Why Do Companies Migrate Towards Cloud Enterprise Systems?

A Post-Implementation Perspective

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Abstract*— Despite the significant benefits of cloud computing, companies are still reluctant to migrate towards cloud solutions and fear the risks related to their security, performance, and availability. This is particularly true for enterprise systems, which play a strategic role and are both the core of companies' business processes and information systems. Prior research has studied opportunities and benefits of cloud computing and Software as a Service (SaaS) based on expert surveys and taking a pre-adoption perspective. Since these findings rely on perceptions, they risk reflecting public opinion rather than real-world experiences. Hence, more empirical research is required to analyze early adopter's migration strategies and practical experiences with cloud enterprise systems. Based on two case studies, this paper explores early implementations of cloud enterprise systems and compares them to the academic literature. As main contribution, we identify a business-driven migration strategy: Contrary to existing research, we find that companies do not implement cloud enterprise systems because of their attractive cost and delivery models, but leverage them as a standardized IT platform for innovating, and optimizing business processes based on mobile and web technologies. Moreover, our study reveals that cloud enterprise systems' scope,, by offering comprehensive application and integration platforms and a set of novel IT capabilities, goes beyond SaaS.

Keywords — Cloud computing; cloud enterprise systems; Software as a Service; migration; case study; adoption

I. INTRODUCTION

Cloud computing is widely accepted as a new paradigm for delivering and consuming IT resources. With its capabilities to provide on-demand, agile, reliable, and scalable IT, cloud computing allows companies to run their IT without the constraints linked to traditional infrastructure [1]. Despite the significant benefits of cloud computing, companies are still reluctant to adopt cloud-based solutions and fear the risks and unexpected issues such as security, performance, and availability of cloud services [2]–[4]. If companies decide to consume software from the cloud (Software as a Service, SaaS), they mostly opt for noncore business applications such as e-mail, content management systems, or collaboration tools [5], [6]. Due to their strategic value and high level of inimitability, enterprise systems are not seen as first candidates for migrating to the cloud [5]. Nevertheless, their provisioning as SaaS is considered as a next step in the history of enterprise systems [7], [8], which have evolved from custom-built software to packaged business applications and – finally – to an increasing service orientation with application service provisioning (ASP) and now cloud computing [9].

Although a vast and still growing body of research studies the opportunities and risks of cloud computing, SaaS in the corporate context has received less attention. Most of the studies are conceptual, and the few empirical ones (except [4]) rely on perceptions, since they questioned professionals with little or no experience of cloud computing. These empirical studies have notably two limitations: First, opinions differ between people that have experience with SaaS and those who do not [4]; Second, the study of opportunities and risks limits the research scope to the pre-adoption phase. It does not sufficiently take into account the actual migration and implementation experiences. Consequently, the first research question addressed by this paper is *Why and how do companies migrate towards cloud enterprise systems?* Comparing the practical experiences with the scientific view on cloud enterprise systems, the second research question is *How do these empirical evidences inform and extend the existing literature on cloud enterprise systems?* Given our explorative research objectives, we opted for a qualitative research design using the case study method of [10]. Based on two case studies, we analyzed how companies have implemented different cloud enterprise systems – Salesforce.com and coresuite cloud – to support their international sales and service organizations. Our empirical findings reveal different motivations and migration strategies towards cloud enterprise systems than prior literature, and thereby broaden the academic perspective on cloud enterprise systems.

II. PRIOR RESEARCH ON CLOUD ENTERPRISE SYSTEMS

A. Cloud Computing

Cloud computing is an emerging model that promotes the use of services through the network in order to provide companies with on-demand and scalable IT resources [1]. Cloud computing covers as much software as hardware and has the potential to take over companies' IT infrastructures. The National Institute of Standards and Technology (NIST), which was among the first to provide a definition of cloud computing, suggests that cloud services are delivered along three service models [11]: Software as a Service (SaaS), which delivers end-users with applications, Platform as a Service (PaaS), which provides development and deployment

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capabilities to developers, and Infrastructure as a Service (IaaS), which allows system administrators to rely on external processing time, network, storage and other fundamental computing resources. Cloud computing is widely accepted by individual users who benefit most from cloud infrastructure services such as storage space, or cloud applications such as e-mail, social networks, or office applications. Because it has quicker-to-market capabilities, lower IT barriers to innovation, and makes it easier for enterprises to scale their services [12], cloud computing is also seen as a relevant alternative for companies to use IT more strategically in business value creation [13]. The reasons that lead companies to adopt cloud computing have consequently drawn many researchers' attention.

B. SaaS Adoption in Companies

The following section will summarize the few studies related to SaaS adoption in companies. [14] interviewed 13 public sector IT managers in order to understand the benefits and risks of cloud-based business applications. Ease of IT control, nonnecessity of installation, maintenance, and access to software otherwise out of reach are seen as benefits, while continuity, performance, privacy, and control are considered to be risks. An empirical study with IT executives [4] reveals that cost advantages, strategic flexibility and quality improvement are perceived as opportunities, whereas performance, economic, strategic and security are considered as risks. [15] conceptualized a framework that seeks to define the decisive factors affecting an organization's SaaS adoption. The authors build a cause-effect matrix that generates a diagram to show perceived SaaS benefits and risks. In general, companies are much more reluctant to use cloud-based applications than individual users [16]. [5] explain such reluctance by the criticality of business applications as well as their inimitability. The same study shows that the more an application is seen as business-critical and inimitable, the less companies will be willing to adopt cloud alternatives. Thereby, customer relationship management (CRM) and enterprise resource planning (ERP) systems – considered as main business application types that compose enterprise systems (ES) [17] – are thus less keen to migrate to the cloud [5].

C. Specificities of Cloud Enterprise Systems

Most of the research investigates cloud-based applications as a generic topic, without specifically considering the case of enterprise systems [18]. Compared to other business applications, an enterprise system supports processes that cross different functions in a company, while its data is shared and often accessed by third parties' applications [19], [20]. Due to their business-criticality and the related performance, privacy and control issues, enterprise systems are more difficult to migrate to the cloud than other business applications, such as e-mail, content management systems or collaboration tools. Nevertheless, they can potentially benefit significantly from cloud computing, owing the highly available infrastructure required by enterprise systems, along with skilled people for their maintenance, expensive licensing fees, and complicated licensing models. The most prominent work on cloud enterprise systems was performed by [21]. In their research, the authors developed a framework composed of motives and barriers of cloud ERP adoption based on a systematic literature review and 10 interviews with experienced ERP systems practitioners, ERP users, and ERP service providers. The paper provides 16 motives and barriers classified within three categories: strategic, operational, and technical. The motives include the business innovation flexibility provided by cloud ERP, the focus on core business activities (since IT operations are outsourced), and the replacement of obsolete systems. The barriers include investments into on-premises ERP systems that prevent migration, the lack of early adopters, the difficulties of integration with existing systems, and issues related to data policies and security. Based on literature review, [22] regrouped the advantages and challenges of cloud enterprise systems. Compared to traditional on-premise systems, cloud ES reduce hardware and license costs, lower upfront cost, reduce the effort of upgrades and ease the implementation. Cloud ES also allow companies to focus on their core activities, while increasing scalability and manageability. The study also mentions some challenges with cloud ES. Among them the security concerns such as data protection, data access, data ownership, flexibility, interoperability and the difficulty to customize. Other conceptual studies show that cloud-based ERP increase stability and performance, reduce capital expenditures and lower barrier to entry [23]. The intrinsic characteristics of enterprise systems also impact the migration process and make the implementation of cloud enterprise systems very challenging. However, little research on this topic has been carried out so far. Among the few studies is the paper by [24], which suggests an implementation model of cloud-based ERP and six cloud services that can be shared across different companies. In another study, [25] provide a mapping approach between the old (on-premise) and the new (cloud) architecture along with a prototype that aims to semi-automatically migrate existing enterprise systems to the cloud.

D. Synthesis and Research Gap

To conclude, we find that current research on cloud enterprise systems is fairly limited and focuses on their opportunities and risks. Moreover, despite their intrinsic characteristics and strategic roles [5], enterprise systems are treated the same way as other applications. Existing studies rely on surveys filled in by people that intend to adopt cloud-based business applications but with little or no tangible experience of this new IT model. Such surveys can only provide *perceptions*, but cannot give insights into their actual implementation. Interestingly [4] show that adopters and non adopters have different opinions, which raises concerns about the reliability of the survey results. To date, we lack empirical insights into real-world experiences of companies that have migrated to cloud enterprise systems. With this paper, we seek to understand 1) *Why and how companies migrate towards cloud enterprise systems?* Comparing the practical experiences with the scientific view on cloud enterprise system, we want to know 2) *How do these empirical evidences*

inform and extend the existing literature on cloud enterprise systems?

III. RESEARCH METHOD

Given the relatively low adoption of cloud enterprise systems in practice, with only few productive implementations, our research is explorative in nature and uses a qualitative research design. [26] classify this type of research as a theory for explaining. Case studies are one of the recommended research approaches to explain how and why things happen in real-world situations. They are particularly useful in situations in which a contemporary phenomenon is studied in its natural context [10], [27] and allow for understanding the complex interactions between organizations and technology. In order to rigorously conduct case study research, we followed the widely accepted guidelines for positivist case study research by [10] and [28].

A. Case Selection

Since of the migration to cloud enterprise systems is still at an early stage, our goal was to select cases, which have gained practical experiences with implementing and using cloud enterprise systems in their core business operations. As a result, we applied the following criteria for case selection: First, we decided to concentrate on customer-facing activities, which represent one of the most popular areas for cloud models. This is notably underpinned by recent market reports that reveal CRM has become a top software application investment priority [29] and that 40% of CRM systems that will be sold in 2014 will be cloud-based, while this percentage will increase up to 50% in 2015 [30]. Second, companies were required to have extensive experience with cloud enterprise systems, documented by productive use in their core business domains and with a larger number of users. We also found important to have multiple case studies, since it would allow us to gain knowledge from within-case and cross-case analysis and provides an opportunity to seek for patterns [10]. Based on these criteria and the willingness to participate in this study, we selected two companies of different sizes and industries. They are using two different cloud enterprise systems – Salesforce.com and coresuite cloud – to support their European or global sales and service organizations. In implementing their cloud solutions, they emphasize service processes, which are information-sensitive and require coordination between headquarters, the regional back office activities, the sales employees, and the service technicians who interact with customers. Both companies had started cloud implementation projects in the late 2000s and, after running successful pilots, had decided to further roll out the cloud solutions at European and global level. Table 1 provides an overview of the two cases.

B. Analysis Framework

As framework for analyzing our cases we used the Business Engineering Case Studies (BECS) method [31]. The latter was developed for analyzing the organizational and technical transformations of a company while implementing new technologies. BECS separates the design levels of a company in three layers i.e., *system, process* and *strategy.* Analyzing each of these layers separately allow for analyzing the new technology's impact. The analysis framework was operationalized by an interview guideline which was structured along the following sections: overview of the company (e.g., company background), initial situation (e.g., strategy, processes, systems), project (e.g., motivations, goals, execution), new situation (e.g., strategy, processes, systems), and lessons learned.

TABLE 1. COMPANIES ANALYZED IN THIS STUDY

	Vaillant	**Kardex Remstar**
Company characteristics (figures as of 2012)		
Founded	1874, headquartered in Germany	1873, headquartered in Switzerland
Employees	12,000 (group)	2,100 (group), 1,200 (Kardex Remstar)
Turnover	€2.3b	Group: €489.7m; Kardex Remstar: €233.7m
Domain	Heating, ventilation, and air-conditioning	Automated storage and retrieval solution
Characteristics of cloud enterprise system implementation		
Goal of the cloud solution	Support global sales and service business	Support European service business
Cloud enterprise system	Salesforce.com (CRM) and Force.com (PaaS) to leverage on-premise ERP	coresuite cloud (PaaS) to leverage on-premise ERP
Status of implementation	Implementation from 2007 to 2015 Productive use since 2009 Number of expected users: 4,500	Implementation from 2009 to 2013 Productive use since 2011 Number of expected users: 300

C. Data Collection

Data was gathered between October 2012 and February 2013 by expert interviews complemented by document analysis. For each company, we conducted semi-structured interviews which lasted half a day with two to three experts. As experts, we selected the IT manager, who was responsible for the investment decision, as well as the project manager from the solution implementer company. We consider these roles as key informants because they are most knowledgeable to report about the decision-making criteria for selecting the cloud enterprise system as well as the migration strategy and process. The interviews were conducted based on the interview guidelines presented above. Based on the interviews, we produced comprehensive case write-ups (of 10 pages) in order to summarize the empirical data, to become familiar with each case as a standalone entity, to enable unique case patterns to emerge, and to accelerate the cross-case comparison. The interviews were complemented by three secondary data types: annual reports, which provided us with general information about the companies, additional material on the cloud implementation projects (from presentations and other public sources), and vendors' websites as a complementary information source regarding the implemented solutions. Hence, data validity was ensured through the use of multiple sources, which allowed for data triangulation, and by documenting the cases in the form of case write-ups.

D. Data Analysis

Data analysis started with the coding of the respective case write-ups according to the analysis framework, i.e. the

Business Engineering Case Study method [31] (Table 2). The use of this distinct structure enhances the likelihood of capturing novel findings among the data [10], in our case, regarding the migration towards cloud enterprise systems. We started with the within-case analysis that allowed the unique pattern of each case to emerge and provided a rich understanding of each case. We then conducted a cross-case analysis to find commonalities and differences across the two cases [10].

IV. CASE STUDIES

For each company, the following sections provide information regarding their background and business strategy, project origins and challenges, project description, and the benefits brought by the cloud solution. The two case descriptions are complemented by a comparison of the two cases in Table 2.

A. Vaillant

1) Company background and business strategy

Vaillant is a family-owned company founded in Remscheid (Germany) more than 135 years ago. Today, it is part of the Vaillant Group, which is active in heating, ventilation, and air-conditioning technologies and provides intelligent systems for domestic comfort. The Vaillant Group has a global presence in more than 75 countries worldwide, with 20 own national sales and distribution companies in Europe, the U.S., and Asia. In 1987, Vaillant defined its long-term strategic objectives and growth strategy. Since then, it has constantly grown and expanded its markets by acquiring renowned brands across the world. While the Vaillant Group follows a global strategy and seeks to establish synergies at an international level, each local branch adapts its strategy according to the specific culture so as to better serve its customers.

2) Project origins and challenges

The high specificity of the different markets and the heterogeneity due to acquisitions led to very diverse local sales and service processes as well as IT systems. In total, there were 37 different CRM systems supporting sales, marketing, and service, in addition to a central SAP system in charge of Vaillant's operational business. As a result, it became difficult for Vaillant to keep local systems up-to-date and to manage them efficiently, while it was difficult to understand the evolving IT and business requirements. The local IT solutions were not flexible enough to quickly implement new business requirements and process variants. Globally, too much effort went into operational tasks related to IT systems, while the improvement of business processes was put aside. In 2007, Vaillant started the project "Excellent Process Support" with the goal of standardizing processes and the IT landscape, and to identify and use best practices. The new solution should provide an optimal support for the country-specific sales and service, with efficient and agile processes and IT platforms.

3) Project description

In the first steps, Vaillant developed and documented the customer experience management core as well as the back end processes. The result was a global process that integrated marketing, sales, and service activities in a continuous cycle. The aim was to improve customer interactions and generate additional revenues by creating more service leads from sales follow-ups and more repeat sales opportunities from service encounters. This process was designed in a consensus-driven approach with strong involvement from the country organizations. The local experts shared their experiences and local ways of working in order to define "ideal" subprocesses based on shared best practices that served as a basis for the elaboration of the future IT solutions' functional requirements. From a technical requirements perspective, the new solution was expected to be highly scalable in response to the rapid usage growth, as well as flexible and easy of adapt to specific country requirements. Finally, Vaillant no longer wanted to be bothered by IT infrastructure management. After evaluating 16 solutions based on their functionality, technology, cost, services, viability, and vision, Vaillant opted for a combined cloud solution of Salesforce.com and GMS Clockport.

A first version of the IT solution was made available in 2009 to a few countries. The solution consisted of four different software applications, comprising cloud and noncloud components: Salesforce Sales Cloud was complemented by GMS Clockport, a specialized component for field service, as well as the customer and partner portal, and was integrated with the (existing) ERP Core. Salesforce supported customer-facing sales activities, including contracts and customer management, while GMS offered a broad range of functionalities for after-sales and field service, including mobile service and sophisticated optimization of service order scheduling, routing, and workload planning. Finally, the portal provided customers with e-services, such as remote control of their heating, and partners with scheduling options and spare parts ordering. The ERP was the leading systems for logistics and invoicing, as well as for product data and inventories, materials, prices, and conditions. In 2011, the target architecture was changed to leverage the standard sales and service functionalities delivered via the Salesforce Sales and Service Cloud. To match Vaillant requirements, Salesforce Service Cloud functionalities – scheduling, capacity planning and forecasting, contracts, complaints, budget management, and steering – had to be customized and extended by up to 60%. This was achieved by moving the GMS Clockport application to Force.com, Salesforce's Platform as a Service. The integration of GMS Clockport in Force.com reduced the number of connections between GMS and Salesforce and simultaneously decreased the number of connections between the ERP system and the portal. This architecture also enabled new functionalities such as instant messaging's internal use for discussion and document exchanges and its external use with customers to directly create new service orders.

4) Cloud solution benefits

As a main benefit, the new cloud-based solution offers comprehensive support of sales and service processes based on group-wide best practices. Most importantly, it provides a panoramic view of customers, partners, appliances, and contracts. The centralization of data in the cloud offers a group-wide single point for collecting information, resulting in high-quality and unique customer data that may be used for loyalty programs, for instance. The workload in the back office has been reduced and can now be shared among

partners, while the efficiency of planning and control have been increased. Finally, the new solution allows for faster order processing, which positively impacts technician productivity and the number of visits per day.

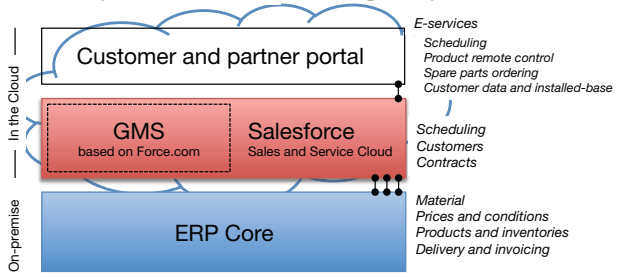

Fig. 1. Cloud Solution Implemented at Vaillant

B. Kardex

1) Company background and business strategy

Kardex Remstar is an international company, funded in 1873 and headquartered in Zurich, which provides automated storage and retrieval solutions. Kardex Remstar (hereafter Kardex) is one of the Kardex Group's three product lines. It manufactures computer-controlled storage and retrieval systems in its owned factories (two in Germany and one in the U.S.) and is active in more than 30 countries worldwide. Kardex's strategy is to develop and provide solutions that not only improve processes, but also provide a competitive edge over the customer competition. By hiring highly qualified employees and providing specific training programs, Kardex focuses on premium services in order to differentiate in a competitive market where better and efficient service is essential.

2) Project origins and challenges

At Kardex, service order processing was slow and the time between service orders and invoicing stretched as far up as three months. The process required substantial coordination between actors as well as much paper work: While performing service orders, technicians had to carry papers about the service order activities, and the spare parts. In addition, customer base and documentation were printed for each customer. At the end each intervention, information had to be entered in different systems and then sent to customers for validation. Such duplication of information was due to the systems' inability to communicate with each other, which also led to data inconsistency and much data redundancy. As a result, Kardex decided to improve its service order process efficiency as well as to increase customer satisfaction. Hence, the goal was to standardize the IT platform and to focus on reducing the lead time between interventions and invoices. In a second step, it would offer reliable reporting at national levels and for individual sales staff.

3) Project description

The first discussions began in 2009, with the software evaluation, but the productive use of the solution started in 2011, with Germany as a pilot. The cloud project was a follow-up activity after harmonizing and standardizing ERP systems in Europe, Asia and North America. It came along with business processes reengineering to fit with the new ERP systems. Locations with higher levels of activities such as Switzerland, Germany, or Austria were hosted on a shared SAP ERP platform, while locations with less activity run on individual SAP Business One system. The solution chosen by Kardex consists of three different elements: 1) A mobile application, which allows technician to consult and document their service orders, to access customer information and configuration, and previous service orders, and to get directions. Data edited on mobile applications is then transferred to the various ERPs by means of the cloud service. 2) A cloud service, called coresuite intelligent cloud as the central piece of the architecture, and synchronizes the on-premise system with the mobile application. Simultaneously, the cloud service ensures that data is consistent between the ERPs, mobile applications, and cloud applications. 3) An additional cloud application (SaaS) used by the resource planners in the countries to schedule service orders, based on the availability of technicians and their location. It takes over a standalone application that relied on file importing and exporting for updates and reporting activities, but also allows the resource planners to have visibility and plan beyond the country borders.

4) Cloud solution benefits

The new solution significantly optimized the service process by reducing the invoicing time from 90 days to six days. The technician gets information about incoming service orders via the cloud pushed on the mobile device. When a service order is complete, the technician documents the activities performed. The customer signs the work report on the technician's mobile device and gets an immediate copy on his or her email. Data centralization – the cloud as a temporary space – improves communication between technician and the back office and reduces data redundancy. On the one hand, technicians can access much information from their mobile application and do not need to carry additional paper copies or call the office to get product or customer information or order spare parts. On the other hand, resource planners have an accurate view on technicians' progress and can better schedule service orders. Furthermore, technicians can access colleagues' car inventories and can contact them directly if they need assistance or additional spare parts. Finally, it increases the quality and the professionalism of Kardex's technicians' service.

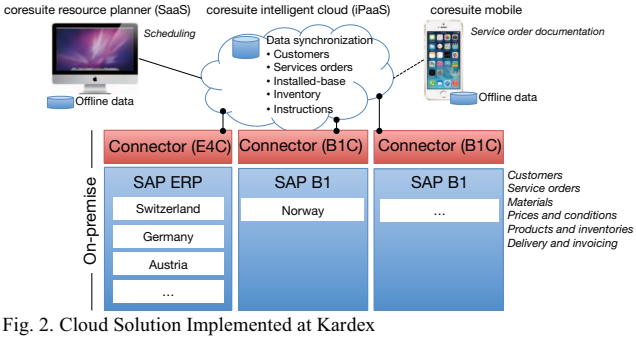

Fig. 2. Cloud Solution Implemented at Kardex

V. Case Analysis and Discussion

The analysis of the two case studies provides interesting insights into the migration towards cloud enterprise systems, which we compared to the pre-adoption perspective prevailing in the existing literature. We focus on the case

analysis and comparison to literature along four identified themes – motivation, project type, as well as enterprise cloud system scope and capabilities (see Table 3). To compare with what exists in the literature, we selected articles which investigate motives, opportunities and benefits of SaaS (in a business context) [5], [14] and cloud ERP [21], [22].

Motives: Both Vaillant and Kardex were motivated by the need to innovate or improve business processes in their highly distributed sales and service networks. The decision in favor of a cloud enterprise system was only taken during the project, after evaluating different implementation alternatives. The main arguments for selecting a cloud rather than an on-premise solution were the flexibility and scalability brought by cloud computing. Specifically, the companies expected the technology to standardize business processes and IT platforms, while adapting to usage growth and to specific country's requirements. The cloud was also selected for its swift deployment in these companies' local units and for its capabilities to enable business innovation by leveraging mobile and web technologies. An important aspect in their considerations was the reduction of the IT complexity in local subsidiaries, which proved to be much simpler with cloud than with on-premise solutions. A cloud solution allowed Vaillant to reduce the number of CRM systems from 37 to one, while it enabled Kardex to establish communication between silo applications and connect mobile applications to a number of ERP systems. Compared to the motivations mentioned in literature, the companies focused neither on replacing existing legacy systems nor on IT cost savings. Economies of scale owing to a shared resource pool were not considered as relevant motivations for Vaillant and Kardex. Besides business innovation, the case analysis reveals two additional motivations not yet mentioned in the literature to date – optimizing process support, allowing the two companies to significantly increase their process efficiency by means of mobile technologies, and reducing IT complexity.

TABLE 2. COMPARISONS BETWEEN KARDEX AND VAILLANT'S PROJECTS

	Vaillant	**Kardex**
Situation prior to implementation		
Organization	9 brands, more than 20 own sales and distribution companies in Europe, Asia, and America; own service organization with 2,200 technicians	15 subsidiaries across Europe; own service organization with 220 technicians; production plants in Germany and the U.S.
Business processes	Sales and service	Service
Main business applications	• SAP ERP • Diverse CRM systems (37 in total)	• SAP ERP • SAP B1 • Innosoft (planning and service orders)
Implementation project		
Motivation	• Challenges owing to different local processes as well as IT systems' complexities for pre-sales and after-sales (37 local CRM systems) • Different degree of IT satisfaction • Local IT systems were not flexible enough to quickly implement new business requirements and business variants	• High competiveness • Lack of service process efficiency • Lack of communication between subsidiaries' enterprise systems
Goals	• Provide optimal support for the country-specific sales and service, with efficient and agile processes and IT platform • Identify and use best practices • Standardize the sales and service processes and the IT landscape	• Reduce the lead time between interventions and invoices • Enable reporting and analytics • Provide a standardized approach to connect mobile devices to (several) ERP systems
New solution based on cloud enterprise system		
Impacts on service process	Creation of a global customer experience management process that integrates marketing, sales, and service activities in a continuous cycle; 360 degree view of customers, partners, products, and brands	Faster service order processing: Service technicians receive the service orders and report their activities on their mobile devices, while resource planners schedule order based on technicians' location and availability
Systems/Cloud services	• [Salesforce Sales Cloud] Sales support (customers, contacts, contracts) • [Salesforce Service Cloud] Service support (customers, contacts, contracts) • [GMS] Planning (scheduling, routing, capacity planning and forecasting) • [Salesforce Force] Application platform • Customer and partner portal	• [coresystem intelligent cloud] Service cloud that manages data synchronization between the mobile devices and several ERP systems • [coresystem coresuite mobile] Mobile applications for technicians (service order info, inventory management, customer base) • [coresystem resource planner] Service order planner (service order scheduling)
Benefits	• Comprehensive support of sales and service processes based on group-wide best practices • High-quality and unique customer data owing to data centralization in the cloud • Reduction of workload in the back office • Higher productivity and number of visits per day due to faster order processing	• Less coordination and communication efforts between service technicians and back office owing to shared and unique data • Replacement of paper copies (customer information, machine instructions, and forms) • Service process improvement (lead time reduction from 90 days to 6 days) • Improved assignment of service orders and resources usage

Project types: In terms of project setups, both projects were not merely initiated to optimize IT resources, but were clearly business-driven: Vaillant and Kardex were driven by the need to harmonize and optimize their business processes. This impacts the scope of a cloud enterprise system, which the literature suggests is equivalent to SaaS [14], [21]. In the two case studies, cloud components *complement* on-premise systems rather than replacing them and play roles that go beyond SaaS. At Vaillant, the new solution relies on an application Platform as a Service (aPaaS) [32], which hosts and integrates multiple heterogeneous cloud applications solutions, i.e. Salesforce Sales and Service Cloud, and GMS

Clockport. This concept of cloud systems made up of multiple cloud services was also discussed by [24]. Integration through aPaaS allows for sharing a unique platform along with a central data source (in our case, Salesforce), while the integration of multiple SaaS was seen as disadvantage and a risk in the study by [14]. At Kardex, the cloud is the centerpiece in the infrastructure that seeks to manage and synchronize data between the resource planner (SaaS), the mobile application, and the ERPs, while interconnecting all the systems. This view of the cloud as a complement of existing systems is not mentioned at all in the current studies, which rather lay the emphasis on the introduction of cloud enterprise systems as a way to replace legacy systems. Owing the cloud's role to integrate the back end systems with the mobile and cloud applications, it can be classified as integration Platform as a Service (iPaaS) [33], [34].

Capabilities: From the way the two companies work with enterprise cloud systems and the benefits they have achieved, we realized that cloud enterprise systems can be associated with specific capabilities that distinguish them from on-premise solutions. These capabilities are the source of value creation: 1) Standardization and optimization of business processes. 2) The ability to provide unique data regarding, for instance, customers, inventory, machine instructions, and service orders. 3) Ubiquitous access to enterprise systems' functionalities and data by means of mobile and cloud applications and to enterprise systems' data. 4) Integration with other cloud applications by means of aPaaS, and existing systems through iPaaS. Some of these capabilities – unique data, ubiquitous access – are known from general studies on cloud computing, but they have not been associated with cloud ES so far.

VI. Summary and Conclusion

To conclude, this paper provides researchers and practitioners with empirical insights into the motivations for and experiences of implementing cloud enterprise systems based on two case studies. By analyzing actual cloud implementation projects, it complements existing studies that focus exclusively on the factors affecting SaaS adoption and rely on *perceptions*. While prior literature views cloud enterprise systems as a replacement of legacy systems by SaaS and emphasizes factors such as costs and higher flexibility, our empirical analysis suggests that we broaden this IT- centered perspective and consider the economic potentials of using cloud enterprise systems.

TABLE 3. PRINCIPLES DERIVED FROM LITERATURE AND FROM CASE STUDIES

		Litera-ture [5], [14], [21], [22]	**Case studies**	
			Vaillant	**Kardex**
Motivations	IT costs	X	-	-
	Flexibility and scalability	X	X	(X)
	Faster time-to-market	X	(X)	(X)
	Enable business innovation	X	X	X
	Reduce IT complexity	N/A	X	X
	Optimize business process support	N/A	X	X
Project type / Cloud migration	IT-driven: Introduce cloud enterprise systems as a replacement of legacy systems	X	-	-
	Business-driven: Harmonize and optimize business processes by means of a centralized IT platform and ubiquitous access (mobile / web)	N/A	X	X
Scope of cloud enterprise system	Software as a Service	X	(X)	-
	Integration Platform as a Service	N/A	-	X
	Application Platform as a Service	N/A	X	-
Capabilities of cloud enterprise systems	Standardization and optimization of business processes	N/A	X	X
	Unique data	N/A	X	X
	Ubiquitous access to applications and data	N/A	X	X
	Integration with applications and systems	N/A	X	X

This paper's primary contributions are threefold: First, we identify **two categories of migration projects towards cloud enterprise systems**. Whereas the first migration type is IT-driven and widely discussed in the literature, we identify a second type – a business-driven migration – where companies implement enterprise cloud systems as a standardized IT platform in highly distributed sales and service networks with the goal of innovating, and optimizing business processes based on mobile and web technologies, while mastering IT complexity. This finding is very much in line with the literature on enterprise systems and the discussion of business vs. IT-driven enterprise systems implementation (e.g. [35]), but has not been picked up in the current debate on SaaS adoption. Second, our empirical findings suggest a **refined scope of cloud enterprise systems** that goes beyond SaaS to cover aPaaS and iPaaS. Our findings reveal that cloud enterprise systems complement existing on-premise business applications rather than replacing them. It also suggests that cloud enterprise systems may be used as platforms for integrating internal and external applications. Our study thereby relativizes the strict focus on SaaS as replacement of existing on-premise software, as suggested by literature on cloud enterprise systems. Finally, we find that the implementation of cloud enterprise systems can be associated with **a set of specific capabilities**, such as ubiquitous access, unique (customer) data, and standardized business processes. These capabilities are the result of converging mobile and cloud technologies, and are the source of economic benefits that go beyond the provisioning of IT resources in a service model.

However, this research has certain limitations. First, it is based on two case studies, which allows only for analytical generalization. Although we have been able to show that the IT-centered perspective on cloud computing needs to be broadened, our cloud migration strategies typology may consequently not be exhaustive. Second, our case sample only

comprises cloud enterprise systems for sales and service processes. Some of our findings are specific to the CRM domain, and we cannot guarantee that they apply to other domains. Nevertheless, we think that certain conclusions may also be transferable to other domains: Most importantly, looking at cloud enterprise systems merely as a shared pool of IT resources, which are accessible over the Web, is not sufficient to explain their de facto adoption and migration towards cloud computing. We therefore encourage more empirical studies to learn from the real-world experiences and study the business contexts in which cloud solutions are emerging.

As implication for further research, the IT-centered perspective on cloud enterprise systems should be complemented by a business-oriented perspective that investigates cloud enterprise systems' specific application domains and capabilities. In this regard, the convergence between cloud computing and mobile technologies deserves more attention from researchers. Furthermore, the move towards the cloud must be seen as the logical next step in an increasing service orientation in enterprise IT provision. Building on our empirical findings and prior studies on service-oriented architecture [36], we find that it is important to understand the capabilities provided by cloud enterprise systems in order to explain their adoption, their value creation and the migration scenarios.

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