Fostering the Virtualization of Service Processes and Touch Points – Identification and Documentation of E-Service Potential in Retail Networks

Jörg Becker, Daniel Beverungen, Ralf Knackstedt, Axel Winkelmann

European Research Center for Information Systems
University of Münster
Leonardo-Campus 3
48149 Münster, Germany
becker@ercis.uni-muenster.de
daniel.beverungen@ercis.uni-muenster.de
ralf.knackstedt@ercis.uni-muenster.de
axel.winkelmann@ercis.uni-muenster.de

Abstract: Offering business services is widely considered a means for superior value creation. Increasing research activities in the emerging disciplines of Service Sciences and Service Science Management and Engineering (SSME) can be ascertained. Even so, the integration of service processes and their virtualization with suitable IT artifacts is seldom focused in SSME. Building on the Process Virtualization Theory (PVT), we propose ways to assess and document the eligibility of service processes and—on a more detailed level—of the activities that need to be virtualized among the stakeholders. On a process level, central questions are derived from the PVT. On an activity level, an extended service blueprinting notation is derived and conceptualized in a language-oriented meta model. We demonstrate the usability of our approach with an exemplary service process from the retail sector. Since the retail sector is quite mature, the concepts to be used there might also be reused in other service settings.

1 Introduction

More than ever, business is no longer about simply selling physical goods to customers. Instead, solving customers' problems (solution business) provides companies with a competitive edge. Some researchers even propose a paradigm shift in thinking about the creation of value from a "goods-dominant logic" to a "service-dominant logic" point of view [VL04]. In this context, all value creation is achieved by combining physical products and services into customer solutions that satisfy a customer's needs [Ch07].

Generally, efficient service processes have to be designed to be integrated in two respects: On the one hand, recognizing customers as a "co-creator of value" [ZB96] demands an integration of service processes with a customer's business processes. On the other hand, service providers have to ensure an efficient integration of service

processes with their own (physical goods and services) backstage processes (e.g., manufacturing processes) in order to reach the operational excellence to satisfy their clients' needs efficiently [RK03]. To aid the integration of business processes in both directions, it is feasible to use electronic service concepts (E-Services) for the virtualization of services that might have been conducted physically or even manually in the past. Virtualization helps improve efficiency in terms of process cycle times, quality, or availability.

The phenomenon of "process virtualization" is relevant in many contexts, including distance learning, friendship development (e.g., via social networks), or electronic shopping through electronic commerce [Ov08]. With regard to process virtualization, E-Services are services that are made available via electronic networks, e.g., on the Internet [SW08]. In general, services usually tend to be oriented downstream [WB99] from the value chain (e.g., provided to customers) or upwards from the value chain (e.g., provided to producers) [SW08]. Hence, E-Service providers need to integrate information that is provided by customers as well as information that is provided by producers as co-creators of value in service systems [Ma09] in order to optimize their own processes.

In economic theory, the retail sector's role is to overcome negative side effects in consequence of the division of labor. The retail sector balances differences between supply and demand in terms of space, time, quality, and quantity of goods. Hence, the retail sector provides services for industrial companies (i.e., manufacturers) as well as for consumers at various parts of the supply and demand aggregation (cf. table 1).

Pre Sales Services	**Services During Sales**	**After Sales Services**

• Master Data Management (Creation and Verification, e.g. individual Description for Electronic Devices)
• Creation of Product Pictures
• Timely Disposition of Orders in Order to Avoid Out of Stock
• Product Distribution (e.g. from Central Warehouse to Stores)
• Shelf Management
• Product Tests in Test Stores
• Product Listing and Price Calculation
• Promotions
  • In-Store Promotions
  • Offline Promotions (e.g. Newspaper Advertisements)
  • Online Promotions (e.g. Banner Ads)
• Product Placement and Space Management
• Customer Loyalty Programs
	• Product Advice
	• Product Configuration (e.g. Car Configuration)
	• Contracting (e.g. Car Contract)
	• Credit Approvals
	• Leasing
	• Granting of Loans
	• Disposal of Expired Goods
	• Cash Withdrawal via EC or Credit Cards
	• Customer Data Collection
	• Product Basket Collections
	• Coupon Redemption
	• Coupon Issuing
		• Product Delivery (e.g. Furniture Retail) and Initial Operation
		• Hotline
		• Maintenance
		• Guarantee Management
		• Reclamations
		• Redemption (Batteries, Used Devices, ...)
		• Waste Disposal (Used Devices, Batteries, Packaging, …)
		• Customer and Product Basket Analyses, Sales Analyses
		• Encashment

Table 1: Exemplary of Retail Services for Industry and Customers

With such diverse individual services in retail, process virtualization—especially with the ease of information flow through the Internet—seems to be a promising reorganization strategy for superior service processes. A sound reorganization seems especially promising for the retail sector as many of their service processes are carried out frequently and, therefore, have to be very efficient and sophisticated. In addition, other service branches might increase their own efficiency by learning from service process optimization in the retail sector. However some service processes are more amenable to virtualization than others are.

Having this in mind, our article provides insights into how the virtualization potential of service processes might be identified and formally documented. To reach this objective, we present artifacts to support the analysis on (a) a service process level of detail and on

(b) an activity level of detail. We start by deriving central questions to assess coarsely the general potential of virtualization for a service process. For that, we apply the Process Virtualization Theory (PVT) [Ov08] to the domain of service processes and E-Services (Section 2). In addition to applying the PVT to service processes as a whole, we build on an extended version of the service blueprinting approach [BKM08] in order to visualize and document the virtualization potential on an activity level of detail (Section 3). Consecutively, we demonstrate the documentation, planning, and composition of E-Services with the example of a coupon service process as is frequently carried out in retail (Section 4). Finally, we present exemplary artifacts for integrating business processes in retail networks that can be used to exploit the identified virtualization potential (Section 5) and conclude the paper (Section 6).

2 Identifying the Virtualization Potential of Service Processes

A process is broadly defined as a set of activities for achieving a goal. A physical process is a process with physical interaction between people or objects and people. Hence, a virtual process is a process in which physical interactions have been removed [FO05, Ov08]. Often, virtual processes are enabled by IT and supported through the help of the Internet, but this is not necessarily the case all the time. For example, catalogue sales allow the non-IT-enabled virtualization of sales services processes through catalogue sales, whereas online shopping is an IT-enabled form of process virtualization.

PVT was first introduced by Eric Overby [Ov05, Ov08]. The purpose of PVT is to provide a general theoretical basis for investigating the factors that affect the virtualizability of a process. It is derived because many processes that have historically required physical interaction amongst participants are now conducted online or through other virtual means. Despite much research on virtual processes e.g., [PI78]; [DL86]; [MYB87]; [Da89], little attention has been paid to the question of what makes processes amenable or resistant to virtualization. For that, the PVT offers four main constructs (namely, sensory requirements, relationship requirements, synchronism requirements, and identification and control requirements) that allow for an explanation of whether a process is suitable for virtualization. In the following, we derive a set of central questions from the constructs proposed in the PVT to assess coarsely the virtualization potential of service processes.

Sensory requirements can be defined as the need of process stakeholders to enjoy fully a sensory experience while conducting the process. Those experiences can be in the way of hearing, seeing, smelling, tasting, touching, or generally engaging in the process. From the point of E-Services, we are able to derive two main questions as follows: **SR1**: Will participants accept a virtualized service without being able to enjoy sensory experiences fully?

SR2: If not, is it possible to overcome the need with the help of, for example, process changes or improvements, technological adaptations or social fortifications?

For example, it is hardly possible to sell perfume over the Internet (hence, to virtualize perfume sales) due to a lack of smelling experience. However, technological devices that are able to imitate the smell within consumer homes may overcome the problem.

Relationship requirements define the need for process stakeholders to interact with each other in a social or professional context in order to acquire knowledge or develop trust or friendship. From the point of E-Services, this leads us to the two following questions:

RR1: Will participants accept a virtualized service without being able to satisfy their relationship needs fully?

RR2: If not, is it possible to satisfy the relationship needs virtually, e.g., through video clips in online shops, through video conferencing, or through utilizing social networks?

For example, video conferencing turns out to substitute more and more business travel as it is possible to not only hear but see and interact with each stakeholder of the business process. Video clips are increasingly used on E-Business web sites to provide a richer sense of how, for example, clothes would look, while social networks might convince customers that their decision to buy a product is a good one.

Synchronism requirement is the degree to which the process activities need to follow one another. Working asynchronously within one process may work for some processes, but delays may not work for every process.

SyR1: Will participants accept a virtualized service without being able to work in synchrony fully?

SyR2: If not, is it possible to reorganize the process or to use other technologies in order to synchronize process activities?

For example, unlike email, chatting or other real-time collaboration tools allow for synchronous discussions between process stakeholders. Hence, some retailers already use this communication technology in order to synchronize their virtual support discussions with their customers.

Identification and control requirements address the requirements of a unique identification of process participants and the ability to exert control over them and to influence their behavior.

ICR1: Will participants accept a virtualized service without being able to identify other process stakeholders?

ICR2: If not, is it possible to implement some identification mechanism that overcomes the obstacle?

ICR3: Will participants accept a virtualized service without being able to control or influence other process stakeholders?

ICR4: If not, is it possible to implement some influential or control mechanisms in order to overcome the obstacle?

For example, when eBay went online, the company soon implemented a rating mechanism for transactions in order to give eBay members some sort of control and virtual identity for their transactions.

Keeping in mind that processes can be virtualized either with or without the use of information technology, PVT explicitly addresses the theoretical significance of information technology in process virtualization by discussing the moderating effects of representation, reach, and monitoring capability. Those moderating effects allow the deduction of additional central questions for the assessment of the virtualization's applicability for individual retail services.

ME1: Is it possible to moderate sensory requirements with the help of a suitable representation of process information through IT, e.g., detailed product pictures instead of seeing and feeling a product in a physical store?

ME2: Is it possible to moderate relationship requirements with the help of a suitable representation of stakeholder information, e.g., social profiles as in social networks?

ME3: Does the reach of virtual processes through information technology enable activities beyond physical boundaries in time and space, e.g., 24/7 worldwide online shopping instead of limited opening hours of physical neighborhood stores?

ME4: Does the reach of virtual processes through information technology allow a better support of synchronism requirements, e.g., co-browsing through online stores?

ME5: Does the monitoring capability of information technology allow a better addressing of identification and control requirements of virtualized processes, e.g., monitoring previous transactions of potential buyers and sellers on e-commerce platforms such as eBay?

3 Identifying the Virtualization Potential of Touch Points

The previously derived central questions help to identify the suitability of physical service processes for virtualization on a coarse detail level. However, in most cases, it will not be possible to virtualize entire service processes with the help of IT. For example, although products might be presented and sold online, they still need to be delivered physically to each consumer. Consequently, instead of referring to the service process as the unit of analysis, in a second step, we will rather have to evaluate the virtualization of "touch points" among process stakeholders. Touch points imply that information is transferred between two or more stakeholders in the process chain. These information flows can be supported by virtualized processes [RK03].

For analyzing touch points in-depth, we can draw from the well-established service blueprinting approach as is traditionally proposed by the service marketing discipline

[Sh82]; [ZB96]; [Kb89]. Primarily, service blueprinting emphasizes the provider-customer interface of service processes. Being more of a diagrammatic illustration of a service process rather than a formal modeling language [BBK10], the service blueprinting approach traditionally distinguishes *activities* to be carried out by service providers and customers in the front stage and backstage of service systems confined by several "*lines*" (see figure 1 for illustration). Activities might be customer activities, onstage activities of a service provider, backstage activities of a service provider, and support processes. The "line of interaction" and the "line of visibility" are of special importance to clarify the roles of service providers and customers in service systems and to determine the detail level of the information to be shared amongst stakeholders.

- The "line of interaction" divides the activities of a process to be carried out by service providers from the activities to be carried out by customers. Therefore, adjusting this line towards the service provider implies a more extensive involvement of customers in the service process (e.g., by more self-service). Accordingly, adjusting the line towards customers adds more activities for service providers, reducing the involvement of the customer in the service process.

- The "line of visibility" determines the scope of information provided to customers related to a service provider's business processes. For example, in many countries, customers are able to track their parcels from their origin to their destination via the Internet. By adjusting the line of visibility towards service providers, customers are provided with more information, e.g., about the current location of the parcel. By reducing visibility of activities for customers, service providers may restrict their customers from gaining information about their service processes.

Both lines have to be adjusted purposefully in each service system to govern the service activities—e.g., in terms of outsourcing or in-sourcing—and to determine the degree of information to be shared in each service process. Originally proposed by [Sh82], the service blueprinting approach has been extended and revised by other authors [Kb89] [Kb95] [Kl00] [FK04] [BOM07].

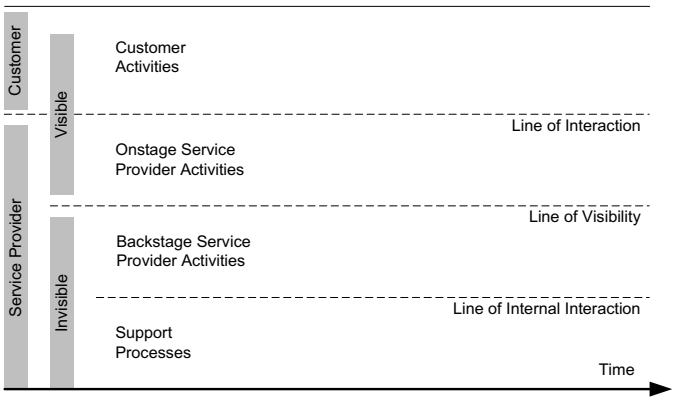

Figure 1: Service-Blueprinting approach as proposed by Bitner, Ostrom, and Morgan (2007)

All of the proposed services blueprinting approaches have been designed to emphasize the service provider's interface with their customers. Even so, to depict the service process (and its degree of automation) in its entirety, it seems beneficial to incorporate stakeholders from the upper end of the value chain into the service blueprint [BKM08]. Therefore, we propose extending the service blueprinting approach to comprise the interface of service providers towards their suppliers. With retail services, this would be the retailer-supplier interface. The idea is to introduce additional layers into the blueprint by partially mirroring elements (an approach that has been elaborated on elsewhere [BKM08]), i.e., the lines of interaction and visibility (cf. figure 2). By bridging the front stage and backstage of services [GT09], all activities of service processes can be streamlined ultimately to influence a customer's service experience positively. In our proposed approach, several of the previously proposed lines are not included. This is conceivable because from a retailer's point of view, they are not necessary to identify and automate touch points towards customers and suppliers because any of those activities are, in fact, encapsulated in the middle layer of the blueprint.

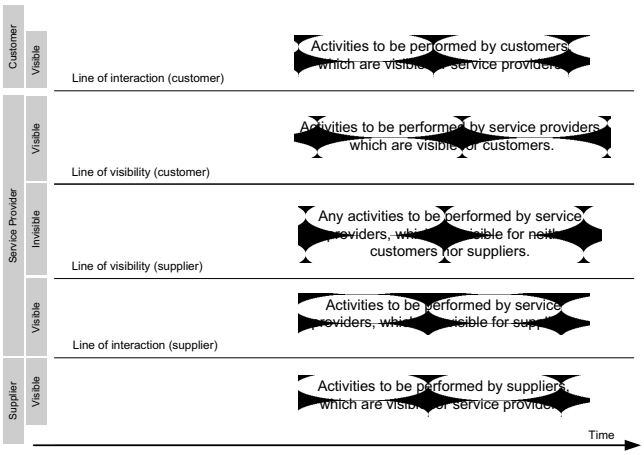

Figure 2: Concept of an extended mirrored service blueprint for depicting service processes

To specify the rules and possibilities of blueprinting, it is beneficial to formally explicate and revise service blueprinting with the help of its meta model and to introduce graphical representations for any of the (additional) language constructs. Previous versions of the blueprinting approach however failed to provide a meta model. Therefore, before we can adapt the service blueprinting approach into a mirrored blueprint to also document touch points and information flows in service systems, we have to reconstruct the meta model of the traditional blueprinting approach (figure 3). *Process Elements* to be found in the blueprint can be the *Activities* to be executed, *Decision Nodes*, *Physical Objects*, or *IT-Systems* (e.g., databases). *Activities* are assigned to different *Layers* confined by lines, whereas *Decision Nodes*, *Physical Objects*, and *IT Systems* transcend the lines and, therefore, are not assigned to layers. *Connectors* split or join the control flow of the service process. Any of the *Process Elements* can be connected with each other by *Edges*. For *Activities*, the allowed *Execution Time* (i.e., relation start and end dates) can be specified.

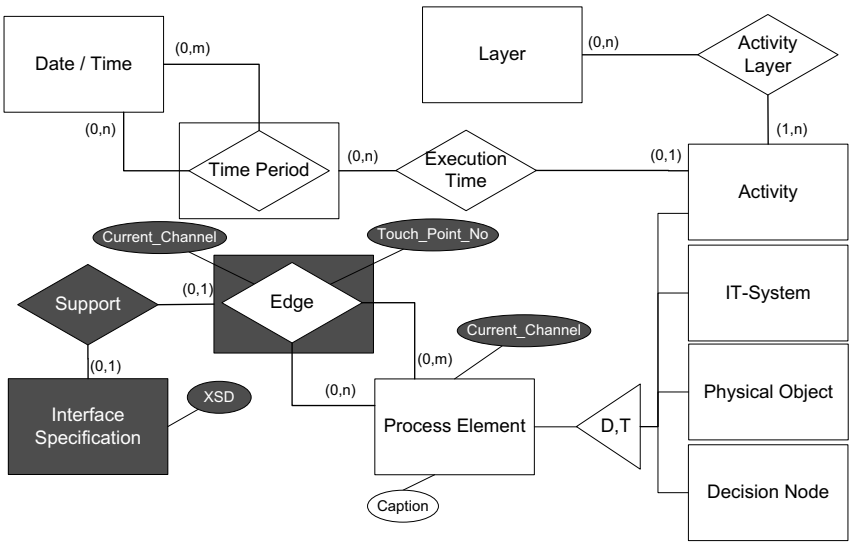

Figure 3: Reconstructed Meta-model of the Service Blueprinting Approach (white objects) as proposed by [BOM07] and the extensions proposed in this paper (grey objects)

To be able to use the mirrored service blueprint as a basis for the formal analysis and for the documentation of information flows at touch points, we propose the introduction of some new language constructs into the service blueprinting meta-model (grey shaded objects in figure 3). On the one hand, the attribute *Current_Channel* is added to any of the *Edges* in the blueprint to document by which channel (e.g., paper sheet, fax, phone, specified electronic document, or web-service) the information is currently transmitted. This extension seems to be valuable to document the potential for a further digitalization of information flows. Furthermore, it is beneficial to understand the nature of the current cooperation in the established service system better. On the other hand, for each of the *Edges*, a formal *Interface Specification* can be assigned to specify the structure of the information to be transmitted (e.g., in an XML document).

Once the potential of automating a service process has been assessed (into which the derived central question can easily be included to investigate all of the touch points with the PVT soundly), the extended service blueprint can be utilized to analyze the service process, acting as starting point to conceptualize, build, and evaluate appropriate IT artifacts for the entire service process. Also, all of the developed IT artifacts can be documented in the blueprint to display the new status of virtualization.

4 A Retail Network Example for the Identification and Documentation of Virtualization Potential for Service Processes and Touch Points

In the following, we exemplify the evaluation of service processes and touch points with the example of coupon promotion services in retail. In addition, the graphical representations corresponding to the proposed meta-model extensions are presented. A coupon promotion is a sales instrument conducted by retailers, but it is launched by an industrial physical-goods supplier in most cases. Consumers receive rebate slips that allow them to buy particular products at a discounted price. The processes to be performed by retailers (redeeming party) and manufacturers (issuing party) are cooperative because they must jointly define the promoted products, the face value of the coupon, the start and end dates of the promotion as well as the amount of coupons to be issued.

On a process level of detail, we use the central questions as derived in Section 2 to estimate the virtualization potential of the entire coupon service process. Importantly, our approach does not constitute an objective weighted aggregation approach, since the suitability of weights for the central questions is contingent on the properties encountered in each design context. Thus, rather than quantitatively computing an eligibility score for each touch point, the approach serves as an analytical lens for qualitatively assessing their eligibility for virtualization. Bearing this in mind, the results suggest that the couponing process generally is amenable to virtualization (Table 2). We use this evaluation as a general estimation of the virtualization potential before the in-depth and time-consuming analysis with the blueprinting approach takes place for each process with virtualization potential. This two-step approach is especially useful when many processes have to be analyzed for reorganization, hence, virtualization potential. Depending on the effort a company is willing to spend on this analysis, surveys and analyses of qualitative data might even be performed.

Central question from PVT	Assessment for the "coupon dissemination and redemption" service process
Sensory Requirements (SR) 1 Will participants accept a virtualized service without being able to fully enjoy sensory experiences?	Yes, consumers will be likely to accept a virtualized couponing process without being able to fully enjoy the sensory experience because coupons generally do not convey rich sensory experiences besides being printed on paper. No, suppliers Used to "feel" all redeemed coupons because of fraud fears.
SR2: If not, is it possible to overcome the need with the help of e.g. process changes or improvements, technological adaptations or social fortifications?	For customers, the way of coupon issuing and redemption does not depend on any form of sensory experience. For retailers and suppliers, process changes and technological innovations are necessary in order to ensure a reliable coupon redemption and clearing without fearing fraud. In former times, consumers redeemed coupons in retail stores. Manual condition checks by store employees made the industry fear fraud. However, if it is possible to change processes in order to enable automatic condition checks, suppliers will likely accept virtualized couponing processes.
Relationship Requirements (RR) 1: Will participants accept a virtualized service without being able to fully satisfying their relationship needs?	Yes, consumers will most likely accept coupons in a virtualized process as there are no relationships associated with receiving or redeeming a coupon in retail. No, suppliers will need to know which retailers accept their coupons (in order to ensure a correct clearing process and to monitor fraud attempts). Furthermore, they would prefer to know which customers or customer groups like to redeem their coupons.

RR2: If not, is it possible to satisfy the relationship needs virtually, e.g. through video clips in online shops, through video conferencing or through utilizing social networks?	For customers, the way of coupon issuing and redemption is not depending on any form of relationship requirements. For suppliers, a virtualization needs to ensure that it is still possible to identify the retailer who has accepted the coupon. This is always the case as the retailers need to be known in order to reimburse them. However, with manual processing it was not possible to identify individual customers or customer groups. Hence, a virtualization may even overcome this obstacle.
Synchronism Requirement (SyR) 1: Will participants accept a virtualized service without being able to fully work in synchrony?	Most likely yes. Customers are used to receive coupons by mail (asynchronous with the redemption process).Also suppliers issue and redeem coupons at various points of times.
SyR2: If not, is it possible to reorganize the process or to use other technologies in order to synchronize process activities?	n.A.
Identification and Control Requirement (ICR) 1: Will participants accept a virtualized service without being able to identify other process stakeholders?	From the consumers point of view, other stakeholders are (a) retail company and (b) supplier, both of which can be identified from the information on the coupon, hence the question is not applicable. From a suppliers and retailers point of view, both know about each other as the issuer and redeemer information is stored on the coupon but they do not know about redeeming customers (also this knowledge would be favorable). With virtualization (e.g. issuing coupons via email) they will both need to ensure that consumers do redeem coupons unjustified.
ICR2: If not, is it possible to implement some identification mechanism that overcomes the obstacle?	Technical mechanisms for automatic redemption management may help overcoming fraud problems at the POS.
ICR3: Will participants accept a virtualized service without being able to control or influence other process stakeholders?	No matter the degree of virtualization, customers generally cannot influence the coupon process, because it is governed by pre-defined rules made up by retailers and suppliers (coupon master data and article master data).
ICR4: If not, is it possible to implement some influential or control mechanisms in order to overcome the obstacle?	n.A.
Moderating Effect 1: Is it possible to moderate sensory requirements with the help of a suitable representation of process information through IT, e.g. detailed product pictures instead of seeing and feeling a product in a physical store?	As customers do not have any sensory requirements there is no need to support it with the help of IT etc. In order to virtualize the issuing and redemption process and to being accepted by suppliers, IT needs to ensure that fraud is not possible when conducting the process virtually.
ME2: Is it possible to moderate relationship requirements with the help of a suitable representation of stakeholder information, e.g. social profiles as in social networks?	For customers, social networks can be setup to be used by customers to discuss on stakeholders and coupons. However, it is not necessary to address relationship issues for consumers. For suppliers, virtual processes have to ensure that coupon accepting retailers are known. For them, virtualized couponing processes would be beneficial if it will be possible to identify each redeeming consumer or consumer group.
ME3: Does the reach of virtual processes through information technology enable activities beyond physical boundaries in time and space, e.g. 24/7 worldwide online shopping instead of limited opening hours of physical neighborhood stores?	For customers, a 24/7 availability can be reached when utilizing the internet for coupon dissemination and redemption. For suppliers, gaining more precise information about customers through coupon redemption may help in better marketing and developing products.
ME4: Does the reach of virtual processes through information technology allow a better support of synchronism requirements, e.g. co-browsing through online stores?	This is most likely not necessary for coupon processes (low level of complexity, familiarity of the customer with the process). However, virtualized processes may allow a faster clearing of coupon promotions between retailers and suppliers.
ME5: Does the monitoring capability of information technology allow a better addressing of identification and control requirements of virtualized processes?	Customers can easily check if their coupon has been redeemed successfully (but no better than they could in a “brick-and-mortar” case).

Table 2: Assessing the eligibility for a virtualization of coupon processes with the central questions derived from the PVT

To assess the virtualization potential in more depth (i.e., by analyzing the potential for virtualization of each touch point), we applied the mirrored blueprinting approach. First,

we transcribed the coupon clearing process [Wi06] to the mirrored service blueprint notation (cf. figure 4). In order to issue, accept, and redeem coupons automatically, article master data and promotional master data (e.g., validity period, region of acceptance, or face value) must be entered into the point of sale systems (POS) first. As a result, it becomes possible to electronically verify and accept a coupon by scanning its barcode at the POS. If the customer identifies herself (e.g., through a loyalty program card), it becomes possible to add her interest in the coupon promotion campaign to her customer record.

Coupons can be issued either in-store or remotely (e.g., on an E-Commerce website) because customers need not necessarily be present in order to buy products and to redeem coupons. Hence, it is possible to use various channels for the interaction between retailers and customers, which can be supported with E-Services. Interaction with suppliers can be conducted with or without involving human actors (interaction patterns 1, 2, or 3), depending on the current level of maturity retailers' and producers' IS support. All of the touch points were documented in the blueprint by numbered circles.

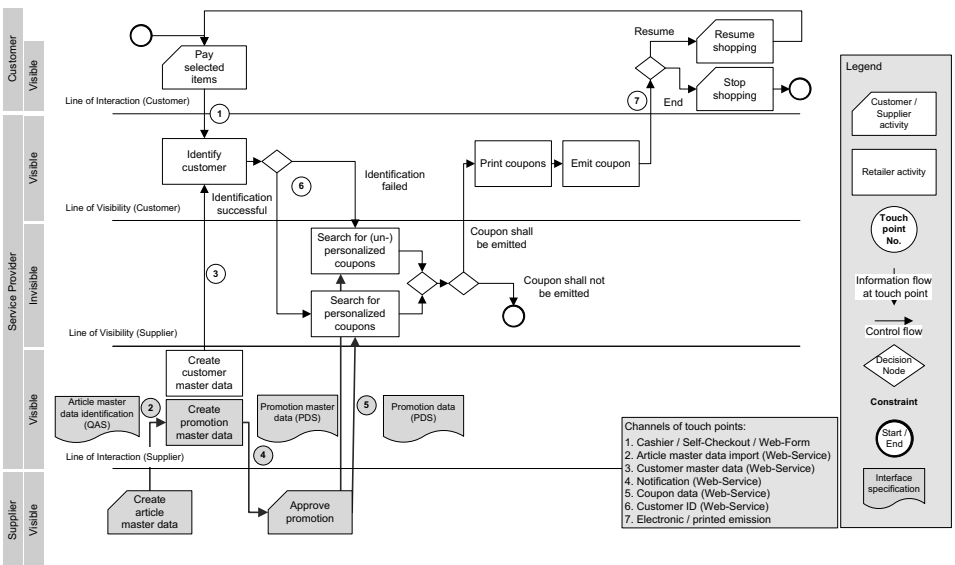

Figure 4: Mirrored Service-Blueprint for coupon dissemination and redemption service processes

5 Artifacts for Virtualized Service Processes in Retail

After identifying and documenting the touch points to be supported by, for example, inter-organizational information flows, IT artifacts can be designed to support the identified information flows in order to exploit their virtualization potential. IT artifacts can be categorized in different ways. Our lens is to classify them according to their granularity into task services and process services [BKM08]. Task services (e.g., a web service providing the required information) are used to virtualize one touch point only,

whereas process services represent collections of task services that are ties together with additional application logic to virtualize a number of touch points simultaneously.

Web-Service-based Virtualization of Touch Points

Apart from the notion of "business" services, web services can be seen as one means of transferring the service paradigm to software components [Ve08]. Web services are one form of realization to provide a business service in value networks [Bu08]. As constitutional parts of service-oriented architectures (SOA), they are heavily debated with an emphasis on integrating information in E-Business scenarios [TK01]. Visions of creating SOA can be quite different, reaching from a dynamic, semantic search of web services described in UDDI repositories to rather conventional Enterprise Application Integration approaches like middleware platforms [Sc06]; [Al04]. Taking our mirrored service blueprinting approach as an analytical lens, the identification and design of web services in service systems can be completed by analyzing business processes at an activity level of detail. Approaches to achieve this have been elaborated on proposed elsewhere [BKM08] and, therefore, are not in the scope of this paper.

Whatever approach for specifying web services is used, the web services conceptualized can be represented on an abstract level in the mirrored blueprint with the extensions proposed in this paper (cf. figure 4), i.e., the element *Interface Specification*. In this way, an overview of the currently used IT artifacts and the degree of virtualization of the entire service process (e.g., a coupon service) can be conveyed.

Web-Service-based Virtualization of Service Processes

To achieve an efficient and, hence, virtualized dissemination and redemption process in couponing, article master data and coupon master data provided by manufacturers and retailers must be thoughtfully organized and provided [Wi08]. One way to achieve this is to design an integrated promotion platform on the Internet, which can be used as a central data repository for manufacturing companies and retailers to aid the coupon promotion processes. Coupon promotion processes aided by a promotion platform might be perceived by customers (e.g., reduced waiting times at the POS and more reliable redemption due to electronic promotions) and suppliers (e.g., fewer resources to set up and operate promotion campaigns, less coupon fraud, etc.) as a superior service experience. Therefore, retailers might want to analyze and design their service processes thoughtfully with respect to their stakeholders.

We designed and prototypically implemented a coupon promotion platform with the paradigm of a middleware approach [Sc06] to facilitate the inter-organizational cooperation of manufacturers and retailers with virtualized touch points (cf. architecture and grey circles in figure 5). The services provided on the promotion platform are managed by a Service Framework (SF), which provides for the integration of these services to support processes. The handling of article master data is crucial for designing and executing promotion campaigns in retail with automatic coupon clearing. Therefore,

the platform has to provide adequate functionality to obtain, manage, save, archive, and provide article master data in the Item Data Service (IDS) Layer.

Besides article master data, the promotion master data of the promotion campaign (e.g., period, involved stores, clearing conditions, etc.) have to be administered on the promotion platform as well. The platform provides this functionality within the Promotion Data Service (PDS) layer. Functionality includes selecting article master data for promotions (*what* articles to promote), validity period of the promotion (*when* to promote articles), selected retailers (*where* to promote articles), and clearing conditions (*under which circumstances* to accept a coupon at the point of sale).

To provide article master data in sufficient quality, the Quality Assurance Service (QAS) layer implements functionality to keep the data repository up-to-date by identifying new article master data in data pools (such as SINFOS) and importing it. Similarity algorithms help to match new master data records with existing ones. The Platform Services (PS) layer provides functionality to administrate the platform.

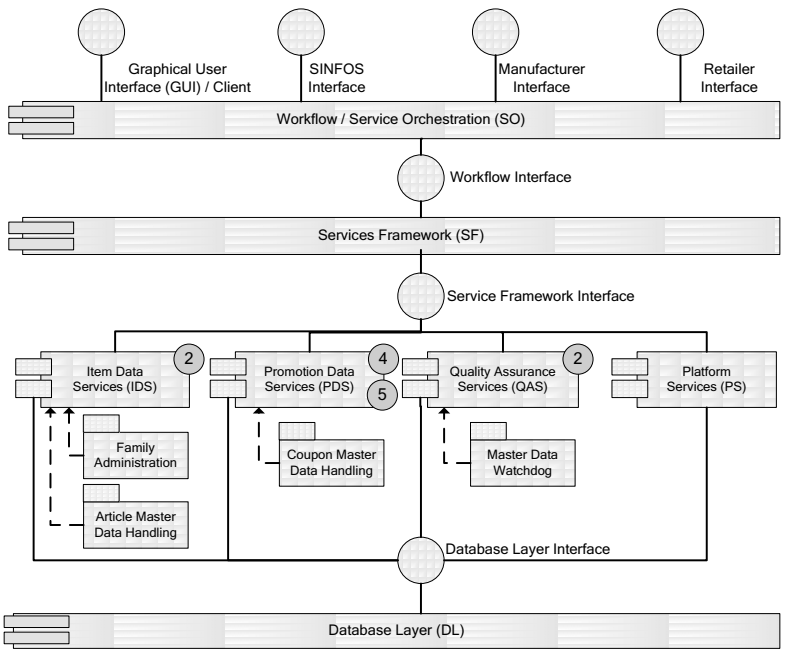

Figure 5: UML Component Diagram of the integrated coupon promotion platform

6 Conclusion

We proposed a method to assess the virtualization potential of service processes on (a) a process and on (b) an activity level of detail. On a process level, we proposed central questions that we derived from the Process Virtualization Theory in order to identify processes that offer virtualization potential. Subsequently, we built on the idea of a

mirrored service blueprint [BKM08] to conceptualize an approach for identifying virtualization potential and formally documenting it with a language-oriented meta model. This formalized blueprint notation serves to initially depict the service process in its entirety and to document its current state of IT support at all times. Methods for designing IT artifacts for putting virtualization into action can be utilized consistent with this approach, but were not in the scope of this paper.

With our evaluation scenario from the retail sector, we provided evidence that the approach is usable to identify virtualization potential and document it formally to advance suitable artifacts further. The approach can be enhanced by subjecting our initial central questions to extensive qualitative and quantitative field-testing. With this approach, a set of generally accepted central questions might be established. Since the retail sector—however important— is only one domain pertinent to service science, we expect that adaptations of our approach would be also usable to virtualize other service processes, such as in Banking, e-Government, or Health Care. Applying the proposed approach might also highlight differences and commonalities for virtualizing touch points in different domains of application. For instance, touch points in health care or e-Government might not be amenable for virtualization due to legal regulations. Also, additional field test and consecutive design cycles are expected to increase the theoretical strength and applicability of the proposed approach.

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