

# Unbundling and Deploying CRM Applications as e-Services

Pedro R. Falcone Sampaio<sup>1</sup> and Yong He<sup>2</sup>

<sup>1</sup>Information Systems Group, School of Informatics, University of Manchester,  
Manchester M60 1QD, UK

<sup>2</sup>Technology Support Department, Guangdong Mobile Communications, China

<sup>1</sup>p.sampaio@manchester.ac.uk

<sup>2</sup>heyong@qy.gd.chinamobile.com

**Abstract:** The development of Customer Relationship Management (CRM) capabilities by incrementally sourcing and combining “best of breed” services from different providers is a key lever for reducing implementation risks and costs linked to CRM projects. Central to a “best of breed” and incremental CRM implementation strategy is the unbundling of CRM functionality into a portfolio of services that can be sourced from application service providers and/or developed internally within the client organization. This paper addresses issues and methodological steps relating to unbundling CRM applications into self contained e-Services and developing the service blueprint to deliver the e-Service. In particular a study is conducted illustrating the unbundling of customer segmentation functionality towards modeling, packaging and delivering the business process functionality as an on-demand e-Service.

## 1 Introduction

E-Services are emerging as a new paradigm for IT functionality delivery developed by packaging core business processes and software applications into services that can be deployed and sourced on the web [rk03]. The e-Services approach employs emerging information and communication standards such as XML, WSDL and SOAP [sh05], enabling a plug & play architecture for functionality sourcing and deployment, helping organizations to rapidly build IT solutions and improve business agility. More recently, leading industrial and academic research labs have elevated “Services Science” and e-Services towards the status of a new discipline that melds business, IT and engineering with the goal of increasing business responsiveness, resiliency and focus [ib05].

The paradigm shift towards e-Services is a consequence of the evolution of the business competitive environment into extended enterprises organized into core and non-core activities focused on core capabilities and measuring the profitability of all pieces of the value chain. The ultimate goal is to reach a development stage where high-value added business services are assembled from a well-defined portfolio of business elements (component services) akin to a “periodic table” of business components [ib05].

To benefit from the potential of e-Services, organizations are aligning Business/IT strategies, streamlining business processes and redesigning IT platforms towards migrating to a Service-Oriented Architecture [cb05]. The roadmap to e-Services in organizations can be traced from two complementary perspectives: the service consumer perspective where e-Services are often used to support/enable cost reduction and faster time-to-market for aggregated business processes and services; and the service provider perspective, where e-Services are employed as direct sources of revenue generation following an application services provider model [ha02].

For the *service consumer*, the key issues to be addressed typically relate to: (1) understanding market supply for e-Services (existing providers, pricing, etc); (2) analyzing strategic implications and financials involved in the build, buy or borrow decision (e.g., return on investment and total cost of ownership); and (3) assessing characteristics of the prospective customer-service provider relationship (e.g., ability of provider to comply with service level agreements, responsiveness, organizational compatibility and trustworthiness).

For the *service provider*, the key issues to be addressed typically relate to: (1) understanding market demand for e-Services (potential buyers, pricing, etc.); (2) analyzing the operating costs and potential profitability for the delivery of the e-Service; (3) mapping enterprise processes and disaggregating applications towards packaging as e-Services; and (4) developing an effective service design and implementation approach to deliver the e-Service.

In this paper we address the technical IT challenges linked to disaggregating (unbundling) Customer Relationship Management (CRM) applications [bu04] into self-contained e-Services, and developing the service blueprint to deliver the e-Service (service provider issues 3 and 4 discussed above). We discuss an unbundling study conducted to illustrate the development of an on-demand CRM e-Service for customer segmentation. Customer segmentation [rc04, bu04] deals with grouping and classifying customers of a business according to an established measure of value to the company (e.g., customer profitability, average number of transactions per year, average transaction amount) and can be a suitable business process for web-based automation and e-Service delivery. Customer segmentation e-services are highly useful for many businesses, e.g. retail, telecom, and the finance industries. These industries need to perform customer segmentation tasks frequently since they acquire new customers on a daily basis. Being able to outsource customized segmentation functions that can be called upon anytime via an ASP service is a key competitive advantage.

The remainder of this paper is organized as follows: Section 2 describes the highlights of the unbundling methodology employed to disaggregate CRM applications into e-services. Section 3 describes the business process analysis/mapping stage of the unbundling methodology. Section 4 presents the functional domain coverage analysis stage of the unbundling methodology. Section 5 presents the design of the customer segmentation service delivery process. Section 6 discusses related work and Section 7 summarizes and discusses the key lessons learned from this work.

## 2 Unbundling CRM Applications

CRM applications such as Siebel, PeopleSoft, and SAP have grown in functionality and usually incorporate components for marketing automation, sales force automation, partner relationship management, customer segmentation, CRM analytics, product support management, channel integration (e.g., call centre, ATMs, branches), employee relationship management, etc. This functionality expansion increased the footprint and complexity of CRM installations, therefore turning CRM implementations into highly disruptive and risky organizational projects.

Large scale CRM application implementations are typically performed in a “Big Bang” approach where several enterprise processes are automated concomitantly. As a result, projects are highly expensive, often delay and are traditionally known for budget overruns. Despite the strategic importance of CRM in revenue assurance and expansion, the spiraling total cost of ownership (TCO) linked to CRM solutions and the high failure rates of CRM projects [gt03] have prevented and/or delayed CRM uptake decisions by companies. To avoid the potential high costs of mega failures and to develop CRM capabilities at an incremental pace, some organizations are opting for a piece-meal and flexible approach to CRM uptake. In this approach, business processes are mapped, prioritized, and CRM functionality is acquired/rent following a business case driven, incremental, and best of breed approach [hg02].

The growing importance of outsourcing and piece-meal approaches to CRM uptake has been spotted by the major CRM providers and is driving vendors to disaggregate CRM solutions into portfolios of functionalities that can be sourced separately and reconciled with third party solutions. The process of disaggregating software packages into self contained services is known as *Unbundling* [gk88,gd88,bc02]. Unbundling is a reengineering concept applicable to several design artifacts such as business system value chains [po85], business processes [hr04] and software architectures [gk88]. From a software design view, unbundling is defined as “the activity to break up monolithic software systems into smaller units with a fair degree of autonomy. Each unit provides a specific service of the software system which should not only be useful in combination with the further functionality of the system but also separate from it [gk88]”.

In this work, we develop an unbundling strategy for CRM applications that combines a top-down business process analysis/mapping stage with a bottom-up functionality coverage analysis stage prior to the design of the unbundled e-service. To illustrate the application of the unbundling process, we disaggregate a customer segmentation business process [rc04,bu04] from a typical CRM value chain [bu04]. The process enacted to unbundle customer segmentation consists of the following stages:

1. *Business process analysis/mapping*: the business process corresponding to the application component considered for unbundling (e.g., customer segmentation) is mapped towards identifying the business process relationship with the business system value chain, the main business process steps, stakeholders, key information flows between process steps and process participants, core IT requirements and interfaces necessary to support the business process.

This stage enables the elicitation of business process knowledge required to understand the interfaces between the business system value chain and the supporting IT applications, therefore enabling the isolation of the main interactions between the business and IT systems underpinning the business process.

2. *Application functional domain coverage analysis*: the existing enterprise application package is functionally decomposed towards identifying self contained functional components (components with high functional cohesion and low coupling with other functional components). The functional analysis stage is performed recursively until the functional domain level of abstraction reaches a level of granularity that corresponds to typical functional interfaces offered by the software application to the business process (Business/IT alignment functions). This stage also enables the identification of functional gaps that may need further development/sourcing and the break up of pre-existing applications that support the process into self contained services.

3. *e-Service design*: the unbundled e-service architecture and the supporting service delivery process are specified following a software architecture and service connection model (e.g., web services standards). The supporting service delivery process is also specified in a software process execution language (e.g., SPEM [og02]), highlighting the process steps and key interactions between stakeholders. Quality concerns relating to delivering the functionality as a service are also addressed ensuring that specific non-functional requirements linked to e-service-based applications are adequately dealt with. In this stage, the relevant functional components are “stitched together” towards developing the delivered e-service.

The unbundling process stages described above are fundamental to (1) understanding the key business requirements linked to the unbundled service; (2) identifying what application functionality is available in the software asset base and/or needs to be developed; and (3) the core interactions between the service provider and service consumers that will ultimately determine how to design the service delivery process. The unbundling process is helpful for organizations that currently possess CRM software assets and are interested in packaging functionality into e-services for third party service provision and also for organizations developing niche CRM e-services for specific application domains without departing from a substantial software asset base. It is important to note that although we used customer segmentation to illustrate unbundling, the unbundling process described above can also be used to disaggregate other functional dimensions of the CRM value chain. The following sections will describe details of the application of each unbundling process stage for the customer segmentation case study.

### **3 Business Process Analysis for Customer Segmentation**

Not all customers are profitable, and some customers are much more profitable than others. For instance, according to [il00], in the pharmaceutical industry, 20 percent of the physicians account for 80 percent of the prescriptions. It indicates that a minority of customers in the pharmaceutical market represent the majority of value.

Companies, hence, need to segment customers based on profitability, focusing on the small number of profitable customers that most contribute to profit pools. Customer segmentation is employed across many industries. A typical example is the retail industry. The retail industry is one of the oldest industries since the notion of trade was invented. Retailers perform the task of middleman and serve the consumers from the barter economy to the new tech-based economy. As the competition in the retailing sector intensifies, retailers now require their own marketing strategies to retain existing customers and acquire new customers to remain ahead of competition. In a retail survey [ib99], most companies are shown to base their strategies on special services to enhance customer loyalty. However, the development of new products and services should be based on a better understanding of the customer base. One of the most useful tools for understanding market diversity is segmentation [rc04].

With segmentation analysis, businesses can know precisely where they have to concentrate efforts. One of the major strategies recommended to retailers by the Retail Council of Canada [ib99] is to focus efforts on niche markets and special customers. Customer segmentation, hence, is a crucial element of retail strategy. Without accurate segmentation in the light of their profitability, strategic decision makers are not able to gather the correct information they need to evaluate and execute marketing strategies to be able to offer personalized products or services to customers. However, implementation of an effective customer segmentation strategy is a serious challenge for many companies, given that they often lack the expertise and specific utilities to make sense of the vast volumes of customer data that exist throughout the business. Besides the need for expertise and specific utilities, the implementation of effective customer segmentation strategies is also required to follow an appropriate segmentation procedure. A typical segmentation procedure includes the following stages:

1. *Understanding segmentation objectives:* Each customer segmentation task has segmentation objectives (e.g. maximize profit, minimize churn) that serve the business needs. The understanding of business needs and segmentation objectives is the first step of a segmentation procedure.
2. *Deciding what data should be collected and where it can be collected:* Customer data is available throughout the enterprise and stored in various databases. Some data are valuable for segmentation whereas some are not. Hence it is necessary to consider what data should be collected and where it can be collected.
3. *Integrating and cleaning collected data:* The data collected from various databases is frequently inconsistent. Some data may also miss values in certain fields. Hence the collected data needs to be integrated and cleaned.
4. *Choosing methods and technologies for segmentation:* Many methods and technologies, e.g. statistical methods, online analytical processing (OLAP), and data mining, can be used for segmentation. Each method or technology has its own advantages and disadvantages. Therefore the selection of the segmentation method is a major consideration for a segmentation operation.

5. *Implementing* applications and tools for segmentation: After the segmentation method has been chosen, the corresponding applications and tools, which implement the chosen segmentation method, will be employed for data segmentation in this stage.

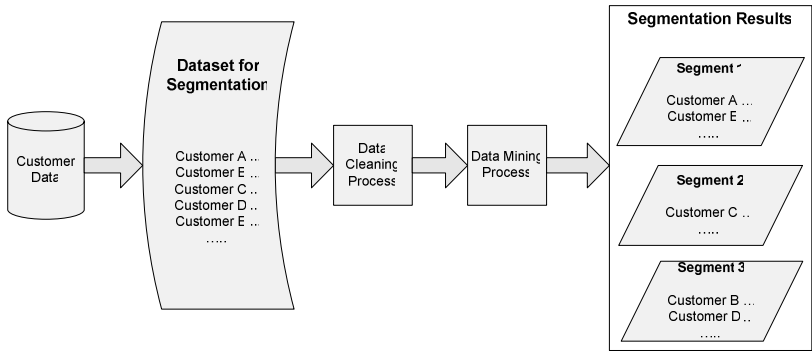


Figure 1: A typical customer segmentation process

Figure 1 shows a typical process for customer segmentation. Customer data for segmentation is collected from databases. The dataset containing the collected customer data is cleaned before it is fed to data mining tools. In the data mining stage, customer data is classified by specific segmentation algorithms. Customers will be segmented into different predefined segments according to their attributes in the dataset, following the segmentation objectives. To unbundle customer segmentation as an e-service, ASPs need an appropriate business process to deliver the customized segmentation functions and an appropriate IT functionality supporting the business process. These issues are examined in the following sections.

#### 4 Functional Domain Analysis

This stage begins with an application domain analysis step to identify available components in the software asset base and the cooperation between components. The components and the cooperation relationships between them determine an architectural structure and main process execution flow underlying the application. This is common in enterprise applications such as CRM and ERP, where the main process execution flow dictates how an organization’s business process should “adapt” to the structures and flows determined by the application software. Changing such structures and moving away from the standard customizations provided by the enterprise application package is too costly for package adopters, and has the additional disadvantage of not benefiting from standard upgrade releases that the software provider may include in contracts.

Given the blending of functional components, process flows and coordination components combined in the packages, the functional coverage analysis stage aims to isolate the functional components and decompose the functional domain into abstraction levels that reflect the interfaces provided to the business process.

Figure 2 provides a high-level illustration of the functional domain decomposition to isolate customer segmentation functionality.

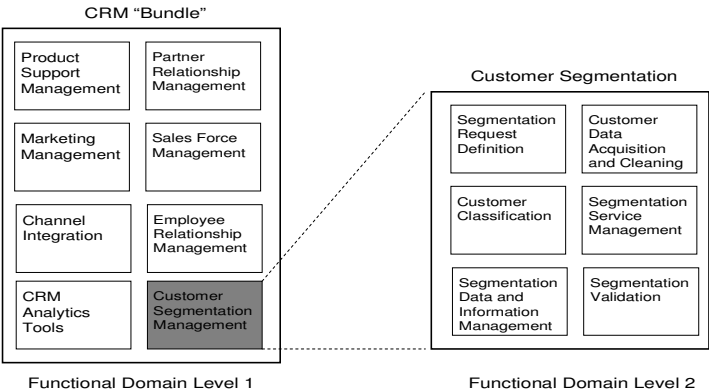


Figure 2: Functional Decomposition

In the decomposition step above, the key motivation is to isolate relevant out-of-the-box functionality for the unbundled e-Service, instead of the process flows and coordination aspects that stitch together the functional components of enterprise applications (e.g., an order business process flow in a CRM package). In case the service provided is a coordination service, the domain coverage analysis focuses on the flows and messages towards packaging the coordination protocols into an e-service. For an example of a CRM coordination protocol for order submission see [si04]. With the help of functional unbundling, service providers are able to develop services that will cater for specific functional needs without service consumers having to adopt and/or follow other dimensions of the application package. This is particularly useful for organizations that want to incorporate CRM functionality incrementally in a piece-meal approach.

The functional gap analysis step enables the identification of functional components that can be reused and/or adapted from the existing software asset base as well as components that need to be sourced and/or built from scratch. Figure 3 provides a high-level illustration of the functional gap analysis step. The gap analysis is performed by contrasting the process map stages and functional requirements relating to each business process map stage vis-à-vis the functional components identified during the functional decomposition of the software asset base. During the gap analysis, there are typically portions of the application asset base that can be straightforwardly reused without major adaptations, portions that will need significant adaptations (e.g., addition of software adaptor patterns for data input and output format changes), and portions that will need to be developed from scratch. In Figure 3, the horizontal axis illustrates the key process map stages and the vertical axis illustrates the functional requirements relevant to each process map stage. A blank in the intersection illustrates a situation where a requirement is not related to a specific process map stage.

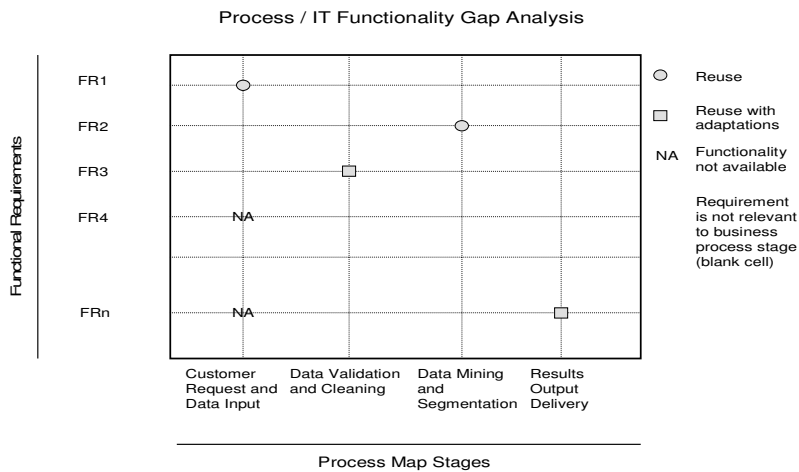


Figure 3: Functional Gap Analysis Conducted

## 5 Customer Segmentation Service Design

Figures 4 and 5 illustrate the key features of the proposed customer segmentation service. In the segmentation delivery process, a web service acts as the service front-end for the segmentation services provider. To request a specific segmentation function, a business client needs to submit a segmentation requirements file and a sample training dataset in XML format through the e-Service following an ASP-based model. After a successful parsing of the XML input files, the staff of the segmentation service provider will analyze the requirements and the sample dataset, and then configure a suitable web service to fulfill the requested segmentation function.

The segmentation e-Service will then be published in the ASP website, and a web application invoking this web service will be integrated into the segmentation e-Service. After that, the client will be able to use the customized segmentation application on-demand through the web service to classify his/her new acquired customer data. The segmentation results of the new acquired customers can be displayed instantly. The customized web service can also be invoked from the CRM system running in the client's company. The functionality of the client's CRM system, hence, is extended by the web service.

The customer segmentation business process is by nature semi-automated requiring creative people intensive tasks prior to a complete automation via a web interface. The process starts with people intensive tasks such as profiling and understanding the customer portfolio and segmentation goals that have to be performed off-line and with the help of analysts and consultants interacting with personnel from the client company (e.g., classify customers based on lifetime value, profitability, propensity to churn, etc).

After the people intensive tasks are performed, the deployment and continued use of the segmentation model by service consumers can be completely automated and supported by an e-service that implements the IF-THEN-ELSE rules underpinning the segmentation's decision model. The segmentation model implementation for a particular service consumer usually remains valid for years until a major event drives the company to request the reclassification of the customer base (e.g., change in market strategy or aggressive expansion of customer base).

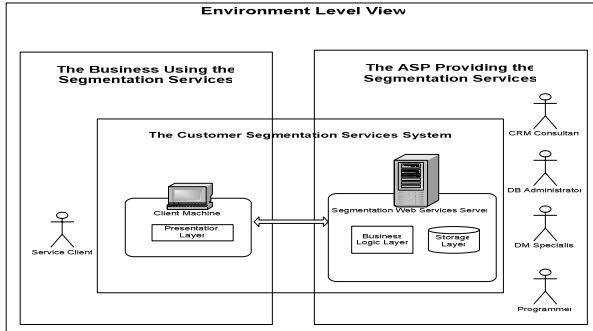


Figure 4: Overview of the proposed service

The key advantages of the ASP-based approach to sourcing segmentation services is the possibility of incrementally incorporating a critical CRM functionality, sourcing from a best of breed CRM/business intelligence provider, without increasing hardware and software ownership costs required to operate CRM solutions. The ASP adds value by having the CRM and business intelligence expertise, software, hardware and hosting databases for performing the segmentation tasks for the client on an ongoing basis. The client company will usually pay per use of the e-service on an on-demand basis.

The customer segmentation web service is not only the place where clients request for customized segmentation functions in the semi-automatic stages of the business process, but also the place where clients use the requested functions on-demand. The ASP website will host segmentation applications for implementing customized segmentation functions for different clients that can leverage the functionality on a pay-per-use basis. Figure 5 illustrates the details of the customer segmentation business process performed by the ASP. The business process specification follows the SPEM notation [og02]. The designed business process is a web-based process in which a website acts as the service front-end for the ASP delivering the specific segmentation CRM functionality.

There are five process roles involved in the designed business process. These five process roles are: service client, CRM consultant, database administrator, segmentation specialist, and programmer. Service clients are the business clients who request customized customer segmentation applications to segment their customers. CRM consultants, database administrators, segmentation specialists, and programmers, are the staff of the ASP. They are responsible for providing the requested customized segmentation services to clients.

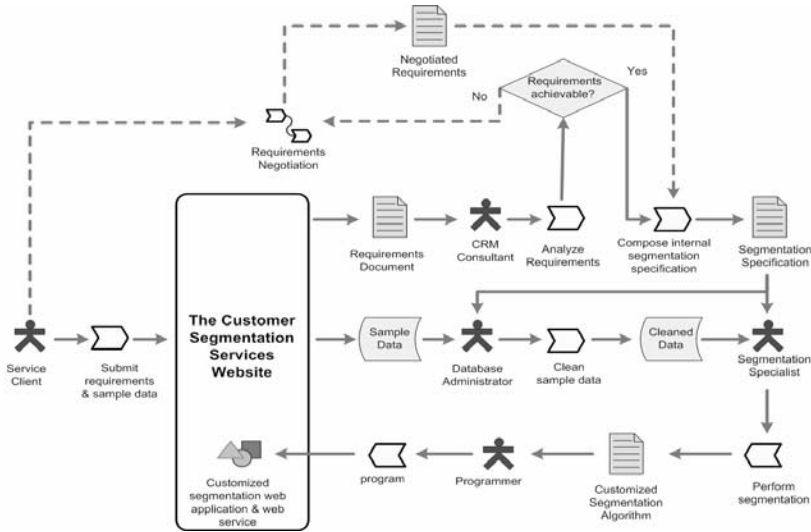


Figure 5: The high-level view of the service delivery process

The sequence of the designed business process to provide a requested customer segmentation application can be described as follows: The process begins with the request of a business client for a customized customer segmentation application to classify his/her customer data. To request a desired segmentation application, the client needs to submit his/her segmentation requirements and a XML file containing his/her sample customer data through the ASP's segmentation e-Service. In the segmentation requirements, the service client may state out how he/she wants to segment his/her customers, which segmentation technique he/she wants to employ to classify his/her customer data, how accurate the segmentation results should be, and so on.

Regarding the sample customer dataset, it is used for performing data classification, so that appropriate segmentation algorithms can be identified to construct the requested segmentation application based on the client's segmentation requirements. When the client submits the sample dataset, he/she also needs to provide a document which contains the description of the attributes in the sample dataset. Once the client submits his/her segmentation requirements to the system, the system will create a document recording the client's segmentation requirements. CRM consultants in the back-office of the ASP will analyze the client's requirements. The CRM consultants are experts familiar with CRM and customer segmentation. They can provide professional advice on customer segmentation to service clients.

If CRM consultants consider the client's segmentation requirements are unreasonable or unachievable (e.g. the client requires a data mining algorithm-based segmentation application that can classify his new customer data with 100% accuracy.), they will contact the client to negotiate the requirements, so that they can achieve an agreement on the revised segmentation requirements.

When the segmentation requirements are considered to be achievable, CRM consultants will compose an internal segmentation specification and send it to database administrators and segmentation specialists. Segmentation specialists are the staff specialized in data mining and statistical methods for customer segmentation. Segmentation specialists will choose appropriate methods and software to perform data classification according to the internal segmentation specification. Before segmentation specialists use the client's sample customer data to perform data classification, the sample customer data submitted through the segmentation e-Service by the client may need to be cleaned if the data has poor quality (e.g. some records have missing values in certain fields such as address or date of birth [al02]). The data cleaning action is performed by database administrators after the internal segmentation specification task.

After cleaning and segmentation specialists identify the most appropriate classifier model to classify the client's sample customer data according to the segmentation requirements, they document the segmentation algorithm of the classifier model and send it to programmers. Based on the segmentation algorithm, programmers program the customized web service and web application which will be integrated into the customer segmentation e-Service. The customized web service and web application can only classify the customer data in which the attributes must be the same as the ones in the sample data submitted by the client before. Once the requested customized segmentation web application and web service are integrated into the customer segmentation e-Service, the service client will be informed that his/her requested service is available. The client will be able to use the customized segmentation application to classify his/her new acquired customer data in the e-Service. Moreover, the client can also invoke the customized segmentation web service in his/her CRM system to classify his/her customer data.

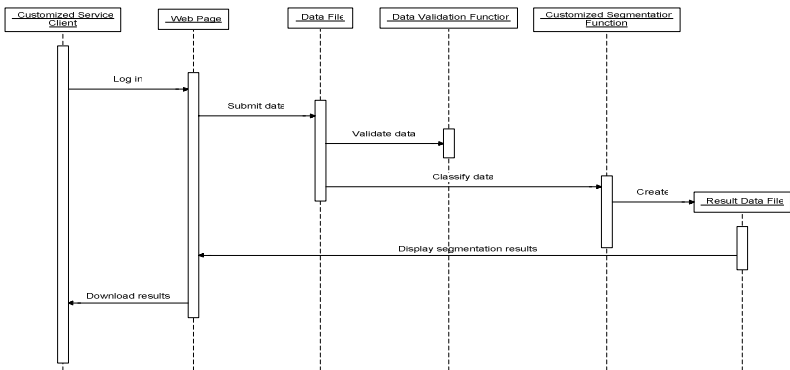


Figure 6: The sequence diagram for the system

Figure 6 illustrates how clients use the segmentation applications in the website. To use a customized segmentation application, a service client needs to log in to the e-Service.

After log in the client submits the XML file containing the customer data for segmentation through a customized page. A data validation function will be invoked to validate the submitted data file. If the validation succeeds, the customized segmentation function will be invoked to classify the data and creates a result data file. The result data file will be displayed to the user so that he can download the segmentation results. When the web service is built, the programmer publishes it in the segmentation services website. The programmer also writes a web application and composes the XML schema for future data to be classified. The web application invokes the customized web service to classify the customer data submitted by the client. The XML schema is also used to validate the submitted data. Both the web application and the XML schema are integrated into the website. When these tasks are finished, the customized segmentation application will be available to the client for on-demand continuous usage.



Figure 7: Fragment of a segmentation result data file

Figure 7 shows a fragment of a segmentation result data file generated by a customized segmentation e-Service (for implementation aspects see [sah5]). The Credit\_Scoring attribute of each customer record in the result file has been marked as high, medium, or low in terms of the segmentation algorithm. This is the output provided by the customized service for a new batch of customers submitted to the ASP portal.

## 6 Related Work

IBM has developed a service design/deployment framework [ibm5] that is applicable to unbundling existing applications and organizational processes into on-demand e-Services. The framework is based on the following complementary methods/techniques: (1) Component Business Model (CBM): this analysis/design method addresses the componentization of the business value chain and underlying IT platform. CBM is based on the analysis and modeling of people, processes and technology to isolate service components that act as standalone building blocks.

(2) Service-Oriented Modeling and Architecture (SOMA): that includes service identification and specification, component identification and specification and supports service deployment decisions. SOMA provides the basis for the service implementation using a service-oriented architecture. SOMA applies techniques such as domain analysis, process modeling and component-based development. It also employs requirements modeling approaches such as goal service modeling to enable customers to determine the optimal granularity of an e-Service. The unbundling approach described in our work differs from the IBM framework with regard to the emphasis given by the IBM framework to the strategic and holistic organizational decomposition prior to the unbundling process. The IBM framework advocates that the organization should perform a holistic analysis, mapping and redesign of its organizational blueprint prior to service redesign. In our approach, we focus at the tactical/operational level of process/service design, therefore confining the mapping and analysis stage to the segments of the organization value chain that are affected by the new/redesigned services. The work described in [hr04] illustrates how banking value chains can be unbundled (disaggregated) to increase sourcing and service delivery flexibility. The approach, however, is limited to addressing the early stages of the unbundling process (analysis of the value chain) without developing the later stages necessary to modeling and packaging process components into on-demand e-Services.

## **7 Summary and Future Work**

The transition from a static and content-based Web to an active and service-based Web will lead to the widespread adoption of e-Services to carry out business processes involving high-level interactions among various parties [sh05]. Within this context, challenging enterprise applications such as CRM, ERP and SCM are already undergoing major reengineering initiatives by leading market players towards leveraging web technologies and standards to develop new models for packaging and deploying application functionality. The new service-based delivery models enable an incremental and piece meal technology adoption approach with the additional possibility of renting the functionality following an application service provider strategy, therefore reducing total ownership costs and entry barriers to enterprise application software adoption. This paper addresses issues and methodological steps relating to unbundling CRM applications into self-contained e-Services and developing the e-service delivery blueprint. In particular a study is conducted illustrating the unbundling of customer segmentation functionality towards modeling, packaging and delivering the functionality as an on-demand e-Service. The unbundling strategy enacted combines a top-down business process analysis/mapping stage with a bottom-up functionality coverage analysis stage prior to the design of the unbundled e-service. The strategy can be applied in settings where there is an extensive software asset base that needs to be reengineered and/or in situations relating to Greenfield e-Service development.

To apply the unbundling strategy and enable a service-oriented deployment of CRM functionality, each core CRM process contained in a CRM package must be isolated, mapped and wrapped in a service interface that can be accessed on the web through a service-oriented architecture.

We have used the SPEM notation to illustrate the business process model details and provided a detailed walk through of how the process works in a typical usage scenario. We are also currently investigating the applicability of the unbundling approach towards packaging CRM coordination functionality as e-Services. Coordination functionality in CRM systems typically span several organizational areas (e.g., order fulfillment spans across Finance, Sales and Logistics), presenting additional challenges relating to mapping, isolating and composing services to support the business process.

**Acknowledgements:** Dr. Sampaio thanks the Knowledge Transfer Partnership Grant from the UK's Department of Trade and Industry (KTP001045) for supporting his work in CRM business/IT frameworks.

## References

- [al02] Arndt, D., Langbern, N.: Data Quality in the Context of Customer Segmentation, in Proceedings of 7th International Conference on Information Quality, 47-60, 2002.
- [bc02] Bauer, C., Colgan, J.: The Internet as a Driver for Unbundling: A Transaction Perspective from the Stockbroker Industry, *Electronic Markets*, 12(2), 2002.
- [bu04] Buttle, F.: *Customer Relationship Management Concepts and Tools*, Elsevier, 2004.
- [cb05] Crawford, C., Bate, G., Chebarkov, L., Holley, K., Tsocanos, C. (2005), Toward an on Demand Service-Oriented Architecture, *IBM Systems Journal*, 44(1), 81-107, 2005.
- [gd88] Geppert, A., Dittrich, K.: Bundling: Towards a New Construction Paradigm for Persistent Systems. *Networking and Information Systems* 1(1): 69-102, 1998.
- [gk88] Gatzju, S., Koschel, A., Bultzingsloewen, G., Fritschi, H.: Unbundling Active Functionality, *ACM SIGMOD Record*, 27(1), 35-40, 1998.
- [gt03] Gartner Group: CRM 'Shelfware': Causes, Effects and What to Do About It, [www.gartner.com](http://www.gartner.com), ID Number COM-19-5473, April issue, 2003.
- [ha02] Harney, J.: *Application Service Providers: A Manager's Guide*, Addison-Wesley, 2002.
- [hg02] Hancock, D., Galal, H., Falcone Sampaio, P.: CRM in a shoestring: Achieving performance impact through customer relationship management. *Knowledge Object* 604404, 48 pages, Knowledge Base Portal (Know), McKinsey & Company Inc, 2002.
- [hr04] Homann, U., Rill, M., Wimmer, A.: Flexible Value Structures in Banking, *Communications of the ACM*, 47(5), 34-36, 2004.
- [ibm5] [http://www-1.ibm.com/services/us/bcs/html/bcs\\_componentmodeling.html](http://www-1.ibm.com/services/us/bcs/html/bcs_componentmodeling.html)
- [ib05] IBM Research: *Services Science: A New Academic Discipline*. IBM Almaden 2005.
- [ib99] IBM Canada, Retail Council of Canada, CEO Survey: The Future of Retailing, 1999.
- [il00] Imhoff, C., Loftis, L., Geiger, J.: *Building the Customer-Centric Enterprise*, John Wiley & Sons, 2000.
- [og02] Object Management Group: *Software Process Engineering Metamodel Specification*, Version 1.0, November 2002.
- [po85] Porter, M.: *Competitive Advantage*, Free Press, 1985.
- [rc04] Ruiz, J.P., Chebat, J.C., Hansen, P.: Another trip to the mall: a segmentation study of customers based on their activities, *Journal of Retailing and Consumer Services*, 2004.
- [rk03] Rust, R., Kannan, P. K.: e-Service: A New Paradigm for Business in the Electronic Environment, *Communications of the ACM*, 46(6), 37-42, 2003.
- [sah5] Falcone Sampaio, P., He, Y.: Business Process Design and Implementation for Customer Segmentation e-Services, in *proc. of International Conf. on e-Technology, e-Commerce and e-Service*, IEEE press, 228-234, 2005.
- [sh05] Singh, M., Huhns, M.: *Service-Oriented Computing, Semantics, Processes, Agents*, Wiley, 2005.
- [si04] Siebel: *Web Services Support in Siebel 7*, Siebel White Paper, May 2004.