt a business and customer perspective instead of a merely technical oriented view (Rae 2015).

### 3.3 Bimodal IT: Approaches for Implementation

Bimodal IT not only changes the business-IT alignment on a macro level, it also implies concrete implementation steps in the IT organization and IS infrastructure. In the following sections, we summarize the implementation approaches on different levels (architecture, processes and organization) as described in the sources we analyzed.

#### 3.3.1 Bimodal IT: Architecture

On the architectural level, bimodal IT takes advantage of emerging tools and platforms for agile customer-facing frontend systems while also running the traditional stable, mission-critical backend systems. This results in a duopoly of business-critical scale-up applications running on one stronger computer and scale-out applications distributed on several regular computers for reacting to changed or new business or technological conditions in the short term (Pfützner 2015). The required flexibility is enabled by virtualizing data and resources in a composable modular infrastructure for traditional IT and digital IT (Greiner 2015), partially with the aid of infrastructure respectively platform as a service cloud-based solutions. Companies often use private clouds for traditional IT

in order to shield operations from risks and to ensure security (Delp 2015) while simultaneously accelerating waterfall development (QualiSystems 2015). Additionally, the risks emanating from the use of shadow IT can be reduced by providing users with a flexible productive infrastructure environment for development and testing separate from the traditional infrastructure (Henthorn-Iwane 2015). Digital IT also uses external public or hybrid clouds (Pfützner 2015) to enable the distribution of workload, decrease deployment time of services by enabling live testing (Marko 2015) and fostering the independence of providers and office hours for agility (Delp 2015). Containers and microservices are commonly used for modularization (e.g. id.). Microservices, representing simple services such as retrieving customer information, are encapsulated in containers and then accessed via http and RESTful APIs (Bils 2014). Based on multiple containers, digital IT can then build their applications. By isolating the applications from the operating system, containers can freely be deployed across multiple cloud environments or in the in-house data center (Delp 2015). Further approaches supporting a bimodal integration on the architectural level include well-known concepts like service-oriented architectures (SOA) and data buses (Computerwoche 2014).

### **3.3.2 Bimodal IT: Processes and Methods**

Concerning the process level, bimodal IT implies a bimodality of existing operating models and processes in organizations. For instance, a “two-speed IT service management” is advised to facilitate the provision of value to the customer with new business and operating models. This concept implies the modernization and innovation of the service delivery, in particular the customer communication (Rae 2015). The traditional IT service management needs to be continued, mainly in the field of service operations (ibid.). In the field of business intelligence, “two-speed business intelligence (BI)” is described as a mean to support the operations with data and information in a bimodal manner (ComputerWeekly 2015, Tejada 2015). While the traditional BI team in a company continues to develop BI best practices focusing on security and profound business objectives, an agile mode of business intelligence needs to be established. This mode has to behave highly iterative and has to deal with unforeseen data discovery to provide agility for business by e.g. enabling self-service reporting (Tejada 2015).

Literature most frequently focusses on software development in respect of bimodal processes. For developing and deploying business-centric services with the aid of traditional IT, DevOps is most often used (e.g. Bils 2014). This is a software development method, which emphasizes close collaboration between developers, operations and quality assurance (Meier 2015). Through rapid evaluation and feedback provided by business and external users, the speed and reliability of improving services can be enhanced. DevOps is often combined with agile methods like Scrum (Computerwoche 2014, LeanIT 2015) or Kanban (LeanIT 2015) and is nowadays not only used by digital native companies like Google, Amazon or Netflix, but also emerging in traditional industries like retailing (e.g. Macy’s), banking (e.g. Lloyds Banking Group) or utilities (Francois et al. 2014).

### **3.3.3 Bimodal IT: Organization and Skills**

As traditional IT and digital IT fundamentally differ in their working styles and methods, the IT organization is either temporarily or permanently split up. The German car manufacturer Daimler for example chose a semi-splitting approach. Daimler set up a separate “project house” with 100-150 employees for the development of their customer-oriented services where engineers, product developers as well as sales and aftersales specialists work closely together with IT experts (Computerwoche 2014). This “project house” is highly agile by using 3-week sprints and 4 Scrum

teams. Other companies prefer to outsource their digital IT in separate “digital units” (Q\_Perior 2014) or subsidiaries. These units, which operate outside of the IT, such as e.g. digital-product management (Bossert et al. 2014) and viral-marketing (Gourévitch et al. 2012) act as collaboration forces between business units, customer-centric IT and the user. A third approach is to retain the IT in its traditional hierarchical organization, but to make it act as a service broker for IT-affine business units, which develop the solutions on their own (The Open Group Blog 2015). In this case, IT people act as consultants and coaches for the business units besides providing mainly cloud-based IT services (CEB 2015).

In particular when acting as a service broker, IT often partners with external vendors and third-party providers (The Open Group Blog 2015) to ensure the agreed quality and reliability levels for services by adding additional resources. Furthermore, new functionalities for services, mainly in respect of analytics and mobile development, are facilitated. This includes, as mentioned above, new BI methods like self-service BI (Tejada 2015) and predictive analytics (ComputerWeekly 2015) as well as providing the mobile back-end services (MBaaS) with user management, push notifications, server-side logic, data management and mobile integration middleware (Katz 2015). Partnerships are often not limited to IT resources like cloud platforms (Gourévitch et al. 2012) but more and more include sourcing of required skills (Avanade 2014). To enable IT as a service (ITaaS) for business, skills mainly staff security and risk specialists, developers, systems integration specialists and regulatory analysts (Telecom Asia 2014). For digital IT, external staffing further includes “digital native” skills like user experience, data science, smart machines (including Internet of Things), robotics and digital business architects (Telecom Asia 2014).

### 3.4 Bimodal IT: Discussion

While most of the cited publications consider the concept of bimodal IT as useful for addressing the rapidly growing digitalization and change of customer and consumer expectations towards digital services, some authors note that a bimodal IT organization is rather harmful to the organization. With regard to business culture, bimodal IT is mainly criticized for maintaining “organization silos” and for creating new silos instead of facilitating business transformation combining business and IT (Katz 2015, Stöcker 2015). Dividing IT organization in fast and therefore “cool” (digital IT) and slow and thus “uncool” (traditional IT) can create a tension between the IT teams who work in these different speed modes (Stöcker 2015). Competition between the two modes could result in non-cooperation with regard to implementation in traditional IT of innovation developed by digital IT (Stöcker 2015). Agile governance linking both modes is not encouraged by bimodal IT. Rather, traditional rigid control structures are favored (Bloomberg 2014). As a result, shadow IT may further encourage “silo thinking” (Katz 2015).

To overcome the competition between the two modes and the silos, a “multi-faceted IT operating model” (Bayley and Shacklady 2015) or “cell structure” (Wardley 2014) with multi-speed governance supporting those multiple ways of operating by the CIO are proposed as alternatives. Some authors suggest a trimodal IT structure with pioneers for digital IT, town planners for traditional IT and settlers as a mediating function ensuring that the innovation by the pioneers is turned into a mature product before traditional IT can transform it into commodities (Wardley 2014). This differentiation is helpful since IT services are not always bimodal such as e.g. enterprise service bus (Stöcker 2015) or microservices (Bils 2014), which do not clearly belong to just one mode. With an increasing number of such services, interfaces and mixed delivery models for each layer, a multiple management approach is required instead of a restricting duopoly.



To summarize, bimodal IT is being criticized as a temporary and intermediate state for pursuing a digital business transformation of the whole IT organization. While handling the most urgent challenges of digitalization, the resulting impact on the backend organization is not handled in the long term (IT Rebellen 2015). However, the life cycles for those systems are also shortened and the demand for agility, e.g. in software development is also rapidly growing in traditional IT. Therefore, resilience concerning the agility of the entire IT organization is a key factor for enterprises to stay competitive (IT Rebellen 2015). Hence, Anderson and Tuddenham (2014) recommend to iteratively reshape the entire IT, from talent to infrastructure.

## 4 Conclusion

In the age of digital transformation, business IT alignment has to be extended in order to take new digital modes of IT provision into account. As a first step, we need to better understand the challenges and implementation means that are used by companies to establish and advance a digital IT unit. In this paper, we gathered and analyzed material on the different means and methods that companies currently implement or use. Based on a literature review and a document analysis, we outlined the characteristics of digital and traditional IT. Furthermore, we investigated the need for changes in the business-IT alignment that follow the bimodality of IT. Finally, we presented some critical arguments concerning the concept of bimodal IT.

The literature review revealed some fundamental research gaps. Though most of the sources cite Gartner's definition, a consensus regarding bimodal IT's content has not been reached. This gap also effects the implementation approaches for IT bimodality, which clearly differ in their extent and method. Developing a clear definition for bimodal IT and formulating concrete suggestions for its implementation are therefore worthwhile next steps. A precise definition would also effect the extensions of the business-IT alignment identified in the paper between traditional and digital IT and to the business units in content and structure. In this context, the deployed methods need to be analyzed regarding their usefulness for achieving an overall alignment. The sources describe bimodal IT as a development that influences various disciplines that support the alignment between business and IT like IT service management, enterprise architecture, and project / project portfolio management. Hence, further research is required regarding the question, as to how these disciplines need to be adapted. Critical voices opine that bimodal IT would be insufficient in the long term. For companies to stay competitive, they propose trimodal and other multi-speed IT approaches in order to bridge a gap between business and IT. Whether these approaches result in a better alignment within the IT and to the business units has so far not been analyzed.

The results presented in this paper are limited due to a number of reasons. Even though the majority of the identified sources attempts to take a neutral stance regarding bimodal IT, an explicit and implicit interference with the authors' opinions is still perceptible. Furthermore, this article is limited in respect of the amount of literature reviewed. While a large number of publications has been examined, an exhaustive review has not been conducted. Research with academic background is scarce so far. Additional research is necessary to gain a better understanding of bimodal IT.

## 5 Literature

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