

# Towards the Development of CRM Capabilities for Leveraging Big Data Assets – A Conceptual Framework Derived from Literature

*Full paper*

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## Abstract

The growing availability of a high volume of continuously generated data being heterogeneous in structure, i.e. big data, represents a change of an organization's data assets. While these novel (big) data assets promise valuable insights, e.g. into customers' preferences and behavior, leveraging them requires the development of corresponding capabilities. By taking the domain of CRM as a functional reference domain, this paper investigates how capabilities for leveraging big data could be developed to create valuable relationships with customers. Based on a literature review of scholarly papers, a conceptual framework for leveraging big data in the domain of CRM is presented. From a preliminary validation of the framework grounded on the analysis of big data success stories, the paper suggests first evidence of our propositions. Future research is intended to further validate the framework in order to provide a systematic understanding of big data and relevant capabilities to leverage these assets.

## Keywords

Big Data, CRM, Dynamic Capabilities.

## Introduction

Ongoing developments in terms of the increasing availability of continuously generated data being heterogeneous in structure, i.e. big data (Laney 2001), stimulate organizations' expectations that these data assets can be leveraged to achieve corporate success. If interpreted in a sound way, these new data assets may for instance provide additional insights into customer preferences. Through the velocity of data, customer behavior can be observed simultaneously with the actual experience of (customized) products and services. By uniting the potential of relationship marketing strategies and IT, Customer Relationship Management (CRM) "*provides enhanced opportunities to use data and information to both understand customers and cocreate value with them*" (Payne and Frow 2005). The availability of big data creates opportunities to improve CRM through an increased understanding of customer preferences and behavior to customize communication and thereby increase the intimacy of the relationship (Goes 2014; Loebbecke and Picot 2015; McAfee and Brynjolfsson 2012; Woerner and Wixom 2015). In addition to the opportunities offered by big data there are also challenges to be addressed for gaining the expected insights. Established companies struggle to develop a deeper understanding of their customers from an increasing digital ecosystem (Weill and Woerner 2015). The properties of big data suggest a more complex picture that goes beyond the sole consideration of the technological means to access and analyze them (Constantiou and Kallinikos 2015). With a company's internal view to its strategic perspective the environmental change introduced by the availability of big data creates the necessity for the company to develop internal capabilities to ensure competitive advantage (Eisenhardt and Martin 2000; Teece et al. 1997; Winter 2003). With our research we aim to find a way towards a capability building process in organizations with regard to leveraging big data. We take the example of CRM as a functional reference domain. Due to the increasing availability of customer-produced data, e.g. via social media platforms,

software logs, mobile devices etc., we consider CRM to be an example with immediate impact. As the domain of CRM is well-discussed in marketing literature, it will be most interesting to see which capabilities are particularly affected by ongoing trends towards increasing data availability. Driven by the promises of software vendors and system integrators, the discussion around big data focuses often on technological aspects: however a more systematic understanding of the potential of big data in the domain of CRM and how to fulfil these promises seems to be necessary (Desmet et al. 2015; Ostrom et al. 2015). As an overall research goal, we aim to investigate the relationship between CRM capabilities and big data assets. Thus, we raise the following research question: *How should organizations develop CRM capabilities to leverage big data for valuable relationships with their customers?* Therefore, we focus on organizations that strive for customer-centric marketing through the development of internal capabilities to ensure competitive advantage (Teece et al. 1997). CRM capabilities identified from scholarly literature serve as a starting point to gain an initial understanding of the domain of CRM in which big data needs to be integrated into.

## Conceptual Background

### *Dynamic Capabilities Theory*

The concept of dynamic capabilities is founded on the resource-based view of the firm (RBV). The RBV is commonly used to articulate corporate strategy in order to gain competitive advantage. The term Resource-Based View of the firm was coined by Wernerfelt (1984) and builds upon earlier work (Penrose 1959). In the eyes of the RBV, an organization is a collection of resources which embrace both capabilities and assets: Capabilities can be viewed as repeatable patterns of actions in the use of assets which are defined as anything tangible or intangible the firm can use to create its products or services (Wade and Hulland 2004). The RBV has been criticized for not adequately explaining how firms gain competitive advantage in dynamic markets with rapid and unpredictable change (Eisenhardt and Martin 2000). The thought of continuous adjustment which is required in these markets is addressed in the concept of dynamic capabilities theory (Eisenhardt and Martin 2000; Teece et al. 1997; Winter 2003) that arose from an extension of the RBV. Helfat et al. (2003) speak of a dynamic resource based view by adopting the process approach, i.e. processes which act as a buffer between firm resources and changing business environments. Accordingly, we speak of dynamic capabilities as *“the firm’s processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match and even create market change”* (Eisenhardt and Martin 2000). In this context, we consider customer data as a firm’s most valuable assets in the domain of CRM and applying analytics as the firm’s capability to leverage these assets. Through changes in the environmental context and the characteristics of available data the firm might need to reconfigure its original analytics capability.

### *Customer Relationship Management*

Originally, CRM has its roots in relationship marketing (Ryals and Knox 2001). CRM is defined as *“a strategic approach that is concerned with creating improved shareholder value through the development of appropriate relationships with key customers and customer segments”* (Payne and Frow 2005). However, CRM is not only a set of strategies but also a core organizational process *“that addresses all aspects of identifying customers, creating customer knowledge, building customer relationships, and shaping their perceptions of the organization and its products”* (Srivastava et al. 1999). Accordingly, Richards et al. (2008) support a dualistic definition that defines CRM as *“a set of business activities supported by both technology and processes that is directed by strategy and is designed to improve business performance in an area of customer management”*. In this context dynamic capabilities theory provides a conceptual framework that supports the recognition of customer networks and market information as assets whilst marketing expertise can be understood as a valuable capability facilitating the deployment of market-based assets (Srivastava et al. 1999; Theodosiou et al. 2012). The success of an organization’s CRM activities can be evaluated by the performance of the organization on customer satisfaction and retention, i.e. CRM performance (Batenburg and Versendaal 2004; Jayachandran et al. 2005). According to Reinartz et al. (2004) CRM benefits do not vary greatly across industries and countries.

## **Big Data**

Through online participation customers make their habits and concerns constantly available for companies to gain insights in a way that differs from traditional marketing (Kallinikos and Constantiou 2015). In particular social media platforms along with other customer-produced content, e.g. captured by software logs as well as mobile, wearable and smart devices, provide a rich channel to gain insights into customer preferences and behavior (Woerner and Wixom 2015; Yoo 2015). The characteristics of the respective data sources differ from traditional data sources. Therefore, practitioners use the term *big data* and explain it by describing the underlying data sources as delivering data of high volume, variety and velocity (Laney 2001). Though this data-centric definition of big data has its limits, we will work with it as it emphasizes the importance of all three Vs (i.e. volume, variety and velocity) leading to a modified understanding of data assets; which results in the need of corresponding capabilities to incorporate such new (big) data assets. This is in line with previous studies that found a crucial difference between big data cases integrating all three V properties and those integrating less (Manyika et al. 2011; Schroeck et al. 2012). Big data expands the scope of existing analytical capabilities with a variety of additional data sources that may lie inside or outside organizational boundaries (Hilbert and López 2011). The nature of big data affects the ability to derive insight and thus introduces changes “to the prevailing traditions of data collection, generation and utilization” (Constantiou and Kallinikos 2015). Therefore, big data capabilities refer to the activities to store, manage and analyze these high volumes of structured and unstructured data that are continuously generated (Chen et al. 2012).

## **Identifying CRM Capabilities**

### **Literature Search**

Our research aims to shed light on the relationship between CRM capabilities and big data assets. To gain a solid theoretical and conceptual foundation of CRM and to identify related capabilities we extensively reviewed scholarly literature from both IS and marketing by following vom Brocke et al.’s (2009) framework. Given the particularities of CRM, the corresponding activities are closely associated with IS as technology based solutions play a crucial role in different areas of this core organizational process (Coltman 2007; Payne et al. 2005). We restricted our literature search to leading journals and conference proceedings from the research areas of IS and marketing. To identify relevant articles in IS we referred to the Senior Scholars' Basket of Journals (Saunders et al. 2006) as a viable starting point. To broaden the perspective of our analysis we also included the following double blinded IS conference proceedings: International Conference on Information Systems and European Conference on Information Systems. For scholarly articles in marketing we referred to the VHB-Jourqual ranking (VHBonline 2015) and included the following highest ranked journals in our literature search: Journal of Marketing, Journal of Marketing Research, Journal of Consumer Research, Marketing Science, Journal of the Academy of Marketing Science, Journal of Service Research and Industrial Marketing Management. To gain access to the full-text articles from the journals and conference proceedings listed above we used EBSCOhost, ScienceDirect and AISEL databases. Within these databases we conducted an advanced search for articles that contained the key phrases ‘crm’ or ‘customer relationship management’ in their title, abstract or keywords. We applied our keyword search in this less restrictive fashion to make sure not to miss any relevant article. Moreover, our literature search was not restricted to any publication period of the articles. We finalized our search in April 2015 which resulted in a long list of 315 articles. We (two authors) verified the relevance of these articles by manually analyzing their titles, abstracts and full texts, if title and abstract seemed promising. Thereby, our focus was on research outcomes that demonstrate capabilities playing a critical role in a firm’s attempt to achieve CRM performance. A selected list of 18 articles became the basis of our subsequent literature synthesis and the identification of CRM capabilities. By applying the conceptualization from above we could identify several CRM capabilities that are presented in the relevant articles as organizations’ patterns of actions for the purpose of achieving CRM performance. During the reading of each article we compiled a concept matrix by listing each CRM capability identified from the respective article. After having assessed all relevant articles we shrunk the list of CRM capabilities by removing redundancies and integrating similar capabilities into key concepts (Webster and Watson 2002). Thereby, we considered a CRM capability as a key concept only if it has been cited multiple times by different authors. Any differences between the authors were resolved by detailed discussion. The resulting list of ten CRM capabilities is presented in Table 1.

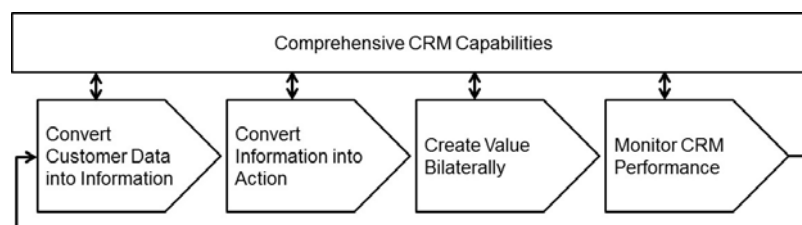
CRM Capability	Authors
Convert customer data into information	(Coltman 2007; Coltman et al. 2011; Mithas et al. 2005; Richards and Jones 2008; Vorhies et al. 2011)
Convert information into action	(Boulding et al. 2005; Coltman et al. 2011; Day 1994; Jayachandran et al. 2005; Richards and Jones 2008; Vorhies et al. 2011; Vorhies and Morgan 2005)
Create value bilaterally	(Boulding et al. 2005; Day 1994; Ernst et al. 2011; Kim et al. 2002; Payne and Frow 2005; Reinartz et al. 2004; Richards and Jones 2008; Vorhies and Morgan 2005)
Monitor CRM performance	(Boulding et al. 2005; Kumar et al. 2008; Payne and Frow 2005)
Manage the customer portfolio	(Boulding et al. 2005; Kim et al. 2002; O'Reilly and Dunne 2004; Reinartz et al. 2004; Ryals 2005; Vorhies and Morgan 2005)
Incorporate a customer-oriented attitude	(Jayachandran et al. 2005; Kim et al. 2002; Kumar et al. 2008; O'Reilly and Dunne 2004; Richards and Jones 2008)
Facilitate cross-functional integration	(Batenburg and Versendaal 2004; Boulding et al. 2005; Day 1994; O'Reilly and Dunne 2004; Payne and Frow 2005)
Have people issues under control	(Boulding et al. 2005; Coltman 2007; Coltman et al. 2011; Ernst et al. 2011; Kim et al. 2002; Kumar et al. 2008; O'Reilly and Dunne 2004; Payne and Frow 2005; Reinartz et al. 2004; Richards and Jones 2008)
Provide CRM information systems	(Coltman 2007; Coltman et al. 2011; Day 1994; Ernst et al. 2011; Jayachandran et al. 2005; Kim et al. 2002; Payne and Frow 2005; Reinartz et al. 2004)
Direct customer information	(Boulding et al. 2005; Coltman et al. 2011; Ernst et al. 2011; Jayachandran et al. 2005; Karimi et al. 2001; Kim et al. 2002; Payne and Frow 2005)

**Table 1. List of CRM capabilities identified from scholarly literature**

The resulting CRM capabilities should not be viewed in isolation as they are inter-related to each other and therefore are associated with increased CRM performance which ultimately leads to firm performance and competitive advantage (Boulding et al. 2005; Coltman et al. 2011; Ernst et al. 2011). Thus, we structured these capabilities and will describe each of them in the following.

### ***Framing CRM Capabilities***

For the first four capabilities listed in Table 1 we identified dependencies to the extent that one capability's output provides an input for the other one. We therefore arranged these capabilities as an overall information processing approach which is inspired by the process of knowledge management (Alavi and Leidner 2001; Nonaka 1991; Walsh and Ungson 1991) as depicted in Figure 1.



**Figure 1. CRM capabilities arranged as an overall information processing approach**

The CRM capability to *convert customer data into information* refers to interpreting customer data correctly to make sense of it and to ultimately create information which often requires human judgement (Coltman 2007; Coltman et al. 2011; Richards and Jones 2008). Mithas et al. (2005) show that increased

information about customers is associated with greater customer satisfaction. However, this can only be achieved if organizations effectively act on this information. We conceptualize the actual use of information about customers as the CRM capability to *convert information into action* (Boulding et al. 2005; Coltman et al. 2011; Day 1994; Richards and Jones 2008). Vorhies et al. (2011) emphasize the positive effects of developing new (marketing exploration) as well as improving and refining current (marketing exploitation) skills, processes and marketing capabilities through the application of this information. The resulting actions are represented by the capability to *create value bilaterally* that Boulding et al. (2005) consider the core of CRM. Payne et al. (2005) describe this capability as the ability to successfully manage the value exchange between the company and its customers. This capability also involves the customization of marketing activities to different customer segments (Ernst et al. 2011) and the ability to manage customer value perceptions (Vorhies and Morgan 2005) for the initiation and maintenance of customer relationships (Reinartz et al. 2004). The outcome of an organization's interactions with its customers should be assessed regularly which is represented by the capability to *monitor CRM performance* through several measures, e.g. acquisition, retention, cross-selling, up-selling, customer migration, customer lifetime value (CLV). A feedback loop returns the results from the performance monitoring to the first step of the overall process that subsequently converts them into new information about customers to maximize performance improvement (Payne and Frow 2005).

With the term *comprehensive CRM capabilities* we summarize the remaining six capabilities from Table 1 because they have an impact on the other CRM capabilities and vice versa, e.g. the results from performance monitoring are evaluated by customer portfolio management and may lead to changes in the bilateral creation of value through converting information into action as depicted in Figure 1. More precisely, the capability to *manage the customer portfolio* is the ability of an organization to segment its market effectively in order to target profitable customers based on the analysis of the CLV that is used as an indicator for the initiation or termination of customer relationships (Reinartz et al. 2004; Ryals 2005). Accordingly, customer portfolio management includes strategies that optimize the match between the firm's resources and its marketplace (Kim et al. 2002; Vorhies and Morgan 2005). The capability to *incorporate a customer-oriented attitude* presents the ability of a firm to develop strategies and tactics from a customer's perspective rather than from a product perspective to align all corporate activities with the customer (Jayachandran et al. 2005; Kumar et al. 2008; O'Reilly and Dunne 2004; Richards and Jones 2008). This also includes the buy-in and commitment of the organization's management and people involved with and affected by CRM to achieve corporate wide customer focus (Kim et al. 2002; O'Reilly and Dunne 2004). Customer orientation belongs to the overall approach of market orientation that encompasses further concepts (Kohli 1990; Narver and Slater 1990). However, by addressing organizations that strive for customer-centric marketing our research is less broad in scope and we therefore put our focus only on customer orientation. This customer-oriented attitude is closely related to the capability to *facilitate cross-functional integration* of processes, information, and resources (Batenburg and Versendaal 2004; O'Reilly and Dunne 2004; Payne and Frow 2005). These activities substantially depend on an organization's employees who need to be integrated into CRM activities successfully as they are an integral part of the delivery of customer-related activities (Boulding et al. 2005; O'Reilly and Dunne 2004), i.e. the capability to *have people issues under control*. The organization needs to create a desire to participate in CRM, e.g. by creating incentives and rewarding employees for engaging in CRM activities and customer-oriented behavior (Coltman et al. 2011; Ernst et al. 2011; Kumar et al. 2008; Reinartz et al. 2004). This also implies employee training and personnel development to keep employees satisfied, motivated and well qualified with diverse skills and experience in CRM (Coltman et al. 2011; O'Reilly and Dunne 2004; Richards and Jones 2008). The capability to *direct customer information* is represented by the five relational information processes, i.e. information reciprocity, information capture, information integration, information access and information use, which increase CRM performance (Jayachandran et al. 2005). Particularly, this includes the ability to draw information from all customer contact points and channels with other information from legacy systems across the organization to build a coherent picture of the customer (Coltman et al. 2011; Karimi et al. 2001; Kim et al. 2002; Payne and Frow 2005). The capability to *provide CRM information systems* is the ability to correctly apply CRM information systems in the organizational context to enable effective CRM (Ernst et al. 2011). CRM information systems are applied to facilitate the collection and processing of customer information (Coltman et al. 2011; Kim et al. 2002). They include front office and back office applications as well as hardware and software for data integration and analysis (Jayachandran et al. 2005; Payne and Frow 2005).

With the increasing availability of big data we would expect that the CRM capabilities described above would need to be developed further to leverage these big data assets and ultimately increase CRM performance.

## Developing CRM Capabilities to Leverage Big Data

### *Transforming existing CRM Capabilities*

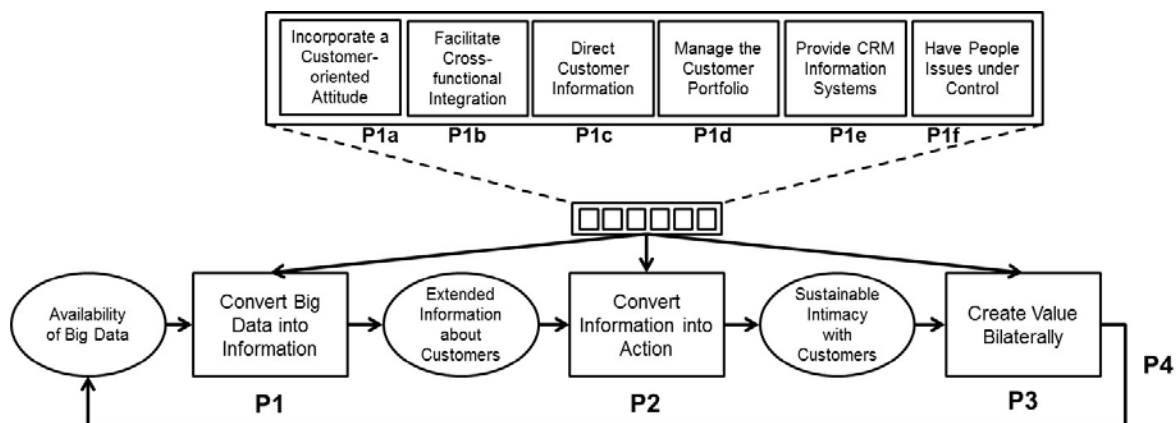
Derived from the overall process of CRM capabilities (see Figure 1) we introduce our conceptual framework for leveraging big data in the domain of CRM as depicted in Figure 2. With regard to dynamic capabilities theory we consider customer data as organizations' most valuable assets in the domain of CRM and leveraging these data as relevant capabilities to create valuable relationships with customers. By reviewing scholarly literature we have identified these capabilities. Through the incorporation of big data and corresponding adjustment of the organization (Teece et al. 1997) we would expect an increase in CRM performance. Thereby, we argue that big data influences CRM performance only indirectly through actually applying new information about customers which is derived from the composition of traditional data sources and big data sources. Thus, we expect that big data directly and positively influences information about customers (P1) which in turn positively influences the company's intimacy with its customers by applying this information (P2) and ultimately impacts CRM performance through creating value bilaterally (P3). Finally, any adjustment of the value exchange with customers has an impact on customer behavior which in return can ultimately change the (big) data about these customers (P4). These expectations are captured in the following propositions:

*P1: We expect that converting big data into information increases the understanding about customers in the domain of CRM.*

*P2: We expect that applying new information about customers increases the intimacy with customers.*

*P3: We expect that creating value bilaterally between a company and its customers increases CRM performance.*

*P4: We expect that the actions taken to increase CRM performance change the system and the available data. Thereby measurement of effect closes the iteration.*



**Figure 2. Proposed conceptual framework for big data in the domain of CRM**

The capabilities to achieve the expected outcomes (P1-P3) originate in existing CRM capabilities which are related to traditional data assets while the availability of big data represents a change of the organization's environment that comes along with a modified understanding of the related data assets. To adjust to this change the firm would need to transform its CRM capabilities (Teece et al. 1997) to incorporate big data for achieving the outcomes proposed above. Through further investigation it needs to be clarified *how* the associated transformation of capabilities evolves (see P1a to P1f in Figure 2). As a first step, the focus of our investigation is on proposition P1.

### **Converting Big Data into Information about Customers**

Based on dynamic capabilities theory, we argue that the capability to *convert big data into information* about customers (P1) evolves from the original CRM capability to *convert customer data into information* and that this transformation will involve the other CRM capabilities identified from scholarly literature (see P1a to P1f in Figure 2). We would expect that these capabilities are involved analogously in the propositions P2 and P3. It is obvious that therefore each of these capabilities would need to be enhanced to a greater or lesser extent. The capability to *monitor CRM performance* is not depicted in Figure 2 as we consider it as an existing CRM capability that embraces the whole circuit by impacting all other capabilities but does not need to be enhanced itself.

We take the capability to *direct customer information* (P1c) as an example to illustrate how the six capabilities from P1a to P1f are involved in the transformation. Given the availability of new external data sources, in most cases the continuous generation of heterogeneous data lies beyond the control of the organization (Constantiou and Kallinikos 2015). The crucial capability is integrating such data with existing internal data. This might require new cleansing logic, experienced modeling techniques as well as advanced analytic models and linking such models together to create a comprehensive view of the customer. This expectation is captured in the proposition P1c: *To direct customer information positively influences the conversion of big data into increased information about customers.*

Analogously, we would expect that the other five capabilities would positively influence the conversion of big data into increased information about customers. For a preliminary validation of the propositions P1a to P1f we gathered more than a hundred big data success stories published on vendors' websites. By qualitatively reviewing some of these success stories in a first step, we identified tentative evidence for each of the capabilities expected to be involved in the conversion of big data into information about customers. These preliminary results are summarized in Table 2. Due to page limitation we present only one example per proposition and provide the whole table on request.

<b>Selected examples from big data success stories</b>	
P1a	<i>"The customer lifetime value team at TalkTalk presented a proposal to senior management to embark on a major big data analytics initiative to enhance customer management and retention. The role of data now has senior management visibility – that is how important it is to the business" (SAS 2012).</i>
P1b	<i>"After analyzing the customer data, the analytical team makes recommendation to the sales and marketing departments. They work collaboratively to understand the customers" (SAS 2011).</i>
P1c	<i>"We collect data from application logs, Facebook insights, and analytics tags. It is imperative that this data is in the hands of the business decision makers immediately, so they can make timely offers to gamers, decide about development, and steer advertising programs for maximum impact" (Tableau 2012).</i>
P1d	<i>"Previously, TalkTalk was looking at single levers of churn, but SAS has helped it identify multiple levers in combination, and uncovering new triggers and levers that they did not know existed" (SAS 2012).</i>
P1e	<i>"macys.com is working toward putting in place the architectural elements it needs for a "360-degree view" of its customers of its customers to support a strategy of multichannel integration" (IBM 2010).</i>
P1f	<i>"As the Macy's transformation program unfolds, it will ultimately affect each of the company's 161,000 employees, from the CEO to the sales associate on the floor" (IBM 2010).</i>

**Table 2. Big data success stories supporting propositions P1a to P1f**

## Conclusion and Outlook

The overall goal of our research is to close the gap between an increasing availability of customer data on the one hand and the promising increase in customer satisfaction and retention on the other. As a first step, to gain a solid understanding of how CRM performance improvement can be achieved we have identified a list of existing CRM capabilities from scholarly literature in IS and marketing (Table 1). From the results of our literature review we derived a conceptual framework for leveraging big data in the domain of CRM (Figure 2). Our framework is based on the assumption that original CRM capabilities would need to be transformed due to the specific nature of big data. To understand how this transformation is evolving we took a detailed look at the capability to convert big data into information about customers. We identified six capabilities from our original list (Table 1) as positively influencing the conversion of big data. From industrial big data success stories we have gained first indications supporting our propositions with regard to how the transformation towards the conversion of big data into customer information would be enabled (P1a to P1f). As a next step, we plan to further validate these propositions by investigating the full set of big data success stories from the domain of CRM. Thereby, we aim to contribute to both fields IS and marketing by systemizing the investigation of big data in the domain of CRM. Our research aims to contribute to practice by structuring those capabilities that are relevant to leverage big data in order to increase CRM performance.

We consider it a limitation of our research to refer to third party data based on a biased perspective of software vendors and system integrators articulated in their success stories. Yet, relying on vendors' success stories to handle emerging phenomena has been fruitful in previous studies in the IS field (Seddon et al. 2012) as this approach provides an easy access to a wide range of organizations. Moreover, so far we have regarded the capabilities related to the propositions P1a to P1f only in isolation. The reason behind this approach is that a detailed investigation of the interaction between these capabilities is not feasible on the basis of secondary cases. However, from looking at our own case in previous research, we have learned that several capabilities would need to be considered as being complementary, i.e. the benefits from one capability are leveraged by the presence of another. It would also be interesting to identify different extents to which these capabilities would need to be transformed. In future research we will investigate multiple case studies from the domain of CRM to gain a detailed understanding of how companies soundly orchestrate and transform existing capabilities to leverage big data for the creation and maintenance of valuable relationships with their customers.

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