DEVELOPING A DEEPER UNDERSTANDING OF DIGITALLY EMPOWERED CUSTOMERS – A CAPABILITY TRANSFORMATION FRAMEWORK IN THE DOMAIN OF CUSTOMER RELATIONSHIP MANAGEM

Katja Tiefenbacher  
*University of Duisburg-Essen*, katja.tiefenbacher@uni-due.de

Sebastian Olbrich  
*European Business School (EBS)*, sebastian.olbrich@ebs.ed

Follow this and additional works at: [http://aisel.aisnet.org/pacis2016](http://aisel.aisnet.org/pacis2016)

**Recommended Citation**

[http://aisel.aisnet.org/pacis2016/293](http://aisel.aisnet.org/pacis2016/293)
DEVELOPING A DEEPER UNDERSTANDING OF DIGITALLY EMPOWERED CUSTOMERS – A CAPABILITY TRANSFORMATION FRAMEWORK IN THE DOMAIN OF CUSTOMER RELATIONSHIP MANAGEMENT

Katja Tiefenbacher, Mercator School of Management, University of Duisburg-Essen, Duisburg, Germany, katja.tiefenbacher@uni-due.de

Sebastian Olbrich, European Business School (EBS), Oestrich-Winkel, Germany, sebastian.olbrich@ebs.edu

Abstract

Improvements in digital technologies have enabled changes in customer behavior which present companies with the challenge to offer enriched customer experiences. These changes come along with an increased availability of customer-produced content, e.g. via social media, mobile devices etc. Leadership in this digital ecosystem is determined by a company’s capabilities to understand its customers’ behavior which manifests in high volumes of continuously generated, heterogeneous data; to actually apply the derived insights in business operations; and finally to create value for both the customers and itself. This paper focuses on the first step, i.e. the understanding of customers by means of big data, and builds on our previous research that derived a conceptual framework for big data in the domain of CRM from scholarly literature. To validate and refine this framework we coded multiple success stories from vendors of big data solutions, guided by Grounded Theory. The results suggest a transformation of a company’s internal CRM capabilities to gain a deeper understanding of their customers derived from big data. By pinpointing the development of relevant capabilities for leveraging big data in the domain of CRM and providing guidelines for deriving customer information, the results contribute equally to theory and practice.

Keywords: Big Data, CRM, Dynamic Capabilities Theory, Digital Technologies.
1 INTRODUCTION

The digital era has induced impressive improvements in information, communication, and connectivity (e.g. Internet and mobile web) technologies (Bharadwaj et al., 2013). These digital technologies have enabled a transformation of the customer buying behavior: having unlimited access to information about various suppliers’ offerings and other buyers’ experiences through the Internet and social media, customers can make better informed choices (Edelman and Singer, 2015; Manyika et al., 2016; Wiersema, 2013). Therefore, they have gained increased buying power and are expecting a seamless multi-channel experience (Benson-Armer and Thiel, 2015; Bharadwaj et al., 2013; Edelman and Singer, 2015; Wiersema, 2013). Consequently, companies face the challenge to keep up with fast-changing customer profiles and behaviors which creates an increased need of customer insights from leveraging more granular customer data to improve customer experiences and to customize offers, products and services (Benson-Armer and Thiel, 2015; Wiersema, 2013). Being focused on customers is hardly a new concept (Narver and Slater, 1990; Slater and Narver, 1994). However, it seems more important than ever for companies to develop a deeper understanding of their customers from an increasing digital ecosystem (Weill and Woerner, 2015).

The change in customer buying patterns also implies that customers become more inclined to provide and share their personal behavior. The expanded use of social media and online/mobile shopping has enhanced the availability of customer-produced data, e.g. via social media platforms, software logs, mobile devices etc. These high volumes of continuously generated structured and unstructured data are usually summarized by the term ‘big data’ (Laney, 2001) as they differ from traditional data assets. The availability of big data creates opportunities for an improved understanding of customer preferences and behaviors 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). 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 and how to leverage these promises seems to be necessary (Desmet et al., 2015; Ostrom et al., 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). Therefore, we would argue that changes in customer behavior – which can be observed and which manifest themselves in the availability of big data – introduce an environmental change that creates the necessity for a company to enhance internal capabilities to ensure competitive advantage. We base our research on the Dynamic Capabilities Theory (Eisenhardt and Martin, 2000; Teece et al., 1997; Winter, 2003) and aim to find a way toward a capability building process in organizations with regard to leveraging big data in the functional domain of Customer Relationship Management (CRM), i.e. 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). From reviewing scholarly literature in the fields of Information Systems (IS) and marketing, and identifying relevant CRM capabilities, in previous research (Tiefenbacher and Olbrich, 2016) we have derived a conceptual framework for leveraging big data assets in the domain of CRM. This approach was based on our underlying understanding that capabilities required to leverage big data assets originate from known CRM capabilities which would need to be enhanced to satisfy the particularities compared to traditional data assets, i.e. volume, variety and velocity. Building on our conceptual framework, the research question addressed in this paper is: How do CRM capabilities need to be transformed to leverage big data assets for an increased understanding about customers? To answer this research question and to validate our framework we followed a discovery-oriented approach and qualitatively examined success stories about big data in the domain of CRM that various vendors of big data solutions had published on their websites.
The remainder of this paper is structured as follows: First, we describe the theoretical background of our research and introduce our conceptual framework derived from scholarly literature. Then, we present and discuss the results from our qualitative analysis of big data success stories. In the last section we provide a conclusion and an outlook on our future research agenda.

2 CONCEPTUAL BACKGROUND

2.1 Dynamic Capabilities Theory

The concept of dynamic capabilities is founded on the resource-based view of the firm (RBV) (Penrose, 1959; Wernerfelt, 1984) which is commonly used to articulate corporate strategy in order to gain competitive advantage. In the eyes of the RBV, an organization is a collection of resources which include 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 the most valuable assets in the domain of CRM and activities to leverage these data as the firm’s capabilities to create valuable relationships with customers. Through changing customer behavior the firm might be encouraged to incorporate data from external environments and therefore might need to reconfigure its original CRM capabilities.

2.2 Customer Relationship Management

Originally, CRM has its roots in relationship marketing (Ryals and Knox, 2001) and 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”. By uniting the potential of relationship marketing strategies and IT, CRM “provides enhanced opportunities to use data and information to both understand customers and co-create value with them” (Payne and Frow, 2005). Hence, 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 these market-based assets (Srivastava et al., 1999; Theodosiou et al., 2012). CRM performance evaluates the success of an organization’s CRM activities on customer satisfaction and retention, i.e. the ability to create value for the customer and the organization (Batenburg and Versendaal, 2004; Jayachandran et al., 2005).

The digital era has put forth empowered customers that have permanent access to unlimited information about products, services and their prices (Benson-Armer and Thiel, 2015; Bharadwaj et al., 2013; Edelman and Singer, 2015; Manyika et al., 2016; Wiersema, 2013). To keep up with the
resulting changes in customer behavior companies need to develop appropriate capabilities to revise their CRM activities in a way that differs from traditional marketing.

2.3 Better Understanding of Customer Behavior by Means of Big Data

Changes in customer behavior relate also to online participation where customers make their habits and concerns constantly available in terms of social media platforms, software logs as well as mobile, wearable and smart devices. These customer-produced data provide a rich channel to gain insights into customer preferences and behavior (Kallinikos and Constantiou, 2015; Woerner and Wixom, 2015; Yoo, 2015). However, the particularities of these data differ from traditional data assets. Therefore, practitioners usually apply the term big data and describe it with the three V properties: volume – massive amounts, variety – heterogeneous structure, and velocity – continuous creation (Laney, 2001). Although we acknowledge that this definition is rather data-centric, we will work with it as it emphasizes the importance of integrating multiple dimensions, i.e. the three Vs, leading to a modified understanding of data assets. It is our underlying assumption that working along such dimensions of data assets and integrating them into existing corporate information structures requires corresponding capabilities that ultimately lead to competitive advantage. This assumption 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). Therefore, capabilities to leverage big data 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).

Following this line of argumentation, in the context of CRM we understand big data as sensors for capturing fast-changing customer behavior. Managing these sensors increasingly becomes a crucial capability for organizations to improve the understanding about their customers.

3 TRANSFORMING EXISTING CRM CAPABILITIES TO LEVERAGE BIG DATA

3.1 Conceptual Framework for Big Data in the Domain of CRM

An increase in information about customers as well as better informed customers demand a change in how marketing activities are performed. As a consequence, costumers can be addressed individually and organizations have to modify their operational and marketing model accordingly. IS play a crucial role in facilitating this transformation. For instance, conventional practices from traditional advertising channels like direct mail, e-mail or telephone, use prospect lists and audience segments to guide the targeting process. Mobile devices and social media enable to move the focus of this customer targeting activity from a segment of customers to the individual customer (Edelman and Singer, 2015; Kridel and Dolk, 2016). This transformation already manifests itself in multiple business models, e.g. L’Oréal provides an app that allows customers to try on makeup virtually, select a look they like and instantly order the right products online; and the convenience store chain 7-Eleven responds to customers with relevant offers in real time depending on a customer’s segment, location and preferences, thereby even integrating temperature data to decide between hot coffee and cold drinks. Such business models require to understand costumer behavior based on data derived from the composition of new big data sources and traditional customer data sources to meet the specific customer expectation in real time. Therefore, the changes in customer demands and contextual factors which manifest themselves by means of big data create the necessity for an organization to transform its CRM capabilities (Teece et al., 1997) to leverage big data assets and ultimately improve CRM performance.
To investigate which capabilities would be particularly affected by ongoing trends toward empowered customers and increasing data availability, in previous research we extensively reviewed scholarly literature from both IS and marketing. Thereby, we found capabilities that play a critical role in a firm’s attempt to achieve CRM performance (Tiefenbacher and Olbrich, 2016). We identified dependencies between core capabilities and arranged them 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). The resulting conceptual framework for big data in the domain of CRM is depicted in Figure 1.

**Figure 1. Proposed conceptual framework for big data in the domain of CRM with focus on P1.**

Based on Dynamic Capabilities Theory, we argue that the capabilities (represented as rectangles in Figure 1) to achieve the expected outcomes (represented as ovals in Figure 1) originate in existing CRM capabilities. The existing capabilities are related to traditional data assets while big data represents a modified understanding of data assets which implies that these capabilities need to be transformed. For instance, with regard to P1 we would assume that the capability to convert big data into information evolves from the original CRM capability to convert customer data into information.

In the following we will explain each of the original CRM capabilities as derived from scholarly literature.

The original CRM capability to convert customer data into information refers to the ability of interpreting customer data correctly to make sense of it and to ultimately create information (Coltman, 2007; Coltman et al., 2011; Richards and Jones, 2008). This capability often requires human judgement in addition to analysis and information distribution for the purpose of feeding the organization’s decision-making (Vorhies et al., 2011). Mithas et al. (2005) show that increased information about customers is associated with greater customer satisfaction. However, this can only be achieved if the resulting information about customers is actually used which is represented by 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. The outcome of an organization’s interactions with its customers should be assessed regularly through several measures, e.g. retention, cross-selling, customer lifetime value (CLV). A feedback loop returns the results from the performance monitoring to the first step of the overall process to maximize performance improvement (Payne and Frow, 2005).
With our conceptual framework we argue that big data influences CRM performance only indirectly and formulated the following propositions (Tiefenbacher and Olbrich, 2016):

**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.

With particular focus on proposition P1 we argue that the enhancement of the original CRM capability to convert customer data into information will involve six comprehensive CRM capabilities (see six boxes in Figure 1) that we derived from reviewing scholarly literature (Tiefenbacher and Olbrich, 2016). It is obvious that therefore each of these six capabilities would need to be enhanced to a greater or lesser extent. As depicted by the dotted arrow lines in Figure 1, we expect that these six capabilities would also be involved in the transformation of the capabilities to convert customer information into action (P2) and to create value bilaterally (P3). The investigation of P2 and P3 is part of our future research.

In the following we will discuss each of the six capabilities in detail as derived from scholarly literature, thus serving as a baseline for our subsequent investigation of how the transformation of capabilities evolves. Thereby we will particularly focus on their expected relevance for the conversion of big data into information about customers (P1).

### 3.2 Comprehensive Capabilities

The capability to incorporate a customer-oriented attitude (P1a) 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). In a company that incorporates a customer-oriented attitude business objectives are primarily driven by the understanding of customers’ needs (Liu et al., 2002). Therefore, we expect that this capability would be relevant for the conversion of big data into information about customers which is formally captured by the following proposition:

**P1a:** To incorporate a customer-oriented attitude positively influences the conversion of big data into increased information about customers.

The capability to facilitate cross-functional integration (P1b) refers to sharing processes, information, and resources across business functions and different departments (Batenburg and Versendaal, 2004; O'Reilly and Dunne, 2004; Payne and Frow, 2005). Cross-functional integration also includes to regularly develop a shared understanding of the available customer data between marketing and other departments (Vorhies et al., 2011). Hence we formulate the following proposition:

**P1b:** To facilitate cross-functional integration positively influences the conversion of big data into increased information about customers.

The capability to direct customer information (P1c) 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,
We consider information capture and information integration as being particularly relevant for P1, i.e. the collection of customer data by considering internal and external sources as well as the subsequent integration of information gathered from different sources and the analysis of customer data to identify structures and patterns (Coltman et al., 2011; Ernst et al., 2011; Jayachandran et al., 2005). This expectation is captured in the following proposition:

**P1c:** To direct customer information positively influences the conversion of big data into increased information about customers.

The capability to manage the customer portfolio (P1d) 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). This also includes the assessment of customer information requirements for the examination of detailed customer profiles and market segments (Ernst et al., 2011; Jayachandran et al., 2005). Therefore we consider the capability to manage the customer portfolio as being relevant for P1 which is captured in the following proposition:

**P1d:** To manage the customer portfolio positively influences the conversion of big data into increased information about customers.

The capability to provide CRM information systems (P1e) is the ability to correctly apply CRM information systems in the organizational context such that they 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 (Payne and Frow, 2005). Types of data processed through CRM information systems include online and offline customer data, customer lifestyle data (e.g. car & home ownership), internal sales data, customer interaction data, customer demographics, internal financial records, customer contact information, ad response data, call center sales and customer service data (Jayachandran et al., 2005). The investment in these systems is particularly valuable to acquire and manage customer information as well as to integrate data from various data sources and to support customer data analysis (Jayachandran et al., 2005; Reinartz et al., 2004). Therefore we formulate the following proposition:

**P1e:** To provide CRM information systems positively influences the conversion of big data into increased information about customers.

The capability to have people issues under control (P1f) describes the ability to successfully integrate an organization’s employees into its CRM as they are an integral part of the delivery of customer-related activities (Boulding et al., 2005; O'Reilly and Dunne, 2004). Therefore 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). With regard to the conversion of customer data into information a company would encourage its employees to gather information about customer needs and assist them in extracting, manipulating, analyzing, and presenting data with extensive documentation and training to develop relevant skills (Coltman et al., 2011; Vorhies et al., 2011). Therefore we outline the following proposition:

**P1f:** To have people issues under control positively influences the conversion of big data into increased information about customers.

As a next step, these propositions (P1a to P1f) need to be validated and through further investigation it needs to be clarified how the six capabilities described above might positively influence the conversion of big data into information about customers in order to ultimately increase CRM performance. To gain this deeper understanding and to validate our propositions we have qualitatively reviewed various big data success stories as described below.
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. Such a transformational effort will involve the six comprehensive capabilities identified from scholarly literature as depicted in Figure 1. Through coding big data success stories downloaded from websites of technology vendors and consultancies we aim to validate our propositions and to understand how the transformation of existing capabilities evolves. We chose to apply an explorative approach because our objective is to investigate in which way these six comprehensive capabilities might positively influence the conversion of big data into information about customers and how they evolve from their original versions such that the understanding about customers is increased through leveraging big data assets. While an established theoretical base for CRM capabilities exists, the transformation of the relevant capabilities in adjustment to changes in customer behavior can be considered as a new phenomenon. We aim to explore this phenomenon by observing its manifestation in what is called big data. As an approach for qualitative analysis we decided to apply coding elements borrowed from Grounded Theory (Glaser and Strauss, 1967; Strauss and Corbin, 1990) and use big data success stories as a starting point for our investigation. We are well aware that by focusing on vendors’ success stories we are presenting a biased perspective. While we cannot completely dismiss the biased nature of the investigated material, this approach provides an easy access to a wide range of organizations leveraging big data and has been fruitful in previous IS studies and allowed insights into emerging phenomena (Müller et al., 2010; Seddon et al., 2012; Wang et al., 2014). As vendors of big data solutions primarily focus on the initial processing of big data, i.e. the conversion into information, and therefore discuss actions required to realize the benefits from their software, we consider their stories as suitable to explore how related capabilities evolve with regard to our proposition P1.

The stories were sourced from websites of technology vendors and consultancies by searching for the term big data in any provided success stories related to leveraging big data in the functional domain of CRM. A success story was selected when it discussed aspects of the conversion of big data into information and its use with relation to CRM. Thereby we restricted our search to those stories that present a clear cut big data use case in the domain of CRM and rejected stories which only superficially promoted a product. Our initial search resulted in more than a hundred big data success stories in various formats, e.g. one pagers, conference presentations, blog entries etc. After having read each success story carefully to finally check its relevance by applying the criteria from above, the data collection resulted in a sample of 28 big data success stories. These stories cover a wide range of different sized companies, mainly located in USA, from a range of industrial branches such as financial services, retail, media, telecommunication, vehicle rental services, and one government organization. We found that success stories from IBM, SAS and Teradata were the most useful because they were longer, i.e. three to six pages in length, than those of other vendors, e.g. SAP or Tableau. All stories originate from the years between 2010 and 2016. A complete list of our sample’s big data success stories will be sent to readers on request. If we quote from a success story, we mark the corresponding number with the # sign.

The two authors coded the sample of 28 big data success stories from the functional domain of CRM. For each story, coding involved asking whether any of the six comprehensive capabilities (P1a to P1f) from the conceptual framework introduced above was mentioned in the success story. Therefore we used a spreadsheet with one row per big data success story and one column for each of the six capabilities to record our results. We marked those capabilities that have been presented in the story by copying the relevant text passages into the corresponding cells in our spreadsheet. By this, we identified which of the six capabilities were presented in each success story as positively influencing the conversion of big data into increased information about customers. We applied several iterations during our subsequent analysis: Inspired by open coding we initially reviewed each of these capabilities to identify descriptive concepts of how the respective capability was applied and how it
evolves from its original version for the purpose of deriving customer information from big data. Finally, we used axial coding (Strauss and Corbin, 1990) to structure the discovered concepts and categorize the differences in how each capability manifests compared to its original version. Thereby we individually went through our notes column-wise for each of the six capabilities. Any discrepancies between the authors (overall agreement > 96%) were resolved through detailed discussion. The results of our analysis are summarized in the following section.

5 RESULTS

By analyzing the 28 big data success stories from the domain of CRM we found evidence that the conversion of big data into information will increase the understanding about customers (P1) to meet their needs. For instance, the Alberta Parks Division described a move “beyond collecting data to gleaning insight from both structured and unstructured data sources, providing a foundation for new program and service delivery” (#13). The success stories emphasized the relevance to make sense of big data to gain a deeper understanding about customers which is important to manage relationships with them. In this context Merkle clearly underlines the relevance of data by stating: “The focus isn’t just on technology. It’s on data. Specifically, how to effectively transform petabytes of raw data into useful information that can better influence marketing processes and predict customer preferences with much greater accuracy” (#17). These findings support our assumption that big data increases CRM performance only indirectly through actually applying the derived information about customers.

Apart from this overall perspective we also found evidence for each of the six comprehensive CRM capabilities in positively influencing the conversion of big data into increased information about customers. The results of our analysis show that the capability to direct customer information (P1c) as well as the capability to provide CRM information systems (P1e) have been presented in all 28 (100%) cases as positively influencing the conversion of big data into increased information about customers.

With regard to directing customer information (P1c) the success stories report on capturing customer data at an increased variety of data sources, including “both internal databases and external sources, such as credit bureaus and web search engines” (#8), “brand touch points” (#20), “transactional, network and dynamic usage data” (#16) and “customer comments” (#21), mostly in real time. For instance, a senior marketing manager at American Eagle Outfitters stated that they “try to capture as much as [they] possibly can within the non-creepy context” (#21). Particularly, the incorporation of detailed unstructured data is presented as a rich source of customer insights. In this context, a crucial ability is the integration of new big data sources with existing internal data sources to create a comprehensive view of the customer, i.e. “seamlessly connect[ ] all disparate data sources […] in a single unified view” (#1). Thereby, “analytic models combine data from the company’s […] systems with data from external sources” (#8) to increase the understanding about customers. However, creating effective models seems to be rather challenging as the ability to “produce accurate look-alike models requires speed. Consumers change, and predictive models have ever-shorter shelf lives in digital media” (#5). The companies from the success stories are applying predictive analytics, advanced statistical methods, data mining algorithms and linguistic rules to categorize customers’ comments, uncover trends and predict future behavior of customers.

These activities are enabled by combining different information systems, for instance Verizon Wireless “is bringing unstructured voice and text data through Hadoop and determining Net Promoter Scores (NPS) and then mining the data on the discovery platform to ultimately get accurate sentiment from the customer. They then match it up and verify in the Teradata Data Warehouse – integrating ALL the data for insights” (#25). This ability clearly belongs to the capability to provide CRM information systems (P1e). The success stories report that for the integration of big data sources, particularly including external data sources that continuously generate data, a variety of information systems needs to be managed, for instance scalable, high-performance, massively parallel analytics platforms, in-memory based data-technologies, multi-node Hadoop clusters and data warehouse appliances. These technologies are different from traditional concepts and therefore need to be
managed differently: “It is a different environment and requires a different mindset. Managing it like a relational database is like buying a Ferrari but always driving in a school zone” (#17). The success stories also reported on moving data between several systems to take advantage of different technologies, for instance “Hadoop helps in establishing relationships between unstructured data elements” while a data warehouse appliance executes high-speed complex queries and integrates with other systems (#18). By keeping the right data in the right place much data replication can be eliminated which might lead to a big data platform as a service that can “easily accommodate new data sources” (#28). In this context data visualization was mentioned as an important feature, in particular to interpret unstructured data. Another important aspect that we found in the success stories is the ability to provide security for sensitive analytics data.

The capability to incorporate a customer-oriented attitude (P1a) was presented in 26 (93%) success stories as positively influencing the conversion of big data into an increased understanding about customers. For instance, Cosmos Bank decided not to enter a price war and instead “rely on [their] data analysis to understand the behaviors of [their] customers – their transaction histories, including the timing of drawdown and repayment patterns” (#15). Other success stories tell about initiatives to “embed a customer-centric orientation into every aspect of the company’s operations” (#20) or to “build a relationship with the customer, on the customer’s terms” (#23).

The capability to have people issues under control (P1f) was mentioned in 20 (71%) stories as positively influencing the conversion of big data into increased information about customers. The success stories mainly relate this capability to the necessary skills and expertise which need to be acquired with increasing sophistication of analytics and modelling. For instance, Telerx recognized that for advanced analytics it needed to invest “not just in technology, but in the skills and expertise necessary to turn raw data into valuable insight” (#6). However, it was also mentioned that training needs vary between different user groups. While analysts need only minimal training on an intuitive platform, e.g. “anyone can use Tableau’s browser based analytics”, specialists require more training to perform advanced analyses. With an intuitive platform employees can “run their own analyses and discovery without requiring extensive IT support” (#15). This gives users the ability “to try things over and over again until they found what they sought, or something different” (#7).

The capability to manage the customer portfolio (P1d) was mentioned in 19 (68%) success stories as positively influencing the conversion of big data into an increased understanding about customers. From analyzing the success stories we have discovered that an important aspect of this capability is data granularity, e.g. “transaction-level analysis” (#18) or the “visibility into the very granular data exhaust from the buying process” (#2), in order to segment customers at a much finer grain and better understand the demands of each customer segment. In this context, the success stories also referred to “identifying patterns in the data over much longer time periods to understand true statistical flow” (#2) and applying “longer-term measurements of customer engagement” as opposed to “traditional by-the-numbers metrics such as event sales and item sell-through rates” (#20). With big data the complexity of segmentation, classification and regression seems to be increased. For instance, success stories report on an “explosion in the number of variables” (#18), “custom models developed for each of its clients” (#6) and the identification of “multiple levers in combination, as well as uncovering new triggers and levers” (#16). We also found examples where the customer portfolio management was automatized. For instance, eircom “generates automatic alerts [...] showing customers who are predicted to churn” (#4) and at 7-Eleven transactional data immediately drives segmentation and subsequent offers in real time (#23).

Finally, the capability to facilitate cross-functional integration (P1b) was presented in 13 (46%) success stories as positively influencing the conversion of big data into increased information about customers. We found two main aspects in the success stories presenting this capability: First, the removal of information silos by sharing data across the group, including all divisions and functions irrespective of business units or state, which was formerly tied to one department. Second, the operationalization of analytics which, for example, is reflected in “using the best-in-class visual analytics in almost every corner of the business” (#11), building a “common analytics workflow
throughout the organization” (4) or “deliver[ing] data-driven insights to business users across the group” (3) to improve the understanding about customers to ultimately create better customer experiences.

6 DISCUSSION AND INTERPRETATION

Our results show that all six CRM capabilities positively influence the conversion of big data into increased information about customers (P1a to P1f) and, more specifically, that the original capabilities might be considered in combination with each other for an overall transformation while each capability itself would need to be enhanced to varying extents. From the acquired results it can be inferred that there exist interdependencies between the six capabilities. In the success stories the capability to incorporate a customer-oriented attitude is presented as a driver for further development of the other five capabilities while the capability itself seems to stay unchanged. Through making the understanding about customers its highest priority an organization considers big data as an opportunity to increase the information about customers and will be determined to invest in new information systems. Therefore, we have identified remarkable changes in the capability to provide CRM information systems to the extent that new technologies need to be managed which provide an adequate level of performance for increased volumes of data. As these new heterogeneous data assets are more difficult to interpret, visualization gains importance. Moreover, an increased variety of data sources as well as the velocity of data generation necessitate new ways of managing appropriate information systems, e.g. reduce replication, combine different systems, easily accommodate new data sources etc. Driven by a strong customer-oriented attitude and changes in providing CRM information systems, the capability to direct customer information requires substantial enhancement for big data. As the success stories show, new heterogeneous data assets are captured in real time and are integrated with traditional data assets, which seems to be a particular challenging task. Therefore, companies introduce new sophisticated modelling techniques and develop the ability to deploy new models quickly. Ultimately the capability to direct customer information seems to be closely related to the capability to manage the customer portfolio which also needs to be enhanced through the introduction of big data. Main differences compared to the original capability are: customer segmentation is cNum>(Jayachandran et al., 2005; Reinartz et al., 2004)<DisplayText>(<rec-number>515</rec-number>)</DisplayText>significant modifications in longstanding marketing traditions that have relied on standard criteria like age or income (Constantiou and Kallinikos, 2015). In some cases customer segmentation and targeting are automatized in real time driven by big data, which gets also facilitated by dedicated high performance information systems. We argue that the enhancement of the capability to manage the customer portfolio is mainly driven by companies’ ambition to keep up with fast-changing customer profiles and behaviors. In this context, companies rely on individual customer interactions for an increased understanding about customers to customize offers, e.g. by developing individualized customer journeys (Edelman and Singer, 2015).

Analyzing the success stories at hand we have discovered that the capability to have people issues under control needs to be further developed with regard to new skills and expertise for the application of advanced analytic and sophisticated modelling techniques. On the other hand, the success stories also report on an intuitive usability of analytical platforms which require less training for simple analyses and therefore allow a widespread application of customer analytics throughout the organization. However, as the capability to convert customer data into information often requires human judgement (Vorhies et al., 2011) we expect that companies with a strong customer-oriented attitude would also invest in expanding skills by hiring new staff to deal with increasingly empowered customers. Understanding more fine-grained customer segments and appropriately developing relevant offers might require new specialists, e.g. user-experience designers (Desmet et al., 2015). This might lead to diversified groups of employees inducing yet another enhancement of the capability to have people issues under control. According to the success stories the capability to facilitate cross-functional integration is mainly impacted by an operationalization of analytics which might ultimately
lead to a data-driven culture through the introduction of big data. With regard to the actual application of increased information about customers and the related dual creation of value, see P2 and P3 from our conceptual framework, we expect that new insights would be taken beyond the marketing process thus aligning all departments that ultimately determine the customer experience. However, we do not consider the removal of information silos, which was also mentioned in the success stories, as being newly developed for dealing with big data because this ability is already described in scholarly literature as being a substantial part of cross-functional integration (Vorhies et al., 2011). Obviously, big data vendors’ primary focus is on the IT department and corresponding skills. Such a biased view might be the reason that the success stories provide a less comprehensive picture for the two capabilities to facilitate cross-functional integration and to have people issues under control.

In Table 1 we summarize the major differences that we identified from our analysis of big data success stories for each of the six capabilities (P1a to P1f) in comparison to their original versions as derived from literature for the purpose of improving the understanding about customers (P1). Anticipated differences with regard to the actions taken from extended information about customers by means of big data (P2 and P3) are marked in italic.

<table>
<thead>
<tr>
<th>Capability</th>
<th>Percent/no of stories (n=28)</th>
<th>Identified differences with big data</th>
</tr>
</thead>
</table>
| Incorporate a customer-oriented attitude (P1a) | 93% (26) | • No difference in manifestation, but increased relevance: customer understanding as highest priority  
• Establish smarter customer experiences |
| Facilitate cross-functional integration (P1b) | 46% (13) | • Operationalize analytics toward a data-driven culture  
• Overall alignment between all departments and processes that determine the customer experience |
| Direct customer information (P1c)    | 100% (28) | • Capture heterogeneous data from additional data sources in real time  
• Integrate external with internal data assets into a single customer view  
• Create effective analytic models quickly  
• Apply advanced analytics and modelling |
| Manage the customer portfolio (P1d)  | 68% (19) | • Segment customers at a much finer grain; for localized and personalized targeting  
• Increase complexity of segmentation, classification and regression  
• Automatize segmentation and targeting |
| Provide CRM information systems (P1e) | 100% (28) | • Combine old and new information systems (high performance platforms)  
• Avoid data replication  
• Easily integrate new data sources  
• Visualize unstructured data |
| Have people issues under control (P1f) | 71% (20) | • Acquire new skills in data analytics and modelling  
• Less training required for simple analyses  
• Integrate new specialists in customer data analytics, and customer experience design |

Table 1. Change in capabilities to increase information about customers by means of big data.

Based on the results of our big data success story analysis we argue that the capability to incorporate a customer-oriented attitude has gained importance and serves as driver for the transformation of original CRM capabilities to increase the understanding about customers through big data. Thereby, the capabilities themselves are still relevant, but there arise differences in how they manifest themselves. With regard to propositions P2 and P3 from our conceptual framework we expect that the capability to incorporate a customer-oriented attitude would also ensure that the increased information...
about customers is actually applied to shape a positive customer experience through, for instance, more personalized and context relevant offers and improved customer services in order to meet the high expectations of empowered customers.

7 CONCLUSION AND OUTLOOK

Our research aims to help leveraging the promises of big data in the functional domain of CRM by guiding the development of necessary capabilities. Building on previous research that derived a conceptual framework for big data in the domain of CRM from scholarly literature in the fields of IS and marketing (Tiefenbacher and Olbrich, 2016), this paper investigates how the relevant capabilities need to be transformed in order to leverage big data for an increased understanding about customers. Therefore, we qualitatively examined success stories that various vendors of big data solutions had published on their websites in order to validate the suggested framework and carve out the needed development in the individual capabilities. Thereby our focus was on how the identified capabilities positively influence the conversion of big data into information about customers, i.e. proposition P1 from our framework. From the analysis of success stories we derived evidence that the conversion of big data into information will increase the understanding about customers (P1) and identified each of the six comprehensive CRM capabilities as positively influencing this relationship (P1a to P1f). Yet, we have not identified any new capabilities from the success story analysis. With big data, the original capabilities identified from scholarly literature are still relevant, but their manifestation changes to varying extents, as presented in Table 1.

We consider our results to be of a rather explorative nature due to the following limitations: First, our data result from the analysis of success stories published by IT vendors which are, naturally, biased. Second, although picking up capabilities derived from scholarly literature, we found the analysis of the individual capabilities rather limiting. However, even though we referred to success stories published by vendors of big data solutions who might be solely dedicated to the capability to provide CRM information systems, we already discovered interdependencies between all six capabilities. This finding seems to be related to an overall trend of the digital era, namely that investments in technology need to be complemented by corresponding investments in organizational processes and people management (Bharadwaj et al., 2013).

Our study provides multiple contributions and offers potential for future research: At the intersection of IS and marketing, our research contributes to theory by providing a conceptual framework that helps classifying different activities around big data in different capabilities. Building on our work which pinpoints the development of relevant capabilities to derive extended customer information from big data, future research might examine each of the identified capabilities in detail as well as mechanisms between them and the integration of these capabilities. As the understanding of customer behavior becomes increasingly relevant in the digital ecosystem, our research contributes to practice by providing guidelines for leveraging big data in the domain of CRM. Our results suggest that existing capabilities need to be modified in order to satisfy an increasing demand on customer insights caused by fast-changing customer behavior. Practitioners could apply Table 1 to assess their current status of capability development and determine enhancements that are required in individual capabilities to reach an increased understanding about their customers by means of big data. Future research might start by building up on the study’s limitations, e.g. extending the sample of 28 success stories from IT vendors. We consider an in depth case study focusing on the individual capabilities and their interdependencies as particularly fruitful. In future research we will further validate the remainder of our conceptual framework, especially the investigation of proposition P2 to examine how an improved understanding about customers might be actually converted into action to gain sustainable intimacy with customers. Apart from that, future research could evaluate the generalizability of the results in different functional domains outside marketing and CRM. It will be interesting to see if the identified capabilities are still relevant and if similar patterns of big data integration emerge.
REFERENCES


