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TRANSFORMATION TOWARDS CUSTOMER-ORIENTED SERVICE ARCHITECTURES IN THE FINANCIAL INDUSTRY

Thomas Puschmann
Institute of Information Management, University of St.Gallen

Rebecca Nueesch
Institute of Information Management, University of St.Gallen

Rainer Alt
Institut für Wirtschaftsinformatik Universität Leipzig

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Puschmann, Thomas, Business Engineering Institute St. Gallen AG, Holzstrasse 39, 9001 St. Gallen, CH, thomas.puschmann@bei-sg.ch

Nueesch, Rebecca, University of St. Gallen, Müller-Friedberg-Str. 8, 9000 St. Gallen, CH, rebecca.nueesch@unisg.ch

Alt, Rainer, University of Leipzig, Grimmaische Str. 12, 04109 Leipzig, DE, rainer.alt@uni-leipzig.de

Abstract

The financial industry is in midst of a global transformation. Drivers for this are changes in customer behaviour, disruptive power of information technology and changes in the industry structure itself. These developments have the potential to shift the financial industry towards a customer-oriented financial market infrastructure and force banks to become more customer-oriented. The research presented here applies an integrated approach on service-oriented architectures (SOA) which combines a business and technological view on services and thus contributes to the emerging field of service science. The paper develops a customer-oriented service architecture model for banks and analyzes the impact of future banking sales and distribution by a quantitative survey. Data was collected from 25 banks in the German-speaking area. The empirical results of hypotheses testing indicate that banks have only started to restructure their existing architectures, but will not be customer-oriented in 2015. However, first tendencies show that banks concentrate on the extension of core competencies in e-channels to better and more cost efficiently serve their customers. Nevertheless, the developments planned until 2015 neglect necessary enhancements of banks` service architectures such as the integration of value added services from external service providers or the centralization of processes in all customer-facing services.

Keywords: customer-orientation, service-oriented architecture, transformation, banking

1 Introduction

At first glance, customer-orientation is a well established competitive paradigm and most businesses will regard themselves as being customer-oriented. However, often this focus on the customer is limited to the marketing side. The company's strategies, business processes and information systems themselves remain product-centered and offer only a fractured view of the customers (Gulati, 2009). This research argues that the development towards customer-orientation is still underway and especially applies to service industries which feature a close interaction between sellers and buyers. Using the financial industry, several drivers may be observed that foster the transformation towards customer-centric architectures in the financial industry:

(1) Customer behaviour changes: Cortiñas et al.(2010) show that most of Spanish bank's customers (97%) have a multi-channel behaviour. 52% of these customers use physical banks and ATMs and 88% use the online channel additionally. Customers, especially "digital natives", are becoming more self-informed, demanding for transparency and technologically affine (Hedley et al., 2006). Banks thus need to keep up profitability with their often comprehensive branches-network on one hand and customers that in the future primarily use online channels for commodity services on the other hand.

(2) IT has a disruptive impact on the banking industry: The financial service industry`s sole product relies on the creation and distribution of information. Other industries have shown the transformative potential of information technology (IT) on existing business models and value chains in service businesses (Kagermann et al., 2011). For example, Apple Corporation is not only hardware manufacturer (iPhone, iPad, etc.), but, as an effect of the ongoing media convergence, iTunes became the world`s largest distributor of multimedia content and software, as well. E-channels and nowadays applications of Web 2.0 are believed to re-shape the consumer-supplier relationships (McAfee, 2006).

(3) Non-banks provide financial services: Currently, banks face a double challenge: First, they have invested large resources in IT infrastructure and online banking platforms, for facilitating the transfer of information from content providers to content consumers and the execution of standardized services (e.g. online payments). Second, new actors are emerging that enter the financial market with new business models and offer services for a variety of financial customer processes. For example, Covestor enables community-based investment management, co-operations of Google, Citibank and Mastercard provide mobile payment systems and Facebook develops its own currency (Facebook Credits).

These drivers force banks to more customer-orientation, because at its core, banking products (e.g. loans), are commodities that are run on IT systems and may be accessed by customers from any device and computer platforms. While some highly specialized banks succeed in differentiating themselves via their products, the majority claims to derive their main competitive advantage through services and customer-orientation (Tallon, 2010). This paper concentrates on two research questions which focus on the customer-oriented design of future service architectures at banks:

- *RQ1: How can a bank`s customer-oriented service architecture be structured?*

- *RQ2: What are the future changes in the customer-oriented service architectures in banks?*

This paper is structured as follows: Section 2 defines terms and captures existing banking architectures. Section 3 develops hypotheses for future customer-oriented service architectures at banks and section 4 discusses and summarizes the results and gives an outlook to future topics and research.

2 Developing a customer-oriented service architecture for banks

2.1 Definition of terms

An architecture is defined as the "fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution" (IEEE 2000). To achieve flexibility in information systems (IS), the concept of service-oriented architectures (SOA) is currently one of the most discussed topics in the IS discipline (Bardhan et al., 2010). SOA builds on the concept of services as fundamental elements and promises to re-

solve many of the existing application architectures' limitations such as the integration of a growing number of (mostly) monolithic applications in and across enterprises, or the lack of agility of application architectures to quickly adapt to changing requirements. It is designed as a multi-layered, distributed architecture paradigm encapsulating parts of it as services, by applying the concepts of modularity, loose coupling, and the use of standards (Mueller et al., 2010). The constantly growing number of research on SOA is mostly technology-oriented, focusing on web services as a specific implementation technology (e.g. Gosain, 2007). Some of this technology-oriented research has even been conducted in the banking domain (e.g. Anderson et al., 2005). While the technological understanding of SOA has matured over the past years, an integrated view on the business *and* the technological dimension is largely missing in research and practice (Kohlmann and Alt, 2010). This service-oriented approach is very often discussed under the term "service science" which combines both service understandings, technical and business services (Bardhan et al., 2010).

Service may be conceived as "a unit of functionality packaged for convenient and consistent use. Typically, this functionality consists of a body of information and a set of operations for managing this information" (Brown, 2007, p. 37). This integrated view on business and IT is well known from the enterprise architecture discipline (Winter and Fischer, 2007). For example, Erl (2007) proposes a layer model for the organization of services by differentiating between business (e.g. customer solvency check), application (e.g. create loan contract) and infrastructure services (e.g. access database). Bell (2008) adds one more layer of preconfigured bindings of business services in so-called service clusters (e.g. financial & asset planning). Those service clusters typically encompass complete business domains such as e.g. marketing or sales. The differentiation between service layers requires different views on services (Legner and Vogel, 2008):

- *Business view:* The business view describes a company`s business service organization. Questions concerning services from a strategic point of view are "make or buy" decisions and concentration on core competencies (von Glahn and Keuper, 2008).
- *Process view:* This view describes a company`s organization concerning service creation processes. Processes can either be delivered in a central or decentral way (e.g. shared service centers) and can be standardized on a global or a local basis (Breuer and Breuer, 2006).
- *IS view:* The IS view describes the company`s IS architecture with respect to services. At this level decisions concerning the use of core banking systems (CBS), peripheral systems, individual and standard software have to be made (Österle and Blessing, 2005).

Companies follow different strategies in providing services to their customers. One strategic approach distinguishes between companies that either have their focus on operational excellence, product leadership or customer relationship (Hagel and Singer, 1999). If this view is combined with the business service cluster approach, the following three service clusters can be distinguished:

- *Customer relationship (customer-oriented service cluster):* Includes all channel-related business services that are focused on customer-orientation such as service delivery through automated teller machines (ATM) or online banking.
- *Product leadership (product-oriented service cluster):* Includes all business services, which enable solution development for customers and thus include product-oriented service clusters such as financial planning or portfolio management.
- *Operational excellence (support-oriented service cluster):* This cluster is not directly involved in solution development or delivery for customers but includes necessary business support services such as compliance or risk management.

2.2 Status quo of banking architectures and architecture design

Many banking architectures with different perspectives on a bank have been discussed in the literature. Although they consider different aspects each having a specific focus on bank's service architectures. Table 1 summarizes the elements covered by the different models. All models are compared by the differentiation of support-oriented (SO-S), product-oriented (PO-S) and customer-oriented service (CO-S) clusters. The comparison shows that no approach fully covers all of those service clusters mentioned above. However, the literature review was helpful in designing a generic architecture for banks that covers all relevant services clusters according to *RQ1*.

	CO-S clusters		PO-S clusters			SO-S clusters
	Sales & distribution channels	Front Support	Value added services	Compe-tence Centers	Sales Manage-ment	Sales Support
Bartmann et al. (2005)	●		●	●		●
Leist and Winter (2002)	●		●			
Dang and Lau (2006)					●	●
Fröschle et al. (2009)	●	●			●	●
Hoppermann (2008)	●					
Lamberti (2004)	●			●		●
Lammers et al. (2004)						●
Riese (2006)	●			●		●

Table 1.   Summary of banking models in literature

Figure 1 shows a model of a customer-oriented service architecture including customer-, product- and support-oriented service clusters which is a result from the consortium research program "Sourcing in the Finance Industry". It was developed according to the principles of Design Science Research (Österle et al. 2011). This approach uses a four-step research process covering the phases of "analysis", "design", "evaluation" and "diffusion" (see figure 1), which was used in order to structure the customer-oriented service architecture for banks. The process steps are embedded in an eight year consortial research program (Back et al. 2007) which started 2004 and is going to be prolonged in 2012. It currently involves 17 partner companies from all tiers of the financial value chain (e.g. regional retail bank, outsourcing provider, etc.). The aim of the research program is to develop artifacts (e.g. architectures, methods, reference models, tools) for customer interaction and the service-oriented design of banking architectures. The artifacts are developed with experts from the participating 17 companies. Those are involved in the overall design science research process. The proposed architecture model is one artifact which was developed and refined within the consortial research program in workshops and bilateral interviews. The sections 3 and 4 use this model for a survey among banks to analyze the current and future situation in practice to relate the model to relevance according to *RQ2* (Peffers et al., 2008).
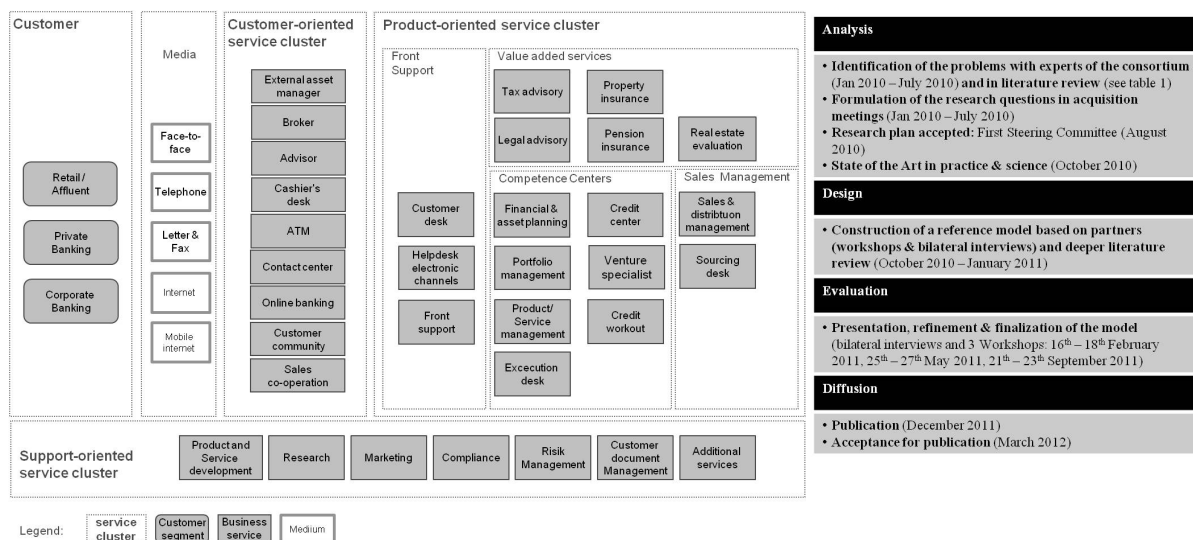

Figure 1.   Generic customer-oriented service architecture of banks and its four-step research process

3 Transformation of service architectures at banks

3.1 Future path to a customer-oriented financial market infrastructure

Many banks still have their focus on operational excellence instead of customer relationship, hence they try to optimize and automate their back office processes in e.g. securities and payments processing (Tallon, 2010). This focus is well-known from other actors in the financial services domain, such as stock exchanges. In a broader context, stock exchanges belong to so called "financial market infrastructures" (Gisiger and Weber, 2005). Financial market infrastructures (FMI) typically encompass institutions for payments and securities processing and basically consist of three elements: The stock exchange, the clearing payment and settlement provider and the gross settlement payment system. The larger network of FMIs also includes banks and their customers (Gisiger and Weber, 2005). Whereas the focus of FMIs is the optimization of securities and payments processing, banks need to operate other processes, such as financing or compliance processes. Therefore banks implemented CBS "on top" of FMIs, in order to achieve higher process automation (Fuss et al., 2007). But, CBS primarily focus on operational excellence and do not address any customer-related processes (Fuss et al., 2007; Tallon, 2010). They provide isolated functions for customers through online banking systems such as payment services etc. and neglect multi-banking interoperability. In contrast, market platforms, such as Apple Appstore or Android Marketplace, allow a customer-oriented bundling of different services from different vendors at the customer interface and thus follow a more customer-oriented approach. But, in comparison to CBS and FMIs they still do not enable semantic service integration. With their growing importance, those platforms could develop into so called "customer-oriented financial market infrastructures" (CFMI) and thus transforming the financial industry in the same way as the before mentioned music industry. Financial services of different providers may be mapped to customers` individual goals. For example, this may include a stock portfolio which is hosted from a private bank, two cash-value life insurances from two different insurers, a pension saving plan from a retail bank and a loan at a private lending platform. The development to a CFMI requires transformation of banks` today`s service architectures towards higher customer-orientation. This transformation process has to consider all possible views on service architectures, i.e. a business, a process and an IS view. The current section develops hypotheses for a future customer-oriented service architecture model for banks as presented in figure 1 and with respect to the three views mentioned above.

3.2 Hypothesis and model development

Business view

The business view of service architectures concentrates on a company's core competencies (Prahalad and Hamel 1990), i.e. the competencies that differentiate a company from its competitors. In the past, banks` business models, such as e.g. the one from Bank of America, used scale (6,139 branches; 18,685 ATMs) to create a business model based on location and access (Digichip, 2010). Today, e-channels such as online and mobile banking or online customer communities play a major role in customer-bank-interaction (Banker et al., 2010). Lee et al. (2010) even state that consumers accept switching costs when switching from offline to online channels because of convenience. "Digital natives" will push the use of e-channels (Hedley et al. 2006) and their expectations as Web 2.0 consumers is accompanied by a growing gap between the existing banking services (Celent, 2008).

Many studies reveal that banks have strongly invested in IT infrastructure, and online banking platforms, but that these systems mainly focus on supporting operational excellence functionalities around established banking products and do not support innovative customer interaction. More innovative functionalities that are valued by "digital natives" are usually not within the scope of banking systems (Anand, 2011). Therefore a major challenge for banks is to operate in large branch networks and to provide customers with more electronic services at the same time. This leads to the first hypothesis:

H1: Banks strengthen their core competencies in e-channels
Since many years banks outsourced back office processes to third party providers (Lacity et al., 2008). The main interests in outsourcing are economic or strategic reasons, such as e.g. lower costs, econo-

mies of scale and scope as well as higher flexibility (Askin et al., 2007). The outsourced services mainly concentrated on standardized back office activities in support-oriented service clusters (e.g., securities or payments processing, etc.) (Metters, 2008). Currently outsourcing developments can also be observed in customer-oriented service clusters in the area of support services. Examples are outsourcing of customer contact centers and ATM services (Giannini and Franciscans, 2008).

Outsourcing and cooperation with external service providers not only means focusing on core competencies, it also leads to organizational changes (Gulla and Cupta, 2009). In contrast to other industries, such as e.g. the automotive industry, which is build on the combination of physical products and electronic services (hybrid products), the financial industry is a pure information-based industry and hence service in- and outsourcing has an important impact on business strategies (Cata, 2007; Dos Santos and Peffers, 1995). Electronic services which are independent of manual interaction can simply be obtained through the use of technology (Meuter et al., 2000). One example is the cooperation of banks with insurances and other value added services (e.g. legal and tax services). Both, outsourcing of support services and the integration of value added services are reflected in H2 and H3.

H2: Banks integrate customer-related value added services from external service providers

H3: Banks outsource support services to external service providers

Process view

The process view of service architectures concentrates on the question service creation processes can be optimized, in order to become more customer-oriented. Those service creation processes can either be standardized or individualized and they can also either be centralized or localized (Breuer and Breuer, 2006). Customers apply services from different channels and even switch channels during a process (Albesa, 2007). These so called "hybrid customers" combine all available channels in their best way (Dapp, 2011). For example a customer could use an online personal financial management tool and expects the same information base by the customer consultant in a face-to-face conversation. Banks are forced to set up multi-and cross-channel management processes and offer value added services through various channels in order to better serve their customers (Sousa and Voss, 2006). In order to ensure a uniform quality of all services delivered through different channels, a central process of service value creation is necessary (Cortiñas et al., 2010). The synchronization of all service value creation processes has to include internal customer-facing activities as well as external providers (Karmarkar, 2004).

A second requirement is standardization of processes (Sannes, 2001). In the past back office processes were standardized through standard CBS and outsourced to third party providers. Customer-oriented services often are still heterogeneous due to individual customer requirements. But the growing importance of e-channels forces standardization of service value creation processes in this domain, too. Examples are chat-based advisory processes or online risk profiling tools, etc. This leads to more standardized processes in all customer-related services. The requirement of process centralization and standardization in service creation are reflected in H4 and H5.

H4: Banks customer-oriented processes provided via e-channels will be centralized

H5: Banks customer-oriented processes provided via e-channel will be standardized

IS view

The IS view of service architectures describes how a company`s services are aligned with the application architecture. This requires the design of application architectures regarding the use of integrated, all-in-one core banking systems vs. best-of-breed architectures and, as a second design option the use of individual vs. standard software (Österle and Blessing, 2005). Still, many banks establish operational excellence through the use of CBS in back office processes (Bardhan et al., 2010). Although, application services provided by CBS led to reduced complexity and maintenance efforts in support- and product-oriented service clusters (Rajagopal and Frank, 2002), many banks still operate on very heterogeneous application architectures in customer-oriented service clusters (Anand, 2011). But the development towards multi- and cross-channel service architectures brings the need of modern standard software. Today`s application architectures are very often silo-build channel applications which

historically evolved from adding channel by channel. The effort of channel integration is tremendous if there is no homogeneous standard software architecture.

Obviously, there have been substantial IT-driven business innovations in banking such as ATMs and online banking, which significantly benefited consumers (Banker et al., 2010). But, as most of banks` investments in the past concentrated on operational excellence, core banking providers did not have a strong focus on customer-oriented service clusters such as portfolio management or financial and asset planning in the past. Banks need to move towards supporting future customer-oriented processes, core banking providers currently focus on these services, too (Anand, 2011). H6 and H7 cover the aspects of standard software use and core banking reach in the customer-oriented service-cluster domain.

H6: Banks apply more standard software in customer-oriented services

H7: Banks CBS will cover customer-oriented services, too

4 Empirical Test of Developed Model

4.1 Data Collection and Sample Characteristics

The data was collected via a quantitative survey which consisted of two parts. The first part included background questions such as markets and bank type. In the second part, the participants were encouraged to evaluate their channels, media and technologies on a 4-point Likert Scale on today's perspective and the year 2015 (see Likert, 1993). Section three focused on questions regarding today`s and future design of the customer-oriented service architecture model (see to figure 1). Within this section the participants evaluated each service cluster in the banking architecture model from today's and planned activities until 2015 (see figure 1). Therefore the three views on service architectures were used. The participants had to evaluate each service cluster regarding (1) the business view (in-house production, outsourcing, insourcing, core competency), (2) the process view (central, de-central production and local, global standardization) and (3) the IS view (core banking system, peripheral system, standard software). Each dimension had to be marked with a cross.

A request for participation in the quantitative survey was sent to banks in the German-spoken area in Switzerland, Austria, Germany and the Principality of Liechtenstein. The survey started on May 2011 and was finished in August 2011. 107 banks received the survey, 25 questionnaires were fully completed (rate of return 23.3). The characteristic of the banks are: 36% are universal banks, 24% retail banks, and 40% private banks. The markets in which the banks operate are: 94% Switzerland, 26% Germany, 17% Austria, 5% America, 5% Asia and 11% others. In the following section the data from the 25 survey responses are evaluated regarding hypotheses H1-H7 using analysis of paired-sample t-test. Pairs of analysis always consist of the actual year of data collection 2011 in comparison to 2015 (summed, unweighted for 2011 & 2015[1]).

4.2 Hypothesis and Model Testing

The first hypothesis forecasts that banks strengthen their core competencies in e-channels. For this the roles ATM, contact center, online banking and customer community were analyzed by means of their core competencies. The results in table 2 shows that H1 (first row) can be confirmed (t (n=25) = -2.982, p < 0.05). As described in table 2, banks will strengthen the core competencies in electronic channels until 2015.

Banks have to focus to build up core competencies in e-channels and will also increase their distribution of banking products over various e-channels in the future. The participants assessed their offered banking products through different e-channels today and 2015 by a 4-point Likert Scale. This trend is being underlined also in table 2 (second row) referring to the analysis of the offered banking products

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[1] Cronbach's Alpha for hypotheses: H1 (α_{2011}=.55, α_{2015}=.43), offered bank products through e-channels (α_{2011}=.63, α_{2015}=.63), H2 (α_{2011}=.41, α_{2015}=.41), H3 (α_{2011}=.56, α_{2015}=.61), H4 (α_{2011}=.40, α_{2015}=.56), H5 (α_{2011}=.40, α_{2015}=.82), H6 (α_{2011}=.89, α_{2015}=.92), H7 (α_{2011}=.46, α_{2015}=.50)

through the e-channels like ATM, contact center, online banking and customer community (t (n=25) = 3.949, p < 0.05).

	Mean	SD	SEM	t	df	Sig. (2-tailed)
Core competencies in e-channels 2011 – Core competencies in e-channels 2015	-.520	.872	.17436	-2.982	24	.006
Offered bank products via e-channels 2011 – Offered bank products via e-channels 2015	.640	.810	.16207	3.949	24	.001

Table 2.   Analysis of banks core competencies (H1) and products via e-channels

As outlined above, service orientation will be a key factor for banks. To create an added-value for the customer in terms of a high access to different services and products, banks have to include external service providers and integrate more know-how from specialists in the future (e.g. tax advisor or property insurer). Table 3 shows that there is no clear trend towards integration of external service providers by 2015 in order to offer the demanded services. The roles tax advisor, legal advisor, property insurance, pension insurance and real estate evaluation were examined. Therefore H2 cannot be confirmed (t (n=25) = -1.365, p = 0.185).

	Mean	SD	SEM	t	df	Sig. (2-tailed)
Integration of customer-related value added services from external service providers 2011 – Integration of customer-related value added services from external service providers 2015	-.120	.440	.088	-1.365	24	.185

Table 3.   Analysis of customer-related value added services from external providers (H2)

H3 predicts that banks outsource support services to external service providers, in order to concentrate on their core competencies. The results of the paired sample t-test are shown in table 4. The analysis included the service clusters product/service development, research, marketing, compliance, risk management, customer document management and additional services. As shown in table 4 (t (n=25) = -1.549, p = 0.134), the result is not significant and H3 cannot be confirmed. Currently no clear trend can be observed that banks outsource support services to external service providers.

	Mean	SD	SEM	t	df	Sig. (2-tailed)
Outsourcing of support services 2011 – Outsourcing of support services 2015	-.200	.646	.129	-1.549	24	.134

Table 4.   Analysis of outsourcing of support services to external service providers (H3)

All the different e-channels (ATM, contact center, online banking and customer community) will need to be closely synchronized to deliver a sustainable customer experience. H4 forecasts that e-channels will be provided via centralized processes to enable cross-channel management. The results of the paired sample t-test are shown in table 5. Note that for the overall sample, the result is not significant (t (n=25) = -2.295, p = 0.096) and therefore H4 cannot confirmed. Banks indeed concentrate on their core competencies, but today they do not concentrate on centralizing their processes, in order to be able to flexibly serve customers through all e-channels.

	Mean	SD	SEM	t	df	Sig. (2-tailed)
Centralized processes provided via e-channels 2011 - Centralized processes provided via e-channels 2015	-.200	.577	.116	-1.732	24	.096

Table 5.   Analysis of centralized processes via e-channels (H4)

H5 predicts, that in the future bank value creation processes in the customer-oriented service cluster domain will be globally standardized, in order to ensure consistent service quality across e-channels. Table 6 shows, that this hypothesis is confirmed (t (n=25) = -2.585, p < 0.05).

	Mean	SD	SEM	t	df	Sig. (2-tailed)
Globally standardized processes provided via e-channels 2011 – Globally standardized processes provided via e-channels 2015	-.280	.542	.108	-2.585	24	.016

Table 6.   *Analysis of banks e-channel processes will be globally standardized (H5)*

This harmonization of channels asks for more use of standard software in the future as forecasted in H6. This hypothesis can be confirmed as shown in table 7 (first row) ((t (n=25) = -2.342, p < 0.05). Additionally the use of CBS in customer-oriented service clusters will rise in the future, too. Hypothesis H7, that analyzed the core banking appliance in customer-oriented services clusters can therefore be confirmed as well (see table 7 (second row): (t (n =25) = -2.270, p < 0.05)).

	Mean	SD	SEM	t	df	Sig. (2-tailed)
Standard software 2011 – Standard software 2015	-.800	1.708	.342	-2.342	24	.028
CBS 2011 – CBS 2015	-1.080	2.379	.476	-2.270	24	.032

Table 7.   *Analysis of standard software (H6) & analysis of core banking systems (CBS) covering all core sales and distribution processes (H7)*

5   Discussion and conclusion

Changes in customer behaviour, new technological developments in Web 2.0 and the entry of new market actors have the potential to shift the financial industry toward a CFMI. Today, banks 'competition takes not only place against other banks but also against so called "non-banks" that offer financial services such as cooperative investment platforms (e.g. Covestor), community-based peer-to-peer lending platforms (e.g. Smava) or even alternative currencies (e.g. bitcoin). It was argued that this forces banks to become more customer-focused, in order to remain competitive.

This study analyzed the transformation of banks towards customer-oriented service architectures. The concept of SOA was used, in order to achieve higher customer-centricity. It was enabled by an integrated business and technological view on services and the combination with generic business strategies (customer relationship, product leadership and operational excellence). This approach enabled the development of an integrated (concerning the business and technological view as well as the business strategy view) service architecture model, that founded the basis for a quantitative survey among banks, in order to evaluate their current and future service architecture models. In summary, three findings may be summarized from this research (see table 8):

- *Business view:* Bank customers pursue a stronger multi-channel behavior (Cortiñas et al. 2010). Our results confirm that banks in the future strongly focus on extending their core competencies in e-channels (H1). Although a greater trend towards customer-oriented service clusters can be seen from a channel point of view, this cannot be confirmed from a product point of view. Banks are still very concentrated on operational excellence (support-oriented service clusters). The development of banks towards financial solution providers that integrate value added services from external providers (e.g. tax advisor, legal advisor, property insurer, pension insurer and property & safety evaluator) could therefore not be confirmed (H2). The outsourcing of support-oriented service clusters such as customer document management etc. could also not be confirmed (H3). This may be due to the fact that the current financial crisis will create new regulatory requirements regarding for example risk and compliance management that banks are unable to foresee at the moment.

- *Process view:* The hybrid use of channels is a trend that was observed in many studies analyzing customer-bank-interaction. This so called cross-channel management requires centralized processes in all customer-oriented service clusters so that customers can flexibly switch channels and always rely on the same centralized services, processes and data (H4). This is in conformity with a study of Lee et al. (2010) who argue, that customers` adoption of e-channels is not just acceptance of new

technology, but a behavioral switch from physical to online banking. Thus, the trust in physical channels is also relevant. A first step towards the greater extension of e-channels is to work on enhancing its customers` trust in offline banking. Thus, banks still lack centralized coordinated processes and H4 was also rejected. But banks at least invest in the standardization of processes (H5). This is due to the fact, that banks currently implement many requirements from regulatory authorities that strongly rely on standardized interaction with customers.

- *IS view:* The standardization efforts concerning processes are also reflected in the growing use of standard software in all areas of the service architecture model (H6). This hypothesis could be confirmed and brings additional value through the harmonization of processes in terms of complexity reduction and higher modularity of all service clusters. Contemporary standard software is very often built on SOA and thus paths the way to a flexible, more customer-oriented infrastructure for banks. H7 could also be confirmed and encompasses the extension of CBS to other customer-oriented service clusters. This leads to a harmonization of customer-oriented service clusters and build the basis for centralization and standardization of processes.

	Customer-oriented services clusters	Product-oriented service clusters	Support-oriented service clusters
Business view	• Banks intensify electronic customer relationship management instead of physical customer relationship management until 2015 • Banks extend their core competencies primarily in e-channels until 2015	• Banks concentrate on their own customer-oriented service clusters which are not enriched by value added services until 2015 • Product-related services such as e.g. managed portfolios are outsourced to specialists until 2015	• Banks do not outsource support-oriented service clusters such as e.g. customer document management until 2015 • Service clusters that are affected by regulatory requirements will not be outsourced until 2015
Process view	• Banks do not rely on centralized processes for value creation in customer-oriented services until 2015 • Banks will standardize processes for electronic channel processes until 2015	• Banks rely on centralized processes for sales management until 2015 • Banks rely mainly on local processes in front support until 2015 • Banks rely on centralized processes for competence centers until 2015	• Banks rely on centralized processes for value creation in support-oriented services until 2015 • Banks will standardize processes for support-oriented services until 2015
IS view	• Customer-oriented services will be supported by CBS until 2015 • Banks use thereby mainly standard software until 2015	• Product-related services will be supported by CBS until 2015 • Banks use thereby mainly standard software until 2015	• Banks use peripheral systems for support-oriented services until 2015 • Banks use thereby mainly standard software until 2015

Table 8.   Characteristics of future service architectures at banks

This research applied an integrated approach on SOA which combined business and technological view on services and thus contributes to the emerging field of service science (Bardhan et al., 2010). The actual research in the area of SOA and service science is either focused on technological or on business aspects. Hence, both practice and science can benefit from this research. For practice it provides a model of how companies may better align business strategies with their processes and IS through the use of SOA. For science the theoretical considerations and the service architecture model shows how different views on service architectures enable an integrated view on service science and how architecture models can be aligned towards customer-orientation. Higher customer-orientation could only be confirmed in some parts of banks` service architectures. Future research should focus on a wider scope of analysis of this transformational trend. The number of 25 survey participants can be seen as a limitation of this research and future research could contribute with additional surveys which may also include other countries.

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