A Process Model for Customer Relationship Management System Selection

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Dipl.-Oekonomin, Ina, Friedrich

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Referent: Prof. Dr. Michael H. Breitner

Korreferentin: Prof. Dr. Cornelia Schön

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Meinen geliebten Eltern Gabriele Böhm und Heinrich Träger

Abstract in English

Customer relationship management (CRM) systems provide an IT support on a strategic, operative and analytic level to improve and intensify customer business. Therefore, the implementation of CRM systems has increased but success rates still lack. In the area of IT implementation the development of an evaluation framework has started but the specific of CRM was disregarded so far.

This thesis develops a CRM specific process model for CRM system selection (CRMSS) based on the methodical framework by Ahlemann and Gastl. Initially a literature review is conducted to assess the current status on CRM and IT system selection to develop an initial model. The findings are evaluated in two phases discussing the process, a criteria catalogue and possible evaluation methods with CRM experts from science, consulting and customer perspective in direct interviews as well as through two online surveys. The model was refined and expanded to a more detailed level in two cycles. The final CRMSS process model describing all phases, management streams, four selection criteria categories (quality, cost, functional and technical) is enhanced by a system selection tool specifically focusing on CRM systems using the weighted scoring method (WSM). All findings are verified in a practical test in a case study with an automotive supplier. The process model was further refined to result in its current form.

Keywords: CRM, system selection, system evaluation, case study research, process model automotive industry.

Abstrakt in Deutsch

Bei Customer Relationship Management (CRM) Systemen handelt es sich um IT Support auf einer strategischen, operativen und analytischen Ebene, um die Geschäftsbeziehung zu verbessern und zu intensivieren. Daher hat sich die Anzahl der Einführungsprojekten von CRM Systemen erhöht, die Erfolgsrate jedoch nicht im gleichen Maße. Im Bereich der IT Implementierungsprojekte wurde aus diesem Grund begonnen, ein Rahmenwerk für einen Standard Auswahlprozess zu entwickeln, in welchem noch nicht auf die spezifischen Anforderungen für CRM Systeme eingegangen wird.

In den nachstehenden Arbeiten wird ein CRM Prozessmodell für CRM Software Selektion (CRMSS) hergeleitet, welches auf dem methodischen Rahmenmodell von Ahlemann und Gastl basiert. Zunächst wird eine Literatur Analyse durchgeführt, um den aktuellen Status im Bereich CRM und IT Software Selektion zu untersuchen sowie ein initiales Modell zu entwickeln. Die Ergebnisse werden in zwei Zyklen analysiert, wobei der Analyseprozess, ein Kriterienkatalog und mögliche Selektionsmethoden mit CRM Experten aus der Wissenschaft, Unternehmensberatungen und Kunden in direkten sowie online Befragungen diskutiert werden. Das Prozessmodell wird auf Basis der Ergebnisse in zwei Zyklen weiterentwickelt und ausdetailliert. Das endgültige CRMSS Prozessmodell beschreibt alle Analysephase des Modells, Management Prozesse, die vier Hauptselektionskategorien (Qualität, Kosten, Funktionen, Technik) und wird durch Grundlagen für ein CRMSS Auswahltool erweitert. Dieses Tool fokussiert auf CRM Systeme auf Basis der Weighted Scoring Methode (WSM). Alle Forschungsergebnisse werden durch einen Feldtest in der Praxis mit einem Automobil-zulieferer erprobt und entsprechend angepasst.

Schlagwörter: CRM, System Auswahlprozess, Software Auswahl, Fallbeispiel Forschung, Prozessmodell, Automobil Industrie.

Content

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List of Abbreviations

Abbreviation	Description
HP	Analytic Hierarchy Process
BI	Business Intelligence
COTS	Commercial Of The Shelf
CRM	Customer Relationship Management
CRMSI	CRM System Implementation
CRMSS	CRM System Selection
ERP	Enterprise Resource Planning
ESSE	Expert system for software evaluation
HKBS	Hybrid Knowledge Based System
ISR	Information System Research
KBS	Knowledge Based System
MCDM	Multiple Criteria Decision Making
ROI	Return on investment
SaaS	Software as a Service
SWOT	Strengths, Weaknesses, Opportunities and Threats
TCO	Total Cost of Ownership
WSM	Weighted Scoring Method

0 Management Summary: General overview of published papers

The software systems market for diverse IT support solutions has increased significantly in the last years covering vertical solutions as well as integration topics. Therefore, identifying and selecting the most suitable solution for a company has become a complex decision problem (Jadhav and Sonar, 2009a). IT departments regularly need to make decisions on hard- and software investments as well as consulting support and other services (Yazgan et. al., 2009). Due to high costs for those IT investments and application maintenance evaluation of software systems should not be a gut feeling but strategically prepared and conducted. The decision problem of selecting a suitable solution has become a complex problem as the number of available solutions is constantly increasing, the variety of hard- and software incompatibilities need to be taken into account, and decision makers do not have all required information to make such decisions (Lin et. al., 2006). Furthermore, the decision should not only be made by IT or business managers, but with shared responsibility, especially to achieve alignment and buy-in within the organization when making new investment decisions (Chen and Wu, 2011; Howcroft and Light, 2010). For this reason, an IT evaluation methodology should be part of every IT/IS management in companies. The main decision parameters cover adaptability of the business processes, flexibility in terms of market and strategy changes, IT architecture fit, as well as implementation, configuration and maintenance costs.

A CRM system selection (CRMSS) process model was constructed and evaluated to support the evaluation of CRM system solutions. Selection of a CRM system is a challenging software engineering process (Jadhav and Sonar, 2009a) and implementation of a CRM system imposes significant changes to business processes and the organization (Chen and Popovich, 2003; Finnegan and Currie, 2009). Although parts of the model can be used for other IT selection projects as well there are specific areas like functional criteria and a provided system selection tool which are tailored for CRMSS. This section provides an overview of all published papers and the underlying methodology to develop the CRMSS process model.

There are differing definitions of process models in the literature, all of which refer to the representation of a class of domains (Frank 1999; Rohloff 2008) as a starting point for the development of new applications (Banker et al. 2010; Braunwarth and Friedl, 2010). The CRMSS process model was developed in four phases based on the methodology suggested by Ahlemann and Gastl (2007). Phase 1 included the challenges of problem identification and planning. The model construction of phase 2 was based on a comprehensive literature review and on expert interviews. In phase 3, a second and third empirical study with the intention of validating results of the former phases and refining the CRMSS approach were conducted discussing the model with international CRM experts. This paper presents the

results and conclusions of phase 4. The CRMSS process model was applied to a case study in the automotive industry using qualitative interviews to evaluate all aspects with project members from all interest groups.

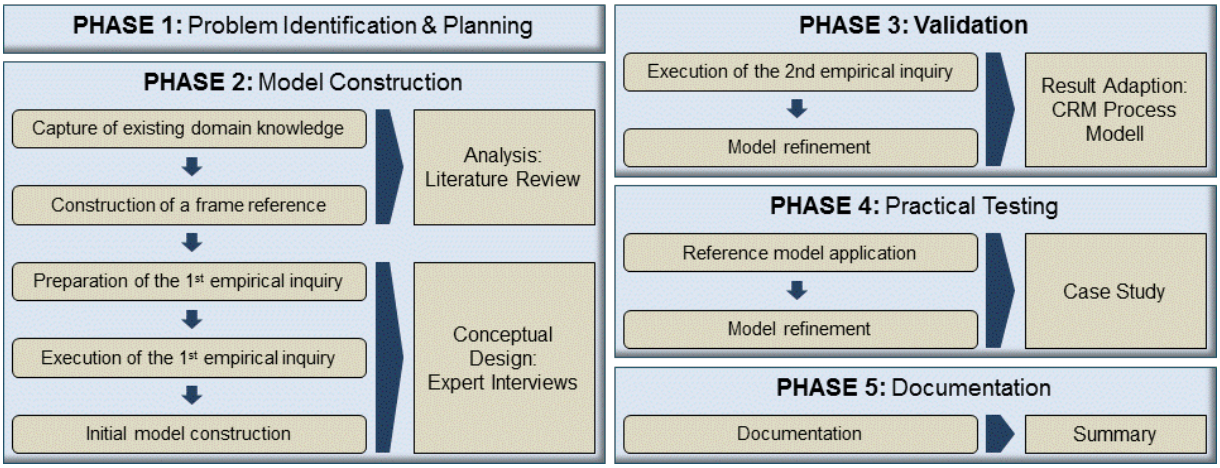

Figure 1: Overview on applied research approach to process model development (Adapted from Ahlemann and Gastl (2007)

The model construction in phase 2 bases on a literature review. This work was conducted in cooperation with Dr. Jon Sprenger and Prof. Dr. Michael H. Breitner in 2009 and published at the Multikonferenz der Wirtschaftswissenschaften (MKWI) in 2010. To validate the initial model an interview guideline was created and tested in expert interviews in 2010. After the refinement of the questionnaire an online survey was conducted which resulted in a paper with Dr. Jon Sprenger and Prof. Dr. Michael H. Breitner published at the AMCIS in 2011. The results were used to refine the process model and the questionnaire and to conduct a second online survey with a more international focus. The results were published and in Review at ICIS 2012. To achieve a practical validation a case study was initiated with an automotive supplier resulting in a paper which is presented at European Conference on Information Systems (ECIS) 2012. All findings of the expert evaluation and the case study were the basis for the development of a supporting system selection tool. The results are currently in review at ICIS 2012.

Beside the research approach to develop the CRMSS process model a few further papers were published in cooperation with researchers from the institute of information system research (ISR), Leibniz University of Hanover. An overview of all published papers is provided in the following table.

Date of publication	Title	Authors	Conference / Journal / Book	VHB WKWI*	VHB JQ2**	Ap-pendix
02/2010	CRM Evaluation – An Approach for Selecting Suitable Software Packages	Friedrich, I. Sprenger, J. Breitner, M. H.	Tagungsband Multikonferenz Wirtschaftsinformatik (MKWI 2010), February 23.-25., Göttingen, Germany.	C	D	A1
11/2010	Discussion of a CRM System Selection Approach with Experts: Selected Results from an Empirical Study	Friedrich, I. Sprenger, J. Breitner, M. H.	IWI Discussion Paper #44, 20 Seiten, Leibniz Universität Hannover, Institut für Wirtschaftsinformatik, Hannover, Germany.			A2
08/2011	Discussion and Validation of a CRM System Selection Approach with Experts	Friedrich, I. Sprenger, J. Breitner, M. H.	Proceedings of the 17th Americas Conference on Information Systems (AMCIS 2011), August 4.-8., Detroit, USA.	B	D	A3
01/2012	Requirements Analysis for a Student Relationship Management System - Results from an Empirical Study in Ivy League Universities	Lechtchinskaia L. Friedrich, I. Breitner, M. H.	Proceedings of the 45th Hawaii International Conference on System Sciences (HICSS 2012), January 4.-7., Maui, HI, USA.	B	C	A4
02/2012	Towards a Process Model for Efficient Customer Relationship Management System Selection	Friedrich, I. Breitner, M. H.	Tagungsband Multikonferenz Wirtschaftsinformatik (MKWI 2012), February 29.- March 2., Braunschweig, Germany.	C	D	A5
06/2012	Acceptance of a Process Model for Customer Relationship Management System Selection an Automotive Case Study	Friedrich, I. Kosch L. Breitner, M. H.	Proceedings of the 20th European Conference on Information Systems (ECIS 2012), June 10-13, Barcelona, Spain, 2012	A	B	A7
12/2012	Validation of a Customer Relationship Management (CRM) System Selection Model Based on International Expert Interviews	Friedrich, I. Breitner, M. H.	Submitted to: Proceedings of the International Conference on Information Systems, ICIS 2012, Orlando, Florida, USA, December 16-19, 2012.	A	A	A6
12/2012	Towards a Multi-Criteria Decision Support Framework for Customer Relationship Management (CRM) System Selection	Zakhariya, H. V. Kosch, L. Friedrich, I. Breitner, M. H.	Submitted to: Proceedings of the International Conference on Information Systems, ICIS 2012, Orlando, Florida, USA, December 16-19, 2012.	A	A	A8

* Classification through academic commission of information system research association of professors (wissenschaftliche Kommission Wirtschaftsinformatik im Verband der Hochschullehrer für Betriebswirtschaft e.V. und den Fachbereichen Wirtschaftsinformatik der Gesellschaft für Informatik), (2010)
** Classification through Business Research (BuR) – Verband der Hochschullehrer für Betriebswirtschaft e.V. (2011)

1 Introduction

The market for software systems on diverse IT support solutions has significantly increased in the last years covering vertical solutions as well as integration topics. Therefore, identifying and selecting the most suitable solution for an individual company has become a complex decision problem. The main decision parameters cover adaptability of the business processes, flexibility in terms of market and strategy changes as well as IT architecture fit. Customer Relationship Management (CRM) was discussed in the literature since the nineties. IT evaluation, on the other hand, dates back to the eighties starting with a more contemporary approach (Farbey et al. 1999). CRM system solutions range from simple address and activity management applications to integrated software packages linking front office and back office functions (Chen and Popovich 2003). Hence, there exists a multitude of different characterizations for CRM which span from a more technological driven perspective (information technology term for methodologies, software and usually Internet requirements that help enterprises, manage customer relationships (Xu et. Al 2002)) to a more strategic and organizational driven perspective (strategic plan of companies to develop stronger relationships with customers and to learn more about their needs and behaviours through the the customer life-cycle (Smith 2006)). For the context of this paper a definition by Goldenberg (2000) is used, who describes CRM as a cross-functional, customer-driven, technology-integrated business process management strategy that aims at sustaining and improving relationships which encompasses the entire organization. This definition thereby incorporates all three dimensions of the CRM implementation model (people, process and technology) by Chen and Popovich (2003). The goal of CRM is to support business units through technology to not only gain insights into the behavior and value of their customers but also to fulfill their needs and satisfaction to effectively increase revenue. It additionally supports the identification, acquirement and retainment of profitable customers by interacting with them in an integrated way through a variety of communication channels (Balaji and Alexander 2003).

As reported by earlier works, the success rate of CRM implementation projects still is not satisfactory up to today (Finnegan and Currie 2009; Becker et al. 2009). Reasons for failing expectations of involved parties are diverse, but can be summarized under the three already mentioned dimensions “Human Factor”, “Processes” and “Technology” (Figure 2). “Human Factor” subsumes reasons that involve people from all stakeholder parties, e.g. missing or inefficient training lead to false use or non-acceptance of software products. “Processes” subsumes reasons that include the implementation, adaption and understanding of business processes. The last dimension “Technology” subsumes reasons of technical failures as e.g. testing of the applicability, integration and functionality of a software product. Mendoza et al. (2007) recently proposed similar critical success factors for an efficient implementation of a CRM strategy.

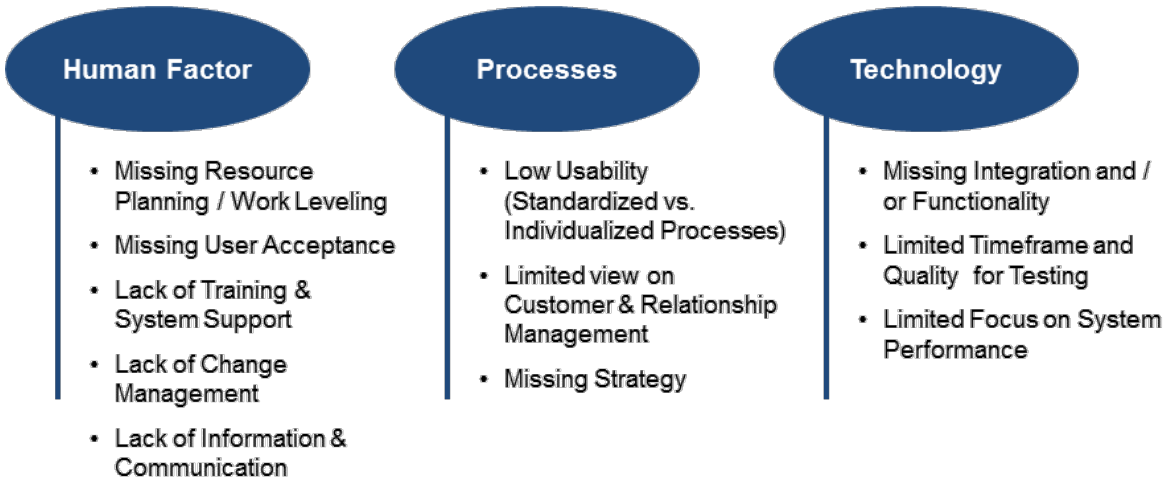

Figure 2: Reasons for failing CRM implementations (own illustration)

New CRM solutions or updated versions of established products continuously enter the market. Due to the described quality problems and to how quickly evaluation results become outdated this work proposes a new approach for the evaluation of a suitable CRM software solution avoiding the identified failures.

The CRM system selection (CRMSS) methodology covers the whole process of selecting packaged CRM software, after a CRM strategy was defined, and before the implementation project begins. The proposed methodology applies to tender evaluation and may be adopted for other purposes. Furthermore, the differences to General IT evaluation are shown.

The thesis is structured as follows:

Within the first section an introduction to the major published papers as well as the underlying research questions is given. Each subsequent paper provides a more detailed view on the underlying methodology, an overview on the results and findings as well as a critical assessment which leads to the next research question. Section 2 presents the initial literature review to assess the current status in 2009 on CRM and IT system selection. The search was conducted via three major research portals in the information system research area. The results were read double-blinded and resulted in an initial CRMSS model. Section 3 evaluated the initial model in two phases. In phase 1 the outcome was discussed with CRM experts from science, consulting and customer perspective. The initial model was refined and expanded to a more detailed level to be presented on an international level using a broader questionnaire and statistical tools to analyze the quantitative results. The CRMSS process model was further refined and expanded to a broader level. Section 4 presents the full CRMSS process model describing all phases, management streams, four selection criteria categories (quality, cost, functional and technical). Section 5 presents the development of a

CRMSS tool using the WSM as an evaluation technique to calculate the multi-criteria problem. The tool incorporates findings from other works on IT selection tools and adds a further component. Section 6 verifies the practical validity of the CRMSS process model and all former findings in a case study with an automotive supplier. The process model was extended once more to result in its current form. Section 7 discusses all findings and provides an outlook on future publications.

In the following, the motivation for each field of study in the successive sections is presented.

Section 2: Literature review on a methodology to select suitable software packages

The paper FRIEDRICH ET AL. (2010) is the foundation work to validate the current research status in the literature. A discussion between researchers and practitioners has shown that process models are available in consulting companies but in science only little work was published especially regarding CRM systems. It is essential to evaluate the current research status in science literature to design an initial model for CRMSS to initiate a scientific discussion on the topic. The central research question is:

1. What is the current status of science research on CRM evaluation methodology?

Section 3: Validation of initial CRMSS process model based on international expert interviews and online surveys

The paper FRIEDRICH ET AL. (2011 and 2012b) validate the proposed CRMSS framework initially developed on the basis of the results of the literature review. After each review cycle the framework was refined. In the discussion with CRM practitioners from business and IT areas also researchers and customers of CRMSS projects were contacted to get all dimensions of CRMSS. The central research questions are:

1. What do experts think of the proposed CRM system selection approach?
2. Which criteria of the proposed approach need to be changed or optimized?
3. Is an Analytic Hierarchy Process (AHP) approach the preferred technique for evaluating CRM systems?

Section 4: Towards the process model for efficient CRMSS

The paper FRIEDRICH AND BREITNER (2012) utilizes all results from the different evaluations and summarizes those in a CRMSS process model for the categories method, criteria and evaluation technique on a detailed level focusing especially on the criteria part as an essential component of the CRMSS process model. The fourth category tool is discussed in section 5 as there were no findings from the evaluations. The central research questions are:

1. What are the core components of an efficient CRMSS process model?
2. What criteria must be taken into consideration in an efficient CRMSS process model?

Section 5: Multi-criteria decision support framework for CRMSS

The paper ZAKHARIYA et, al. (2012) analyzes the current research status on the weighted scoring method (WSM) to outline a best practice proposal for CRMSS. The focus is not only on the mathematical derivation but also on the process steps to apply the tool in practice. The findings are incorporated into a CRMSS tool contemplating the four major CRM systems. The central research question is:

1. How can WSM be applied as a feasible evaluation technique to support CRMSS?

Section 6: Acceptance of CRMSS process model – An automotive case study

The paper FRIEDRICH ET AL. (2012) describes the application of the CRMSS process model in a case study with an automotive supplier. Selected project members from all areas were interviewed after the CRMSS project was completed. The findings resulted in a final refinement of the CRMSS process model. The central research question is:

1. Is the CRMSS process model applicable in practical testing and which model elements need to be refined?

2 Literature review on a methodology to select suitable software packages

2.1 Methodology

To get an overview on the currently available information, a content analysis was performed (phase 2). The goal was to find published articles in journals and conference proceedings which discussed the topic of CRM evaluation or IT evaluation in general. With “ACM Portal”, “Elsevier Science Direct” and “Springer Verlag” three major databases were selected for the baseline search for German and English language papers. As search criteria, the terms “IT evaluation”, “CRM evaluation” and “CRM strategy” were used. Hand research included the selection of referenced articles and papers that related to the search criteria.

In total, 137 papers could be identified with 122 in English and only 15 in German. 76 hits were related to IT evaluation, whereas 61 contained topics linked to CRM evaluation or other associated CRM topics. All papers were reviewed in full text for their relevance to the research question. Eighty-three papers were found to offer significant input and therefore were included in further analysis. The remaining papers then were further classified into four categories: “method”, “evaluation technique”, “criteria” and “tools”. Papers that could not be assigned to one or more categories or that were not referring to the subject were excluded. However, a publication might be allotted to more than one category if more than one topic was discussed by the authors. The search was performed between June and August 2009. Based on the results of the structured analysis of the identified literature a methodology that tries to address four categories was developed. The fourth category tools had not enough input so the authors developed a first concept (see section 4). The categories are adopted from Jadhav and Sonar (2009a), and defined as follows:

- Method: Methodology to perform the actual evaluation, including the steps and scope to be considered.
- Evaluation technique: Approach to apply the identified criteria (e.g. WSM). It supports the decision-making process over the available alternatives, and is aimed at selecting one CRM package that is superior to the researched alternatives.
- Criteria: Criteria or areas (e.g. functional requirements) supporting the comparison of CRM software.
- Tool: Systems or programs supporting the evaluation.

2.2 Results

A previous review of evaluating and selecting software packages from a broader perspective was found (Jadhav and Sonar 2009a). The paper primarily focuses on IT evaluation, as it covered only one article on CRM evaluation.

Table 1 summarizes the results from analyzing the selected relevant publications. 77 papers were excluded as they did not relate to the predefined criteria. As some papers discussed more than one category the total number does not equal the sum of all categories.

Category	IT	CRM
Method	15	9
Evaluation technique	14	1
Criteria	13	21
Tool	2	0
Total	36	24

Table 1: Overview of the results of the literature review (own illustration)

In the following the results of the literature review is described for each category.

2.2.1 Category: Method

Twenty-four of the reviewed papers discuss the evaluation process. Nine papers are directly related to CRM process methodologies. Most of the remaining discuss IT evaluation in general or for other specific areas, such as knowledge management tools or computer-based instructional support systems. Seven papers describe methods which are not adequate for CRM (pre-) evaluation. The following list gives an overview of all activities that should be performed during the evaluation process which were mentioned by many of the identified papers.

Statement	Supporting documents
Define strategy	Chalmeta (2006), Dangelmaier et al. (2004), Illa et al. (2000), Patel and Hlupic (2002), Wright (1990)
Establish organizational framework and scope definition	Barclay and Osei-Bryson (2008), Chalmeta (2006), Franch and Port (2005), Jemili (2006), Kontio (1996), Patel and Hlupic (2002), Saastamoinen (2005), Schöffmann et al. (2008)
Determine requirements (processes & system)	Chalmeta (2006), Dangelmaier et al. (2004), Franch and Port (2005), Gentsch et al. (2002), Howcroft and Light (2002), Kontio (1996), Patel and Hlupic (2002), Saastamoinen (2005), Schöffmann et al. (2008), Stylianou et al. (1992), Tewoldeberhan et al. (2002), Wright (1990)
Examine IT landscape and interfaces	Franch and Port (2005), Gentsch et al. (2002), Schöffmann et al. (2008)

Analyze software market	Le Blanc and Jelassi (1989), Franch and Port (2005), Illa et al. (2000), Jemili (2006), Kontio (1996), Schöffmann et al. (2008), Wright (1990)
Design target processes	Chalmeta (2006), Dangelmaier et al. (2004), Gentsch et al. (2002), Illa et al. (2000), Saastamoinen (2005)
Define functional criteria	Le Blanc and Jelassi (1989), Colombo and Francalanci (2004), Dangelmaier et al. (2004), Franch and Port (2005), Illa et al. (2000), Jemili (2006), Kontio (1996), Schöffmann et al. (2008), Tewoldeberhan et al. (2002), Wright (1990)
Identify potential vendor	Le Blanc and Jelassi (1989), Colombo and Francalanci (2004), Dangelmaier et al. (2004), Franch and Port (2005), Howcroft and Light (2002), Illa et al. (2000), Jemili (2006), Kontio (1996), Patel and Hlupic (2002), Schöffmann et al. (2008), Stylianou et al. (1992)
Create and transmit material	Barclay and Osei-Bryson (2008), Howcroft and Light (2002), Jemili (2006), Tewoldeberhan et al. (2002)
Schedule and conduct vendor workshops / presentations	Dangelmaier et al. (2004), Franch and Port (2005), Howcroft and Light (2002), Illa et al. (2000), Jemili (2006), Patel and Hlupic (2002), Wright (1990)
Evaluate collected information	Barclay and Osei-Bryson (2008), Le Blanc and Jelassi (1989), Franch and Port (2005), Illa et al. (2000), Jemili (2006), Kontio (1996), Saastamoinen (2005), Stylianou et al. (1992), Tewoldeberhan et al. (2002), Wright (1990)
Prepare and document the final decision	Franch and Port (2005), Illa et al. (2000), Schöffmann et al. (2008)
Present results to involved parties	Le Blanc and Jelassi (1989), Franch and Port (2005), Saastamoinen (2005)
Select final vendor	Barclay and Osei-Bryson (2008), Dangelmaier et al. (2004), Illa et al. (2000), Kontio (1996), Schöffmann et al. (2008), Stylianou et al. (1992), Wright (1990)
Negotiate vendor contract	Le Blanc and Jelassi (1989), Colombo and Francalanci (2004), Illa et al. (2000), Jemili (2006), Patel and Hlupic (2002)
Start implementation	Chalmeta (2006), Dangelmaier et al. (2004), Gentsch et al. (2002), Howcroft and Light (2002)

Table 2: List of process steps and related literature (own illustration)

An initial process model was created based on the results of the above literature analysis. Strategy definition as well as the start of the implementation was discussed in some papers as part of the evaluation process other literature excluded this step. In the presented model

this step is mentioned but not core of the process model. The other categories were combined in four major steps which will be further described in detail in section 2.2.

Figure 3: Initial process model for CRMSS (own illustration)

2.2.2 Category: Criteria

Thirty-four papers describe aspects that concern the assessment of CRM or IT evaluation. Twenty-one papers focus on CRM matters in specific areas like sales force automation, or give an overall view. The remaining thirteen papers center on evaluation criteria from a more general perspective mostly relating to quality or cost aspects. The following overviews summarize criteria specified by the literature in the areas of functionality, quality and costs, accompanied by a description that supports evaluating a fitting CRM system ranked in the order of highest occurrence.

Criteria category	Type of criteria
Quality criteria	• Portability • Usability • Data Integration • Modifiability & Maintainability • Resources • Training & Support • Reliability & Robustness • Performance & Practicability • Security • Timeliness • Popularity
Cost criteria	• System costs (hardware/software licenses) • Preparation and installation costs • Maintenance costs • Resources (consulting, internal) • Training and support • Upgrade costs

CRM functionality	• Reporting • Contact Management • Campaign Management • Call Center • Relationship Management • Field Service • Sales Management • Lead/Opportunity Management • Customer Service • Internet • Account Management

Table 3: Initial criteria catalogue (own illustration)

2.2.3 Category: Evaluation technique

Fourteen papers deal with evaluation techniques. Only one of these studies is directly related to CRM evaluation. Various evaluation techniques were mentioned in the literature, but not one dominating technique was found. Instead, the identified studies discuss various different techniques each with its own characteristics presenting a rather heterogeneous picture of the available data. Renkema and Berghout (1997) present an overview of 65 evaluation techniques based upon re-search of different Dutch researchers. In general, more or less all authors aim for a ranking of alternatives up for selection by scores. However, there are also approaches concentrating mainly on the monetary aspects like the Return on investment (ROI) analysis or the Total Costs of Ownership (TCO) approach (Deschoolmeester et al. (2004)). These methods are supportive, but to only concentrate on monetary aspects seems not satisfactory for selecting a software package. Hence, Lech (2005, p. 298) rightfully notes that these approaches are suitable for the evaluation of the cost side calling for a combination approach.

Eight of the fourteen papers are covering different techniques, giving overviews, drawing comparisons, or are searching for a way to define an adequate technique for the respective situation. A detailed description of all differences would go beyond the scope of this paper. Following there is a list of the three different approaches that are mentioned explicitly.

- Fuzzy based Approach,
- Weighted Scoring Method (WSM)
- Analytical Hierarchy Process (AHP)

2.2.4 Category: Tools

None of the identified tools covered all stages of an evaluation. The knowledge based systems (KBS) introduced by Kathuria et. al. (1999) offers the best fit with the proposed methodology, despite being limited to manufacturing processes only. Whether the expert system for software evaluation (ESSE) method by Vlahavas et al. (1999) covers CRM-

specific metrics could not be assessed due to limited information given by those authors. Due to a rather small budget compared to other IT implementations (e.g. Enterprise Resource Planning Systems (ERP)) of all other industries, no tool is recommended for CRM evaluation.

2.3 Critical assessment

The paper FRIEDRICH ET AL. (2010) provides an overview on the current status in science research and the CRM components found in literature. On this basis the paper proposes an initial CRMSS framework which is evaluated and refined in following works.

The individual results of the research for individual assessment categories are not considered to be new overall. There are publications discussing IT evaluation in general and specific fields. However, in the area of CRM evaluation no process model was proposed at this point. The combination of existing IT evaluation findings with CRM specific requirements cumulates in the CRMSS framework proposed in this paper and adds a new contribution to the field of CRM evaluation.

The paper is subject to limitations. First of all, the search is limited to three major search portals and subsequent hand research of references. In addition, only English and German papers are reviewed. However, it is still assumed that the selection reflects the current status of available evidence. The search uses specific pre-defined search terms. By entering further alterations to these terms, it became apparent that all relevant papers were covered. Secondly, the proposed methodology is not verified yet. Further investigation needs to be done to validate our findings. Thirdly, the methodology is based on a specific CRM concept and underlying definition. Changing or altering any of the above named factors might lead to different conclusions. Lastly, as some critical points are discussed in the literature about the AHP (e.g. Chou et al., 2006) as the evaluation technique it remains to be clarified whether any of these aspects would jeopardize the quality of results.

The presented CRM evaluation methodology should add a new facet to the existing information in the field of (successful) CRM selection. In a next step, the methodology needs verification of the initial proposed areas methodology, criteria and evaluation technique to add parts from practitioners that have not been discussed in literature yet and further refine the existing framework to develop a CRMSS process model. This is done via expert interviews and online surveys which are presented in the next section.

3 Validation of initial CRMSS process model based on international expert interviews and online surveys

3.1 Methodology

To validate the literature findings an evaluation was conducted in two cycles starting with expert interviews followed by two international online surveys. The first cycle is still part of phase 2 whereas the online surveys represent the model refinement in phase 3.

3.1.1 First cycle: Expert Interviews and first online survey

The evaluation in the first cycle was conducted in two stages: direct expert interviews and an online survey. In the first stage of the empirical study (direct interviews), experts were searched in business networks such as xing.com. The experts were identified and interviewed using partly standardized interview guidelines. Candidates were identified as experts if they had specific knowledge of the broader topic, meaning they dealt with CRM business topics (such as marketing, sales and advertising) or technical areas (such as CRM software systems and CRM IT consulting). The search was conducted from April to May 2010. In addition to the interview invitations, the partly standardized interview guideline was sent to 165 potential participants. Personal interviews were limited to eighteen experts in order to develop the initial model and asked the remaining experts to participate in the online survey. The majority of the CRM experts was working in the consulting industry and had been involved in multiple CRM evaluation and implementation projects. Only two interviewees experienced CRM evaluation from a client's point of view. Two CRM experts worked for a CRM system manufacturer. The interviews were conducted via phone between March and April 2010 and lasted between 15 and 45 minutes. Due to the relatively small number of participants and the nature of qualitative data, a qualitative content analysis was conducted after constructing the initial version of the CRMSS process model. In stage two, a normative online survey was conducted. Invitations to participate in an online survey were sent out in three cycles from June 17, 2010 to June 30, 2010. A total of 1,435 potential respondents in various countries were contacted, with a focus on Germany and the US. In total, 125 (8.7%) experts took part (Friedrich et. al., 2011).

3.1.2 Second cycle: Second online survey

The second online survey cycle used an international tool, Survey Monkey. The survey was set up in the first week of January 2011 and quality tested on a pilot with seven people working in different areas. The three CRM experts mainly focused on content and comprehensibility. The remaining candidates focused on face validity, question routing, and grammar (Saris et al. 2007). The survey was finalized and sent out on January 15th, 2011. The CRM experts were found via the business platform LinkedIn. "CRM" was used as the keyword search criterion. The search was further narrowed down by country, using "USA",

“Germany”, “Australia”, “Great Britain” and “Canada”. An additional search criterion was used later, “company”. The values used included “SAP”, “Microsoft”, “Oracle”, and “Salesforce”. The search provided experts with various relations to CRM. LinkedIn does not provide e-mail addresses. A Google search was performed to obtain those. The Google search combined the first name and the last name with the company name or company web address. The total list included 1,699 CRM experts. None of these experts participated in the first survey cycle. Of the e-mail addresses found, 17.4% were invalid. Another 4.4% indicated they were not qualified for a particular peer group within the survey. Therefore, 1,325 CRM experts received the survey request and were able to participate. One hundred fifty nine CRM experts replied to the online survey, which is a response rate of 12.0%.

3.1.3 Questionnaire

Ninety-six per cent of the questions were direct questions, which provided a sound basis for the statistical evaluation (Saris et al., 2007). Fifty-eight per cent of the questions allowed for further comment. The first section of questions focused on the country, relation to CRM and size of the company the expert is working for. The questions were written so that interviewees could be clustered into groups, which aided evaluation. The second section, on CRMSS, focused on project budgets, timeframes of projects, number of users for CRM systems and the CRM expert’s type of involvement. The third section looked at the standard CRM software system solutions. The questionnaire was customized and changed according to the respondent’s classification after the general questions about the interviewee and specifics of CRMSS projects. Based on involvement, questions on standard software system to “customers”, “system vendor” or “consulting” were phrased differently, but had the same aim. The main section of the questionnaire (section three) presented each project phase. For each phase, the expert was asked to rate the importance of each presented activity (for example, “scope definition” is an activity in phase “demand analysis”) and to select or provide suitable deliverables. In addition, a suitable number for the vendor long and short list was inquired for phase “demand analysis” and “detailed requirement specification”. In section four, the classification of CRMSS was examined. For each category (quality, cost and functionality), the importance of the presented characteristic was asked. Last, the most appropriate evaluation method was requested. Section five was an overall rating of the presented process model and provided the possibility to add personal remarks. The values provided in the survey are presented in the following.

3.2 Results

3.2.1 Overall specifics on CRMSS projects

All expert groups agreed on a minimum budget of US$ 10,000 for the CRMSS project. The maximum budget varied according to company size, from US$50,000 (<50 employees) to

US$250,000 (>10,000 employees). Generally, budget spent differs in all clusters. A majority of experts allocated smaller amounts to system selection and few experts allocated large amounts. Concurrent users vary from 100 (customer) to 400 (consulting & system vendor). Named users vary from 125 (customer) to 1,000 (consulting & system vendor). In general, the results only allow for a distinction between companies smaller than 10,000 employees (concurrent 100-300, named 125-500) and companies larger than 10,000 employees (concurrent 1,000, named 2,000). The average CRMSS time frame is seen as 1-6 months. Respondents from large companies (>10.000 employees) suggest longer time frames (4-6 months) than those from smaller ones (1-3 months). Especially experts working in IT and business areas tend toward longer timeframes. The CRMSI time frame for all clusters was 7-12 months. The selected systems come from the big players: Microsoft, Oracle, SAP, and Salesforce. CRM IT experts tended to select SAP. The more CRM selection projects an expert had been involved in, the more likely he or she was to choose Microsoft. Experts from larger companies tended to select Oracle. Experts involved as customers preferred Salesforce. Therefore, a CRMSS tool should incorporate at least those four systems.

3.2.2 Process model for CRMSS

The proposed activities (for details see section 4) for each phase in the process model are all relevant according to the experts. Identification of the current software system market and analysis of system interfaces in phase one (see section 4.1.1) were rated as “not relevant”, because consulting companies usually provide those overviews. Especially small companies (1-10 employees) were looking to relinquish this activity. The majority of the experts suggested that a vendor long list should not have more than six vendors, independent of company size or cluster. Especially CRM business experts suggest ten vendors for the long list, but compared to the rest, this is not significant. The standard deviation shows that the range is best set at 2-4 vendors. Especially experts from English-speaking countries found “non-functional requirements” unnecessary. The reduction of vendor selection was not important to most experts from IT. These experts also suggested relinquishing the vendor short list in phase 2 (see section 4.1.2). The “Target processes” and “functional criteria” activities may be grouped into one activity, “business process & functional scope” and a new activity needs to be added “technical & non-functional scope”, as many of the activities suggested by the experts would fall under this activity. Depending on the project scope, that makes sense. Mainly business-related experts found the reference visits to be unnecessary (see section 4.1.3). They are not always achievable, because those are competitors or companies in other industries that do not relate to the own field of work. This activity should be an optional part of the process model. Reference visits were not necessary due to cost. A less costly alternative is conference calls with reference clients. It was specifically highlighted that employees needed to be informed continuously in order to ensure the success of the CRM implementation. The number of deliverables named for the strategy phase (not part of

the model) indicates that this phase has an impact on all further activities (for example, objectives and constraints should be part of the transmission material or corporate vision and objectives are the base for functional and process analysis and design). Deliverables suggested for project management make it obvious that a “project management” (see Section 4.1.6) process activity is required in parallel to the “change management” (see Section 4.1.5) process activity along all four phases. The deliverables that are relevant for a CRMSS are an independent decision (no probability was tested). Therefore all deliverables are offered in the process model and all are optional.

3.2.3 Classification of CRMSS

The survey shows that some sub-criteria are more important to CRMSS than others (see section 4.2 for the full list of criteria). Since most experts recommended that none of the suggested criteria be deleted, all of them could be incorporated into a vendor evaluation catalogue, which would allow company-specific assessment. Modifiability and maintainability are the most important quality criteria in the context of CRMSS, as CRM systems often lack the flexibility to implement full business processes. Only a few experts suggested other criteria. The list is assumed satisfactorily complete once the new suggestions are incorporated. The criteria need to be adapted in a tool that enables companies to customize their evaluation according to their preferences. The answers given by the experts indicate that an additional category, “technical characteristics” could be useful and would inherit values from the category “quality”. The value “technical architecture” is therefore obsolete in the group “functionality”. Non-functional requirements are part of the quality and technology criteria. The preferred evaluation techniques for criteria and functional evaluation are “WSM” and “SWOT” (Strengths, Weaknesses, Opportunities and Threats). “TCO” must be used in any case for cost calculation of the CRMSI. The proposed evaluation technique “AHP” was only named by a few experts and is not preferred.

3.2.4 Overall rating of process model

The process model was appreciated by experts from medium to larger companies. Because especially experts from small companies view the model critically, the process model is more applicable to companies with more than 50 employees. This varies depending on the industry and field of business. The results lead to the revised CRMSS process model shown in Figure 4.

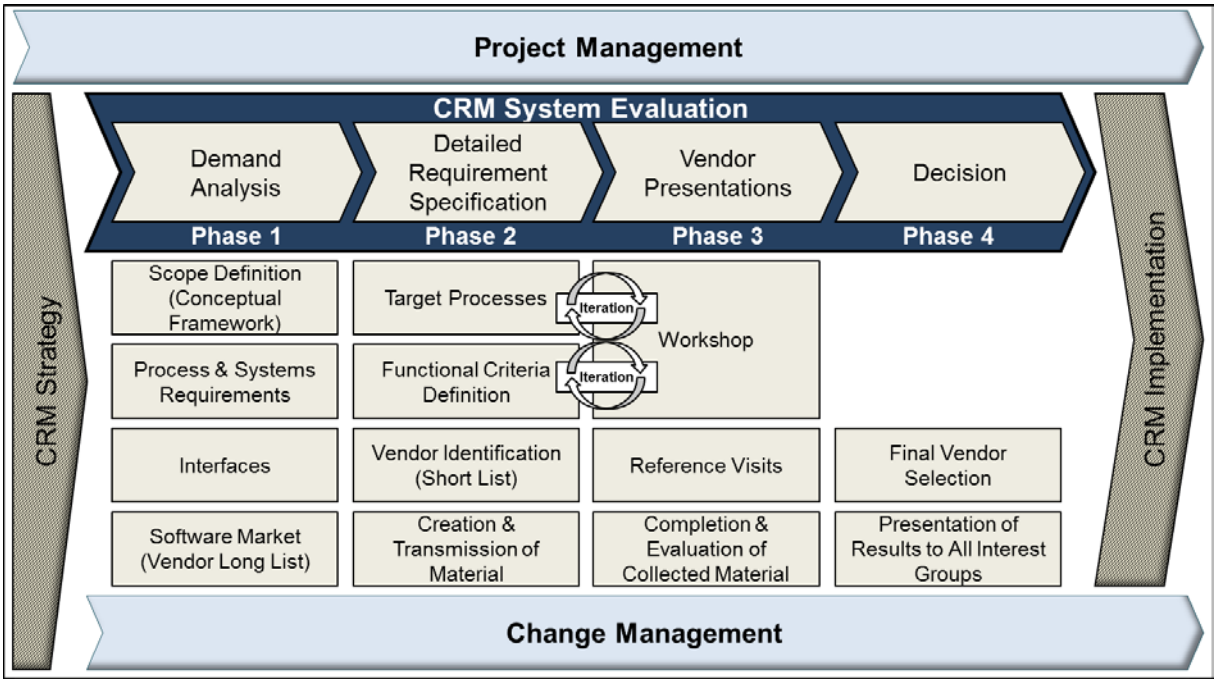

Figure 4: CRM system selection (CRMSS) process model after evaluation phase (own illustration)

3.3 Critical assessment

The paper FRIEDRICH ET AL. (2011 and 2012b) evaluates the proposed CRMSS process model with international CRM experts from business and IT as well as the academic sector.

The discussion with CRM experts has shown that most parts of the process model are applied in practice when conducting CRMSS or other IT selection. Nevertheless, the model was further improved by the valuable feedback, which resulted in the final illustration seen in Figure 4. The results have shown that the proposed model is valid to evaluate CRM systems. However, some limitations remain.

Due to the nature of empirical studies and the identification of experts, it might be possible that the identified group of CRM experts is not a representative group. In addition, while conducting the online survey, a software problem arose. The online survey tool that was used, EvaSys, displayed a warning message when entering the survey that simply needed to be accepted by the users but unfortunately had no English translation. Therefore only a few English speaking CRM experts actually answered the first online survey completely. The second online survey had a response rate of merely 12%, globally. This looks rather low, but considering the poor response rate in the USA (average 4%) due to high number of survey requests there, it is acceptable.

Overall, the approach might not only be applicable for CRM evaluation, but can be a base for other IT evaluation projects, as the quality and cost criteria are generally applicable.

Based on the results, the CRMSS framework needs further refinement in the initial categories methodology, criteria and evaluation technique. In the next section these findings are presented. The refinements resulted from the information received from the CRM experts during the personal and online interviews.

4 Towards the process model for efficient CRMSS

4.1 CRM System Selection Process Model

The CRMS process model (see Figure 4) is a formal methodology that needs to be adapted according to the individual situation of a specific company including its objectives and strategy. The model provides a framework that includes tasks, deliverables as well as supporting information. The model was designed under the assumption that the CRM system is purchased (and then customized) and not built from scratch. Although CRM strategy and CRM implementation are crucial steps before and after an efficient CRMSS they are not part of the model and not described in this paper. The CRMSS is applicable for companies starting from 50 employees but that might vary depending on the industry and field of business.

4.1.1 CRMSS Phase 1: Demand Analysis

During the demand analysis, the conceptual framework is established by determining the main functional processes, system requirements, and underlying IT landscape. This includes interfaces that depend on the as-is-situation, as well as the future strategic orientation. The analysis of the as-is-situation to identify possible wins must be conducted without taking specific CRM system into consideration. All relevant interest groups must be involved throughout this phase. Top management especially needs to communicate its sponsorship to ensure quick and efficient involvement and commitment of all stakeholders. The defined scope specifies high-level requirements in order to deduct future requirements and to prepare vendor selection. Due to constant changes in the market, a detailed search for currently available solutions is required. Mandatory deliverables are the “scope & constraints” and “as-is-analysis (GAP)” whereas “user requirement analysis”, “non-functional requirements”, “system portfolio & IT architecture (blue print)”, “requirement checklist for vendor” and “underlying project data” are optional.

4.1.2 CRMSS Phase 2: Detailed Requirement Specification

To derive mandatory functional criteria, target processes are specified. The outcome helps to narrow the list of potential vendors down to four to six candidates (referred to as a ‘short list’). In addition, the proposed evaluation techniques are filled with the estimation metrics. A

project summary, company-specific application cases for demonstration purposes, and the required costing factors are then transmitted to the selected vendors. A criteria catalogue and feedback forms are developed for internal use during pre-project sessions with potential vendors. Mandatory deliverables are “target process design”, “vendor assessment criteria” and “functional criteria catalog”, and “transmission material (e.g. demo scripts)”.

4.1.3 CRMSS Phase 3: Vendor Presentation

To facilitate vendor presentations, workshops that focus on obtaining a deeper insight on the degree of scope coverage are scheduled. The vendors are asked to present their solutions for the pre-defined use cases. Functional and system requirements that are mandatory for vendor-specific solutions are discussed and modified. Each party fills out a feedback form that provides evaluators with a sense of the individual “look and feel” of the proposed system solution. Subsequently, all materials are analyzed to evaluate and prioritize different vendors. “Workshop protocol” and “evaluation results presentation” in this phase are optional.

4.1.4 CRMSS Phase 4: Decision

Finally, in the decision phase, the results are summarized and documented before they are presented to the interest groups. Using this approach, the decision is justified and demonstrated before the negotiation process with vendors begins. Before the first presentation, it is necessary that contract negotiations are initiated to eliminate unqualified vendors in the results presentation. All deliverables, “vendor contract”, “implementation & roll-out plan” and “decision presentation”, in this phase are mandatory.

4.1.5 Change Management

A CRM system implementation cannot be successful without initiating transformation and communication. CRMSS and implementation must be a technical success, but it also needs to be accepted and followed by employees using it. This part of the model includes communication to all stakeholder, transformation and organization enablement.

4.1.6 Project Management

As any IT project the CRMSS project must be budgeted, planned and controlled to secure the strategic goals are adhered to. Ideally the project is conducted by the same project manager that is assigned to the CRM implementation later.

4.2 Criteria for CRM System Selection

As mentioned by Farbey et al. (1992), “the criteria by which a system should be judged must reflect the nature and the purposes of that system.” Evaluation criteria cannot exclusively focus on functional requirements, although these are a critical element. Cost and quality criteria are two other areas that are included from general IT selection models. A fourth area,

technical characteristics was suggested by the CRM expert community. All areas are split up into further topics with sub-categories. The criteria selection in this section is completed as only few suggestions were made in the last evaluation cycle and all were incorporated.

4.2.1 Quality Criteria

Quality criteria are an important component to system selection, as they cover the non-functional requirements for evaluating the vendor and its product. The contents of a full quality concept are covered by ISO/IEC 9126-1, which are used as a framework.

Criteria	Description
Popularity	Reputation, credentials, market share, product age, risk overspending budget (lifecycle)
Portability	Compatible platforms, integration into existing landscape (e.g. ERP), available interfaces
Project Management	Document management, status tracking and methodology toward achieving set objectives
Resources	Experience and availability of external consultants and internal personnel
Security	Security levels (data and/or functional), resisting unauthorized access
Timeliness	Implementation time and duration
Training & Support	Training material, documentation (user and technical), support and services, available tools
Usability	Usefulness, user friendliness (ease of use)
User Acceptance	Acceptance and level of utilization of system by user

Table 4: Overview quality criteria (own illustration)

User acceptance is one of the major decision components for the success of a CRM system. It is therefore necessary to evaluate the quality in order to shape CRM requirements which lead to end-user acceptance. The author expects that all of the quality criteria affect user acceptance. This hypothesis and the interdependence of each criterion has not been analyzed by the author yet and will be further discussed in section 4.3.

Table 4 summarizes the most important quality criteria assessed by the initial literature review, as well as the criteria from the CRM expert surveys. Most emphasized criteria by the CRM experts are modifiability (now technical criteria), usability and user acceptance.

4.2.2 Cost Criteria

An assessment of cost must cover all related expenses. In addition to the costs of the system itself, which include hardware and software components, preparation, installation, upgrade and maintenance costs should be considered, as these vary depending on the vendor and the software product. Workforce costs include not only external consulting fees, but also an approximation of internal resources. Training and support costs need to account for both charges from the vendor and internal efforts. In most cases, the training materials provided need to be adjusted according to company-specific changes. Table 5 specifies cost-relevant criteria mentioned by experts in the empirical study:

Criteria	Description
Maintenance	Activities to keep the system up and running, retain and restore hardware and software
Migration	Transfer of master and transaction data from legacy to new system, transfer of legacy systems to new landscape
Preparation and installation	Preparation of required hardware components and Installation of all software packages
Resources	All required project resources incl. internal employees (project related time), additional staff temporary employed for project, consulting, and vendor trainer
System (hard-ware/software)	Licenses for software and hardware applications, support contract costs
Training and support	Training material development, training execution (incl. time of employees to take training), support during project, Go-live and after Go-live
Upgrade	Anticipation of future upgrade costs to next releases as well as additional system components

Table 5: Overview cost criteria (own illustration)

4.2.3 CRM Functionality Criteria

The functional categories vary depending on the industry and culture of the company and are divided into three groups: Operative, analytical and communicative. In some cases, function-al areas are assigned to both operative and communicative CRM. Table 6 shows the most important functional criteria.

Criteria	Description
Account Mgmt	Sales support, contract management

Call Center	Complaint management, query & feedback management, call logging, communication support e.g. automated phone systems, help desk
Campaign Management	Design, implement and monitor campaigns for marketing information, catalogues, magazines or newsletter through diverse channels, group or segment data, programs for loyalty, retention or promotions
Contact & Customer Mgmt	Customer data incl. basic data and transaction data (sales data), information for the customer, services and campaigns, customer feedback including complaints, inquiries, suggestions
Customer Service	After-sales-service, maintenance and repair management, SLAs
Field Service	Mobility technology and options (data synchronization) incl. laptop, handheld, mobile phones, route planning, synchronization capabilities, offline functionality, work without a corporate network connection
Industry Specifics	Industry specific requirements not found in general CRM systems
Internet	Customer self-service (including e-cash), intranet with front-office company functions, web-based decision systems (DSS), Internet presentation of products and services, e-commerce
Lead & Opportunity Mgmt	Workflow to track and trace leads, acquisition management
Relationship Mgmt	Customer retention or exit management, partner (network) management, loyalty programs, scheduling
Reporting	Supporting strategic decision making, processing queries, forecasting and statistics, tools and engines for information retrieval, optimizing or profiling data, strategic and daily business analysis, monitoring, data mining, business intelligence or ad-hoc reporting
Sales Mgmt	Quotation management (including tracking and tracing), product configuration, pricing and financing options, cross- or up-selling

Table 6: Overview functional criteria (own illustration)

The categories of the functional vary depending on the industry and culture of the individual company and can be divided into three blocks:

- Operative CRM, which comprises all processes and functions regarding the day-to-day business;
- Analytical CRM, which systematically analyzes customer and customer-related information; and

- Communicative CRM, which controls, supports and synchronizes each communication channel. In some cases, functional areas may be as-signed to operative and communicative CRM.

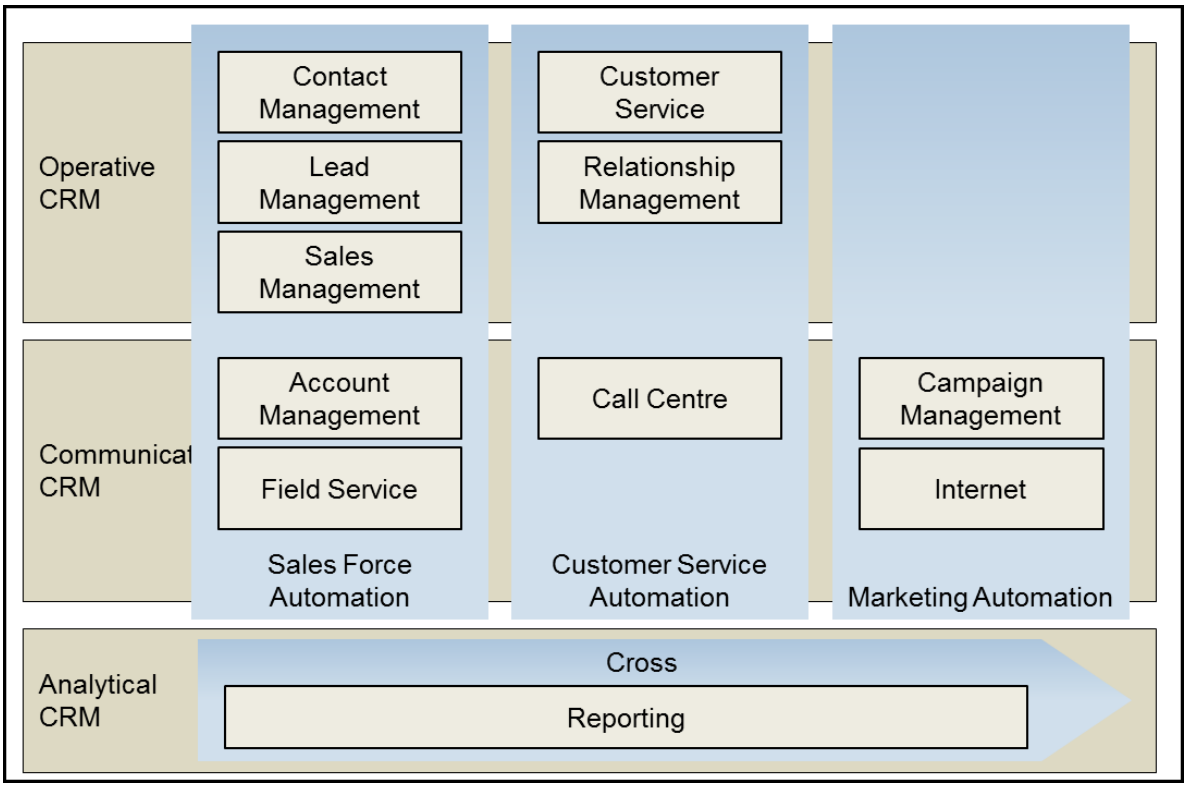

Figure 5: Categories overview of functional evaluation criteria (own illustration)

Figure 5 provides a general overview on the automation of the sales force, customer service and marketing, in addition to reporting. Lead and opportunity management are summarized in the “Lead management” block. Some categories may be part of an ERP, Business Intelligence (BI), or another software solution. These were added to this methodology for reasons of completeness, as it depends on the individual CRM solution which category needs to be included.

4.2.4 Technical Criteria

The technical categories cover all areas related to hard- and software attributes. Table 7 shows technical criteria which needs evaluation.

Criteria	Description
Data Integration	Data structure (models), information quality, data access, conversion and movement, actuality, central data base, tools (e.g. data mining)
Deployment	Technical transformation from old hard- and software environment to the new setting including # of releases, update tools
Integration & Infrastructure	Data handling, interface definition, development environments and stages, system (e.g. operating system, legacy applications, security) and hardware (e.g. server, network) environment and groupware
Mobility	Available tools and hardware integrations to use the CRM system outside the company's main infrastructure
Modifiability (Scalability) & Maintainability	Degree of configuration, individual changes and adjustments, availability of source code, personalization (design, reports)
Performance & Practicability	Execution time, responsiveness, efficiency, design principles (e.g. SOA)
Reliability & Robustness	Ability to keep operating, troubleshooting, reproduction of its functions over a period of time
Scalability	Management of growing data and functionality requirements
Software & Hardware Requirements	Technical standards, compatibility

Table 7: Overview technical criteria (own illustration)

4.3 Critical assessment

The paper FRIEDRICH AND BREITNER (2012a) illustrates the details of the proposed CRMSS process model incorporating feedback from practitioners and researchers. The main contribution of this paper is the outlined CRMSS process model. It enables a structured selection of a CRM system. The process model enables implications for both theory and practice. As an implication for theory, the proposed model summarizes the state of the art in CRM evaluation and generates a solid foundation to foster knowledge in this field.

The outlined CRMSS process model covers the whole process of evaluating packaged CRM systems, after a CRM strategy was defined and before the implementation project begins. The process model is generic and needs to be adapted according to an individual company, industry, and the project budget. As an a priori critical success factor, the CRM strategy and the basic functionality for the software must be defined in advance. To apply it in practice, the criteria template and an evaluation technique must be also included. External consulting

often is crucial, but needs to be adapted to the individual case. According to CRM experts mandatory activities are scope definition, analysis of processes and the vendor selection. Optional but recommended activities are analysis of interfaces, reference visits and a vendor short list.

Besides general limitations based on the chosen research design with restricted search criteria in the literature review, there are more specific limitations. As mentioned in section 4.2.1 the interdependent effect of each criterion has not been analyzed yet but needs to be further researched to measure the possible interactions of quality criteria on user acceptance as the system quality has an expected influence on system usage and therefore user satisfaction (DeLone and McLean 2003). The mutual preferential independence of criteria is widely discussed in the academic literature (see for example Dubois et. al. 2000, Brown and Massey 2003) and must be analyzed via factor analysis (e.g. Sin et. al. 2005). In addition the proposed CRM process model has at that point not been applied in real-world scenarios. In addition, the fourth dimension tool was not covered in the evaluation and therefore in the CRMSS process model. For that reason the next section discusses a CRMSS tool on the basis of the WSM incorporating the results of all prior research. A practical test is presented in section 6.

5 Multi-criteria decision support framework for CRMSS

5.1 Methodology

Selecting a fitting CRM software package can be described as a multiple criteria decision making (MCDM) problem. The main difficulty of multi-criteria problems is a mathematical description, as there is no objective solution (Vincke, 1989). MCDM describes the evaluation of a - often restricted - number of alternatives, considering multi-criteria (Yoon and Hwang, 2009). It also supports a decision-making process if those criteria are unmanageable and difficult to rank, helping users choosing the best alternative (Le Blanc and Jelassi, 1989). Evaluation techniques that translate information into comparable numbers provide a mathematical bridge for the underlying qualitative problem. One evaluation technique that is frequently discussed in literature is WSM, which is the focus for CRM system selection in this paper. This evaluation technique has also been the mostly prioritized in the discussions with CRM experts.

A literature review was conducted on the four major research databases in the field of ISR: ACM, IEEE, Science Direct, and SpringerLink. Combinations of “evaluation technique”, “weighted scoring method”, “system selection”, “software selection” and “decision making” were used as search terms. The following table displays the literature found that addresses WSM, the area in which it is used and how it is applied. Eleven papers were identified that discussed and applied WSM in the IT context. All mathematical calculations were analyzed to find the main components to create a best practice approach for CRMSS. Section 5.2 shows the results of the literature review.

Authors	Area	Calculation
Collier, Carey, Sautter, and Marjaniemi (Collier et al., 1999)	Data mining evaluation	1) Screen for alternatives to reduce number of tools in scope 2) Identify additional selection criteria 3) Weight selection criteria (0-100%) 4) Score each alternative against a reference tool (scale 1-5) 5) Review scoring evaluation
Goyal and Sharma (Goyal and Sharma, 2010)	Data mining effectiveness evaluation	1) Extract and rate important criteria (5 point scale; mean value greater or equal than 4 is treated as important) 2) Assign weights to criteria according to importance (percentage of variance method; total weight within each category = 100%) 3) Calculate and rate score (1 poor – 5 excellent) 4) Evaluate alternatives using score rating
Le Blanc and Jelassi (Le Blanc and Jelassi, 1989)	Decision Support Systems (DSS) selection	1) Screen alternatives and criteria (n criteria versus m alternatives) 2) Weight criteria importance (scale 1-3) 3) Rate completeness of requirements per criterion (scale 0-3) 4) Calculate evaluation matrix (weights x requirements met) 5) Calculate total scores and percentages of require-ment satisfaction (minimum 80%) 6) Divide each result by costs
Lee, Shen and Chih (Lee et al., 2004)	Fuzzy multiple criteria decision making	1) Build fuzzy decision matrix (incl. weights and criteria) 2) Create strength and weakness matrix 3) Calculate fuzzy weighted strength and weakness indices per alternative 4) Calculate the total performance indices and aggre-gate them 5) Rank all alternatives
Jadhav and Sonar (Jadhav and Sonar, 2009b)	Comparison of evaluation methods for software selection	1) Select criteria and alternatives 2) Assign importance score to each criterion (range not specified) 3) Assign performance for each criterion and alternative 4) Calculate decision matrix

Authors	Area	Calculation
Naumann and Palvia (Naumann and Palvia, 1982)	Development tool evaluation	1) Identify functions (objectives) 2) Weight functions using the Delphi technique 3) Develop criteria to evaluate functions 4) Assign values to each criterion 5) Relate each technique 6) Calculate total score
Perez and Rojas (Perez and Rojas, 1999)	Workflow-type software evaluation	1) Identify indicators grouped into categories 2) Apply qualitative scale to each indicator to score the availability of a functionality 3) Define weights for usability 1-10 4) Calculate weighted average for each indicator 5) Calculate weighted average by each category 6) Multiply weighted average by category with the weight from step 3, add up all values and assign recommendation (values in 6 categories with values from 1-10: 0 no support provided; 0.1-2.5 scarce support; 2.5-4; 4-6; 7-8; 9-10 excellent support)
Vavpotic and Bajec (Vavpotic and Bajec, 2009)	Software development methodologies evaluation	1) Assign measurement scales (seven-point Likert scale) to characteristics of social adoption and technical efficiency 2) Omit characteristics and items that are irrelevant 3) Calculate Cronbach alpha coefficients
Vlahavas, Stamelos, Refanidis and Tsoukias (Vlahavas et. al. , 1999)	Expert system for software evaluation (ESSE)	1) Define evaluation alternatives 2) Define type of evaluation (choice, classification, sorting and description) 3) Define evaluation attribute tree (compound and sub-attributes) 4) Define measurement methods (arithmetic or nominal values) 5) Define set of measurement scales (ordinal) 6) Define set of preference structure rules 7) Select appropriate aggregation method (algorithm: multiple attribute utility method, outranking method and interactive method)

Authors	Area	Calculation
Wang and Chen (Wang and Chen, 2007)	Model for prioritized multi-criteria decision making	1) Define alternatives and sets of criteria (each set of criteria has an equal priority) 2) Assign degree of satisfaction (via weighted averaging or quantifier guided OWA) 3) Evaluate alternatives according to objective: a) Degree of satisfaction as high as possible b) Degree of satisfaction has at least a degree of k
Yan and Huynh (Yan et al., 2011)	Discrete multi-criteria decision making	1) Define set of alternatives and set of criteria (n criteria versus m alternatives) 2) Calculate degree of satisfaction per alternative (all criteria or specific criterion fulfilled) using OWA operator for weighting vector to consider different importance levels

Table 8: Overview of ISR literature on WSM (own illustration)

5.2 Results

Selecting a CRM software system can be defined as a MCDM problem. Alternatives in the proposed framework are commercial off the shelf (COTS) solutions, which are weighted by functional, technical, cost and quality criteria (Lee et. al. 2004). The proposed CRMSS tool framework consists of five steps which are derived from the literature review.

Figure 6 shows an overview of the five major steps of the rating process of CRMSS. The beginning and the end of the process is qualitative evaluation whereas the middle of the process represents quantitative evaluation. All sub steps are described in the following sub-sections. The respective resource involvement is stated at the bottom of each step.

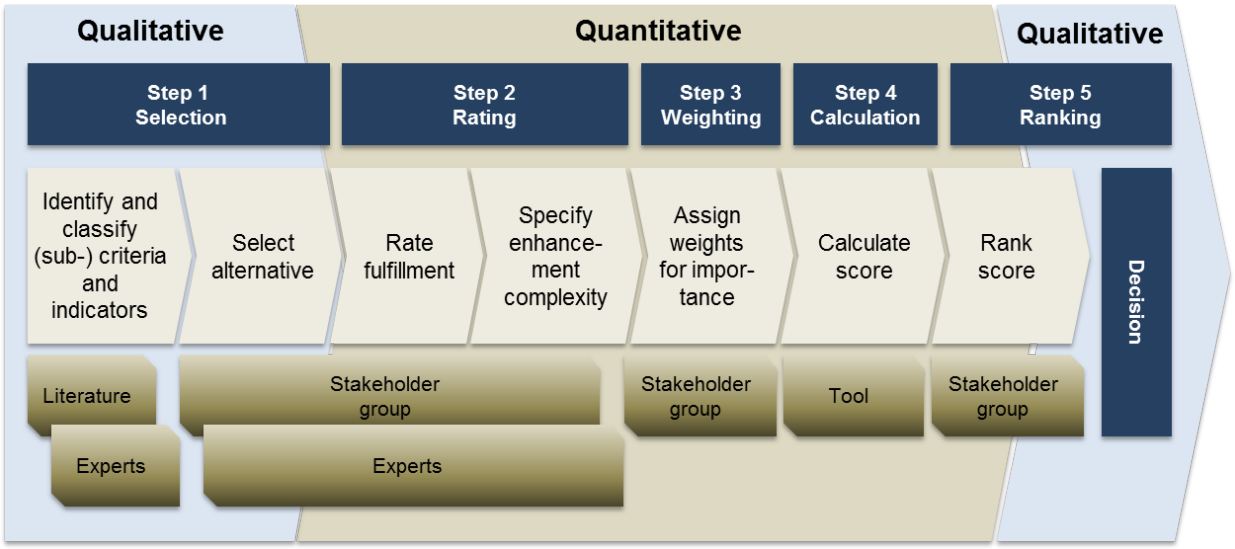

Figure 6: Decision support framework for customer relationship management system selection tool (own illustration)

5.2.1 Step 1 – Selection

MCDM problems deal with multiple decision criteria, which are represent different aspects of alternatives. The first step is to select the relevant decision criteria in the areas of business and technical functionality. Evaluation criteria cannot exclusively focus on functional requirements, although these are critical. Four categories must be considered for CRMSS: functional fit, quality aspects, technical considerations and costs. All categories are split up into further criteria and sub-criteria with indicators (see Section 2.2.2).

Figure 7 shows a CRM criteria catalogue excerpt for the relevant categories with a detailed view of functionality criteria, particularly the area of sales force automation, as well as indicators of its sub-criterion, lead management. The criteria list is generally applicable, but each alternative must be rated according to the expectations of the individual case. This list must be enhanced with industry-specific criteria, as well as company-specific requirements.

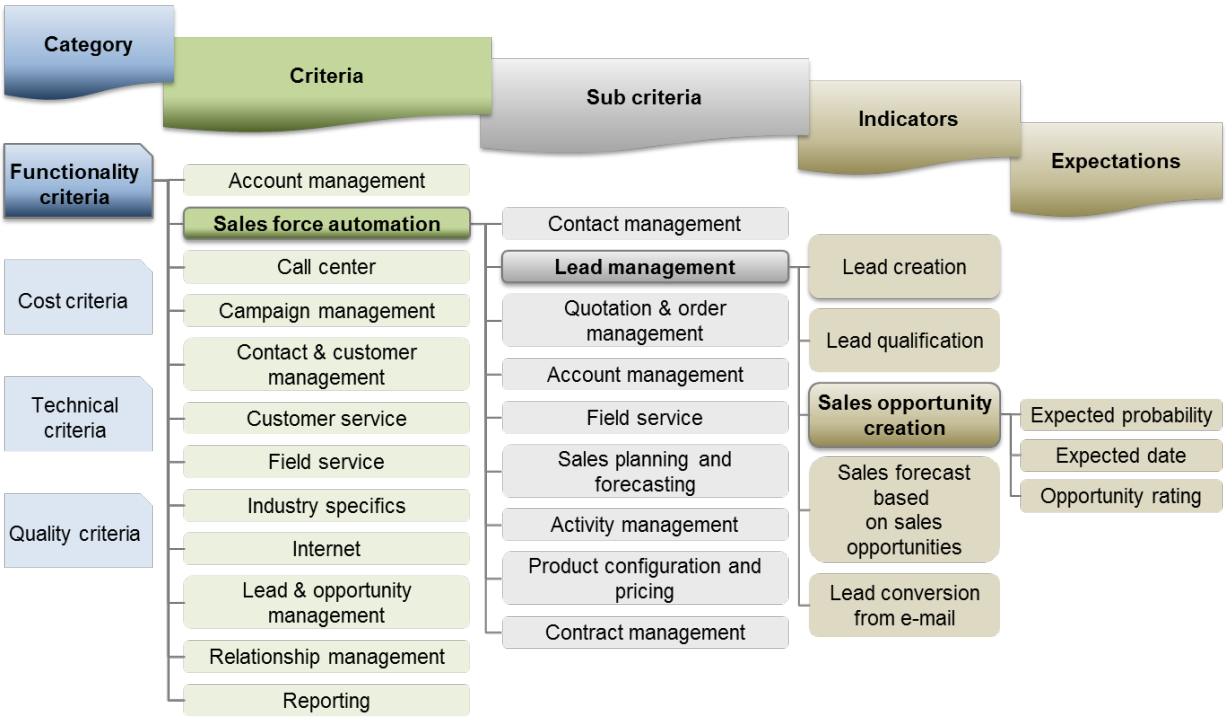

Figure 7: Decision support framework for customer relationship management system selection (own illustration)

All of the criteria dimensions mentioned here, together with the criteria, sub-criteria and indicators presented were evaluated during three different renowned CRM expert evaluations and an extended literature review (Friedrich et. al. 2010, 2011, 2012b).

Once the criteria list is complete, the alternative selection must be made. The market of CRM systems packages is dominated by Microsoft CRM, SAP, Oracle Siebel and Salesforce. Depending on the individual CRM strategy, these alternatives must be expanded, e.g. automotive solutions include Detecon, Dealersocket and Autobase.

5.2.2 Step 2 – Rating

Each CRM system software fulfills the listed criteria to a certain degree. This fulfillment level is applied generally, but must be validated according to the company's expectations. For instance, for sales opportunity creation, a lead must be classified using expected probability, expected date of sale and an opportunity rating to fulfill the specifications of pipeline reporting (see Figure 7). The detailed requirements are only partially covered for some alternatives. The examples of the rating scale and specification of enhancement complexity are presented in Table 9 and Table 11.

To rate the fulfillment level, the rating not only must take the degree of coverage into account, it must also include the complexity of enhancing the feature to the expected level. The effort required for enhancement varies by CRM system software. For example, complex enhancements in SAP result in higher efforts than in Microsoft Axapta. The implementation

of a coefficient that helps to take enhancement complexity into account which improves the rating of the evaluated alternatives.

5.2.3 Step 3 – Weighting

The relative importance of each criterion cannot be assigned before all alternatives are selected and rated to prevent results from affecting the rating of further alternatives. Especially when adding industry-specific alternatives, the criteria catalogue is extended, which has an impact on results and preferences. The allocated weights must be hidden throughout the whole process so as not to influence the judgment of the person conducting the evaluation.

The example weighting scale for measuring criteria importance is presented in Table 10. The scores increase to reflect the level of importance (Breslin, 1986). The sum of all category weights must equal 100 per cent.

Featured	Rating
Yes	6
Substantially	4
Partly	2
No	0

Table 9: Rating of feature fulfillment (own illustration)

Importance	Weight
Essential	5
Important	3
Nice to Have	1
Not Relevant	0

Table 10: Weighting of criteria importance (own illustration)

Enhancement complexity	Coefficient
Easy	3
Moderate	2
Difficult	1
Not possible	0

Table 11: Specification of enhancement complexity (own illustration)

5.2.4 Step 4 – Calculation

Once the values were assigned to feature fulfillment, enhancement complexity and criteria importance, the CRM selection tool calculates the performance of each criterion for each alternative. Figure 8 gives an overview of the variables used and described in this section for a calculation and also illustrates formalized results.

Let $A = \{A_1, A_2 ...., A_N,\}$ specify a set of alternatives. Then the score for the criteria indicator z of the alternative A_j is calculated as follows:

$$s_{zj}^{indicator} = w_z^{indicator} \cdot r_{zj}^{indicator} \cdot q_{zj}^{indicator};\ z \in (1,k),\ j \in (1,N) \quad (1)$$

$r_{zj}^{indicator}$ and $q_{zj}^{indicator}$ denote rating of feature fulfillment and coefficient of enhancement complexity, respectively for the z^{th} indicator of j^{th} alternative. k and N are the numbers of indicators and alternatives. $w_z^{indicator}$ describes the importance weight of the indicator z and is

identical for all alternatives. After all indicator scores are calculated, the next computation of the weighted means occurs on the sub-criteria level:

$$m_{yj}^{subcriterion} = \frac{\sum_{z=1}^{k} s_{zj}^{indicator}}{\sum_{z=1}^{k} w_{z}^{indicator}} \quad ; \; y \in (1, v), \; j \in (1, N) \tag{2}$$

Aggregated scoring					Alternative											
					A_1				A_2				A_N			
Category	Criteria	Subcriteria	Indicator	Weight	Rating	Coefficient	Weighted mean	Score	Rating	Coefficient	Weighted mean	Score	Rating	Coefficient	Weighted mean	Score
Category 1				$w_1^{category}$			$m_{11}^{category}$	$s_{11}^{category}$			$m_{12}^{category}$	$s_{12}^{category}$			$m_{1N}^{category}$	$s_{1N}^{category}$
	Criterion 1			$w_1^{criterion}$			$m_{11}^{criterion}$	$s_{11}^{criterion}$			$m_{12}^{criterion}$	$s_{12}^{criterion}$			$m_{1N}^{criterion}$	$s_{1N}^{criterion}$
		Subcriterion 1		$w_1^{subcriterion}$			$m_{11}^{subcriterion}$	$s_{11}^{subcriterion}$			$m_{12}^{subcriterion}$	$s_{12}^{subcriterion}$			$m_{1N}^{subcriterion}$	$s_{1N}^{subcriterion}$
			Indicator 1	$w_1^{indicator}$	$r_{11}^{indicator}$	$c_{11}^{indicator}$		$s_{11}^{indicator}$	$r_{12}^{indicator}$	$c_{12}^{indicator}$		$s_{12}^{indicator}$	$r_{1N}^{indicator}$	$c_{1N}^{indicator}$		$s_{1N}^{indicator}$
			Indicator 2	$w_2^{indicator}$	$r_{21}^{indicator}$	$c_{21}^{indicator}$		$s_{21}^{indicator}$	$r_{22}^{indicator}$	$c_{22}^{indicator}$		$s_{22}^{indicator}$	$r_{2N}^{indicator}$	$c_{2N}^{indicator}$		$s_{2N}^{indicator}$
			…													
			Indicator k	$w_k^{indicator}$	$r_{k1}^{indicator}$	$c_{k1}^{indicator}$		$s_{k1}^{indicator}$	$r_{k2}^{indicator}$	$c_{k2}^{indicator}$		$s_{k2}^{indicator}$	$r_{kN}^{indicator}$	$c_{kN}^{indicator}$		$s_{kN}^{indicator}$
		Subcriterion 2		$w_2^{subcriterion}$			$m_{21}^{subcriterion}$	$s_{21}^{subcriterion}$			$m_{22}^{subcriterion}$	$s_{22}^{subcriterion}$			$m_{2N}^{subcriterion}$	$s_{2N}^{subcriterion}$
		…														
		Subcriterion m		$w_m^{subcriterion}$			$m_{m1}^{subcriterion}$	$s_{m1}^{subcriterion}$			$m_{m2}^{subcriterion}$	$s_{m2}^{subcriterion}$			$m_{mN}^{subcriterion}$	$s_{mN}^{subcriterion}$
	Criterion 2			$w_2^{criterion}$			$m_{21}^{criterion}$	$s_{21}^{criterion}$			$m_{22}^{criterion}$	$s_{22}^{criterion}$			$m_{2N}^{criterion}$	$s_{2N}^{criterion}$
	…															
	Criterion p			$w_p^{criterion}$			$m_{p1}^{criterion}$	$s_{p1}^{criterion}$			$m_{p2}^{criterion}$	$s_{p2}^{criterion}$			$m_{pN}^{criterion}$	$s_{pN}^{criterion}$
Category 2				$w_2^{category}$			$m_{21}^{category}$	$s_{21}^{category}$			$m_{22}^{category}$	$s_{22}^{category}$			$m_{2N}^{category}$	$s_{2N}^{category}$
…																
Category x				$w_x^{category}$			$m_{x1}^{category}$	$s_{x1}^{category}$			$m_{x2}^{category}$	$s_{x2}^{category}$			$m_{xN}^{category}$	$s_{xN}^{category}$

Figure 8: Generic layout of CRMSS tool (own illustration)

$m_{yj}^{subcriterion}$ presents the weighted mean for the y^{th} sub-criterion of j^{th} alternative and is used next to calculate the score of this sub-criterion:

$$s_{yj}^{subcriterion} = w_{y}^{subcriterion} \cdot m_{yj}^{subcriterion}, \; y \in (1, v), \; j \in (1, N) \tag{3}$$

The number of sub-criteria as well as of weighted means and scores for these sub-criteria is equal v for every available alternative. Note that the importance weight given to sub-criterion y ($w_{y}^{subcriterion}$) is used to calculate the sub-criterion score in (3). When the weighting of the sub-criterion changes, this change is independent from the alternative and a new value of the weight is the same for all alternatives. The same applies to the weights of indicators, criteria and categories. In (4) - (7) the calculation of criterion and category weighted means and scores are given analogue to those of sub-criteria. The only difference is the number of criteria and categories, which are p and u in this case.

$$m_{tj}^{criterion} = \frac{\sum_{y=1}^{v} s_{yj}^{subcriterion}}{\sum_{y=1}^{v} w_{y}^{subcriterion}} \quad ; \; t \in (1, p), \; j \in (1, N) \tag{4}$$

$$s_{tj}^{criterion} = w_t^{criterion} \cdot m_{tj}^{criterion};\ t \in (1, p),\ j \in (1, N) \tag{5}$$

$$m_{uj}^{category} = \frac{\sum_{t=1}^{p} s_{tj}^{criterion}}{\sum_{t=1}^{p} w_t^{criterion}};\ u \in (1, x),\ j \in (1, N) \tag{6}$$

$$s_{uj}^{category} = w_u^{category} \cdot m_{uj}^{category};\ u \in (1, x),\ j \in (1, N) \tag{7}$$

5.2.5 Step 5 – Ranking

To obtain a final ranking of the selected alternatives, the results are summarized and the percentage fit is calculated.

- Total score per alternative (TS_j) is a sum of all category scores. According to the variables in the previous sub-section, the calculation is as follows:

$$TS_j = \sum_{u=1}^{x} s_{uj}^{category};\ j \in (1, N) \tag{8}$$

Different results should be calculated to get an overall impression of fit. The following results are suggested (Breslin, 1986):

- Category percentage fit ($CPT_{uj}^{category}$): The criteria scores for quality, functionality, cost and technical are totaled and then divided by the sum of maximum achievable scores with regard to feature fulfillment and enhancement complexity ($ms_{tj}^{criterion}$).

$$CPT_{uj}^{category} = \frac{\sum_{t=1}^{p} s_{tj}^{criterion}}{\sum_{t=1}^{p} ms_{tj}^{criterion}} \cdot 100\% \quad ;\ u \in (1, x),\ j \in (1, N) \tag{9}$$

- Essential feature fit (EFF_j): The scores of all criteria that are marked as essential are totaled ($s_j^{essential-criterion}$) and divided by the sum of the corresponding maximum achievable scores ($ms_j^{criterion}$).

$$EFF_j = \frac{\sum_{1}^{h} s_j^{essential-criterion}}{\sum_{1}^{h} ms_j^{criterion}} \cdot 100\% \quad ;\ j \in (1, N), \text{ with } h \text{ - number of all essential criteria} \tag{10}$$

- Total percentage fit (TPF_j): All category scores are totaled and divided by the sum of maximal achievable scores per category ($ms_{uj}^{category}$).

$$TPF_j = \frac{\sum_{u=1}^{p} s_{uj}^{category}}{\sum_{u=1}^{p} ms_{uj}^{category}} \cdot 100\% \quad ;\ u \in (1, x),\ j \in (1, N) \tag{11}$$

Results vary according to importance weights, individual feature fulfillment, and the enhancement coefficient. Therefore, the preference for specific CRM system software is not a constant outcome. An ideal solution meets all criteria categories at 100%, but in reality, that is rarely the case. A good solution must cover at least a certain percentage; otherwise additional alternatives need to be considered. If the minimal must be 80%, alternative 1 is not a satisfactory solution for the presented example company, even if the cost/usability ratio is the lowest of all other alternatives.

Finally, to comply with objective three (assess alternatives holistically on the basis of costs versus utility), the overall score must be divided by the overall cost of each alternative (Le Blanc and Jelassi, 1989). One method that is often applied is the calculation of the total cost of ownership (TCO). In this calculation, all direct and indirect costs of system software that is in scope are determined and totaled. The TCO per alternative is divided by the total score per alternative (8). An example to accentuate the different results is provided in the paper.

5.3 Critical assessment

The paper ZAKHARIYA et. al. (2012) evaluates the feasibility of WSM as an evaluation technique for CRM system selection. Furthermore, it describes the development of a CRMSS tool to assess the individual preference between the four major CRM systems. While the framework provides mainly subjective evaluation, it structures the decision process and demonstrates tendencies and specific insights that are otherwise hard to grasp. The proposed framework presents one way of supporting MCDM providing a CRMSS recommendation. Making a final decision still requires an in-depth analysis of available results to be made by decision-makers.

However, some limitations remain. The results of the WSM tool calculation cannot be the determining factor for the final system software selection (Le Blanc and Jelassi, 1989). That is why the proposed framework also comprised qualitative evaluation within the step of ranking score. This part of evaluation allows the decision-makers not only to compare the calculated results, but to analyze them from different perspectives before making a decision.

Nevertheless, there are too many factors that affect the final outcome of an implementation and (IT/IS) strategies might change during evaluation and selection. In addition, the aggregated score depends on the subjective judgment of the evaluation project team, which might change over time, too. The framework accommodates this issue through individual prioritization of a multitude of indicators in four different dimensions. The subjectivity is reduced by individual weights on three levels – on the category level (quality, functionality, cost and technical), on the criterion level, and on the sub-criterion level (see Figure 4).

The results of the framework are only meaningful for a particular company at a specific point in time. The scales used for rating and weighting in previous sub-section can be individually

chosen. To validate the decision, the framework should be adapted for different scenarios to analyze the robustness of the result.

A further limitation is importance weighting which is conducted by subjective opinion (Bouyssou et al., 2006). Hence the assigned weights are not always reliable, but this drawback also occurs with AHP. Because selecting CRM system software based on functional, technical, cost and quality criteria does describe a complex decision problem, WSM is the preferred evaluation technique (Shyur, 2003). Compared to other techniques, it can be applied rather quickly, and produces similar results. The implementation of this technique within a spread sheet tool makes the proposed framework not only automatable but also easily manageable (Collier et al., 1999). AHP additionally offers rank reversal and Hybrid Knowledge Based System (HKBS) also provides the ability to specify user requirements and indicate the level of requirement fit (Jadhav and Sonar, 2009b). But in terms of CRMSS, the added value does not justify the additional time and budget required. Therefore, the WSM is regarded as the best evaluation technique for CRMSS.

After all four components of the CRMSS process model were developed a practical test is necessary to test the validity in a case study (phase 4). The next section gives an overview on the first appliance with an automotive B2B company.

6 Acceptance of CRMSS process model – An automotive case study

6.1 Methodology

Case research is applicable to develop and test process models (Radeke, 2010). Data collection in interpretative case study research can be manifold including, for example, observation, archival records, and participation (Yin, 2009). Walsham (1995) argues “that interviews are the primary data source, since it is through this method that the researcher can best access the interpretations” of the participants. For this reason, six focused interviews were conducted with different stakeholders from the project team (Yin, 2009; Berg 2009). The interview guideline was pretested with a researcher familiar with the research topic (Berg, 2009) and the wording was adjusted according to his comments. During the interview a semi-structured interview guideline was used. The interviewees were first asked to elaborate on their qualification and current role in the company and during the evaluation project. The main part of the interview guideline was based on the different phases of the CRM system selection approach (Figure 4) and the interviewees were subsequently asked to evaluate the applied CRMSS process model from their perspective as model users (Ahlemann and Gastl, 2007). The interview partners were chosen according to their role in the project to make sure that all perspectives were covered (Yin, 2009). Individual interviews were conducted with the project IT manager, the business IT manager, and key users from sales, controlling and IT as well as the involved business consultant. The personal interviews

were conducted at the company's site in two subsequent weeks in November 2011, each lasting approximately 1 hour. Walsham (2006) states that when the researcher is closely involved with the researched case interviewees feel that a valid contribution can be made and are more likely to cooperate. At the same time, close involvement potentially endangers a fresh perspective on the case (Benbasat et al., 1987). Each interview was recorded with the consent of the interviewee and transcribed later. To ensure objectivity as recommended by Yin (2009) and Eisenhardt (1989), data triangulation was applied to merge qualitative data from the focused interviews with other, partly quantitative, data sources, such as documents and presentations from the different project phases. Content analysis was applied to evaluate the data collected from the case study (Berg, 2009) by independently paraphrasing and deductively coding the material into the set of category given by the CRMSS approach. An extended interview guideline served as the set of coding rules for matching of paraphrases with categories.

6.2 Results

The consolidated results of all interviews are mapped to the CRMSS process model and presented in Figure 9 as an overview which is based on the process model.

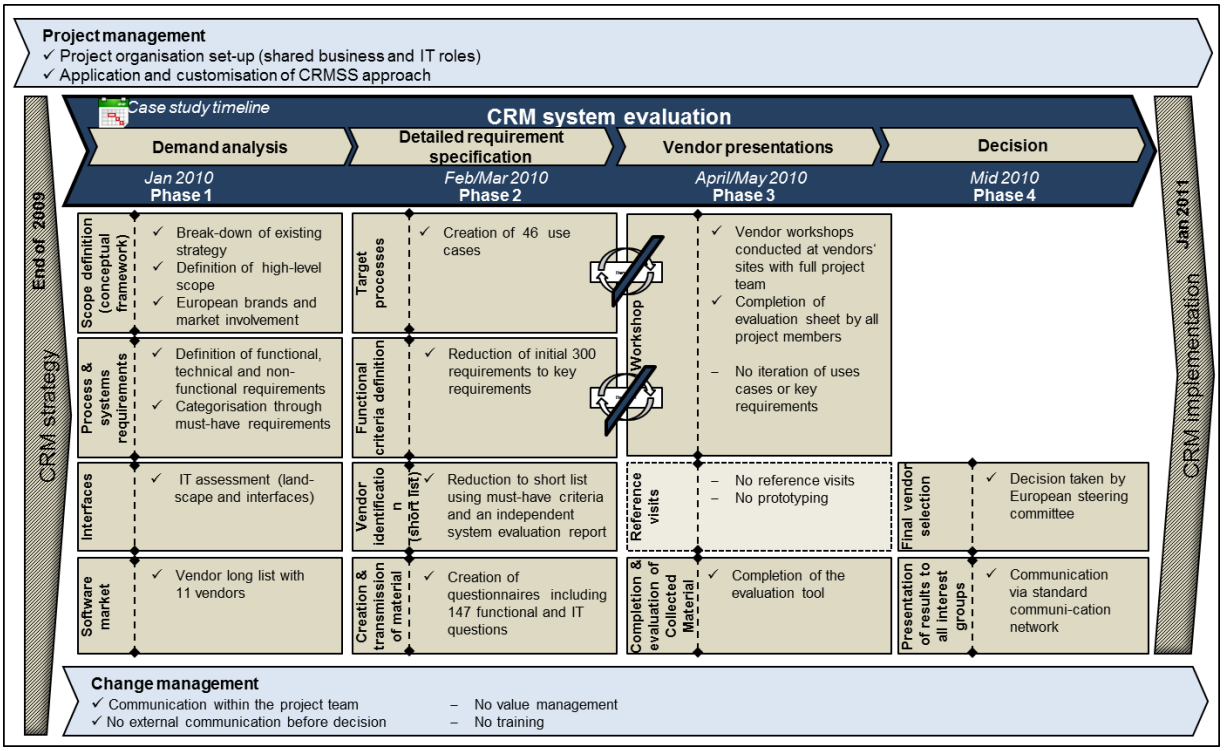

Figure 9: Consolidated results applied CRMSS Process Model (own illustration)

The following paragraphs illustrate the outcomes in more detail. For each Subsection a short definition of each CRMSS phase is given followed by a description of the realization of each phase and corresponding statements of the interviewees.

6.2.1 Project Management

The CRMSS approach includes the establishment of a project organization in the beginning of the evaluation that remains stable also during the implementation project. Furthermore, the full methodology needs to be set up and understood by the project management. The project organization in the evaluation project was almost identical with the staffing of the implementation project. Only 20 percent of the initial staff was exchanged due to requirements of the daily operation. The main reason was the required degree of involvement of the business with their specific knowledge. The workload on each project member remained equally high during the evaluation phases as well as during the implementation project. The process organization was established before the selection project started. The project management was enlarged by the role of a template keeper who is necessary to ensure the stability of the system template throughout the rollouts and prevents country-specific changes that endanger the robustness of the template. In addition the project management was consequently shared between business and IT.

6.2.2 Demand Analysis

In the first phase of the CRMSS approach a conceptual framework must be established including a scope definition, critical process and system requirements identification, interface classification and vendor long list creation. The initial scope definition was conducted by the project management together with the consulting partner. As in input to the initial phase existing strategy documentation was used as a basis. The high-level strategy was broken down for each business area. The scope definition included functional high-level scope, IT assessment, project planning and market strategy. Out of scope were risk management and exit strategies. The categorization included must-have and other requirements. The later were subdivided into important and less important requirements. For all categories, requirements that were simple or considered as a branch-standard were excluded from further analysis. In total, 300 specific requirements that included functional, non-function and technical subcategories were identified. They served as input for the questionnaire provided to the vendors in phase 2. The architectural assessment was conducted by the IT project manager in the context of a different project prior to the evaluation. In addition, further analysis of interfaces and relevant systems was conducted for the first rollout in Germany. The vendor long list included around ten vendors identified by the IT project manager and consultants. Established standard and industry solutions were considered and subsequently reduced by applying certain general must-have criteria. These criteria consisted of, for

example, turn-over, existence of an automotive roadmap, connectors for legacy systems and availability of independent implementation partners.

6.2.3 Detailed Requirements Specification

In the second phase of the CRMSS approach mandatory functional criteria and target process are derived and specified. The outcome helps to narrow the list of potential vendors down to a short list. The initial 300 requirements were reduced to key requirements depending on their criticality. There were 46 use cases derived from functional key requirements. On this basis, a questionnaire of 147 questions was set-up to be distributed to the vendors from the short list. The questionnaire included functional and IT-related questions. The template keeper selected and defined the relevant business processes. The topic of user friendliness was scoped out during evaluation. A few other quality criteria were considered, for example, performance and scalability. Cost and return-on-investment were not part of the evaluation. A Software as a Service (SaaS) vendor was part of the vendor long list but could not remain on the vendor short list as there was not sufficient consulting capacity in Europe. The short list was defined with the help of the general must-have criteria and independent system evaluation by the Aberdeen Group. The questionnaire and the use cases were handed out to the vendors as transmission material. The evaluation sheet was designed by the project management and the consulting partner and is an internal document to collect the opinions of the project team during vendor workshops.

6.2.4 Vendor Presentations

In phase 3 of the CRMSS approach, workshops that focus on obtaining a deeper insight on the degree of scope coverage are scheduled. The vendors are asked to present their solutions for the predefined use cases. Vendor workshops were conducted at the vendors' sites with each of the three vendors from the short list. The whole project team of 20 members, including project managers, template keepers, key users/process owners and consulting, took part. Specific expectations were addressed to the vendors prior to the workshops. The lack of individualized presentations in the workshops made it necessary to conduct many further videoconferences for clarification of critical issues. The project members'' suggestions for mitigation were pre-workshop with a small group or telephones conference prior to the workshops. Preparation of the workshops was considered very important. The decision criteria remained stable and were not iterated after the first workshop. As representatives from all relevant departments and European countries participated in the vendor workshops, critical business questions could be addressed directly. During the case study no reference visits were conducted. Reference visits need to be prepared thoroughly which could not be integrated into the project timeline. There was no sufficient time frame to create prototypes. For the assessment of the vendors from the short list, the consultant collected the results from the evaluation sheets. The evaluation tool was an excel-

based weighting method. The weights were set up by the project management and confirmed by the steering committee.

6.2.5 Decision

In phase 4, results are summarized and documented before they are presented to the interest groups. Using this approach the decision is justified and demonstrated before the negotiation process with vendors begins. The final decision was taken by the European steering committee with feedback from both project managers two months later. Within the two months, the vendor negotiations took place. The decision was only not reached based on the feedback of the project management but also based on the information from the different business units represented by the template keepers. The main decision factors in this phase were cost and standardization in regard to process fit. The selected vendor was officially announced though the general communication channels. A large meeting did not take place as employees are scattered all over Europe. After the decision was taken, a ramp-up phase of six months served as preparation for implementation.

6.2.6 Change Management

Change management spans across all phases of the CRMSS approach and includes communication to all stakeholder, transformation and organization enablement. Change management consists of different areas, also in an evaluation project, including communication, business transformation, value management and training. In the researched case study all topics were less prioritized. For communication the project management counted on the usual communication channels. Before the final decision was taken, the intention was to not spread unconfirmed information that could lead to rumors and false assumptions. In the area of business transformation the IT initiated organization change in form of a second support team. Other business transformation topics were not addressed during evaluation. This was handled similarly in the areas of value management and training. Training was only roughly accounted for in the project cost calculation, but was not considered as functionally important during the selection process. The most important change management aspect in the case study was to reach buy-in of the organization through representatives from the different departments.

6.3 Critical assessment

The paper FRIEDRICH, KOSCH AND BREITNER (2012) verifies the feasibility of the CRMSS process model. The practical application has proven the operational fit of the CRMSS process model. A couple of key points stand out and are discussed in this section.

In the area of project management an important deliverable was missing to plan and level resource workload. The CRMSS approach did not include a resource plan. This deliverable is not only relevant for acquiring project members with the demanded skills and capacity but

also necessary for managing expectations of each project member regarding their workload and responsibilities. When selecting project members it is essential to involve staff from all affected groups, in this case all key users from the different sales departments. An early participation increases their understanding of the project activities and their outcome efficiency significantly. The case study has confirmed the necessity to involve, for example, a controlling key user to ensure that sales controlling aspects are considered. The project organization must be established before the first phase of the evaluation project. In the case study, some project members were involved at a later stage and thus initially struggled to fully participate in the workshops. A valuable outcome of the case study is consequently teaming each project organization role from an IT and a business representative to ensure the coverage of all aspects.

During the demand analysis critical requirements are identified. As the case study has proven it is important to already involve business experts (in this case the template keepers) to account for all angles. For example, from the perspective of the interviewed key users, user friendliness is a critical factor for acceptance of the software later in implementation and after go-live. Although this is a trivial assumption, the case study and the earlier research with experts showed that this aspect is often being neglected in evaluation projects. Furthermore, when the strategy is incorporated into the project scope, it is necessary to not only consider business aspects but also incorporate the IT strategy. This ensures that future readiness of the vendors is considered. In the area of interface analysis for CRMSS it is specifically crucial to analyze the integration of the ERP and BI system to ensure to be able to achieve synergy effects and an improvement of the as-is situation.

In the detailed requirement phase, an interesting discovery was made regarding the vendor workshops. Although sending out detailed material with company specific information not all vendors prepared accordingly. Using solely transmission material has proven to be not a sufficient instrument to explain expectations. For a more efficient preparation the conduction of telephones conferences beforehand are necessary to clearly define expectations towards the vendors. Two interviewees suggested pre-workshops with a smaller team to prevent misunderstandings, but in this regard, CRM evaluation can be distinguished from other standard software evaluation, for example ERP systems, as CRM functional requirements are less complex and smaller budgets are available. The iteration of processes and decision criteria were not necessary in the case study as sufficient effort was applied during the strategy, process and decision criteria development. According former study with CRM experts (Friedrich et. al. 2011 and 2012b) iterations are important. Therefore, this subject needs further practical investigation during a field search. Reference visits and prototyping can be considered as an optional element of the CRMSS process model. In this specific case, the project timeline was too short and both tasks require thorough preparation.

Phase	Task	Roles	Deliverables	Additional deliverables
Phase 1: Demand analysis	Scope definition	Steering committee Project management	✓Strategy documents ✓Categorization criteria	+ Exit strategies
	Process & system requirements	Template keeper (per business unit)	✓ High level process definition ✓ Initial requirements list ✓ Selection criteria	+ Business operations plan + Roll-out plan
	Interfaces	IT project manager	✓ Architectural Assessment	
	Software market	IT project manager	✓ Vendor long list	+ Vendor assessment
Phase 2: Detailed requirement specifi-cation	Target process	Template keeper, business experts, IT and business key users	✓ Key requirements ✓ Decision criteria and weights	
	Functional criteria definition	Template keeper, business experts, IT and business key users	✓ Evaluation sheet	
	Vendor identification	Business project manager, IT project manager	✓ Criteria for vendor short list ✓ Vendor short list	
	Creation & transmission of material	Business project manager, IT project manager, template keeper, business experts, IT and business key users	✓ Use cases ✓ Questionnaire ✓ Prototype	+ Company and project overview
Phase 3: Vendor presentation	Workshops	Business project manager, IT project manager, template keeper, business experts, IT and business key users	✓ Evaluation sheet (filled out)	+ Interview guideline for reference visits
	Completion & evaluation of collected material	Business project manager, IT project manager	✓ Evaluation tool	+ Cost calculation
Phase 4: Decision	Final vendor selection	Steering committee		
	Presentation of results to all interest groups	Project management	✓ Presentation	
Change management		Business project manager	✓ Communication package	+ Stakeholder analysis + Business assessment
Project management		Business project manager, IT project manager	✓ Project plan ✓ Project organisation chart	+ Resource plan + Business case

Figure 10: Overview of tasks, roles and deliverables derived from the case study (own illustration)

The area of change management retreated to the background during the evaluation. This had mainly impact on the information level of the stakeholder groups. This is therefore addressed differently in the implementation project and has achieved a positive effect on opinion towards the new system. Overall the involvement of the different stakeholder groups had already a positive effect towards the organizational acceptance.

The CRMSS approach was judged as supportive and a good instruction for the evaluation project by all interviewed project members. They stated that the process model helped them to consider all critical factors throughout the different project phases. Lessons-learned is that it is not sufficient to give a detailed instruction solely to the project managers but also to provide the big picture to other project members. As described in this section it is necessary to train project members in the methodology. Further system training in the selection project is challenging to offer as various systems are still under discussion. This becomes inevitable during the preparation of the implementation project to enable key users during fit-gap-analysis.

Based on the results of and conclusions from the cases study the CRMSS process model is further adapted. Figure 10 illustrates relevant project roles in each phase and distinguishes which deliverables were applied in the case study and which were identified as helpful in the aftermath (see column “additional deliverables”). These findings together with the developed tool in the previous section are the major improvements of the final CRMSS process model.

7 Conclusion

The findings and discussion in each section has shown that the CRMSS process model was developed and evaluated on a rigorous research approach and included not only research results but also practical experiences from CRM experts as well as results derived from a case study.

The research questions proposed in section 1 are answered in the following paragraphs separately.

Section 2: Literature review on a methodology to select suitable software packages

The paper FRIEDRICH et. al. (2010) presents an overview on the latest research on CRM software selection for tender evaluation. It provides an impression of published papers, specifically regarding CRM evaluation, and might therefore serve as a basis for other researchers in this field.

1. What is the current status of science research on CRM evaluation methodology?

In research literature only one published paper was identified which was related to CRM system selection. On this basis the search was enlarged to IT system selection as basis and guideline for developing the initial CRMSS. Those findings were combined with CRM requirements found in strategic research literature. The process as well as the quality, cost and technical criteria are similar to General IT system selection but specifically the functional criteria catalogue has a strong focus and deviation to the later. In addition there are only few tools to support system selection even in the area of IT selection and specifically no CRM tool.

Section 3: Validation of initial CRMSS process model based on international expert interviews and online surveys

The paper FRIEDRICH ET AL. (2011 and 2012b) evaluated the initial CRMSS framework in two review cycles and further refined.

1. What do experts think of the proposed CRM system selection approach?
2. Which criteria of the proposed approach need to be changed or optimized?
3. Is an Analytic Hierarchy Process (AHP) approach the preferred technique for evaluating CRM systems?

The discussion with CRM experts has shown that most parts of the process model are applied in practice when conducting CRMSS or other IT selection, especially after further refining the model and evaluating it on an international level. There are connections to general IT/IS evaluation that can be used for either discipline, as quality, technology, and cost criteria are generally applicable. However, functional criteria, which make up the largest portion, are only valid for CRMSS and most areas are adapted for CRMSS, for example activities or deliverables in process model. All experts emphasized that CRMSS is a necessary step for successful CRM implementation.

Generally all four categories (quality, functionality, technology and costs) need to be considered when evaluating the suitability of CRM systems. One CRM system may have the best functional fit, but if the acquisition and maintenance costs are significantly higher than another CRM solution that almost has the same functional fit, the decision falls differently. A CRMSS tool supports the simultaneous consideration of all dimensions. The proposed criteria were accepted to a great extent with additional suggestions, mainly in the functionality and quality areas, as discussed in more detail in section four.

The empirical study showed that AHP is still not an established technique. CRM experts who are familiar with AHP are convinced that this technique is quite appropriate for evaluating CRM systems. AHP considers every aspect of influence factors, but depending on the project size and budget, it might be more suitable to choose or combine techniques that are easier to implement, such as WSM. How suitable this technique is in terms of CRM system selection still needed to be verified in case studies.

Section 4: Towards the process model for efficient CRMSS

The paper FRIEDRICH AND BREITNER (2012b) summarized all results from the literature review and the three evaluations in a CRMSS process model for the categories method, criteria and evaluation technique on a detailed level focusing especially on the criteria part as it is the essential component of the CRMSS process model.

1. What are the core components of an efficient CRMSS process model?
2. What criteria must be taken into consideration in an efficient CRMSS process model?

The outlined CRMSS process model covers the whole process of evaluating packaged CRM systems, after a CRM strategy was defined and before the implementation project begins. The process model is generic and needs to be adapted according to an individual company, industry, and the project budget. As an a priori critical success factor, the CRM strategy and the basic functionality for the software must be defined in advance. To apply it in practice, the criteria template and an evaluation technique must be included also. External consulting often is crucial, but needs to be adapted to the individual case. According to CRM experts mandatory activities are scope definition, analysis of processes and the vendor selection.

Optional but recommended activities are analysis of interfaces, reference visits and a vendor short list.

Four criteria dimensions must be taken into consideration: quality, functionality, technical and cost. The main part of the criteria category focuses on CRM-specific aspects. Cost, technical and quality categories are generally relevant for IT evaluation and are the core difference to General IT system selection. In addition, the relative values and weighting for CRM do vary.

Section 5: Multi-criteria decision support framework for CRMSS

The paper ZAKHARIYA et. al. (2012) proposes a CRMSS selection tool on basis of WSM contemplating the four major CRM systems.

1. Is WSM a feasible evaluation technique to support CRMSS?

While the framework provides mainly subjective evaluation, it structures the decision process and demonstrates tendencies and specific insights that are otherwise hard to grasp. As shown, WSM technique is easily applicable to CRMSS. The proposed framework presents one way of supporting MCDM providing a CRMSS recommendation. Making a final decision still requires an in-depth analysis of available results to be made by decision-makers. The presented framework provides valuable insight in terms of analyzing various aspects that affect the efficiency of a CRM implementation. In addition, the decision is based on meaningful results that can be presented later in the implementation process if the decision is challenged. As the literature review and the discussion have shown WSM is a feasible evaluation technique as it is easy to apply which is crucial for smaller system software decisions.

Section 6: Acceptance of CRMSS process model – An automotive case study

The paper FRIEDRICH, KOSCH AND BREITNER (2012) describes a practical test of the CRMSS process model in a case study with an automotive supplier which resulted in a final refinement of the CRMSS process model.

1. Is CRMSS process model applicable in practical testing and which model elements need to be refined?

Overall, the CRMSS process model was judged as supportive and a good instruction for the evaluation project by all interviewed project members. The major refinements are the inclusion of roles matched to tasks of the model phases and the enhancement of the deliverables catalogue. The case study shows, that an early and comprehensive explanation of the methodology ameliorates the understanding and motivation of the project members. This is also applicable to communication throughout the evaluation project. Furthermore, neglecting quality criteria, such as user friendliness, has a significant negative impact on the acceptance of the CRM system. Another important aspect is the preparation of the vendor workshops that, in part, were not fully satisfying in the investigated case. Next to complete

transmission material, communication with the potential candidate before the workshops is decisive to convey the expectations of the company. From an economical point of view, reference visits and prototyping are only optional elements of the model and are sensible to apply when complexity of individual CRM processes is rather high or when the company has limited experience with CRM processes.

Based on the results of the presented papers there are some further steps that should be addressed in the near future.

It is planned to conduct further practical validation through field research as a theory is only generalizable to other settings when it is actually tested against the empirical circumstances of these other setting (Lee, 1989). Further case studies will focus on the functional selection criteria for CRM system evaluation. The assessment of the critical requirements needs further investigation to provide a tool for enhanced CRM specific evaluation.

Multi-criteria decision frameworks aid the selection process of CRM systems software in an efficient way. To even better validate the proposed framework, a comprehensive case study should be conducted, preferably in a context where a CRMSS was carried out and the system software has already been implemented for at least a year. The results achieved by the framework must be compared to the results and outcome of the former CRMSS in an a posteriori analysis and evaluation.

There are deviations when conducting system selection in different industries. So practical testing concentrated on the automotive industry. To further refine the CRMSS tool it is necessary to evaluate the requirements of other industries as well and to incorporate those findings in the tool.

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Appendix

Appendix 1

CRM Evaluation - An Approach for Selecting Suitable Software Packages

Ina Friedrich, Jon Sprenger, Michael H. Breitner

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Abstract: Evaluating software solutions before making an investment decision is crucial - considering the current economic climate as well as the success that the implementation projects have up until today. A methodological approach is necessary in order to make efficient decisions in this area. This paper systematically researched and reviewed articles which discuss the topic of CRM evaluation, or IT evaluation in general, and which have been published in science journals and conference proceedings. The goal of this paper is to evaluate the current status of methods and tools for CRM evaluation. As a result, a deficiency in the area of CRM evaluation has been identified. On the basis of their research the authors of this paper propose an approach for evaluating packaged CRM software, making a new contribution to the field of methodology.

Appendix 2

Discussion of a CRM System Selection Approach with Experts: Selected Results from an Empirical Study

IWI Discussion Paper #44, Leibniz Universität Hannover, Institut für Wirtschaftsinformatik 2010

Link: http://www.iwi.uni-hannover.de/cms/images/stories/publikationen/2010-11/iwi-dp44_if_js_k.pdf

Abstract: In order to get an overview of the current status of CRM system selections the authors performed a comprehensive, structured review of the literature concerning the topic of CRM evaluation and identified a deficiency in this area in prior work. On the basis of the results of this analysis, a new CRM system evaluation approach for selecting suitable packages was developed (FRIEDRICH ET AL. 2010). This approach covers the whole process of selecting packaged CRM systems, once a CRM strategy has been defined, and before the implementation project begins. The proposed approach must be evaluated by experts to verify its practicality and to refine the model. Therefore, the authors conducted an empirical study. This study was performed in two parts in order to combine qualitative and quantitative research methods (more precisely the research findings were combined, but not the methods and data). The qualitative research (expert interviews) was primarily used to explore the topic whereby the quantitative research (online survey) focused on testing the approach (MILES AND HUBERMAN 1994). Following GLÄSER AND LAUDEL (2006), the amendment of the literature-based findings with empirical data enables additional results. Summarized, the empirical study was carried out to confirm the literature-based perceptions, achieve improvements, and ensure the practical relevance of the approach. The results are presented within this paper.

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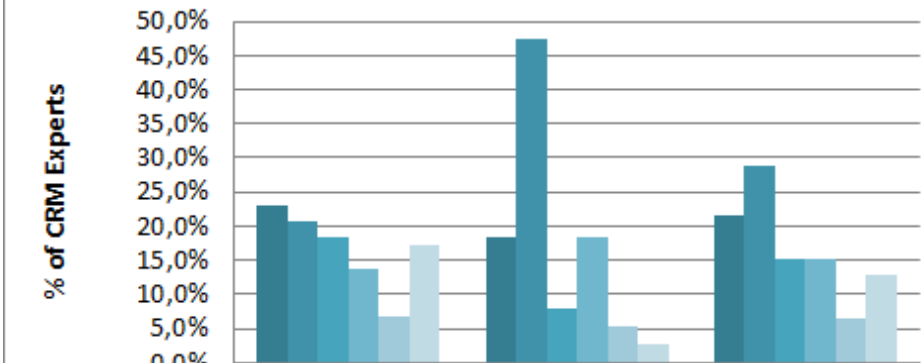
Discussion of a CRM System Selection Approach with Experts: Selected Results from an Empirical Study

Ina Friedrich[2], **Jon Sprenger**[3] and **Michael H. Breitner**[4]



	German	English	Total %
1-10	23,0%	18,4%	21,6%
11-50	20,7%	47,4%	28,8%
51-150	18,4%	7,9%	15,2%
151-1.000	13,8%	18,4%	15,2%
1001-10.000	6,9%	5,3%	6,4%
>10.000	17,2%	2,6%	12,8%

[1] Copies are available on inquiry: Institut für Wirtschaftsinformatik, Leibniz Universität Hannover, Königsworther Platz 1, 30167 Hannover, Germany (www.iwi.uni-hannover.de).
[2] Certified economist, Ph.D. student and manager, Accenture, Campus Kronberg 1, 61476 Kronberg, Germany (ina.friedrich@accenture.de).
[3] Certified economist, Ph.D. student and research assistant, Institut für Wirtschaftsinformatik der Leibniz Universität Hannover, Königsworther Platz 1, 30167 Hannover, Germany (sprenger@iwi.uni-hannover.de).
[4] Full Professor for Information Systems and Business Administration and head of the "Institut für Wirtschaftsinformatik der Leibniz Universität Hannover", Königsworther Platz 1, 30167 Hannover, Germany (breitner@iwi.uni-hannover.de).

Table of Contents

Abstract

Due to the high failure rate, the costs and the long project duration of CRM implementation projects, it is crucial to evaluate software solutions before making an investment decision. A methodological approach is required in order to make these decisions more effectively and efficiently. On the basis of the results of a comprehensive, structured literature review, a new CRM system selection approach for selecting suitable packages was developed in prior work. This approach must be evaluated by experts. In this paper, the results of an initial reality check are presented. The intention is to verify feasibility of the proposed approach with CRM experts who have practical experience with the selection of different systems. This is done by an empirical study that is subdivided into qualitative expert interviews and a quantitative online survey. Both surveys are described in detail relating to research design and results. The core results demonstrate that the approach is a valid method for evaluating CRM software applications.

Keywords

Customer Relationship Management, CRM System Selection, Empirical Study, Expert Interviews, Online Survey.

Introduction

In order to get an overview of the current status of CRM system selection the authors performed a comprehensive, structured review of the literature concerning the topic of CRM evaluation and identified a deficiency in this area in prior work. On the basis of the results of this analysis, a new CRM system evaluation approach for selecting suitable packages was developed (FRIEDRICH ET AL. 2010). This approach covers the whole process of selecting packaged CRM systems, once a CRM strategy has been defined, and before the implementation project begins.

The proposed approach must be evaluated by experts to verify its practicality and to refine the model. Therefore, the authors conducted an empirical study. This study was performed in two parts in order to combine qualitative and quantitative research methods (more precisely the research findings were combined, but not the methods and data). The qualitative research (expert interviews) was primarily used to explore the topic whereby the quantitative research (online survey) focused on testing the approach (MILES AND HUBERMAN 1994). Following GLÄSER AND LAUDEL (2006), the amendment of the literature-based findings with empirical data enables additional results.

Summarized, the empirical study was carried out to confirm the literature-based perceptions, achieve improvements, and ensure the practical relevance of the approach. The results are presented within this paper.

Research Design

1.1 Expert Interviews

At early stages of research qualitative methods are useful in order to get a professional perspective based on long-standing experiences (BECKER ET AL. 2009, MILES AND HUBERMAN 1994). Therefore, focused one-to-one expert interviews (YIN 2009, MERTON ET AL. 1990) with partly standardized interview guidelines (FIELDING 2001) were chosen as a suitable qualitative research method (PUNCH 2005, KLEIN AND MYERS 1999). To capture the full range of impressions on the proposed approach, the interview guideline was not applied restrictively and the results were analyzed according to guidelines from KLEIN AND MYERS (1999).

165 experts (persons with specific knowledge in the broader topic, GLÄSER AND LAUDEL 2006) were identified via business networks such as *www.xing.com*, *www.competence-site.de*, and *www.crm-expert-site.de.* These potential participants were invited to participate.

In addition to the interview invitations, the partly standardized interview guideline (Table 1) was sent to the potential participants. Finally, 18 experts were interviewed.

The interviews were conducted via phone between March and April 2010 with an interview length between 15 and 45 minutes.

The majority of the CRM experts was working in the consulting industry and had been involved in multiple CRM evaluation and implementation projects. Only two interviewees experienced CRM evaluation from a client's point of view. Two CRM experts worked for a CRM system manufacturer.

Due to the relatively small number of participants and the nature of qualitative data, a qualitative content analysis was conducted.

Table 1: Expert Interview Guideline

Section 1: Personal Questions
Questions: - Name and position of the interviewee? - Name and industrial sector of the interviewees' company? - In which way do you already took part in a CRM system selection process?
Section 2: Questions about the process models method
Questions: - How do you rate the process model with regard to the sequence of the phases? - How do you rate the content of each phase? Are there essential additions? - Which approach have you experienced/are you familiar with? - How good does the proposed model fit the idea of CRM evaluation?
Information: 1. "Demand Analysis": The conceptual framework is established by determining the main functional processes, system requirements and underlying IT-landscape. This includes interfaces that depend on the 'as-is' situation, as well as the future strategic orientation. All relevant interest groups should be involved throughout this phase. Especially the top management needs to communicate their sponsorship to gain quick and efficient involvement and commitment of all stakeholders. The defined scope specifies high-level requirements to deduct future to-be requirements and for preparing a vendor selection. Due to constant changes in the market, a detailed search for currently available solutions is required. 2. "Detailed Requirement Specification": Target processes need to be specified in order to derive mandatory functional criteria. The outcome helps to narrow the list of potential vendors down to a maximum of four to six candidates (referred to as 'short list'). In addition, the proposed evaluation techniques can be filled with the estimation metrics. A project summary and company-specific application cases for demonstration purposes, along with required costing factors, are then transmitted to the selected vendors. A criteria catalog and feedback forms are developed for internal use during pre-project sessions with potential vendors. 3. "Vendor Presentations": Workshops that focus on obtaining a deeper insight on the degree of scope coverage are scheduled. The vendors are asked to present their individual solutions for the pre-defined use cases during the sessions. Furthermore, functional and system requirements that are mandatory for vendor-specific solutions are discussed and modified. Each party fills out a feedback-form that later provides evaluators with a sense of the individual "look and feel" of the proposed software solution. Subsequently, all materials can be analyzed to evaluate and prioritize different vendors. In addition site visits might be conducted. Based on the findings iterations might be required by shaping functional criteria and target processes. This may result in further vendor workshops. 4. "Decision": The results are summarized and documented before the presentation to the interest groups. Using this approach, the decision toward a specific solution can be justified and demonstrated before the negotiation with the vendors begins. Before the first presentation it is necessary to begin contract negotiations to eliminate unqualified vendors in the result presentation. • The pre-phase "CRM Strategy" and "CRM Implementation" are not in scope.

Section 3: Questions about the process models criteria

Questions:

- Is the classification of quality, costs and functionality coherent?
- Which sub criteria is not relevant/should be deleted?
- Which sub criteria should be added?
- Which criteria is the most important for CRM package selection?

Information:

Quality:	*Costs:*	*Functionality:*
• Portability • Usability • Data Integration • Maintainability • Resources • Training & Support • Reliability • Performance • Security • Timeliness • Popularity	• License costs • Installation costs • Maintenance costs • Resources • Training & Support • Upgrade costs	• Operative CRM - Contact Mgmt - Lead Management - Sales Management - Customer Service - Relationship Mgmt • Communicative CRM: - Account Mgmt - Field Service - Call Center (CIC) - Campaign Mgmt - Internet • Analytical CRM: - Reporting

Section 4: Questions about the evaluation technique

Questions:

- Did you use AHP for any IT selection project?
- Is this a relevant technique for companies?
- Which technique is your company using?
- In case of "Other" which are you using?
- How do you proceed in CRM evaluation?

Information:

Analytic Hierachy Process (AHP): Method to support multi criteria deci-sion problems. A decision is refined with the goal of selecting criteria and subriteria as possible alternatives. By comparing pairs of criteria and weighting the results a prioritization of alternatives is achieved (in this case CRM systems)

1.2 Online Survey

In the second step a normative online survey was conducted. This quantitative research present a suitable way of connecting research questions with more data (PUNCH 2005). Moreover, it enables an overall assessment of the proposed approach in a systematic and comparable way and conceptualizes reality (MILES AND HUBERMAN 1994).

The search for experts was expanded for this part of the empirical study. In addition to the expert networks mentioned in section 1.1 of this paper, the search was conducted via GOOGLE (using the search terms *CRM expert*, *CRM software expert*, *CRM software selection*, *CRM systems* and *CRM*), via listed authors in CRM related articles/books and via named authors in case studies on CRM vendor websites (SAP©, Microsoft©, Sage©, Oracle© and Salesforce©).

Invitations to participate in an online survey were sent out in three cycles (Table 2) to a total of 1435 potential respondents in various countries (Table 3). The online survey was carried out using the web-based survey management system EVASYS by ELECTRIC PAPER GMBH. In total, 125 (8.7%) experts took part in the online survey.

The experts were asked predominantly closed questions in order to evaluate single aspects of CRM system selection and the proposed approach (Figure 1-4). The findings were evaluated in two ways. EVASYS itself calculates percentages and other descriptive statistics for closed questions whereas replies to open questions were clustered to draw conclusions. Dependencies between certain characteristics were not analyzed within this work.

Table 2: Online Survey Cycles

Survey Cycle	Date	Number of CRM Experts Contacted	Number of Responses
1	2010-06-17	836	53
2	2010-06-24	210	17
3	2010-06-30	389	55
Total		1435	125

Table 3: Country Allocation CRM Experts

Country	Number of Contacted CRM Experts
Germany	844
USA	365
U. K.	43
Switzerland	27
India	24
Australia	23
Austria	23
China	12
Other	CRM experts from countries with numbers below 10.

EvaSys
Education Survey Automation Suite

Leibniz Universität Hannover
Institut für Wirtschaftsinformatik

Ina Friedrich, Jon Sprenger, Michael H. Breitner
CRM System Evaluation

Greeting

Dear Sir or Madam,

in the context of an economic study of the Leibniz University of Hanover we would like to invite you to participate in our survey about "CRM software selection".
As you are a known CRM-Expert it would be great if you could spend 5-10 minutes of your time to answer a few questions about this topic.
Your answers will be kept anonymously and will be presented at an international conference.
On request, we can provide you the final results. If you are interested please enter your e-mail address in the online questionnaire.

Thank you for your support and
Best regards,
Ina Friedrich, Jon Sprenger & Prof. Michael H. Breitner

General Questions

Sector of your company:

Company size (number of employees):

○ 1-10 ○ 11-50 ○ 51-150 ○ 151-1000
○ 1001-10.000 ○ >10.000

Please disclose your email-adress if you are interested in getting the results of our survey.

Experiences in CRM System Evaluation

Were you already part of a CRM system evaluation project?

○ Yes ○ No

If yes, in which year were you part of a CRM system evaluation project?

Number of CRM system evaluation projects:

○ 1 ○ 2-5 ○ 6-20 ○ 21-50 ○ 51-100 ○ >100

Involvement as:

○ Customer ○ Vendor ○ Consultant ○ other

Which product did you choose?

Figure 1: Online survey (1/4)

Which product do you sell?

Was your CRM evaluation project successful?

Yes No

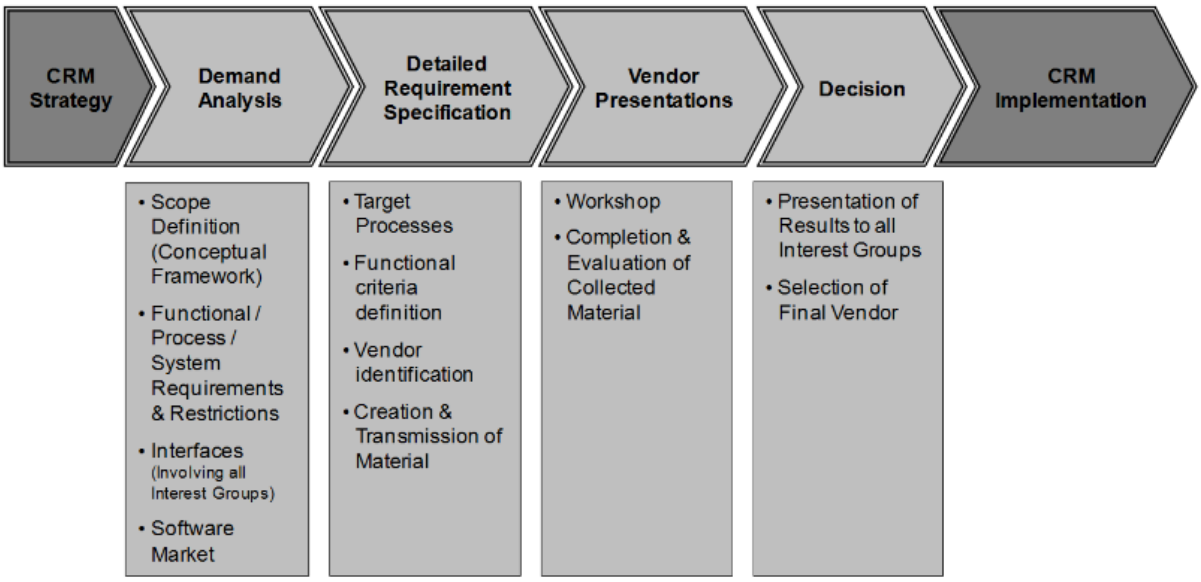
What was the most important success factor of your CRM evaluation project?

Which changes would have made the selection successful (in case CRM evaluation was not satisfying)?

CRM Evaluation

In your point of view, how important is CRM evaluation generally for your business? very important ○ ○ ○ ○ ○ not necessary

Figure 1: Process model for CRM evaluation



How good does the proposed model fit your idea of CRM evaluation? very good ○ ○ ○ ○ ○ very poor

How do you rate the practical relevance of the proposed process model for CRM evaluation? very relevant ○ ○ ○ ○ ○ not applicable

Do you think the support of a consulting company to perform a CRM system evaluation is necessary?

Yes No Case-based

If anything, what would you change in the proposed approach?

Figure 2: Online survey (2/4)

CRM Criteria

Figure 2: CRM criteria

Quality criteria:	*Cost criteria:*	*CRM functionality:*
• Portability • Usability • Data Integration • Modifiability & Maintainability • Resources • Training & Support • Reliability & Robustness • Performance & Practicability • Security • Timeliness • Popularity	• System costs (hardware/software licenses) • Preparation and installation costs • Maintenance costs • Resources (consulting, internal) • Training and support • Upgrade costs	• Reporting • Contact Management • Campaign Management • Call Center • Relationship Management • Field Service • Sales Management • Lead/Opportunity Management • Customer Service • Internet • Account Management

Do you agree with the classification of quality, costs and functionality?

○ Yes ○ No

Which sub criteria would you delete as unnecessary?

- ☐ Quality: Portability
- ☐ Quality: Usability
- ☐ Quality: Data Integration
- ☐ Quality: Modifiability & Maintainability
- ☐ Quality: Resources
- ☐ Quality: Training & Support
- ☐ Quality: Reliability & Robustness
- ☐ Quality: Performance & Practicability
- ☐ Quality: Security
- ☐ Quality: Timeliness
- ☐ Quality: Popularity
- ☐ Costs: System Costs
- ☐ Costs: Preparation & Installation Costs
- ☐ Costs: Maintenance Costs
- ☐ Costs: Resources
- ☐ Costs: Training & Support
- ☐ Costs: Upgrade Costs
- ☐ Functionality: Reporting
- ☐ Functionality: Contact Management
- ☐ Functionality: Campaign Management
- ☐ Functionality: Call Center
- ☐ Functionality: Relationship Management
- ☐ Functionality: Field Service
- ☐ Functionality: Sales Management
- ☐ Functionality: Lead/Opportunity Management
- ☐ Functionality: Customer Service
- ☐ Functionality: Internet
- ☐ Functionality: Account Management

Figure 3: Online survey (3/4)

Which 1-3 sub criteria would you add?

In your opinion, which criteria are the most important for CRM system evaluation?

- [ ] Quality: Portability
- [ ] Quality: Usability
- [ ] Quality: Data Integration
- [ ] Quality: Modifiability & Maintainability
- [ ] Quality: Resources
- [ ] Quality: Training & Support
- [ ] Quality: Reliability & Robustness
- [ ] Quality: Performance & Practicability
- [ ] Quality: Security
- [ ] Quality: Timeliness
- [ ] Quality: Popularity
- [ ] Costs: System Costs
- [ ] Costs: Preparation & Installation Costs
- [ ] Costs: Maintenance Costs
- [ ] Costs: Resources
- [ ] Costs: Training & Support
- [ ] Costs: Upgrade Costs
- [ ] Functionality: Reporting
- [ ] Functionality: Contact Management
- [ ] Functionality: Campaign Management
- [ ] Functionality: Call Center
- [ ] Functionality: Relationship Management
- [ ] Functionality: Field Service
- [ ] Functionality: Sales Management
- [ ] Functionality: Lead/Opportunity Management
- [ ] Functionality: Customer Service
- [ ] Functionality: Internet
- [ ] Functionality: Account Management

CRM Evaluation Technique

Which technique does your company use for CRM system evaluation?

- [ ] AHP (Analytic Hierarchy Process)
- [ ] TCO (Total Cost of Ownership)
- [ ] Fuzzy-based approach
- [ ] no method
- [ ] Weighted Scoring Method
- [ ] SWOT-Analysis
- [ ] others

Which **other** technique(s) uses your company for CRM system evaluation?

Do you know the AHP (Analytic Hierarchy Process)?

- ( ) Yes
- ( ) No

If yes, do you think the AHP is applicable for CRM system evaluation in praxis?

- ( ) Yes
- ( ) No

Closure

Thank you very much for taking the time to complete our survey.

Figure 4: Online survey (4/4)

Research Results

1.3 Expert Interviews

Overall Rating and Feasibility of the Approach: About two thirds (67%) of the CRM experts rated the overall CRM system selection approach as excellent. They highlighted that the sequence is logically structured and therefore should be applicable in practice. Almost half of the respondents (44%) thought that application would be feasible in practice. Only three interviewees declared that they do not think that the proposed approach is realistic because too many aspects were missing in each process phase.

The core critical point was the narrowed focus on the main functional processes in the evaluation. According to their experience, a full requirement specification should be conducted earlier in the analysis phase of the evaluation, instead of later during the implementation of the software. Using the proposed approach, the experts thought it might be possible to define a quantity structure that could be taken as input for a cost calculation. Another important suggestion for improvement was limiting the number of vendor presentations to a maximum of two to four candidates. Further it was noted, that the approach might generally not be applicable without an external consulting company.

Criteria Evaluation: Most of the CRM experts (89%) agreed with the overall criteria catalog sometimes limiting their approval with specific remarks. The participants were asked to discard or to add sub-criteria to the quality, cost, or functionality compounds of the criteria groups.

Eight interviewees recommended eliminating popularity. However, five CRM experts determined that all sub-criteria of the catalog were necessary. Three participants suggested eliminating portability.

The most frequently named sub criterion to be added was ROI calculation (four interviewees). In addition, other financial ratios such as CAPEX and OPEX were mentioned. Some specific functions, such as checking for duplicates, a help desk, and web integration were also proposed. Six interviewees could not select the most important criterion per se as they thought it depended on the individual situation of a specific customer. Usability (e.g. improvement customer satisfaction, easy system usage) and user acceptance (e.g. system usage in various areas of daily work) were considered most important for an evaluation (four and three CRM experts, respectively).

Evaluation Technology: None of the interviewees had used AHP as an evaluation technique when conducting a CRM evaluation, although two had heard of it. Five CRM experts commented on using a similar technique after learning about AHP. Four experts did not use any kind of technique to verify their CRM system selections because they rely on ‘gut instinct’. However, 80% named a technique they had used, with the Weighted Scoring Method (five CRM experts) being the one most commonly used for CRM evaluation. Overall, most CRM experts agreed that CRM system decisions need to be made based on both experience and evaluation results.

1.4 Online Survey

Participating CRM Experts: 50.4% of the participating CRM experts work in small and medium-sized enterprises (SME) with less than 50 employees. Only 12.8% are employed in companies larger than 10,000 employees (Figure 5). Almost 90% have experience in CRM selection. One third of these participated in more than 20 CRM system selection projects. Only 8.2% have performed just one CRM selection.

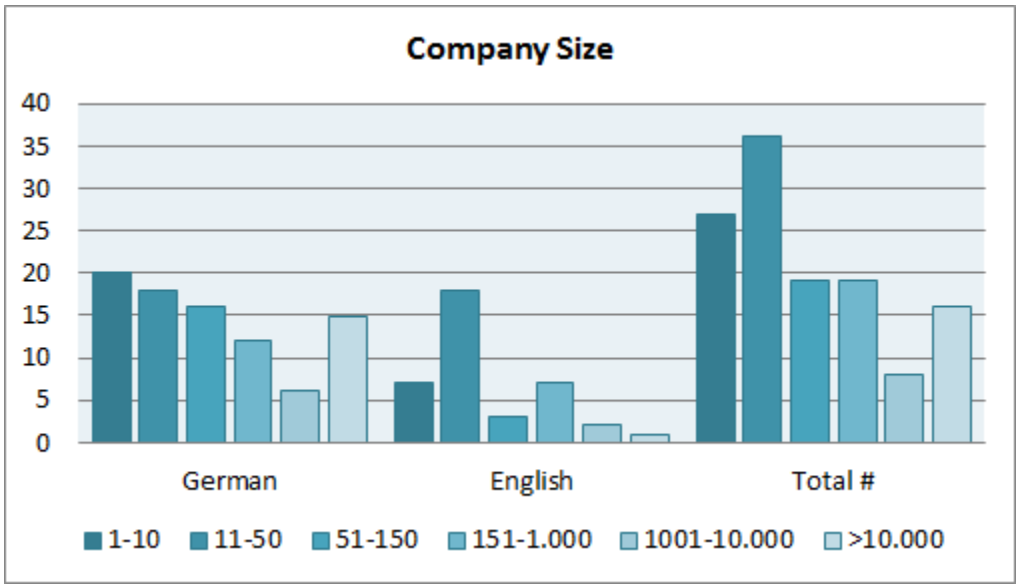


Figure 5: Company Size

The highest response rate was achieved in the consulting sector. Customer experience had a smaller response rate compared to vendor and consultant feedback.

73% overall rated the significance of CRM selection projects as being very important. 22.9% believe it to be important, and none stated it is not necessarily required or even not required at all (Figure 6). All experts stated that their CRM projects were successful.

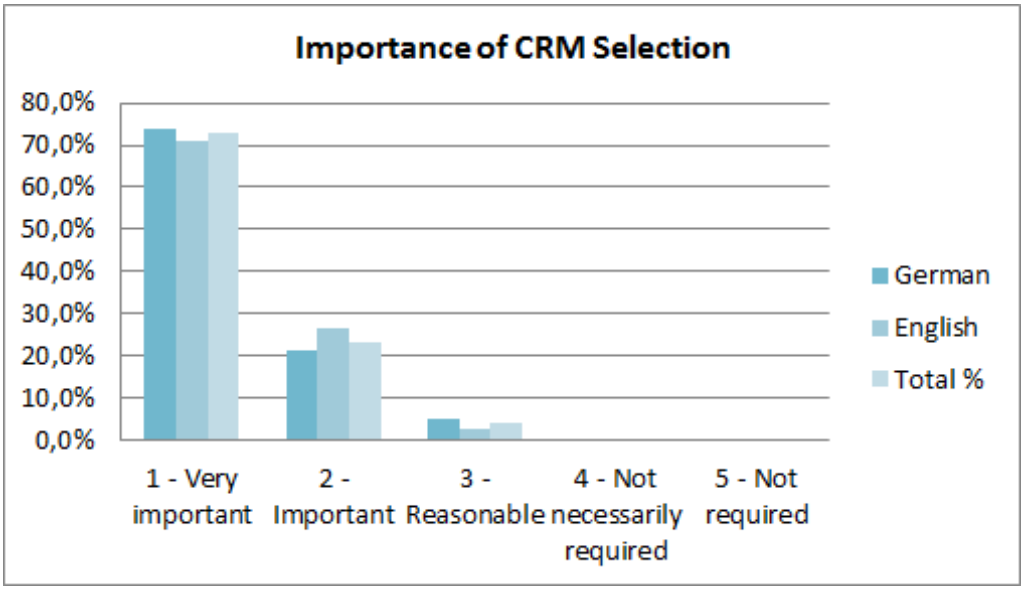
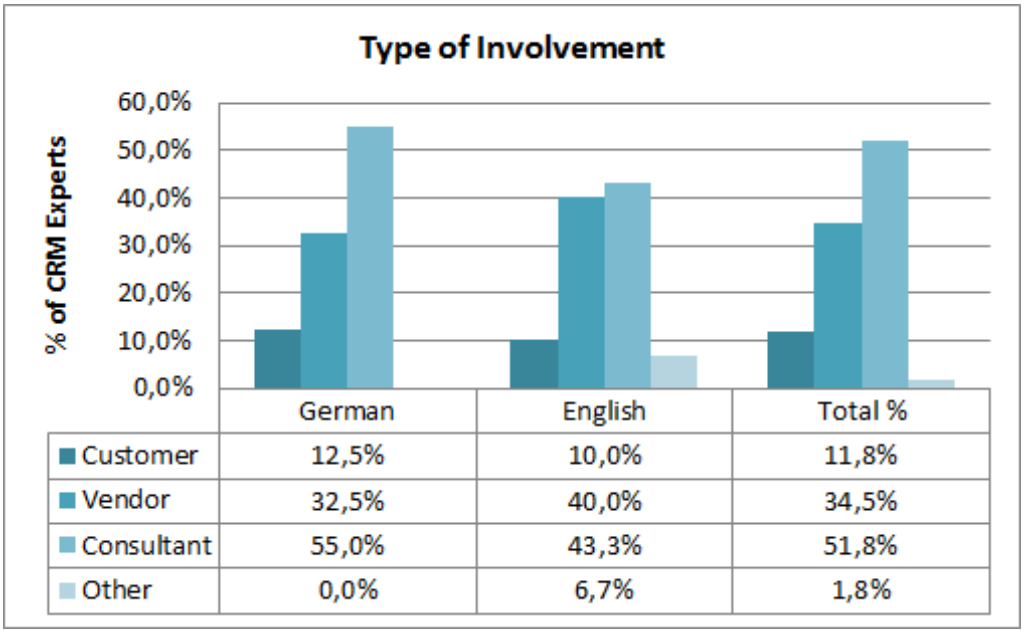


Figure 6: Importance of CRM Selection



	German	English	Total %
Customer	12,5%	10,0%	11,8%
Vendor	32,5%	40,0%	34,5%
Consultant	55,0%	43,3%	51,8%
Other	0,0%	6,7%	1,8%

Figure 7: Type of Involvement

Critical Success Factors: When asked for the most important critical success factor in their CRM evaluation projects (Table 4), most CRM experts referred to requirement fit meaning the match of the customers' needs and main business processes by focusing on the business need and not the IT solution. The selected software certainly needs to fit those business requirements, which in turn should be supported by identifying must-have criteria.

The next most often named critical success factors were usability and functionality. Usability in this context focuses on user experience when using the software in day-to-day business. The solution has to be easy to use, which means users can become familiar with it quickly due to straightforward functionality, user-friendly and efficiency in handling. In addition simplicity of the application is important, meaning that it has been ergonomically designed. Nevertheless the functional scope always depends on the specific demands of the individual company. Costs were almost exclusively mentioned by German experts, with the exception of one English-speaking expert. The majority rated costs via the price performance ratio. Other dimensions were cost efficient implementation and TCO calculation. Business process design comprises a detailed analysis and definition of business processes and derived requirements to optimize the current situation and design appropriate processes in the CRM system. To achieve user acceptance, most CRM experts referred to end and key users, as well as management involvement. In this context it is important that all stakeholder groups are represented to achieve comprehensive user acceptance. Employees that use the system must recognize the added value it provides.

Integration into the existing application landscape was understood to be the integration of Microsoft© solutions (e.g. Outlook©, but depending on the individual case, other Office Suite integration might be required), integration with the ERP system and other company applications (e.g. backend systems) to access additional data (e.g. POS). This permits integration across departments. Another important success factor is the configurability of software, including ergonomic factors, as well as customization to requirements with no or limited development effort. The software configuration should involve little technical knowledge so that it is flexible and changes can be made (enhanced or additional requirements) at a later stage. Stakeholder involvement comprises affected departments (e.g. sales, marketing), end users, and communication between selected stakeholders and the consulting or IT vendor imple-

menting the CRM system. Involvement includes communication of the major impact and of changes resulting from the project to alignment and integration of stakeholder groups in the requirement and selection process. Management support entails not only involvement of an additional stakeholder party, but also the commitment needed to motivate and provide capability for other stakeholder groups.

Table 4: Critical Success Factors

Ranking	Critical Success Factors of CRM Projects	#
1	Requirement Fit	20
2	Usability	17
3	Functionality	17
4	Costs	14
5	Business Process Design	13
6	User Acceptance	11
7	Integration in Application Landscape	11
8	Configurability	11
9	Stakeholder Involvement	8
10	Management Support	8

Other critical success factors mentioned included flexibility, short implementation cycles, industry know-how, CRM experience, strategy, open source, training, methodology, innovation, SaaS availability, change management, project management, performance and autonomy to software vendor.

Selected CRM System: The most popular CRM out of the box software (Table 5) includes Microsoft Dynamics CRM© and Siebel©, which is part of the Oracle© product portfolio. Customers were the group of CRM experts that mainly preferred standard solutions.

Table 5: Most popular CRM System

Ranking	Software	#
1	Microsoft Dynamics© CRM	22
2	Oracle Siebel©	19
3	SAP© CRM	13
4	Oracle© on demand	11
5	Salesforce©	9
6	CAS©	7
7	SugarCRM ©	6
8	Sage© CRM	5
	Other	39

Certain software solutions by popular vendors were not mentioned at all, e.g. Oracle E-Business Suite© CRM, PeopleSoft Enterprise© CRM and Microsoft DynamicsAX© CRM. In several cases, CRM experts referred to individual software solutions or named solutions that had not been referenced by other experts. These have been subsumed under other.

Feasibility of the Proposed Approach: 75.8% CRM experts rated the CRM evaluation approach as very good or good (Figure 8). Only 4.8% rated it poor and 0.8% thought it is not applicable in practice.

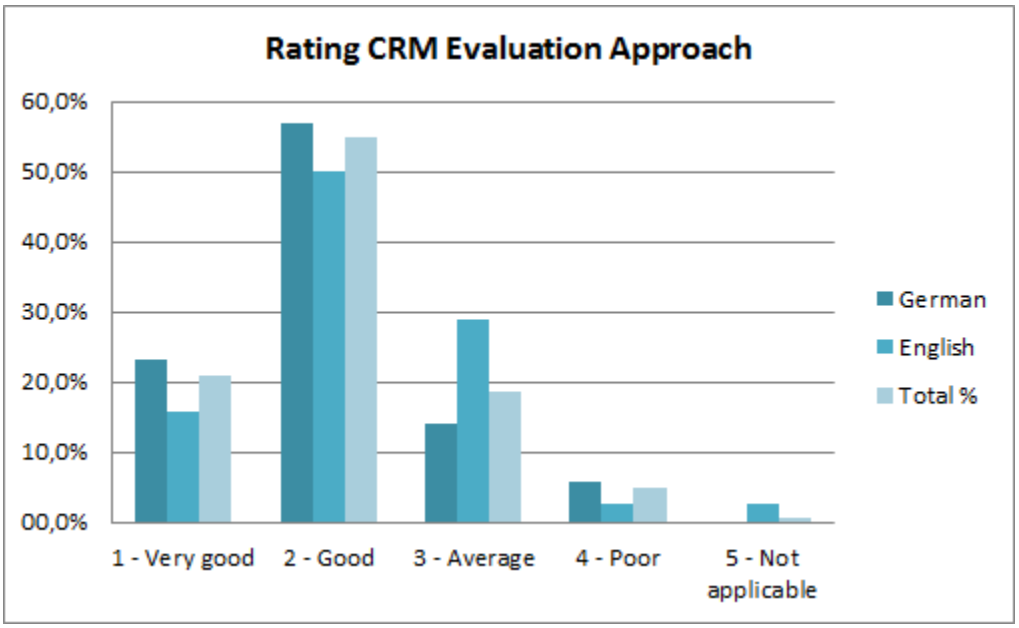


Figure 8: Rating CRM Evaluation Approach

CRM Criteria Evaluation: Overall, 75.7% agreed with the classification presented in the approach. When asked for the most irrelevant criteria *popularity* was nominated most often (n=47), whereas *portability* was mentioned by ten CRM experts and *field service* by seven. In most cases criteria from the category "quality" were rated as irrelevant.

When participants were asked for the most important criteria topics from all three categories were mentioned. An overview of the ranking for each category can be found in Table 6.

Table 6: Most Important Criteria

Ranking	Quality	Costs	Functionality
1	Usability	Maintenance	Contact Management
2	Data Integration	System Costs	Relationship Mgmt
3	Performance & Practicability	Preparation & Installation	Lead/Opp. Mgmt

Additional Criteria: Along with suggesting sub criteria for existing categories, the CRM experts were asked for new criteria (Table 7). The most often referred to new main criteria was *technical architecture* which subsumes using technical standards, design principles (e.g. SOA), data handling, interface definition (e.g. to mobile technology, other applications), development environments and stages, software (e.g. operating system, legacy applications, security) and hardware (e.g. server, network) environment and groupware.

Table 7: Additional Sub Criteria for Main Criteria

Ranking	Category	Main Criteria	#
1 - new	Functionality	Technical Architecture	11
2 - add	Functionality	Reporting	9
3 - add	Quality	Popularity (Vendor)	7
4 - new	Quality	Project Management	7
5 - new	Quality	Sustainability	6
6 - add	Functionality	Field Service	6

Reporting as an existing criteria had the majority of sub criteria suggestions. These suggestions included strategic and daily business analysis, monitoring, data mining, dashboard, business intelligence or ad hoc reporting.

Other criteria referred to was *popularity*. New sub criteria suggested were reputation of vendor and consultancy concerning financial viability, stability, strategy, references, experience, resources, quality, price, and market share of the evaluated CRM system. Another new criterion is *project management*, which refers to document management, status tracking and methodology toward achieving set objectives. Furthermore *sustainability* was added in the "*quality*"-category which rates the upgradability to state-of-the-art technology and the possibility to create a future proof on the industry sector.

In the "functionality"-category, an addition was to the main criterion *field service*. CRM experts requested mobility technology, which involves installing software and synchronization capabilities with data sources and partner portals on selected devices, as well as offline functionality, to work without a corporate network connection.

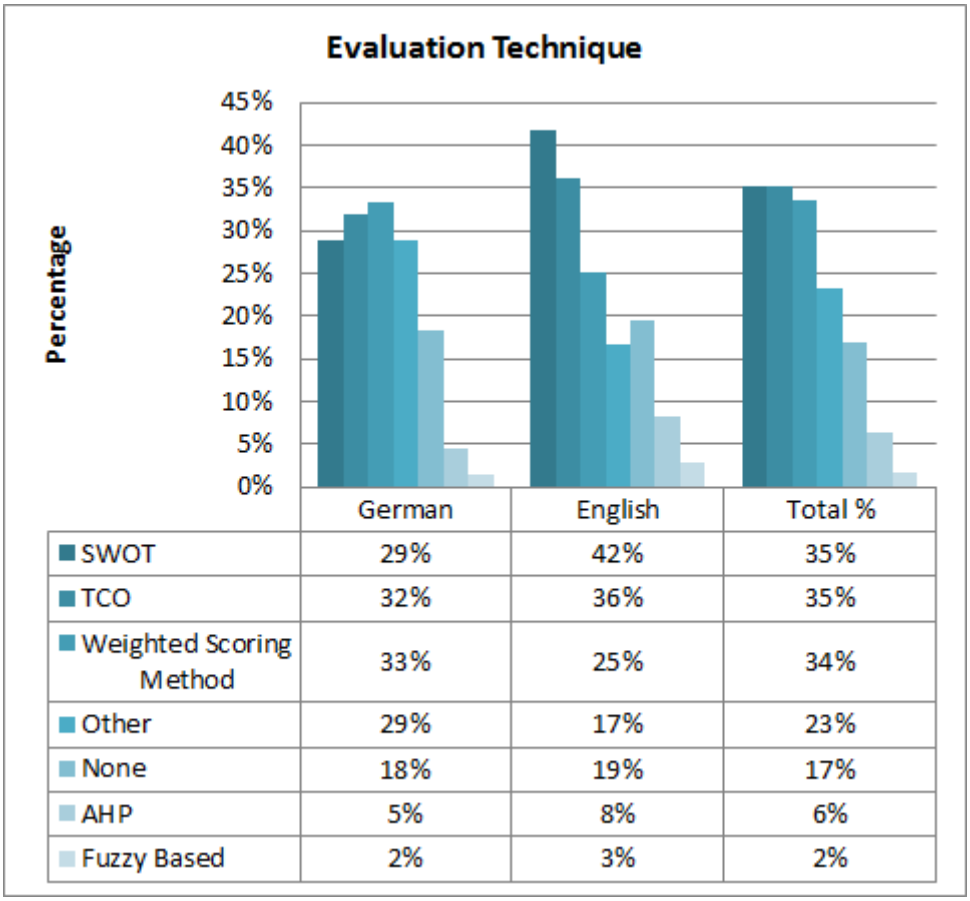
More references were made in all three categories, to customer service, marketing management, modifiability and maintainability, usability, preparation and installation costs amongst others all reaching less than 5 nominations.

CRM Evaluation Technique: Most CRM experts (82.1%) were unfamiliar with AHP. However, the experts that were familiar with it thought it was applicable.

An overview of the applied evaluation techniques shows Figure 9. Other techniques mentioned were usually self developed evaluation methods and requirement analysis, balanced scorecard and workshops. Most CRM experts involved as customers were not sure which technique was applied to evaluate their CRM system.

Changes to the Proposed Approach: The majority of changes were seen in the area of *Methodology* (Table 8). The suggested enhancements included a change from a linear to an iterative approach for the requirement analysis and vendor presentations including workshops. Some of the CRM experts mentioned that the approach required adaptation to individual needs. Some thought that change management and expectation management should be integrated along the phases. Lastly, the definition of as-is as well to-be situations and processes required a stronger focus.

The creation of a *long* and a *short list* should be part of the iterative process in the form of market screening, vendor pre-selection based on requirements and final decision after presentations, taking human factors into account. Reference visits and prototyping are further components that support the decision-making process. Such lists are available over the internet (www.selectcrm.de).



	German	English	Total %
SWOT	29%	42%	35%
TCO	32%	36%	35%
Weighted Scoring Method	33%	25%	34%
Other	29%	17%	23%
None	18%	19%	17%
AHP	5%	8%	6%
Fuzzy Based	2%	3%	2%

Figure 9: Evaluation Technique

The involvement of all affected departments, including the user and IT, was referred to as *stakeholder involvement* in the form of decisions, requirement definition and other areas of the selection process.

Suggested *additional phases* were a test phase for key users to verify acceptability and feasibility in daily business with the selected CRM systems. In addition, some CRM experts suggested expanding phases to include additional steps. Reference visits and vendor presentations for short list vendors in the decision phase should be followed by a new prototype phase for the final one or two vendors. Also a proof of concept phase might be added before the vendor presentations in the decision phase.

Table 8: Change in CRM Selection Approach

Ranking	Area to Change	#
1	Methodology	19
2	Long and Short List	11
3	Stakeholder Involvement	10
4	Additional Phases	7

Other suggested changes were in the area of limited scope, goal focus, strategy, risk management, key performance indicators, consulting support, and success evaluation. All of these changes were mentioned by fewer than five experts.

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Appendix 3

Discussion and Validation of a CRM System Selection Approach with Experts.

Ina Friedrich, Jon Sprenger, Michael H. Breitner

In: Proceedings of the 17th American Conference on Information Systems (AMCIS), August 4. - 8. 2011, Detroit, USA, Paper 282: 2521-2531.

Link: http://aisel.aisnet.org/amcis2011_submissions/282

Abstract: Due to the high failure rate, the costs and the long project duration of CRM implementation projects, it is crucial to evaluate software solutions before making an investment decision. A methodological approach is required in order to make these decisions more effectively and efficiently. In this paper, an approach to evaluating CRM software packages is proposed that is the result of a literature review. In a second step an initial applicability check of the approach is conducted. The intention is to verify feasibility of the proposed approach with CRM experts who have practical experience with the selection of different systems. This is done by an empirical study that is subdivided into qualitative expert interviews and a quantitative online survey. The core results demonstrate that the approach is a valid method for evaluating CRM software applications.

Appendix 4

Requirements Analysis for a Student Relationship Management System – Results from an Empirical Study in Ivy League Universities

Lubov Lechtchinskaia, Ina Friedrich, Michael H. Breitner

In: Proceedings of the 45th Hawaii International Conference on System Sciences (HICSS) 2012: 5132 – 5141.

Link: http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=6149514&contentType=Conference+Publications&refinements%3D4292709977%26sortType%3Dasc_p_Sequence%26filter%3DAND%28p_IS_Number%3A6148595%29%26rowsPerPage%3D100

Abstract: The higher education sector encounters increasing number of students with more diverse attributes, expectations, and demands. In times of sinking budgets and severe competition among universities, student relationship management (SRM) has become a key instrument in attracting paying students and retaining a long-lasting relationship, which in turn provides financial benefits and enhances the reputation of the university. In this paper, a structured literature review revealed a lack of requirement analysis for a student relationship management system (SRMS) from the target group perspective. An online survey was conducted with students and alumni from four Ivy League universities. The survey showed that university administration needs to improve their relationship and communication habits with the target groups. Because modern communication channels such as social network, blogs and apps are not yet wide-spread in this context, SRMS need to be further enhanced to include them.

Appendix 5

Towards a Process Model for Efficient Customer Relationship Management System Selection

Ina Friedrich, Michael H. Breitner

In: Tagungsband Multikonferenz Wirtschaftsinformatik (MKWI), February 29. – March 02. 2012, Dirk Christian Mattfeld, and Susanne Robra-Bissantz (Ed.), Braunschweig, Germany, 45-57.

Abstract: Changes to the economic and competitive environment require a reorientation of companies' communication activities, which has implications for the customer relationship management (CRM). Assistance provided by information communication technology (ICT) is an important component of reacting to these potential changes. The failure rate of CRM implementation projects is high when it comes to measuring the impact. It is crucial to evaluate system solutions before making an investment decision. Based on a literature review, the authors developed a CRM evaluation approach to select CRM systems that suit the particular needs of a company. This approach resulted in a CRM system selection (CRMSS) model that covers the whole process of evaluating CRM systems, once a CRM strategy has been defined, and before the implementation phase begins.

Appendix 6

Validation of a customer relationship management (CRM) system selection model based on international expert interviews

Ina Friedrich, Michael H. Breitner

Zur Begutachtung und Veröffentlichung eingereicht In: Proceedings of the International Conference on Information Systems (ICIS) Florida, USA 2012.

Abstract: Due to the high failure rates, costs, and long duration of CRM implementation projects, it is crucial to evaluate software system solutions before making an investment decision. A methodological approach is required to make these decisions more efficiently and efficiently. In this paper, a process model to evaluating CRM packages is validated by international CRM experts. The discussed model is the result of a literature review and prior applicability checks with an initial, explorative group of mainly German CRM experts. The intention is to globally verify the validity of the proposed process model with international CRM experts who have extensive practical experience with the selection of different systems. A large international empirical study based on an online survey is used for this validation. The results show that the process model is a valid method for evaluating CRM application

A Customer Relationship Management System Selection

Process Discussion with International Experts

Completed Research Paper

Introduction

Companies must often operate in environments of strong competition, resulting in varying degrees of cost pressure. Constant changes in the surrounding economic and competitive conditions require a reorientation of management activities. The need for information systems (IS) and their contribution to the value creation of a company during these processes is undisputed. In addition, customer orientation is crucial to surviving in this competitive landscape (Gneiser 2010, Elmuti et al. 2009). Hence, customer relationship management (CRM) systems undoubtedly can contribute to increasing customer profitability (Coltman 2005, Sigala 2004). A noticeable discrepancy has been reported between the high economic impact of CRM system evaluation and the low success rate of CRM implementation projects (Becker et al. 2009, Elmuti et al. 2009, Finnegan and Currie 2009, Buehrer and Mueller 2002). Decreasing the failure rate of CRM implementations and supporting their success has become a priority of researchers and IS users (Kim and Pan 2006). To increase this success rate, it is very important that the most appropriate system solution be selected for the particular context of a company and that the selection process involves all stakeholders, including key users (Gable and Chin 2001, Howcroft and Light 2002). Since CRM systems connect all the core domains of a company, such as supply chain, production, and finance, and considering the global competition and high failure rate of CRM implementation projects, it is crucial to evaluate system solutions in detail before making an investment decision. As prior work has shown, there is a deficiency in academic literature with regard to CRM system selection (CRMSS) (Author et al. 2010). There is no reference or process model for selecting a CRM system according to conditions specific to a company in the academic literature. Based on a literature review, the authors developed a new CRM system process model to selecting suitable system packages. To further enrich the proposed process model, the literature-based approach and expert interviews were followed up with an international online survey (Cao et. al. 2004).

This paper presents the steps involved in validating a CRMSS process model. The model is a result of refinement based on a combination of the scientific status-quo and the needs of analysts who use these approaches in daily life. The following research question provided the framework to our latest research:

Is the presented process model a valid approach

to conduct CRM system selection (CRMSS)?

Approaches to IS/IT system selection do exist (Bernroider and Koch 2000; Ghapanchi et. al. 2008), but specific CRM criteria need to be evaluated to make the process model more efficient. The authors have not created a detailed process model for system selection for IS/IT or CRMSS (Author et al. 2010). Not only do we need to adapt existing models, we must also develop a process model that is based on existing research and CRM expert experience.

The paper is structured as follows: section one presents the methodology used to address the research questions, including an illustration of the overall process model of past research (literature review, first interview cycle and model development) as well as a process model for the current paper (second interview cycle). The second section presents the results and statistical analysis of the survey, which are then discussed in section three, closing with the main conclusions on CRM experts' contributions, enhancements to the CRMSS process model, some limitations, and an outlook of future research on this topic.

Methodology

The literature includes differing definitions of process models, all of which refer to the representation of a class of domains (Frank 1999; Rohloff 2008) as a starting point for the development of new applications (Banker et al. 2010; Braunwarth and Friedl 2010). Within this paper the process model is based on the characteristics described by Fettke and Loos (2007), which are best practices, universal applicability, and reusability. The process model was based on Ahlemann and Gastl (2007). Phase one includes the problems of identification and planning. The model construction of phase two is based on a comprehensive literature review and on expert interviews. This paper presents the results and conclusions of phase three, a second empirical study with the intention of validating results of the former phases and refining the CRMSS process model. Phases four and five include a reality test and documentation.

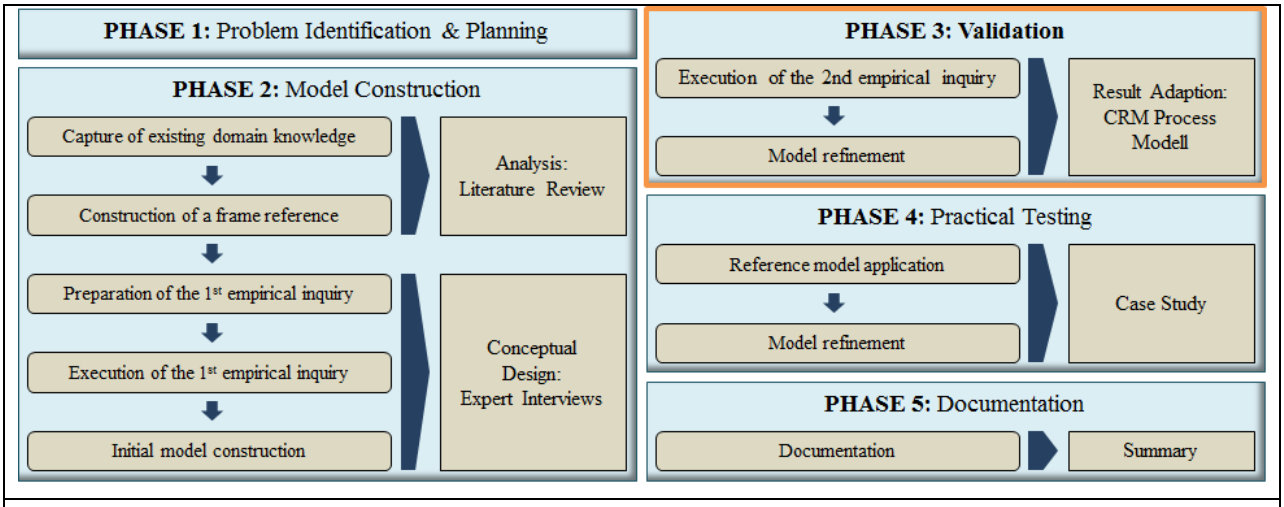

Figure 1. Approach to Process Model Development (Adapted from Ahlemann and Gastl 2007)

Phases 1 & 2: Literature Review

To get an overview of the current knowledge about CRMSS, a comprehensive, structured review of the literature was performed. The intention of the review was to identify published evidence in journals and conference proceedings that discuss CRM evaluation or IT evaluation in general. Four major databases were selected (ACM Portal, AISNET, Elsevier Science Direct and Springerlink) for the baseline search of English language papers. The terms "IT evaluation", "IT system selection", "CRM evaluation", "CRM system selection", and "CRM strategy" were used as the search criteria. In total, 137 papers were identified. Seventy-six hits related to IT evaluation, and 61 contained topics related to CRM evaluation or other associated CRM topics.

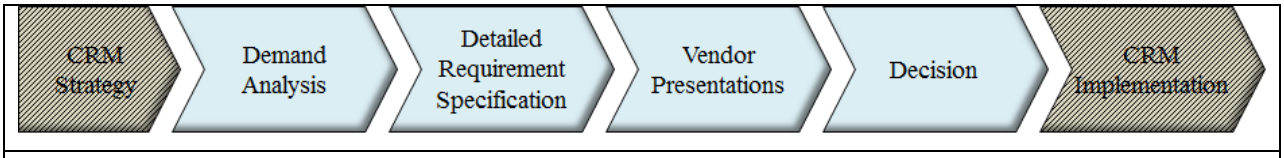

Figure 2. Initial CRM Process Model (End of Phase Two)

All papers were reviewed in full for their relevance to the following: identifying the research gap or providing a strategy closing the gap, and were classified into four categories: methods, criteria, evaluation technique, and tools (Howcroft and Light, 2002). Papers that could not be assigned to one or more category were excluded. In the final sample, 60 papers were used to construct the initial version of the CRMSS process model. For each area (method (24), criteria (34), evaluation method (14), and tools (2)) findings from the identified papers were used to develop the initial model.

Phase 2 & 3: 1st and 2nd Expert Interview Round & Model Refinement

The expert interviews in phase two were conducted in two stages: direct interviews and online interviews. In the both stages, the authors searched for experts in business networks such as xing.com. Candidates were identified as experts if they had specific knowledge of the broader topic, meaning they dealt with CRM business topics (such as marketing, sales and advertising) or technical areas (such as CRM software systems and CRM IT consulting). The search was conducted from April to May 2010.

During the first stage of the empirical study (direct interviews) the experts were interviewed using partly standardized interview guidelines. In addition to the interview invitations, the partly standardized interview guideline was sent to 165 potential participants. The authors limited the personal interviews to eighteen experts in order to develop the initial model and refine the questionnaire for the online survey receiving valuable input for the statistical analysis. All interviews were conducted over the phone. The remaining experts were asked to participate in the online survey (stage two). The majority of the CRM experts was working in the consulting industry and had been involved in multiple CRM evaluation and implementation projects. Only two interviewees experienced CRM evaluation from a client's point of view. Two CRM experts worked for a CRM system manufacturer. The interviews were conducted via phone between March and April 2010 and lasted between 15 and 45 minutes. Due to the relatively small number of participants and the nature of qualitative data, a qualitative content analysis was conducted after constructing the initial version of the CRMSS process model.

In stage two, a normative online survey was conducted. Invitations to participate in an online survey were sent out in three cycles from June 17, 2010 to June 30, 2010. A total of 1,435 potential respondents in various countries were contacted, with a focus on Germany and the US. In total, 125 (8.7%) experts took part (Authors, 2011). The rather low rate of response arose due to the selected survey tool, EvaSys, which displayed a warning message when entering the survey that simply needed to be accepted by the users but unfortunately had no English translation. Therefore only a few English speaking CRM experts actually answered the survey completely.

Phase 3: 3rd Expert Interview Round

To avoid the problems encountered with EvaSys, the web survey was created using Survey Monkey. The survey was set up in the first week of January 2011 and quality tested on a pilot with seven people working in different areas. The three CRM experts mainly focused on content and comprehensibility. The remaining candidates focused on face validity, question routing, and grammar (Saris et al. 2007). The survey was finalized and sent out on January 15th, 2011. The CRM experts were found via the business platform LinkedIn. "CRM" was used as the keyword search criterion. The search was further narrowed down by country, using "USA", "Germany", "Australia", "Great Britain" and "Canada". An additional search criterion was used later, "company". The values used included "SAP", "Microsoft", "Oracle", and "Salesforce". The search provided experts with various relations to CRM which were derived from their curriculum vitae (e.g. working in presales, experience with CRM software packages). LinkedIn does not provide e-mail addresses. A Google search was performed to obtain those. The Google search combined the first name and the last name with the company name or company web address. The total list included 1,699 CRM experts. None of these experts participated in the first survey cycle. Of the e-mail addresses found, 17.4% were invalid. Another 4.4% indicated they were not qualified for a particular peer group within the survey. Therefore, 1,325 CRM experts received the survey request and were able to participate. One hundred fifty nine CRM experts replied to the online survey, which is a response rate of 12.0%.

Table 1. Overview of the CRM Expert Survey Group			
Country	Contacted	Responses	Response Rate
USA	859	52	6%
Germany	189	31	16%
Australia	124	27	22%
Great Britain	220	24	11%
Canada	187	10	5%

Countries with responses from <10 CRM experts were: Spain, Belgium, Sweden, India, Denmark, New Zealand, Ireland, Italy, Philippines, Switzerland and Austria. Experts in 17 other countries were contacted, with up to nine CRM experts per country, but none replied. Invitations were sent out on subsequent weekends from calendar week two to calendar week 10. The survey closed on March 31th.

Ninety-six per cent of the questions were direct and closed questions, with a fixed set of values of which only one could be selected. This provided a sound basis for the statistical evaluation (Saris et al., 2007). The available values are displayed in each sub-section of the section "Results" within the text or in the graphics. Fifty-eight per cent of the questions allowed for further comment. The first section of questions focused on the country, relation to CRM and size of the company the expert is working for. The questions were written so that interviewees could be clustered into groups, which aided evaluation. The second section, on CRMSS, focused on project budgets, timeframes of projects, number of users for CRM systems and the type of involvement the expert in CRM has. The third section looked at the standard CRM software system solutions. The questionnaire was customized and changed according to the respondent's classification after the general questions about the interviewee and specifics of CRMSS projects. Based on involvement, questions on standard software system to "customers", "system vendor" or "consulting" were phrased differently, but had the same aim. The main section of the questionnaire (section three) presented each project phase. For each phase, the expert was asked to rate the importance of each presented activity (for example, "scope definition" is an activity in phase "demand analysis") and to select or provide suitable deliverables. In addition, a suitable number for the vendor long and short list was inquired for phase "demand analysis" and "detailed requirement specification". In section four, the classification of CRMSS was examined. For each category (quality, cost and functionality), the importance of the presented characteristic was asked. Last, the most appropriate evaluation method was requested. Section five was an overall rating of the presented process model and provided the possibility to add personal remarks. The values provided in the survey are presented in the following.

Results of the 3rd Expert Interview Round

Section 1 – General Information on CRM Experts

This section provides information on the interviewed experts and on the basis for further analysis. The following cluster groups were used for evaluation: relation to CRM (Sales, Marketing, Research, Media, IT related, project related, other), involvement in CRMSS (customer, consultant, vendor), company size (1-10, 11-49, 50-149, 150-999, 1.000-10.000, >10.000) and number of CRMSS projects participated in (none, 1, 2-4, 5-19, 20-49, 50-100, >100). The experts were asked to specify their relationship to CRM. Multiple answers were possible. Thirty-four experts only had technical ties to IT. Fifty-eight of the sales-related experts also dealt with marketing. Experts in media also had ties to at least three other categories (sales, marketing, research and IT). The experts were grouped into three categories: "Business" (n=82 experts), "IT" (n=34) and "Both" (n=44). The "business" group relates to sales, marketing, research or media. The "IT" group was not broken down further.

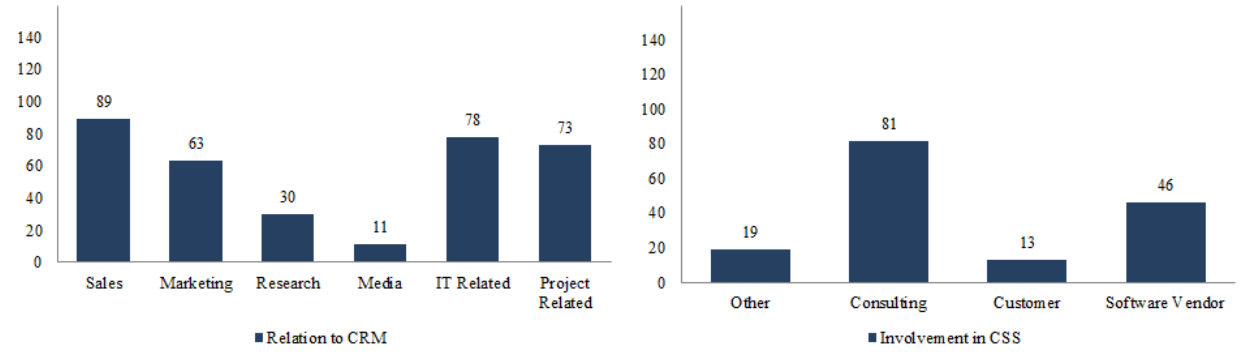

Figure 3. Relation to CRM and Involvement in CRMSS

On average, an expert had participated in "5-20" CRMSS projects. Customer experts had less (median 2-5 projects) and system vendor had more experience (median 20-50 projects) in CRM evaluation. Only 15 of the 156 experts had never participated in CRMSS. Most of these experts were IT consultants who worked on CRM implementation projects or sold CRM system. Experts that participated in more than 100 CRMSS projects (27 experts) were either working for a system vendor or a consulting company.

Table 2. Company size where CRM experts are employed

(No. of employees)	1-10	10-50	50-150	150-1,000	1,000-10,000	>10,000
Number of Experts	22	17	11	16	16	77

Section 2 – Overall Specifics of CRM System Selection Projects

This section covers general information on CRMSS. The experts were asked to provide a range that included a minimum and maximum budget for CRMSS and CRM system implementation (CRMSI) projects in US$ (<10.000, 10.000-50.000, 50.001-100.000, 100.001-250.000, 250.001-500.000, 500.001-1.000.000, >1.000.000). The answers were analyzed using descriptive statistics, overall and by cluster. Eighty-two experts answered the question, 38 from Business, 21 from IT, and 23 with ties to both areas.

Table 3. CRM System Selection (CRMSS) Budget in US$

Minimum	Overall	Business	IT	Both
Mean	152,744	122,237	135,714	218,696
Standard deviation	318,024	283,617	306,717	380,968
Median	10,000	10,000	10,000	10,000
Maximum	Overall	Business	IT	Both
Mean	557,659	523,658	288,762	859,348
Standard deviation	821,152	804,256	607,106	945,266
Median	50,000	50,000	50,000	250,000

The minimum median remains at US$10,000 for all cluster values when the data is analysed according to "involvement in CRMSS". The maximum amount ranges from US$50,000 (for a customer and system vendor) to US$100,000 (for consulting) and US$275,000 (for other areas). The experts were also asked to provide what they thought was an average number of users suitable for a CRM system (answer in free

text). The maximum number of concurrent users named by the experts was 10,000, and the maximum number of named users was 30,000. Table 4 presents the median per company size for both concurrent users and named users.

Table 4. Number of Users for CRM System (Median)

Size of Company	Concurrent Users	Named Users	Number of Experts
1 - 10	180	200	9
10 - 50	125	500	8
50 - 150	100	125	5
150 – 1,000	300	300	3
1,000 – 10,000	100	300	6
> 10,000	1,000	2,000	38
Total	300	1,000	69

The experts were also asked to select the average duration of the CRMSS project in in months (0≤1; 1=1-3; 2=4-6; 3=7-12; 4≥12; 5=depends) for their CRMSS and CRMSI. Ninety-three experts rated the CRMSS time frame and 106 experts rated the CRMSI time frame. Overall the mean for CRMSS is 1.68 months, whereas the mean for CRMSI is 3.02 months (SD ±1.3). The mean for concurrent users comes to 1,114 and for named users to 3,763. The standard deviation for concurrent users is 1,979 (SD ±1,979) and for named users it is 6,181 (SD ±6,181). Finally the experts were asked to choose software that they selected when conducting CRMSS. Most interviewees were part of more than one CRMSS and therefore might have used more than one system. They were able to name more than one system. Oracle included CRM systems such as Siebel, Peoplesoft, and Oracle on demand, etc. Other identified systems were Achiever Anyware, Aprimo, BCM, CAS, Combit Relationship Manager, CRM on Demand, C-World, Evidence, Entellium, IFS, Infusion, Goldmine, Superoffice, Teradata, UNICA, Update 7, and also custom-built systems without a brand name.

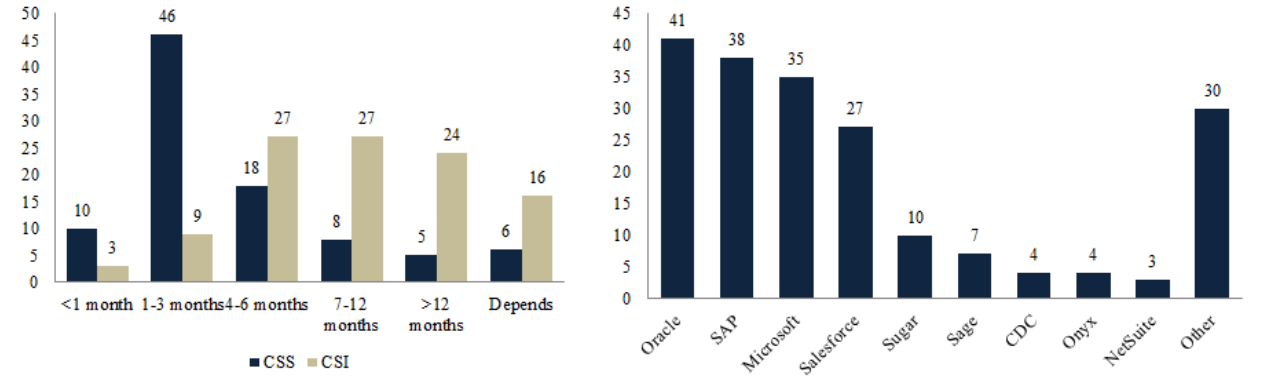

Figure 4. Timeframe for CSS / CSI and preferred CRM software systems

Preferred systems were further examined if more than 25 of the experts chose the software system. Binary logistic regression (LR) was used to search for characteristics that experts were likely to tag as system relevant. Covariates are “country”, “company size”, “type of involvement”, “relation group” and “number of projects”. The SAP system was significant for the covariate “relation group” (p=0.07; B(SE)=0.08 (0.3)); the system Microsoft was significant for the covariate “number of projects” (p=0.01; B(SE)=0.41 (0.16)); the system Salesforce was significant for the covariate “type of involvement” (p=0.02; B(SE)=-

0.61 (0.26)); and Oracle was significant for the covariate "company" (1,000-10,000) (p=0.02; B(SE)=-2.51 (1.08)).

Section 3 – Process Model CRM System Selection

This section covers the method of CRM system selection. Experts were asked to rate the relevance of the proposed activity for each phase in the process model. Activities were examined further if more than 20 experts rated an activity to be irrelevant. Binary logistic regression was used to test the probability of experts finding an activity irrelevant (see the section Discussion of Results). Covariates are "country", "company size", "type of involvement", "relation group" and "number of projects". The activity "identify software system market" was significant for "company size: 1-10" (p=0.02; B(SE)=-1.5 (0.63)); the activity "reduce vendor selection" was significant for "relation group" (p=0.02; B(SE)=0.93 (0.4)); for all other activities none of the variables were significant.

Table 5. Activity relevance per phase

	Activity	Relevant	Not Relevant
Phase 1	Define scope definition (conceptual framework)	118	1
	Analyze process & system requirements	114	5
	Identify software system market (vendor long list)	85	27
	Analyze system interfaces	91	25
Phase 2	Select target processes	109	2
	Define functional criteria	107	5
	Create transmission material (e.g. use cases)	86	21
	Reduce vendor selection (vendor short list)	81	26
Phase 3	Hold workshops	110	3
	Conduct reference visits	90	22
	Complete & evaluate workshop material	96	14
Phase 4	Present results to interest groups	103	7
	Select final vendor	112	1

For each phase, the experts could include further comments. Recommendations included market reviews and vendor literature for the market analysis (vendor long list), IT strategy (long term platform standardization and rationalization goals), decision to out-source, cloud, SaaS, PaaS or another subscription-based model for delivering a CRM solution. Eighteen experts specifically mentioned keeping the list as short as possible from the beginning to limit costs and complexity. Further recommendations are discussed in section "Discussion of Results". In phases one and two, experts were required to select their ideal figure for a vendor long and short list.

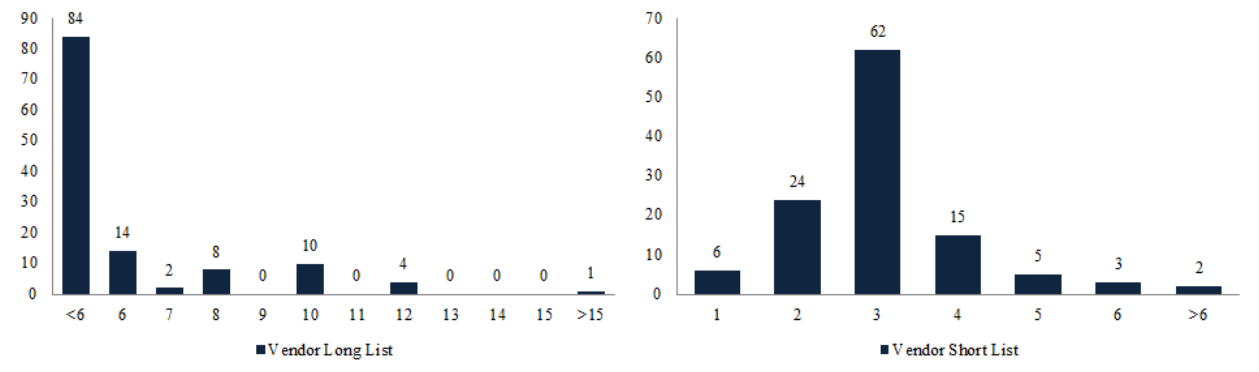

Figure 5. Ideal number for vendor long list and vendor short list

Finally, for each phase, the experts were asked to select one or more suitable deliverables from a list or provide suggestions for other useful documentation. Deliverables were examined further if less than 75% of the experts identified the deliverable as relevant. Binary logistic regression was used to test the probability of experts finding a deliverable irrelevant. Covariates are "country", "company size", "type of involvement", "relation group" and "number of projects". Only the deliverable "non-functional requirements" was tested significantly for "country" ($p=0.04$; $B(SE)=-0.07(0.03)$). For all other deliverables, none of the variables are significant (system portfolio and IT architecture, transmission material and workshop protocol).

Table 6. Relevance of suitable deliverables per phase

	Deliverable	Relevant	%
Phase 1	Functional scope	115	93.5%
	Non-functional requirements	74	60.2%
	System portfolio and IT architecture (big picture)	72	58.5%
	Underlying project data	69	56.1%
Phase 2	Target processes design	99	80.5%
	Functional criteria catalogue	98	79.7%
	Transmission material	73	59.3%
Phase 3	Workshop protocol	75	61%
	Evaluation results presentation	110	89.4%
Phase 4	Vendor contract	95	77.2%
	Decision presentation	99	80.5%

The experts suggested other deliverables that were suitable for each phase. Numerously named deliverables were "corporate vision & goals / objectives", "as-is-analysis incl. GAP analysis", "vendor assessment / evaluation criteria", "implementation & roll-out plan (incl. resource req.)".

Section 4 – Classification of CRM System Selection

This section covers the criteria and evaluation method for CRMSS. The experts were first asked to select the most important sub-criterion per category (quality, cost and functionality). Seventy-nine per cent of the experts agreed with classifications into quality, cost, and functionality. Figure 7 shows the values with seven or more replies.

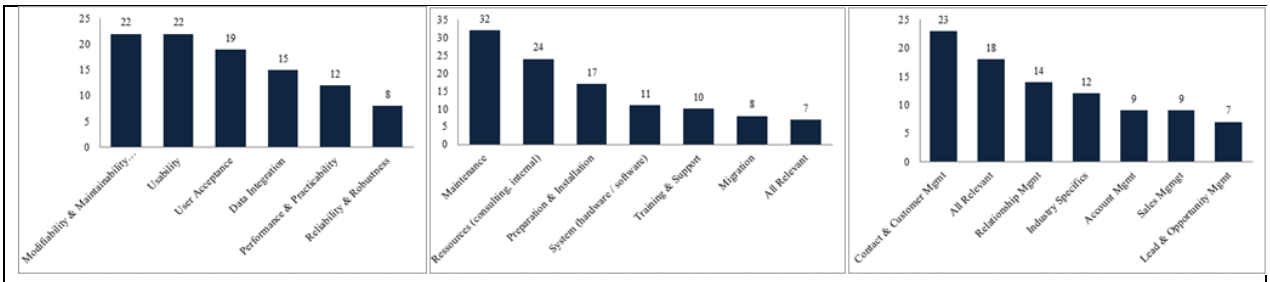

Figure 6. Most important classifications for the areas quality, cost, and functionality

In addition to the respondents that selected "all relevant", ten further experts, each of whom chose a specific value, stated that multiple values were important and that the values vary in importance according to individual needs. According to the experts, further criteria might be "business process/requirement fit" (quality), "industry match", "mobility" (quality), "past relation to the vendor" (quality), "scalability" (quality), "deployment options" (quality & functionality-technical architecture), "analytics" (functionality), "partner relationship management" (functionality), "integration" into existing landscape (cost & quality), "payment options" and "total cost of ownership" (cost). The experts were then asked to select the sub-criterion that is not relevant and therefore might be deleted. Most experts replied that all criteria are relevant. The most frequently named criterion for each area were "performance & practicability" (quality = 25), "preparation & installation (cost = 10), "technical architecture" (functional = 9).

Finally, the experts were asked to select one or more evaluation techniques that they are currently using for CRMSS. Total cost of ownership (TCO) was rated highest, having been selected by 61.1% of the experts, followed by the weighted scoring method (WSM) with 47.8%, and SWOT-analysis by 35.4%. Other suggestions included net present value (NPV), activity based costing (ABC), and return on investment (ROI).

Section 5 – Questions on the Overall Process Model

This section covers the overall rating for the proposed CRMSS process model. The experts were first asked to select the most important sub-criterion per category (quality, cost or functionality). The overall rating of the proposed process model is "good" (scale: 4=very good, 3=good, 2=average, 1=poor, 0=N/A) with 85.59% (111 experts answered) giving it a rating of 3 or 4. The median was "good" for all company sizes and all types of involvement. Only experts from a company size of 150-1,000 employees rated the process model as "very good". Experts who were involved as customers rated the process model as "good" to "very good". Only two experts (both from a company with 1-10 employees) rated with the lowest value, "poor". The overall mean is 3.05 (SD ±0.952). At the end of the survey, the experts were able to add comments. The conclusions are discussed in the next section.

Discussion of Results

Section 2 – Overall Specifics on CRM System Selection Projects

All expert groups agreed on a minimum budget of US$ 10,000 for the CRMSS project. The maximum budget varied according to company size, from US$50,000 (<50 employees) to US$250,000 (>10,000 employees). Generally, budget spent differs in all clusters. A majority of experts allocated smaller amounts to system selection and few experts allocated large amounts. Concurrent users vary from 100 (customer) to 400 (consulting & system vendor). Named users vary from 125 (customer) to 1,000 (consulting & system vendor). In general, the results only allow for a distinction between companies smaller than 10,000 employees (concurrent 100-300, named 125-500) and companies larger than 10,000 employees (concurrent 1,000, named 2,000). The average CRMSS time frame is seen as 1-6 months. Respondents from large companies (>10.000 employees) suggest longer time frames (4-6 months) than those from smaller ones (1-3 months). Especially experts from both clusters "Relation to CRM" (business & IT) tend toward longer timeframes. The CRMSI time frame for all clusters was 7-12 months. The

selected systems come from the big players: Microsoft, Oracle, SAP, and Salesforce. CRM IT experts tended to select SAP. The more CRM selection projects an expert had been involved in, the more likely he or she was to choose Microsoft. Experts from larger companies tended to select Oracle. Experts involved as customers preferred Salesforce. Therefore, a CRMSS tool should incorporate at least those four systems.

Section 3 – Process Model CRM System Selection

The proposed activities for each phase in the process model are all relevant according to the experts. Identification of the current software system market and analysis of system interfaces in phase one were rated as "not relevant" by 24% of experts, because consulting companies usually provide those overviews. Especially small companies (1-10 employees) were looking to relinquish this activity. The reduction of vendor selection was not important to 20% of the experts, most of whom were from IT. These experts also suggested relinquishing the vendor short list in phase 2. Depending on the project scope, that makes sense. Mainly business-related experts found the reference visits to be unnecessary. They are not always achievable, because those are competitors or companies in other industries that do not relate to the own field of work. This activity should be an optional part of the process model. Reference visits were not necessary for 22 experts due to cost. A less costly alternative is conference calls with reference clients. Six experts specifically highlighted that employees needed to be informed continuously in order to ensure the success of the CRM implementation. The "Target processes" and "functional criteria" activities may be grouped into one activity, "business process & functional scope" and a new activity needs to be added "technical & non-functional scope", as many of the activities suggested by the experts would fall under this activity. The majority of the experts (80%) suggested that a vendor long list should not have more than six vendors, independent of company size or cluster. Especially experts from the cluster "Relation to CRM = business" suggest ten vendors for the long list (58% of 12 experts), but compared to the rest, this is not significant. Fifty-three per cent of experts suggested a vendor short list of three vendors for presentation workshops and/or on-site visits. The standard deviation shows that the range is best set at 2-4 vendors (86%). Especially experts from English-speaking countries found "non-functional requirements" unnecessary. The number of deliverables named for the strategy phase indicates that this phase has an impact on all further activities (for example, objectives and constraints should be part of the transmission material or corporate vision and objectives are the base for functional and process analysis and design). One expert indicated that data analysis is unnecessary if standard systems are selected. This is true for CRMSS and is therefore not part of the model, but must be done in CRMSI for the activity "migration". Deliverables suggested for project management make it obvious that a "project management" process activity is required in parallel to the "change management" process activity along all four phases. The deliverables that are relevant for a CRMSS is an independent decision (no probability was tested). Therefore all deliverables are offered in the process model and all are optional.

Section 4 – Classification of CRM System Selection

The survey shows that some sub-criteria are more important to CRMSS than others. Since most experts recommended that none of the suggested criteria be deleted, all of them could be incorporated into a vendor evaluation catalogue, which would allow company-specific assessment. Modifiability and maintainability are the most important quality criteria in the context of CRMSS, as CRM systems often lack the flexibility to implement full business processes. Only ten experts suggested other criteria. The authors assume that the list is satisfactorily complete once the new suggestions are incorporated. The criteria need to be adapted in a tool that enables companies to customize their evaluation according to their preferences. The answers given by the experts indicate that an additional category, "technical characteristics" could be useful and would inherit values from the category "quality". This category includes the values "data integration", "deployment", "integration & infrastructure", "mobility", "modifiability & maintainability (for example degree of configuration)", "performance & practicability", "reliability & robustness", "scalability" and "software & hardware requirements". The value "technical architecture" is therefore obsolete in the group "functionality". Non-functional requirements are part of the quality and technology criteria. The preferred evaluation techniques for criteria and functional evaluation are "WSM" and "SWOT". "TCO" must be used in any case for cost calculation of the CRMSI. The proposed evaluation technique "AHP" (Analytic Hierarchy Process) was only named by 8.8% of all experts and is not preferred.

Section 5 – Questions on Overall Process Model

The process model was appreciated by experts from medium to larger companies. Because especially experts from small companies view the model critically, the process model is more applicable to companies with more than 50 employees. This varies depending on the industry and field of business. The concluding remarks are directed to different areas within the model. Several experts were looking for involvement of key users and employees, as they use the system after implementation. This involvement is already part of the process model, but feedback shows that the description needs to be clearer and more detailed. Other remarks were directed, for example, to proposed values. The value "internet" in the category "functionality" must be described in more detail. This value should be called "web channels" and include commerce/eSales, web presence, and eMarketing. The remarks lead to the conclusion that the process model requires more detailed description to fully clarify terms which lead to the revised CRMSS process model Figure 7. A full model description can be found in Authors 2012 including a full process description, functional criteria catalogue and general recommendations.

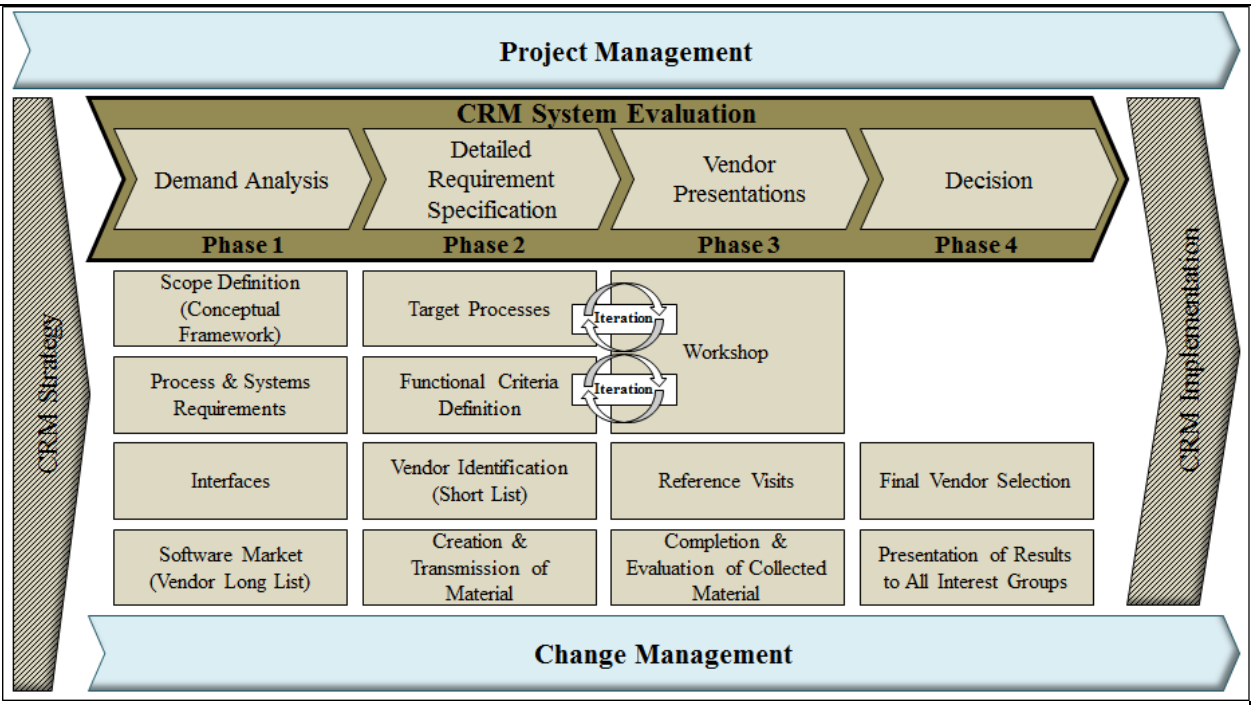

Figure 7. Final CRM System Selection (CRMSS) Process Model (End of Phase 3)

Limitations and Recommendations

The international evaluation of the CRMSS process model has proven its operational fit. Still a few limitations remain which are further discussed in this section accompanied by recommendations.

CRM experts have been interviewed individually and their feedback merged in an improved CRMSS process model. But as none of the experts have reviewed the adjustments a Delphi study should be conducted to verify the new results. The survey had a response rate of merely 12%, globally. This looks rather low, but considering the poor response rate in the USA (average 4%) due to high number of survey requests there, it is better than expected. The literature review was limited to three major databases. Still, the authors are confident that they have covered the most important research papers because secondary literature was also included.

The process model is a theoretical framework that cannot be applied without being adapted to an individual company. Including all aspects thoroughly makes the selection too time consuming and complicated. Depending on the specific situation, especially industry adaptation and company size, parts

of the model must be reshaped and brought into focus. Generally all four categories (quality, functionality, technology and costs) need to be considered when evaluating the suitability of CRM systems. One CRM system may have the best functional fit, but if the acquisition and maintenance costs are significantly higher than another CRM solution that almost has the same functional fit, the decision falls differently. A CRMSS tool supports the simultaneous consideration of all dimensions. Business and technology criteria need to interact with one another. Both dimensions must be considered as constraints when analyzing and designing processes and criteria requirements. These constraints must be taken into account in the strategy definition phase and post implementation of key performance indicators (KPIs) must be determined to define and measure the success. The criteria definition within the selection process must focus on the critical areas. A detailed definition is performed during the implementation phase.

CRMSS covers the whole process of selecting packaged CRM systems, however, an a priori CRM strategy, including business objectives and benefits, is crucial to define the basic parameters of the system. All phases of the model offer activities and deliverables that are somewhat optional, depending on size and industry. For example, a vendor long list might not always be necessary if the general ERP strategy is already defined. The vendors would then be limited to the ERP CRM solution and one or two industry specific CRM solutions. Further core components are the CRM-specific criteria catalogue and adapted evaluation techniques to support system selection. Involvement of all stakeholders is crucial and not visible in the process model. Participation in terms of process and requirement definition, selection criteria rating, and conducting workshops must be accentuated in the process model description. Without the buy-in of the different groups within the company, the implementation can hardly be successful. Companies with smaller budgets will not create prototypes due to cost. The most relevant influence factors are employee involvement and a management-supported CRM strategy. Not only are employees very familiar with their company's detailed business processes, they are also the ones using the system after implementation. If they are not satisfied, it does not matter how perfectly the solution matches the company requirements.

Conclusion and Outlook

This paper discusses the proposed CRM system selection process model by conducting an online survey with internationally renowned CRM experts. Research includes several contributions to the area of CRM evaluation and therefore to the field of CRM system selection. There are connections to general IT/IS evaluation that can be used, e.g. quality, technology, and cost criteria are generally applicable. Functional criteria, which make up the largest part, are only valid for CRMSS and most areas are adapted for CRMSS, for example activities or deliverables in the process model. The paper answers the research question given in section one as follows:

The discussion with CRM experts has shown that most parts of the CRMSS process model are applied in practice when conducting CRMSS or other IT selection. The model was further improved by the valuable feedback, which resulted in the final illustration in Figure 7. The proposed criteria were accepted to a great extent with additional suggestions, mainly in the functionality and quality areas, as discussed in more detail in section "Results". Feedback in the area of functional requirements is especially valuable to improve the CRM-specific dimension of the process model. All experts emphasized that CRMSS is a necessary step for successful CRM implementation. The results have shown that the proposed model is useful to evaluate CRM systems. So far the proposed process model has been applied in a pre-test study with a German automotive OEM to discuss the complete process model in practice (Authors 2012b). Further practical research is necessary to verify the CRMSS in different industries and company sizes. In addition, a tool to support the selection process must be developed and provided that takes the costs, functionality, quality, and technology criteria into account.

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Appendix 7

Acceptance of a Process Model for Customer Relationship Management System Selection – an Automotive Case Study

Ina Friedrich, Lubov Kosch, Michael H. Breitner

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Link: http://aisel.aisnet.org/ecis2012/21/

Abstract: Selecting suitable customer relationship management systems (CRM) is a decision problem with economic, behavioral, technical and functional implications. It is important to methodically identify an appropriate solution with regard to the various aspects of the decision. In this paper, a practical test of the previously developed customer relationship management system selection (CRMSS) process model is conducted in a case study with an automotive safety goods supplier. The process model used was constructed based on a literature review and further refined by expert interviews and two international online surveys. To test the models applicability and align phases, tasks, roles and deliverables with practical experiences, qualitative interviews were conducted with the different stakeholders in the evaluation project. The CRMSS process model was then further refined according to the conclusions drawn from the presented case study. The first application of the process model suggests that it is considered as relevant for practice and can be understood and applied successfully for a CRM selection and evaluation. In the context of the case study the model was customized to meet the needs of the project.

Appendix 8

Towards a Multi-Criteria Decision Support Framework for Customer Relationship Management (CRM) System Selection

Halyna Zakhariya, Lubov Kosch, Ina Friedrich, Michael H. Breitner

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Abstract: Identifying and selecting the most suitable CRM system for an individual company has become a complex decision problem. The CRM system sourcing decision needs to cover the span between the large vendors who support end-to-end processes and specialized vendors who support industry and niche requirements. Therefore, selecting the appropriate CRM system can be described as a multi-criteria decision making problem. In this paper, the overall objective is to design a multi-criteria decision support (MCDS) framework for CRM system selection (CRMSS). Based on literature review and an international expert survey, a CRMSS criteria catalogue with four categories (quality, functionality, technical and cost criteria) is defined and a suitable evaluation method is identified. This method includes a combination of the weighted scoring method (WSM) with the total cost of ownership (TCO). The CRM evaluation method is implemented in a tool and discussed within the context of the MCDS framework.

Towards a Multi-Criteria Decision Support Framework for Customer Relationship Management System Selection

Completed Research Paper

Introduction

The market for software packages and diverse IT solutions has significantly increased in recent years, covering both vertical solutions and integration topics. Identifying and selecting the most suitable solution for an individual company has become a complex multi-criteria decision problem. The main decision parameters include adaptability of the business processes, flexibility in terms of market and strategy changes, and IT architecture fit. The main difficulty of multi-criteria problems is a mathematical description, as there is no objective solution (Vincke 1989). Multi-criteria decision making describes the evaluation of a - often restricted - number of alternatives, considering multi-criteria (Yoon and Hwang 2009). It also supports a decision-making process if those criteria are unmanageable and difficult to rank, helping users choosing the best alternative (Le Blanc and Jelassi 1989). Evaluation methods that translate information into comparable numbers provide a mathematical bridge for the underlying qualitative problem.

The scope of customer relationship management (CRM) processes is constantly increasing as customers demand the integration of new communication channels (e.g. mobile), new CRM processes are being established (e.g. social CRM) and more data needs to be processed and mined (e.g. in terms of cloud computing and analytics) (Thompson et al. 2011). The vendor landscape for CRM systems shifts further towards more focused vendors who target specific industries. According to Thompson et al. (2011), the established suite vendors also continue to extend their market into front-office applications. The CRM system sourcing decision needs to cover the span between the large vendors who support end-to-end processes and specialized vendors who support industry and niche requirements. Therefore, selecting the appropriate CRM system can be described as a multi-criteria decision making problem.

In this paper, the overall objective is to design a multi-criteria decision support (MCDS) framework for CRM system selection (CRMSS). By incorporating selection criteria and an appropriate evaluation method the CRMSS tool should be developed. For this purpose, common evaluation methods for software selection frequently discussed in academic literature are summarized. CRM solutions range from simple address and activity management applications to integrated software packages that link front office and back office functions (Chen and Popovich 2003). This means that there is a multitude of different characterizations for CRM, which in turn implies selecting a particular one requires methodological support. General selection criteria need to be tailored to reflect the specific requirements of a CRMSS. In order to create the structured criteria catalogue an overview of criteria is extracted from the literature and verified with CRM practitioners. Afterwards, the most suitable evaluation procedure for CRMSS based on the weighted scoring method (WSM) is selected and implemented. Although a number of approaches to WSM have been discussed in different areas of information system research (ISR), a MCDS framework for CRMSS which includes a calculation tool has not been proposed yet.

The aim of this paper is to answer the following research questions:

(a) Which main evaluation criteria are relevant for CRMSS?
(b) Which evaluation method is suitable for this specific multi-criteria decision making problem and how can it be applied?

This paper is structured as follows: In the next section an overview of current research for IT evaluation methods and selection criteria with focus on CRM systems is provided. The resulting theoretical basis is verified and extended in an expert survey with international CRM practitioners. In the following section the WSM is introduced in detail and applied within the suggested MCDS framework for CRMSS. An exemplary evaluation process is presented step by step and illustrated within the designed evaluation tool.

The presented MCDS framework for CRMSS is discussed and limitations and recommendations are summarized. The paper closes with conclusions and an outlook.

Literature Review

In order to generate an overview of current research for software evaluation methods and CRMSS criteria, a literature review was conducted on the five major research databases in the field of ISR: ACM, IEEE, Science Direct, EBSCOhost and SpringerLink. The authors used combinations of "IT evaluation", "CRM evaluation", "evaluation method", "system selection", "software selection", "decision making", "evaluation criteria", "criteria system selection", "criteria software selection", "evaluation tool" and "evaluation MCDS framework" as search terms. In total 34 academic articles were identified for software evaluation methods and 31 articles for CRMSS criteria.

Literature Review of Software Evaluation Methods

To identify the methods researched and applied for system evaluation, relevant articles (see Table 1) were categorized based on their focus (general or specific software selection) and used methods. The preferred methods suggested for software selection are the Analytical Hierarchy Process (AHP), partly with fuzzy extensions, the Analytical Network Process (ANP) and the weighted scoring method (WMS). AHP is characterized by pair-wise comparison of criteria in a hierarchical net and allows for consideration of both, objective and subjective, aspects (Jadhav and Sonar, 2009). ANP is a generalization of AHP, where the hierarchy of alternatives is extended to a network to reflect the complexity of many "real-life" problems with interconnected inputs (Gürbüz et al., 2012). WSM uses weighting and rating of criteria to calculate a total score for each of the evaluated alternatives (Jadhav and Sonar, 2009). The examples of other methods - not as frequently used in the research of system selections - are DEA (data envelopment analysis), SWOT (Strengths, Weaknesses, Opportunities, and Threats), TOPSIS (Method for Order Preference by Similarity to Ideal Solution) and HKBS (Hybrid knowledge based system).

Table 1. Literature Review of Software Evaluation Methods

Focus		ERP													General software selection												Other software								
		Ghapanchi et al. 2008	Guan 2008	He and Li 2009	Karsak et al. 2009	Kutlu and Akpinar 2009	Liang and Lien 2007	Lien and Chan 2007	Lien and Liang 2005	Lingyu et al. 2009	Nikolaos et al. 2005	Onut and Efendigil 2010	Parkhill et al. 2010	Yazgan et al. 2009	Ziaee et al. 2006	Gashi and Popov 2007	Gürbüz et al. 2012	Huang 2008	Jadhav and Sonar 2009	Kontio 1996	Lee and Wang 2007	Lee et al. 2004	Lin et al. 2007	Maxville et al. 2009	Ncube and Dean 2002	Tarawneh et al. 2011	Vlahavas et al. 1999	Wang and Chen 2007	Yan et al. 2011	Collier et al. 1999	Colombo and Francalanci 2004	Goyal and Sharma 2010	Hong and Kim 2007	Hrgarek 2008	Le Blanc and Jelassi 1989	Naumann and Palvia 1982	Neubauer and Stumme 2009	Perez and Rojas 1999	Vavpotic and Bajec 2009
Method	AHP/ANP/FAHP	x	x				x	x	x			x		x		x		x		x										x		x					
	WSM										x								x	x					x		x		x		x			x	x	x	x
	Fuzzy				x	x				x												x															
	Other method	x	x		x					x			x		x	x	x	x				x	x	x				x	x								

Table 1 shows that the majority of articles dealing with specific software selection relate to ERP systems, while the only three articles refer to CRM software. Colombo and Francalanci (2004) compared 42 CRM software packaged using AHP merely regarding quality criteria. Hong and Kim (2007) developed a criteria catalogue for CRM system selection for financial institutes and ranked the criteria based on expert opinion. Goyal and Sharma (2010) refer to CRM only in a wider framework for the selection of data mining tools.

Literature Review of Criteria for CRM System Selection

The challenges of IS system selection result from e.g. the non-uniform definition which can vary depending on industry and may therefore be interpreted differently. The same applies to requirements and functionality. Depending on the industry or field of work, different value is attached to selection

criteria (Breslin 1986). CRM is a cross-functional and integrated business process management strategy (Chen and Popovich 2003) and CRMSS criteria need to be individually tailored to fit a company's requirements. According to Vlahavas et al. (1999), the definition of selection criteria is the most important step of the evaluation process. As measurable and quantifiable factors, criteria express the value generated by the selection process (Nikolaos et al. 2005).

Relevant articles were independently screened by two researches and openly coded with a focus on selection criteria. The generic list of criteria was then aggregated into 28 selection criteria which are subdivided into the three categories: "quality", "cost" and "functionality" (see Table 2). Most frequently mentioned were quality criteria, partly as they are based on the ISO standards for software quality. Functionality criteria are the once which are related to CRM processes and therefore deviate most from the selection criteria for other IS systems. Costs criteria are generally underrepresented in the reviewed system selection literature. A possible reason is stated by Nauman and Palvia (1982) who suggest that cost considerations should be separated from the calculation process.

Table 2. Literature Review of Criteria for CRM System Selection

		Alshawi et al. 2011	Avlonitis and Panagopoulos 2005	Bohling et al. 2006	Buehrer et al. 2005	Carlsson et al. 2005	Chau 1995	Close et al. 2001	Colombo and Francalanci 2004	Dong 2011	Finnegan and Currie 2009	Franch and Carvallo 2003	Holland and Light 1999	Illa et al. 2000	Jemili 2006	Kemper et al. 2006	Khaddaj and Horgan 2004	Le Blanc and Jelassi 1989	Mahmood et al. 2001	McCalla et al. 2002	Missi et al. 2005	Park and Kim 2003	Pullig et al. 2002	Schöffmann et al. 2008	Sohn and Lee 2006	Stefanou et al. 2003	Stylianou et al. 1992	Tsai et al. 2011	Vasconcelos et al. 2007	Wright 1990	Wu and Hung 2009	Wybo et al. 2009
Quality criteria	Data Integration	x				x				x					x			x			x	x				x		x		x	
	Modifiability & Maintainability						x	x	x			x	x	x			x			x								x	x		x
	Performance & Practicability											x			x		x								x				x	x		x
	Popularity						x								x										x					x		
	Portability						x		x			x	x	x			x	x				x				x	x		x		x	x
	Reliability & Robustness											x	x				x												x	x		x
	Resources						x						x		x								x				x					x
	Security								x			x															x	x	x			x
	Timeliness												x				x								x				x			
	Training & Support					x	x							x				x					x							x		
	Usability		x		x	x	x					x					x	x	x	x				x				x	x	x		x
Cost criteria	Maintenance																								x			x				
	Preparation & installation																								x		x	x				x
	Resources	x																									x	x				x
	System Costs	x					x																				x		x			x
	Training & Support																										x	x				x
	Upgrade																										x	x				x
Functionality criteria	Account Management															x																
	Call Center							x			x									x					x	x						
	Campaign Management			x				x		x	x									x					x							
	Contact Management										x					x						x				x							
	Customer Service			x												x									x							
	Field Service							x								x				x					x	x						
	Internet							x												x						x						
	Lead / Opportunity Management							x			x									x					x							
	Relationship Management							x								x				x						x					x	
	Reporting							x		x	x							x		x		x			x	x						
	Sales Management							x		x	x									x					x							

Empirical Study on CRM System Selection

The selection criteria and the evaluation methods extracted from academic literature were verified and extended with CRM practitioners. An online survey was used to generate feedback from CRM experts

identified via the business platform LinkedIn. Candidates were considered as experts if they had specific knowledge of the broader topic, meaning they dealt with CRM business topics (such as marketing, sales and advertising) or technical areas (such as CRM software systems and CRM IT consulting). The survey was set up in the first week of January 2011 and quality tested on a pilot with 7 people working in different areas. The survey was finalized and sent out on January 15th, 2011. The total list included 1,699 CRM experts. Of the e-mail addresses found, 17.4% were invalid. Another 4.4% indicated they were not qualified for a particular peer group within the survey. Therefore, 1,325 CRM experts received the survey request and were able to participate. 159 CRM experts replied to the online survey, which is a response rate of 12.0%. Countries with responses from >10 CRM experts were: USA (52), Germany (31), Australia (27), Great Britain (24) and Canada (10). Countries with responses from <10 CRM experts were: Spain, Belgium, Sweden, India, Denmark, New Zealand, Ireland, Italy, Philippines, Switzerland and Austria. The survey closed on March 31th, 2011.

The first section of questions focused on the country, relation to CRM and size of the company the expert is working for. The questions were written so that interviewees could be clustered into groups, which aided evaluation. The second section, on CRMSS, focused on project budgets, timeframes of projects, number of users for CRM systems and the type of involvement the expert in CRM has. The third section looked at the standard CRM software system solutions. The questionnaire was customized and changed according to the respondent's classification after the general questions about the interviewee and specifics of CRMSS projects. Based on involvement, questions on standard software system to "customers", "system vendor" or "consulting" were phrased differently, but had the same aim. In section four, the classification of CRMSS was examined. For each category (quality, cost and functionality), the importance of the presented characteristic was asked. Last, the most appropriate evaluation method was requested.

The following cluster groups were used for evaluation: relation to CRM (Sales, Marketing, Research, Media, IT related, project related, other), involvement in CRMSS (customer, consultant, vendor), company size (1-10, 11-49, 50-149, 150-999, 1.000-10.000, >10.000) and number of CRMSS projects participated in (none, 1, 2-4, 5-19, 20-49, 50-100, >100). The experts were asked to specify their relationship to CRM. Multiple answers were possible. 34 experts only had technical ties to IT. 58 of the sales-related experts also dealt with marketing. Experts in media also had ties to at least three other categories (sales, marketing, research and IT). On average, an expert had participated in "5-20" CRMSS projects. Customer experts had less (median 2-5 projects) and system vendor had more experience (median 20-50 projects) in CRM evaluation. Only 15 experts had never participated in CRMSS. Most of these experts were IT consultants who worked on CRM implementation projects or sold CRM system. Experts that participated in more than 100 CRMSS projects (27 experts) were either working for a system vendor or a consulting company.

The experts were asked to select one or more evaluation methods that they are currently using for CRMSS. Total cost of ownership (TCO) was rated highest, having been selected by 61.1% of the experts, followed by WSM with 47.8%, and SWOT-analysis by 35.4%. Other suggestions included net present value (NPV), activity based costing (ABC), and return on investment (ROI). AHP was only named by 8.8% of all experts and is not preferred. Experts who were familiar with AHP method found it too complex. None of the experts specified their own self-developed evaluation method. The preferred evaluation methods for criteria and functional evaluation were WSM and SWOT. The experts recommend using TCO in any case for cost calculation of the CRM implementation. Therefore, a mix of TCO and WSM makes sense because regarding CRM evaluation projects both evaluation methods are mostly used by CRM experts and WSM is additionally one of the frequently cited methods in the academic literature. Regarding the question which CRM system software has been selected, the most commonly selected systems come from the big players: Microsoft, Oracle, SAP, and Salesforce.

The experts received the list of criteria extracted from the literature review (see Table 2) and were first asked to select the most important criterion per category (quality, cost and functionality). The answers given by the experts indicate that an additional category, "technical characteristics" could be useful and would inherit values from the category "quality" and newly proposed criteria. This category includes the values "data integration", "deployment", "integration & infrastructure", "mobility", "modifiability & maintainability" (for example degree of configuration), "performance & practicability", "reliability & robustness", "scalability" and "software & hardware requirements". According to the experts, further criteria might be "business process/requirement fit" (quality), "industry specifics" (functionality), "past

relation to the vendor" (quality), "analytics" (functionality), "relationship management" (functionality) and "payment options" (functionality). The experts were then asked to select the criterion that is not relevant and therefore might be deleted. Most experts replied that all criteria are relevant. The most frequently named criterion for each area were "usability" (quality = 22), "maintenance" (cost = 32), "contact & customer management" (functional = 23) and "modifiability & maintainability" (technical = 22). Since most experts recommended that none of the suggested criteria be deleted, all of them should be incorporated into a CRMSS criteria catalogue, which would allow company-specific assessment. The criteria need to be adapted in a tool that enables companies to customize their evaluation according to their preferences.

Table 3. Selection Criteria for CRM System Selection Tool

Quality criteria	Functionality criteria	Cost criteria	Technical criteria
Business Process /Requirement Fit	Account Management	Preparation & Installation	Data Integration
Past Relation to the Vendor	Analytics	Maintenance	Deployment
Popularity	Call Center	Migration	Integration & Infrastructure
Portability	Campaign Management	Payment Options	Mobility
Project Management	Contact & Customer Management	Resources	Modifiability & Maintainability
Resources	Customer Service	System Costs	Performance & Practicability
Security	Field Service	Training & Support	Reliability & Robustness
Timeliness	Industry Specifics	Upgrade	Scalability
Training & Support	Internet		Software & Hardware Requirements
Usability	Lead & Opportunity Management		
User Acceptance	Relationship Management		
	Reporting		
	Salesforce automation		

Table 3 summarizes the list of 41 CRM selection criteria based on the literature review and extended through expert survey. Four categories are considered for CRMSS: functionality, quality, technical and costs considerations. Quality criteria cover the requirements that measure the quality of the vendor and its product; functional criteria determine the functional fit; costs include all software-related expenses (incl. implementation costs); and technical requirements reflect technical characteristics from hard- and software to data integration.

MCDS Framework for CRM System Selection

Weighted Scoring Method

There are several methods for supporting a decision-making process. Incorporating preferences is a key aspect of a decision making process framework (Neubauer and Stummer 2009; Vincke 1989). This paper focuses on an evaluation method that supports the analysis of qualitative data to gain a more clear picture of a preferred solution. With evaluation methods, researchers use numeric variables to code information into machine-readable form (Neuman 2006). Based on the results of the expert survey a combination of WSM method with TCO is adopted. WSM is a systematic subjective quantification process, which evaluates alternatives according to a performance measurement scale. It supports only quantitative parameters. For qualitative parameters other evaluation methods are used, e.g. AHP or HKBS. All alternatives need to be rated separately before the final score is calculated. No extra effort is required to calculate a final score if the number of evaluation criteria changes (if criteria are defined initially). Changing the weights has an effect on the final score and should not be done after the final score has been determined (Jadhav and Sonar 2009). Preferences are factored into account for company specific requirements (Lin and Nagalingam 2000). WSM presupposes that a numeric rating scale can be applied to selection criteria. This method is not suitable for system selection with evaluation criteria which can only be characterized by ordinal scales. Therefore a transformation of ordinal scale to numeric rating scale is often used in practice (Morisio and Tsoukais 1997).

WSM varies in some aspects (see Table 4), although the basic characteristics always apply. The least common denominator of the procedure explained in the literature is: Initially, a list of criteria is defined to determine the decision problem (a). Next, a list of alternatives for problem solving is created (b).

Table 4. Overview of WSM Evaluation Process

	Focus	Steps / Characteristics of WSM: Criteria Selection (a)	Alternative Selection (b)	Rating (c)	Weighting (d)	Weighted Average	Score Calculation / Ranking (e)	Tool	Scale Rating	Scale Weights	Number of dimensions	Sum equals 100 or 1	Differentiation quantitative / qualitative evaluation
Collier et al. 1999	Data Mining	x	x	x	x		x	x	Discrete (1-5)	Continuous (e.g. 0.1, 0.25, 0.4)	2	x	
Goyal 2010	Data Mining for CRM	x		x	x		x		Not specified	Continuous (e.g. 0.2, 0.25, 0.4)	2	x	
Le Blanc and Jelassi 1989	Decision Support Systems	x	x	x	x		x		Discrete(0-3)	Discrete (1-3)	2		x
Jadhav and Sonar 2009	General Software Selection	x	x	x	x		x		Discrete (1-5)	Discrete (5; 10; 15; 20)	1		
Naumann and Palvia 1982	Sytem Development Tools	x		x	x		x		Discrete (0-1)	Discrete (1-10)	1		x
Perez and Rojas 1999	Workflow-Type Software Products	x		x	x	x	x		Discrete (1-10)	Continuous (e.g. 2%, 35%)	3	x	
Nikolaos et al. 2005	ERP	x	x	x	x		x		Discrete (1-10)	Not specified	2	x	
Hrgarek 2008	Quality Management Software	x	x	x	x		x	x	Discrete (0-5)	Discrete (1-5)	1		x
Kontio 1996	Commercial off-the-shelf software	x	x	x	x		x		Discrete (1-5)	Not specified	1		
Neubauer and Stumme 2009	Web services	x	x	x	x		x		Discrete (1-9)	Discrete (1-9)	1		
Ncube and Dean 2002	Commercial off-the-shelf software	x	x	x	x		x		Discrete (1-5)	Discrete (1-5)	1		

All alternatives are rated (c) according to their fit to each criterion. This step must be finished before weights are assigned to the criteria. A weight indicates the importance of a criterion (d) to an individual situation. The scale for weights is not generally defined, as it varies according to the decision problem. The criterion that is perceived to be most important is assigned the highest weight. Finally, an overall score is calculated (e) by adding the results of the relevant criteria.

Applying the Weighted Scoring Method to CRM System Selection

In social science, there are two research approaches, quantitative and qualitative, and they differ significantly. The qualitative approach constructs social reality by focusing on interactive processes and events. It focuses on a few cases, and these are constrained by the situation. The quantitative approach measures objective facts that focus on variables, using many cases and statistical analysis (Neuman 2006). Although the investigated problem is qualitative, the decision-making process includes both qualitative and quantitative steps (see Figure 1) (Naumann and Palvia 1982).

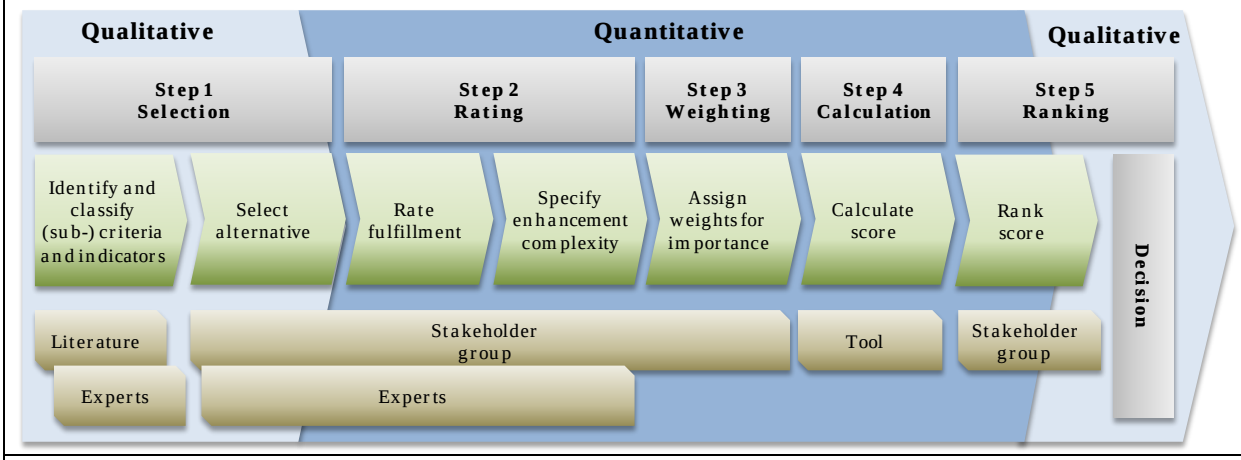

Figure 1. Multi-Criteria Decision Support Framework for CRM System Selection.

Selecting a CRM software system can be defined as a multi-criteria decision making problem. Alternatives in the proposed MCDS framework are standard software, which are weighted by functional, technical, cost and quality criteria (see Table 3). According to expert survey, the average budget for CRMSS is US$ 10,000 to US$ 50,000 and for CRM implementation, US$ 100,000 to US$ 250,000. Larger companies tend to spend up to US$ 2 million. The software system purchase and selection process represents the most critical part of the IT implementation (Gray 2010). In the case of CRMSS, the authors suggest a framework described in Figure 1 to apply the WSM. The five steps are derived from the literature review on system selection with WSM (see Table 4). Following Subsections describe each step in more detail.

Step 1 – Selection

Multi-criteria decision making problems deal with multiple decision criteria, which are represent different aspects of alternatives. The first step is to select the relevant decision criteria in all areas. Evaluation criteria cannot exclusively focus on functional requirements, although these are critical. Categories are subdivided into criteria, which are represented by sub-criteria, indicators and expectations on the lowest level of detail. Company-specific adjustments need to be conducted for sub-criteria, indicators and expectations.

Figure 2 shows an excerpt of the CRM criteria catalogue for the relevant categories with a detailed view of functionality criteria, particularly the area of sales force automation, as well as indicators of its sub-criterion, lead management. The criteria list is generally applicable, but each alternative must be rated according to the expectations of the individual case. This list must be enhanced with industry-specific criteria, as well as company-specific requirements.

Once the criteria list is complete, the alternative selection must be conducted. The market of CRM systems packages is dominated by the vendors Microsoft CRM, SAP, Oracle Siebel and Salesforce. Depending on the individual CRM strategy, these alternatives must be expanded, e.g. automotive solutions include Detecon, Dealersocket and Autobase. This expanded list of alternative vendors needs to be shortened applying a structured approach, e.g. as presented in Friedrich et al. (2012).

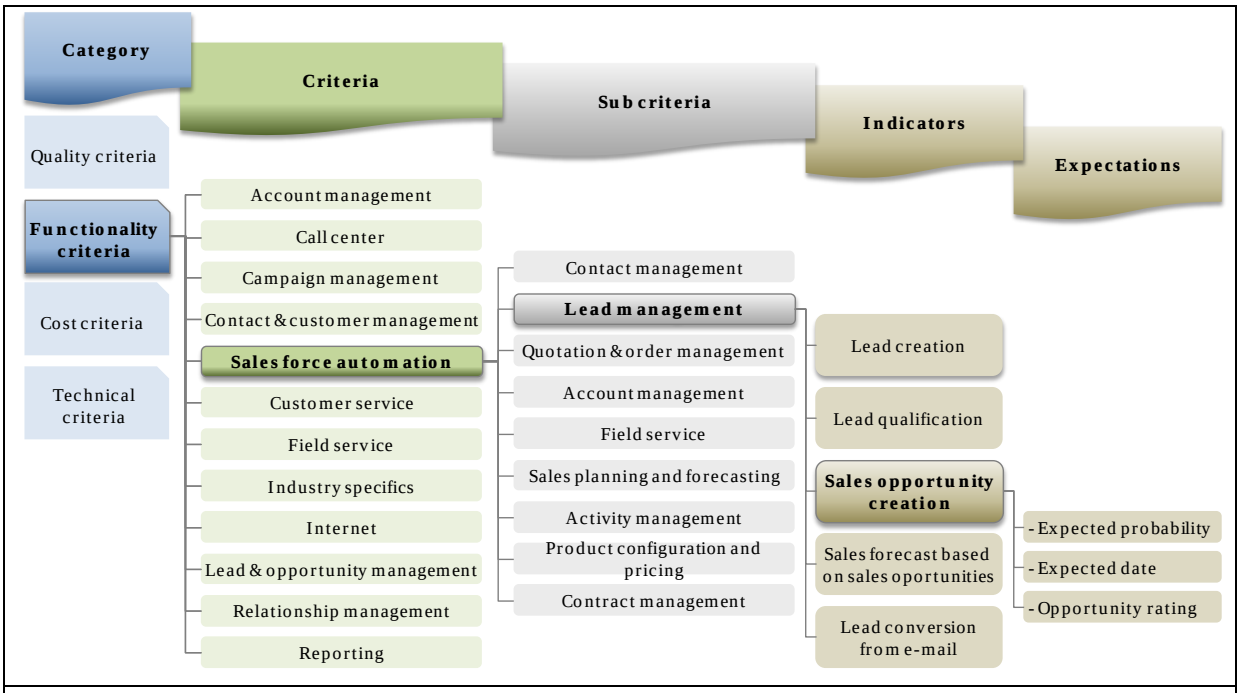

Figure 2. CRM Criteria Catalogue Excerpt.

Step 2 – Rating

After determination of criteria, sub-criteria, indicators and considered alternatives, the feature fulfillment is rated for each indicator per alternative. Feature fulfillment in this context means the coverage of a criterion in the system which is independent from the expectation of the individual company performing the rating. Each CRM system fulfills the listed criteria (rated on the level of indicators) to a certain degree. This fulfillment level is applied generally, but must be validated according to the company's expectations. For instance, for sales opportunity creation, a lead must be classified using expected probability, expected date of sale and an opportunity rating to fulfill the specifications of pipeline reporting (see Figure 2). The detailed requirements are only partially covered for some alternatives. The example of the rating scale is presented in Table 5.

To rate the fulfillment level, the rating not only must take the degree of coverage into account, it must also include the complexity of enhancing the feature to the expected level. Enhancement complexity in this context means the effort needed to reach a expected level in the system through development or customization. The effort required for enhancement varies by CRM system software. For example, complex enhancements in SAP result in higher efforts than in Microsoft Axapta. The implementation of a coefficient that helps to take enhancement complexity into account minimizes possible errors regarding cost and effort estimation. The example of specification of enhancement complexity is presented in Table 6.

Step 3 – Weighting

During step three, each criterion, sub-criterion and indicator is weighted according to their individual importance. Importance in this context represents the significance of the criterion for the individual rater.

In contrast to the individual importance, the relative importance indicates the overall significance of each category in comparison to the other categories. The weights (relative importance) on the highest level of "category" are based on the percentage scale (0 %-100%) and mirror the importance assigned to each of the categories, quality, cost, functionality and technical. For instance functionality is more important than cost and therefore receives a higher percentage. The sum of all category weights must equal 100 per cent (Collier et al. 1999; Goyal and Sharma 2010).The relative importance of each criterion cannot be assigned before all alternatives are selected and rated to prevent results from affecting the rating of further alternatives. Especially when adding industry-specific alternatives, the criteria catalogue is extended, which has an impact on results and preferences. The relative importance of criteria represented by allocated weights must be hidden throughout the whole process so as not to influence the judgment of the person conducting the evaluation.

The example weighting scale for measuring the individual importance of indicators, sub-criteria and criteria is presented in Table 7. The scores increase to reflect the level of importance (Breslin 1986).

Table 5. Rating of Feature Fulfillment.

Featured	Rating
Yes	6
Substantially	4
Partly	2
No	0

Table 6. Specification of Enhancement Complexity.

Enhancement complexity	Coefficient
Easy	3
Moderate	2
Difficult	1
Not possible	0

Table 7. Weighting of Criteria Importance.

Importance	Weight
Essential	5
Important	3
Nice to Have	1
Not Relevant	0

All the scales used in this and previous subsection (see Table 5-7) are example scales. They are numerical descriptions of a qualitative assessment (e.g. for weighting: essential = 5) and can be individually defined. The literature review in Table 4 shows that the scales used vary from case to case. As the same scale applies to all alternatives the total score for each alternative is equally influenced. In the presented example scales the intermediate steps (e.g. Table 5: ratings 1; 3; 5 and Table 7: 2, 4) are left out for the

benefit of simplicity. An extended scale could be applied to specify further the ratings and weights but requires a sophisticated approach for assigning values. The more specific the scale the lower the risk of subjectivity but in any case a certain risk is inherent in any evaluation (Perez and Rojas 1999).

Step 4 – Calculation

Once the values have been assigned to feature fulfillment, enhancement complexity and criteria importance (weights), the CRM selection tool calculates the performance of each criterion for each alternative. Figure 3 gives an overview of the variables used for a calculation and also illustrates formalized results.

Let $A = \{A_1, A_2 ...., A_N,\}$ specify a set of alternatives. Then the score for the criteria indicator *z* of the alternative A_j is calculated as follows:

$$s_{zj}^{indicator} = w_z^{indicator} \cdot r_{zj}^{indicator} \cdot c_{zj}^{indicator};\ z \in (1,k),\ j \in (1,N) \quad (1)$$

$r_{zj}^{indicator}$ and $c_{zj}^{indicator}$ denote rating of feature fulfillment and coefficient of enhancement complexity, respectively for the z^{th} indicator of j^{th} alternative. k and N are the numbers of indicators and alternatives. $w_z^{indicator}$ describes the importance weight of the indicator *z* and is identical for all alternatives. After all indicator scores are calculated, the next computation of the weighted means occurs on the sub-criteria level:

$$m_{yj}^{sub-criterion} = \frac{\sum_{z=1}^{k} s_{zj}^{indicator}}{\sum_{z=1}^{k} w_z^{indicator}};\ y \in (1,v),\ j \in (1,N) \quad (2)$$

$m_{yj}^{sub-criterion}$ presents the weighted mean for the y^{th} sub-criterion of j^{th} alternative and is used next to calculate the score of this sub-criterion:

$$s_{yj}^{sub-criterion} = w_y^{sub-criterion} \cdot m_{yj}^{sub-criterion},\ y \in (1,v),\ j \in (1,N) \quad (3)$$

The number of sub-criteria as well as of weighted means and scores for these sub-criteria is equal v for every available alternative. Note that the importance weight given to sub-criterion y $(w_y^{sub-criterion})$ is used to calculate the sub-criterion score in (3). When the weighting of the sub-criterion changes, this change is independent from the alternative and a new value of the weight is the same for all alternatives. The same applies to the weights of indicators, criteria and categories.

In (4) - (7) the calculation of criterion and category weighted means and scores are given analogue to those of sub-criteria. The only difference is the number of criteria and categories, which are p and u in this case.

$$m_{tj}^{criterion} = \frac{\sum_{y=1}^{v} s_{yj}^{sub-criterion}}{\sum_{y=1}^{v} w_y^{sub-criterion}};\ t \in (1,p),\ j \in (1,N) \quad (4)$$

$$s_{tj}^{criterion} = w_t^{criterion} \cdot m_{tj}^{criterion};\ t \in (1,p),\ j \in (1,N) \quad (5)$$

Aggregated scoring					Alternative											
					A_1				A_2				A_N			
Category	Criteria	Subcriteria	Indicator	Weight	Rating	Coefficient	Weighted mean	Score	Rating	Coefficient	Weighted mean	Score	Rating	Coefficient	Weighted mean	Score
Category 1				$w_1^{category}$			$m_{11}^{category}$	$s_{11}^{category}$			$m_{12}^{category}$	$s_{12}^{category}$			$m_{1N}^{category}$	$s_{1N}^{category}$
	Criterion 1			$w_1^{criterion}$			$m_{11}^{criterion}$	$s_{11}^{criterion}$			$m_{12}^{criterion}$	$s_{12}^{criterion}$			$m_{1N}^{criterion}$	$s_{1N}^{criterion}$
		Subcriterion 1		$w_1^{subcriterion}$			$m_{11}^{subcriterion}$	$s_{11}^{subcriterion}$			$m_{12}^{subcriterion}$	$s_{12}^{subcriterion}$			$m_{1N}^{subcriterion}$	$s_{1N}^{subcriterion}$
			Indicator 1	$w_1^{indicator}$	$r_{11}^{indicator}$	$c_{11}^{indicator}$		$s_{11}^{indicator}$	$r_{12}^{indicator}$	$c_{12}^{indicator}$		$s_{12}^{indicator}$	$r_{1N}^{indicator}$	$c_{1N}^{indicator}$		$s_{1N}^{indicator}$
			Indicator 2	$w_2^{indicator}$	$r_{21}^{indicator}$	$c_{21}^{indicator}$		$s_{21}^{indicator}$	$r_{22}^{indicator}$	$c_{22}^{indicator}$		$s_{22}^{indicator}$	$r_{2N}^{indicator}$	$c_{2N}^{indicator}$		$s_{2N}^{indicator}$
			...													
			Indicator k	$w_k^{indicator}$	$r_{k1}^{indicator}$	$c_{k1}^{indicator}$		$s_{k1}^{indicator}$	$r_{k2}^{indicator}$	$c_{k2}^{indicator}$		$s_{k2}^{indicator}$	$r_{kN}^{indicator}$	$c_{kN}^{indicator}$		$s_{kN}^{indicator}$
		Subcriterion 2		$w_2^{subcriterion}$			$m_{21}^{subcriterion}$	$s_{21}^{subcriterion}$			$m_{22}^{subcriterion}$	$s_{22}^{subcriterion}$			$m_{2N}^{subcriterion}$	$s_{2N}^{subcriterion}$
		...														
		Subcriterion m		$w_m^{subcriterion}$			$m_{m1}^{subcriterion}$	$s_{m1}^{subcriterion}$			$m_{m2}^{subcriterion}$	$s_{m2}^{subcriterion}$			$m_{mN}^{subcriterion}$	$s_{mN}^{subcriterion}$
	Criterion 2			$w_2^{criterion}$			$m_{21}^{criterion}$	$s_{21}^{criterion}$			$m_{22}^{criterion}$	$s_{22}^{criterion}$			$m_{2N}^{criterion}$	$s_{2N}^{criterion}$
	...															
	Criterion p			$w_p^{criterion}$			$m_{p1}^{criterion}$	$s_{p1}^{criterion}$			$m_{p2}^{criterion}$	$s_{p2}^{criterion}$			$m_{pN}^{criterion}$	$s_{pN}^{criterion}$
Category 2				$w_2^{category}$			$m_{21}^{category}$	$s_{21}^{category}$			$m_{22}^{category}$	$s_{22}^{category}$			$m_{2N}^{category}$	$s_{2N}^{category}$
...																
Category x				$w_x^{category}$			$m_{x1}^{category}$	$s_{x1}^{category}$			$m_{x2}^{category}$	$s_{x2}^{category}$			$m_{xN}^{category}$	$s_{xN}^{category}$

Figure 3. Generic Layout of the CRM System Selection Tool.

$$m_{uj}^{category} = \frac{\sum_{t=1}^{p} s_{tj}^{criterion}}{\sum_{t=1}^{p} w_t^{criterion}};\ u \in (1,x),\ j \in (1,N) \tag{6}$$

$$s_{uj}^{category} = w_u^{category} \cdot m_{uj}^{category};\ u \in (1,x),\ j \in (1,N) \tag{7}$$

Step 5 – Ranking

To obtain a final ranking of the selected alternatives, the results are summarized and the percentage fit is calculated.

- Total score per alternative (TS_j) is a sum of all category scores. According to the variables in the previous sub-section, the calculation is as follows:

$$TS_j = \sum_{u=1}^{x} s_{uj}^{category};\ j \in (1,N) \tag{8}$$

Different results should be calculated to get an overall impression of fit. The following results are suggested (Breslin, 1986):

- Category percentage fit $(CPT_{uj}^{category})$: The criteria scores for quality, functionality, cost and technical are totaled and then divided by the sum of maximum achievable scores with regard to *feature fulfillment* and *enhancement complexity* $(ms_{tj}^{criterion})$.

$$CPT_{uj}^{category} = \frac{\sum_{t=1}^{p} s_{tj}^{criterion}}{\sum_{t=1}^{p} ms_{tj}^{criterion}} \cdot 100\%;\ u \in (1,x),\ j \in (1,N) \quad (9)$$

- Essential feature fit (EFF_j): The scores of all criteria that are marked as essential are totaled $(s_j^{essential-criterion})$ and divided by the sum of the corresponding maximum achievable scores $(ms_j^{criterion})$

$$EFF_j = \frac{\sum_{1}^{h} s_j^{essential-criterion}}{\sum_{1}^{h} ms_j^{criterion}} \cdot 100\%;\ j \in (1,N), \text{ with } h \text{ - number of all essential criteria} \quad (10)$$

- Category essential feature fit $(CEFF_{uj}^{category})$: The scores of criteria per category that are marked as essential are totaled $(s_{uj}^{essential-criterion})$ and divided by the sum of the corresponding maximum achievable scores with regard to *feature fulfillment* and *enhancement complexity* $(ms_{tj}^{criterion})$

$$CEFF_{uj}^{category} = \frac{\sum_{1}^{g} s_{uj}^{essential-criterion}}{\sum_{t=1}^{p} ms_{tj}^{criterion}} \cdot 100\%;\ u \in (1,x),\ j \in (1,N),\ g \text{ - number of essential criteria per category} \quad (11)$$

- Total percentage fit (TPF_j): All category scores are totaled and divided by the sum of maximal achievable scores per category $(ms_{uj}^{category})$.

$$TPF_j = \frac{\sum_{u=1}^{p} s_{uj}^{category}}{\sum_{u=1}^{p} ms_{uj}^{category}} \cdot 100\%;\ u \in (1,x),\ j \in (1,N) \quad (12)$$

As suggested by the experts at this point in the evaluation process the total cost of ownership (TCO) is calculated. All direct and indirect costs of system software that is in scope are thereby determined and totaled. Finally, in order to assess alternatives holistically on the basis of costs versus utility a cost / utility ratio per alternative is calculated. Hereby, the TCO per alternative are divided by the TS per alternative (8) (Le Blanc and Jelassi 1989).

In addition to the TS (8) calculation and cost considerations the measures for fit also provide decision support. For example, if a company considers quality criteria as most important, the $CPT^{quality}$ (9) should be compared for each of the evaluated alternatives. Furthermore referring to the same example, the $CEFF^{quality}$ (11) gives a measure for fit only regarding the quality criteria that initially were weighted as "essential".

Figure 4 illustrates an example for the aggregated scoring of an individual company. In this example, the number of categories and alternatives both equal 4. The tool indicates that in this example, the best

overall fit is alternative 4 due to the highest TS (15.41) and TPF (84.05%). Nevertheless, alternative 3 fulfills all absolutely essential criteria better than alternative 4 (EFF =91.58%).

An ideal solution meets all criteria categories at 100%, but in reality, that is rarely the case. A good solution must cover at least a certain percentage; otherwise additional alternatives need to be considered. If the minimal TPF must be 80%, alternative 1 is not a satisfactory solution for the presented example company, even if the cost/usability ratio is the lowest of all other alternatives.

Although alternative 4 provides the best TPF , the cost/ usability ratio reveals that alternative 3 provides a comparable TPF and better EFF at a considerably lower cost. Moreover, the alternative 3 indicates the best $CEFF^{quality}$ (94.35%), $CEFF^{functionality}$ (90.87%) and $CEFF^{technical}$ (93.93%) in comparison to the other alternatives as well as the highest $CPT^{quality}$ (88.55%) and $CPT^{functionality}$ (86.10%). Based on this argumentation the final decision is alternative 3.

Discussion – Limitations and Recommendations

There are two major conceptual contributions. First, there are two perspectives in the rating phase. Besides the rating of the feature fulfillment an enhancement complexity factor is suggested. This dimension gives an important indication how complex and costly a development or customization of a specific CRM system will be. This differs significantly between systems. Second, in the weighting phase an importance weight has been added on all levels to minimize subjective judgments. Due to the detail level of criteria decision-makers are encouraged to involve different stakeholders, e.g. key-user from functional departments, in the weighting activity. They can independently assign weights for individual importance on the level of indicators and sub-criteria. The individual importance for criteria should be determined by project management. The relative importance on category level is an ultimate decision of the steering committee.

There are too many factors that affect the final outcome of an implementation and strategies might change during evaluation and selection. The aggregated score depends on the subjective judgment of the evaluation project team, which might change over time, too. The framework and tool accommodate this issue through individual prioritization of a multitude of criteria in four different dimensions. The authors reduce subjectivity by individual weights on three levels –on the criterion level, on the sub-criterion level and on indicator level as well as on the category level (quality, functionality, cost and technical) (see Figure 4). The results of the CRM-specific MCDS framework and tool are only meaningful for a particular company at a specific point in time. The scales used for rating and weighting in the previous section can be individually chosen. To validate the decision, the framework and tool should be adapted for different scenarios to analyze the robustness of the result.

As demonstrated before the results of the WSM tool calculation cannot be the only determining factor for the final system software selection (Le Blanc and Jelassi 1989). That is why the proposed MCDS framework also comprises qualitative evaluation as part of the step of ranking score. This part of evaluation allows the decision-makers not only to compare the calculated results, but also to analyze them from different perspectives before making a decision. In practice, political decisions could lead to active manipulation of the achieved result. This could happen, for example, by adjusting the relative importance of the categories in case the final score is not satisfactory. A further limitation is importance weighting which is conducted by subjective opinion. Assigning weights requires the availability of comprehensive information which is not always the case in practice (Neubauer and Stummer 2009). Hence the assigned weights are not always reliable, but this drawback also occurs with AHP. Therefore, the suggested tool is embedded within the MCDS framework in which information is collected as part of the alternative and criteria selection (see step 1). A further important aspect of the MCDS framework, and the CRMSS tool in particular, is the combination of WSM and TCO as well as the application of measures for fit (see step 5 - ranking). Consideration of total aggregated scores only leads to a biased decision as e.g. the individual strengths of particular criteria are concealed. In the worst case, alternatives can have the same total score although the weights and rating of specific criteria vary significantly. This compensation of incompatibilities of one alternative compared to the other can lead to inferior selection decisions (Ncube and Dean 2002, Morisio and Tsoukais 1997).

Aggregated scoring			Alternative																					
			A_1: Alternative 1						A_2: Alternative 2						A_3: Alternative 3						A_4: Alternative 4					
Category / Criteria / Subcriteria / Indicator	Weight		Rating	Coefficient	Weighted mean	Score	Category essential feature fit (CPF)	Category percentage fit (CEFF)	Rating	Coefficient	Weighted mean	Score	Category essential feature fit (CPF)	Category percentage fit (CEFF)	Rating	Coefficient	Weighted mean	Score	Category essential feature fit (CPF)	Category percentage fit (CEFF)	Rating	Coefficient	Weighted mean	Score	Category essential feature fit (CPF)	Category percentage fit (CEFF)
Quality criteria	10%				12.55	1.25					13.71	1.37					14.65	1.46					13.98	1.40		
Popularity	Not Relevant				5.46	0.00					6.62	0.00					8.63	0.00					9.09	0.00		
Portability	Important				15.81	47.43					9.28	27.84					11.52	34.56					16.23	48.69		
Project management	Essential				16.17	80.85					16.21	81.05					17.13	85.65					15.99	79.95		
Resources	Important				10.20	30.60					13.00	39.00					10.41	31.23					16.00	48.00		
Security	Essential				9.37	46.85					14.27	71.35					16.44	82.20					13.44	67.20		
Timeliness	Important				12.66	37.98					11.33	33.99					8.96	26.88					17.34	52.02		
Training & support	Nice to Have				9.32	9.32					5.69	5.69					7.11	7.11					7.60	7.60		
Usability	Essential				10.31	51.55					13.34	66.70					17.81	89.05					8.63	43.15		
User acceptance	Essential				14.36	71.80					17.12	85.60					16.55	82.75					14.56	72.80		
Functionality criteria	40%				12.69	5.08					10.64	4.25					15.50	6.20					15.28	6.11		
Account management	Essential				11.20	56.00					17.00	85.00					16.84	84.20					14.50	72.50		
Call center	Important				7.00	21.00					11.52	34.56					6.12	18.36					17.84	53.52		
Campaign management	Important				10.31	30.93					6.20	18.60					10.20	30.60					17.66	52.98		
Contact & customer manage	Essential				12.10	60.50					10.10	50.50					15.95	79.75					17.83	89.15		
Customer service	Essential				16.00	80.00					18.00	90.00					17.99	89.95					14.44	72.22		
Field service	Nice to Have				14.25	14.25					13.50	13.50					18.83	18.83					15.33	15.33		
Industry specifics	Essential				16.00	80.00					6.00	30.00					16.44	82.22					14.44	72.22		
Internet	Essential				11.74	58.70					10.96	54.78					16.61	83.04					12.52	62.61		
Lead & opportunity manage	Important				15.69	47.08					8.08	24.23					16.62	49.85					17.31	51.92		
Relationship management	Important				16.22	48.67					7.11	21.33					16.44	49.33					16.44	49.33		
Reporting	Important				7.58	22.74					7.05	21.16					15.68	47.05					14.11	42.32		
Sales force automation	Essential				12.79	63.93					9.13	45.64					15.94	79.68					13.74	68.70		
Contact management	Essential				11.58	57.92					9.8	49.2					20.0	100.0					18.4	92.1		
Lead management	Important				13.83	41.50					14.5	43.5					16.5	49.5					8.2	24.5		
Lead creation	Essential	Substa	Moderate			40.00			Yes	Easy		90.0			Yes	Easy		90.0			No	Not possible		0.0		
Lead qualification	Important	Yes	Easy			54.00			Substa	Easy		36.0			Yes	Easy		54.0			Yes	Moderate		36.0		
Sales opportunity cre	Important	Yes	Easy			54.00			Yes	Moderate		36.0			Yes	Moderate		36.0			Yes	Easy		54.0		
Sales forecast based	Nice to Have	Yes	Easy			18.00			Substa	Easy		12.0			Yes	Easy		18.0			Subst	Moderate		8.0		
Lead conversion	Not Relevant	Partly	Difficult			0.00			No	Difficult		0.0			No	Not possible		0.0			Yes	Easy		0.0		
Quotation & order manag	Essential				14.67	73.33					8.3	41.7					14.7	73.3					11.7	58.3		
Account management	Essential				15.39	76.96					9.7	48.7					16.7	83.5					16.7	83.5		
Field service	Important				12.00	36.00					15.0	45.0					15.0	45.0					15.0	45.0		
Sales planning and foreca	Important				5.85	17.54					8.8	26.3					14.0	42.0					12.9	38.8		
Activity management	Important				7.60	22.80					9.7	29.1					15.0	45.0					8.1	24.3		
Product configuration an	Essential				15.86	79.29					10.9	54.3					16.9	84.6					13.7	68.6		
Contract management	Essential				13.56	67.78					13.3	0.0					13.3	66.7					14.7	73.3		
Cost criteria	20%				12.45	2.49					14.53	2.91					13.54	2.71					15.43	3.09		
Maintenance	Important				10.10	30.30					11.23	33.69					10.96	32.88					17.08	51.24		
Preparation & installation	Essential				10.86	54.30					16.31	81.55					15.41	77.05					15.11	75.55		
Resources	Important				13.50	40.50					12.10	36.30					10.03	30.09					17.05	51.15		
System costs	Essential				16.00	80.00					17.58	87.90					17.48	87.40					17.23	86.15		
Training & support	Nice to Have				5.89	5.89					7.29	7.29					6.21	6.21					7.05	7.05		
Upgrade	Important				12.67	38.01					14.59	43.77					12.36	37.08					12.48	37.44		
Technical criteria	30%				11.91	3.57					14.48	4.34					14.29	4.29					16.05	4.81		
Data integration	Essential				10.60	53.00					16.23	81.15					17.12	85.60					16.69	83.45		
Deployment	Important				9.02	27.06					12.56	37.68					15.40	46.20					17.60	52.80		
Integration & infrastructure	Important				12.04	36.12					14.89	44.67					6.09	18.27					17.87	53.61		
Mobility	Essential				12.10	60.50					17.00	85.00					16.60	83.00					13.50	67.50		
Modifiability (scalability) &	Essential				15.23	76.15					15.98	79.90					17.00	85.00					16.01	80.05		
Performance & practicability	Important				9.87	29.61					6.23	18.69					15.40	46.20					14.65	43.95		
Reliability & robustness	Important				14.16	42.48					17.57	52.71					9.60	28.80					18.00	54.00		
Scalability	Not Relevant				10.60	0.00					6.03	0.00					7.10	0.00					16.78	0.00		
Software & hardware require	Nice to Have				8.47	8.47					5.60	5.60					7.02	7.02					14.00	14.00		
Total score (TS)					12.39						12.87						14.66						**15.41**			
Essential feature fit (EFF)					74.33%						68.71%						**91.52%**						79.43%			
Total percentage fit (TPF)					67.59%						80.42%						80.78%						**84.05%**			
TCO					$67,000						$115,000						$80,000						$100,000			
Cost / usability ratio					$5,406						$8,933						**$5,458**						$6,489			

Figure 4. Example of a Proposed CRM System Selection Tool Calculation

But, taking account of measures for fit (9-11) can have an additional decision value, if the fit of a specific category (e.g. quality) or criteria weighted as essential should be preferred. According to the company's individual prioritization, considering TCO and cost / utility ration may also affect the final result.

Because selecting a CRM system based on functional, technical, cost and quality criteria does describe a complex decision problem, WSM is the preferred evaluation method. Compared to other methods, it can be applied rather quickly and produces similar results. The implementation of this method within a spreadsheet tool makes the proposed CRM-specific MCDS framework not only automatable but also easily manageable (Collier et al. 1999). Other evaluation methods frequently discussed in literature offer additional benefits, e.g. AHP is argued to result in more reliable ranking due to pair-wise comparison of alternatives (Kontio 1996). But in terms of CRMSS, the added value does not justify the additional time and budget required. Therefore, the authors regard WSM as the best evaluation method for CRMSS.

Conclusion and Outlook

The purpose of this paper is to determine the most appropriate evaluation method and criteria for CRM system selection based on a literature review and subsequent expert survey. The result is a MCDS framework including a tool which supports the structuring of the underlying multi-criteria decision making problem of CRMSS. The research includes valuable contributions to software evaluation and answers the research questions as follows:

(a) Based on the literature review the main criteria for CRMSS were identified and extended by expert survey. The 41 CRM-specific selection criteria are grouped into four categories: quality, functionality, cost and technical criteria. These criteria are part of the MCDS framework and tool for CRMSS.

(b) The MCDS framework structures the otherwise mainly subjective decision process and demonstrates tendencies and specific insights that are otherwise hard to grasp. According to the experts' opinion, a combination of WSM and TCO is the most suitable evaluation methods for CRMSS which is implemented in the MCDS framework. As shown, the WSM method is easily applicable to CRMSS. The proposed MCDS framework presents one way of supporting multi-criteria decision making providing a CRMSS recommendation. Making a final decision still requires an in-depth analysis of available results to be made by decision-makers. The presented MCDS framework and tool provides valuable insight in terms of analyzing various aspects that affect the efficiency of a CRM implementation. The decision is based on meaningful results that can be presented later in the implementation process if the decision is challenged. As the literature review and the following discussion have shown WSM is a feasible evaluation method as it is easy to apply which is crucial for smaller system selection decisions. According to strategy consulting companies like Deloitte, AT Kearney, and McKinsey, evaluation methods are one of the four major key elements for implementation (Hart et al. 2004). The MCDS framework and tool aid the selection process of CRM systems software in an efficient way. To even better validate the proposed MCDS framework, a comprehensive case study should be conducted, preferably in a context where a CRMSS was carried out and the system software has already been implemented for at least one year. The results achieved by the MCDS framework and tool must be compared to the results and outcome of the former CRMSS in an a posteriori analysis and evaluation. Further, the sub-criteria for CRMSS need to be formally defined and verified with CRM practitioners in order to further refine the criteria catalogue.

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