

# Development of a method for measuring customer advisory system effectiveness

Wolfgang Messner

*This paper has been accepted for publication in **Business Information Review** and the typeset version of this paper will be published in **Business Information Review** in 2007 by Sage Publications Ltd. All rights reserved. © Sage Publications Ltd., 2007*

## Abstract

Information Systems (IS) managers in companies are under increasing pressure to justify the value and contribution of customer advisory systems to the profitability of the organization. Measuring the usefulness of systems is critical to an understanding of this value contribution. This paper proposes a multidimensional model and method for assessing the effectiveness of customer advisory systems by inviting end users to express their opinion on 25 criteria which are grouped into 5 areas. The model is illustrated with results of a survey among bank employees.

## 1 Theory and background

Customer advisory systems have changed the way companies handle customer enquiries, advertise and sell their products or manage the entire relationship with their customers (see Messner 2005, p. 253). As such systems become more complex and move into global markets, relying on experience, judgment and intuition alone is increasingly difficult and potentially misleading. Guiding action for continuous improvement of the application landscape requires a feedback loop. Developing and applying a systematic model for assessing information systems is an essential requirement for supporting the feedback loop. Such a model will be multidimensional. "Just as a human being needs a diversity of measures to assess his or her health and performance, an organization needs a diversity of measures to assess its

health and performance" (Drucker, 1989, p. 230). The outcome and findings of the model will be expressed in numbers. "When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind: it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science" (Lord Kelvin in 1890, as quoted in Bohn, 1994, p. 72).

## 2 Literature review of models of information system success

### 2.1 D&M IS Model

In 1992 DeLone and McLean presented the Information Systems Success Model as a framework and model for measuring the complex dependent variable in IS research (see DeLone and McLean, 1992). Taking both process and causal considerations into account, there are six dimensions of success which are proposed to be interrelated rather than independent. This has important implications for the measurement, analysis, and reporting of IS success in empirical studies. A temporal process model suggests that an IS is first created, containing various features, which can be characterized as exhibiting various degrees of system and information quality. Next, users and managers experience these features by using the system and are either satisfied or dissatisfied with the system or its information products. The use of the

system and its information products then impacts or influences the individual user in the conduct of his or her work, and these individual impacts collectively result in

organizational impacts. This sequence is reflected in the D&M IS Success Model in figure 1.

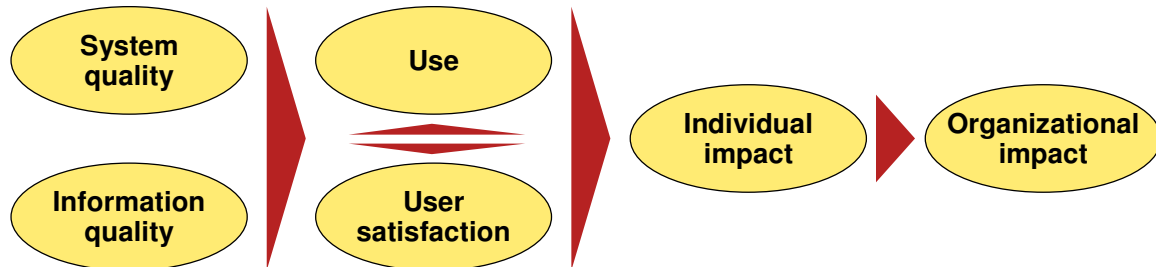


Figure 1: D&M IS Success Model (Source: DeLone and McLean, 1992)

Based on research contributions and changes in the role and management of information systems, in 2003 DeLone and McLean (see DeLone and McLean, 2003) presented an updated success model which is presented in figure 2. In this model, quality has three major dimensions: information, systems, and service. Because all three dimensions singularly or jointly affect use and user satisfaction, they are measured and controlled for separately. Given the difficulties in interpreting the multidimensional aspects of use – mandatory versus voluntary, informed versus

uninformed, effective versus ineffective, and so on, DeLone and McLean suggest that intention to use is an alternative measure. Intention to use is an attitude, whereas use is a behavior. Use must precede user satisfaction in a process sense, but positive experience with use will lead to greater user satisfaction in a causal sense. Similarly, increased user satisfaction will lead to increased intention to use. As a result of use and user satisfaction, certain net benefits will occur which in turn reinforce use and user satisfaction.

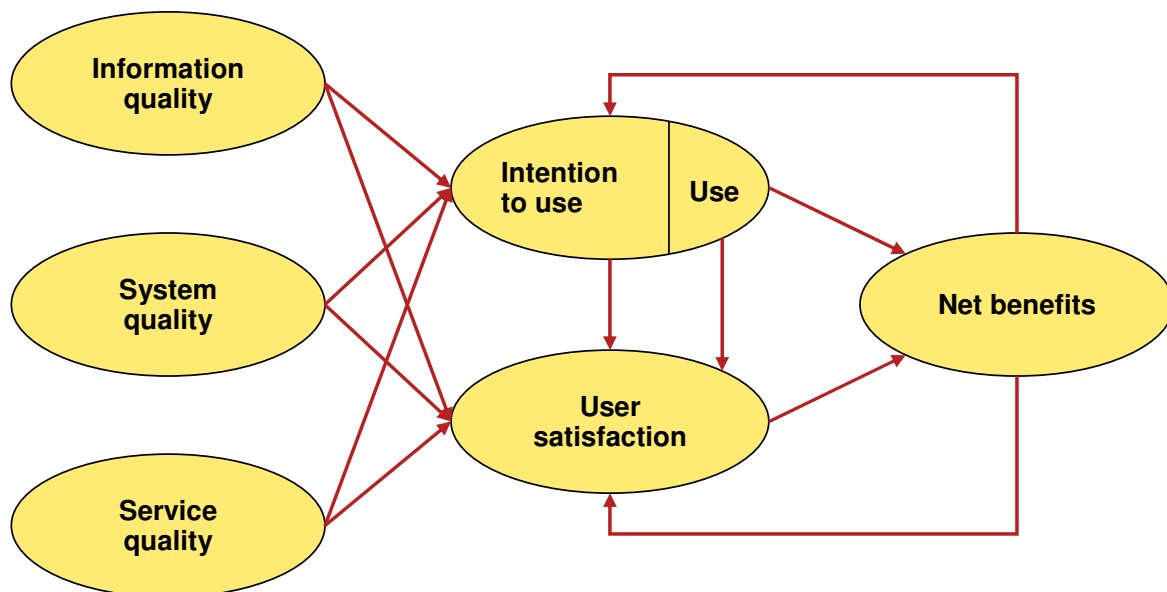


Figure 2: Updated D&M IS Success Model (Source: DeLone and McLean, 2003)

This process model has just three components: the creation of a system, the use of the system, and the consequences of this system use. Each of these steps is a *necessary, but not sufficient, condition* for the resultant outcome(s). For instance, without system use, there can be no consequences or benefits. However, with system use, even extensive use, which is inappropriate or ill-informed, there may also be no benefits.

- *System use* is typically voluntary and is measured as frequency of use, time of use, number of accesses, usage pattern, and dependency.
- *System quality* is calculated based on ease-of-use, functionality, reliability, flexibility, data quality, portability, integration, and importance.
- *Information quality* is evaluated in terms of accuracy, timeliness, completeness, relevance, and consistency.
- *User satisfaction* highlights the users' opinions of the system. Measures should cover the entire user experience cycle from information retrieval through capture, update and delete of contracts or transaction data.
- *Service quality* describes the overall support delivered by application management and can be evaluated along the three dimensions assurance, empathy, and responsiveness.
- *Net benefits* capture the balance of positive and negative impacts. Measures are determined by context and objectives of the application: e.g. cost savings, incremental additional sales, reduced search costs, time savings.

## 2.2 User information satisfaction (UIS)

Since the quality or effectiveness of information systems is difficult to measure directly, many researchers and practitioners are turning to indirect measures, such as user information satisfaction (UIS). Users

are asked to evaluate the information retrieved from an application relative to a sense of satisfaction. The applicable definition of satisfaction (see Bailey and Pearson, p 531, 1983) is the sum of the user's weighted reactions to a set of factors,

$$S_i = \sum_{j=1}^n R_{ij}W_{ij}$$

where

$R_{ij}$  = The reaction to factor  $j$  by individual  $i$ .

$W_{ij}$  = The importance of factor  $j$  to individual  $i$ .

In order to implement the model, a set of factors comprising the domain of satisfaction must be identified, and a vehicle for scaling the user's positive and negative reactions to these factors must be found. For a review of measures and classifications for measuring see Seddon and Yip, 1992.

## 2.3 SERVQUAL applied to an IS context

Parasuraman, Zeithaml and Berry (see Parasuraman et al., 1985) proposed a framework called SERVQUAL consisting of ten determinants or dimensions of service quality: reliability, access, understanding of the customer, responsiveness, competence, courtesy, communication, credibility, security, and tangible considerations. Researchers have applied and tested the SERVQUAL measurement instrument from marketing to an IS context. Some sample IS-SERVQUAL instrument items include (see Hochstein et al., 2004; DeLone and McLean, p 18, 2003):

- "The IS has up-to-date hardware and software" (tangible);
- "The IS is dependable" (reliability);
- "IS Employees give prompt service to users" (responsiveness);
- "IS employees have the knowledge to do their job well" (competence); and

- “IS has users’ best interests at heart” (empathy).

Service quality, properly measured, deserves to be added to system quality and information quality as components of IS success. It could be argued that service quality is merely a subset of the system quality. But the changes in the role of IS over the last decade give reason for adding the service quality dimension as a separate variable.

#### **2.4 Organizational benefits from IS projects**

Mirani and Lederer (see Mirani and Lederer, 1998) developed and validated a 33-item instrument to measure organizational benefits derived from IS projects. Their measurement framework consisted of three categories of organizational benefits: strategic, informational, and transactional. Strategic benefits were further subdivided into competitive advantage, alignment, and customer-relations benefits. Informational benefits included information access, information quality, and information flexibility subdimensions. Transactional benefits comprised the subdimensions communication efficiency, systems development efficiency, and business efficiency subdimensions.

#### **2.5 IS Balanced Scorecard**

Martinsons, Davisons and Tse (see Martinsons et al. 1999) suggested an adaptation of the Balanced Scorecard (BSC) as developed by Kaplan and Norton (see Kaplan and Norton, 1996). The original BSC is made up of four performance perspectives: the financial perspective, the customer perspective, the internal business process perspective, and the learning and growth perspective. In order to apply it to an IS context, the following four dimensions are proposed: a business-value measurement dimension, a user orientation dimension, an internal-process dimension, and a future-readiness dimension. Specific meas-

ures are related to each dimension. For example, cost control, revenue generation, strategic alignment, and return on investment are among the measures suggested for the business-value dimension.

#### **2.6 Individual impact of information systems**

Torkzadeh and Doll (see Torkzadeh and Doll, 1999) developed a four dimensional, 12-item instrument for measuring the individual impact of IS with the following dimensions:

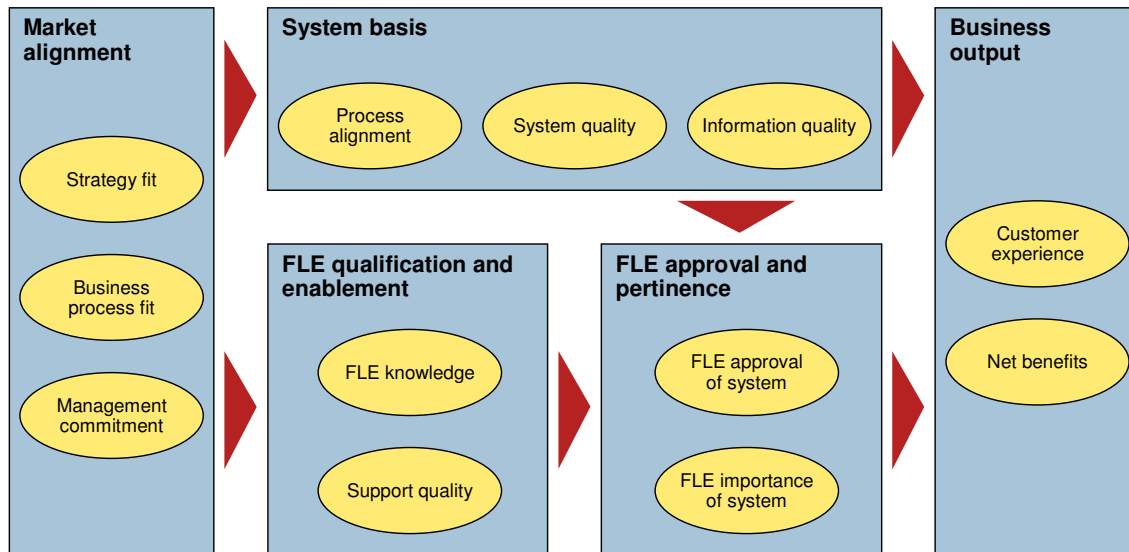
- Task productivity – the extent to which an IS improves the user’s productivity, i.e. the output per unit of time
- Task innovation – the degree to which an IS supports innovation, i.e. helps users to create and try out new approaches
- Customer satisfaction – how the IS helps the user create value for the firm’s internal or external customers and thereby increases customer satisfaction
- Management control – the extent to which the application regulates work processes and monitors performance.

### **3 Development of a tool for measuring effectiveness of information systems**

While many steps towards the development of a stringent model for measuring the usefulness of information system have been taken, the journey is still in progress. This paper presents a model which attempts to exhibit high content validity to practitioners and especially upper management. While the model is applicable to all industries, for the actual questions a special focus has been laid on advisory systems in the banking industry.

Five areas have been identified (see figure 3): Market alignment, system basis, FLE

qualification and enablement, FLE approval and pertinence, and business output.



**Figure 3: Model for measuring advisory system effectiveness (Source: Author)**

*Market alignment* studies if the front-line employee (FLE) feels that the company's strategy, processes, and management are adapt to the market environment. It is divided into three indicators:

- Strategy fit. Based on the customer and market strategy, can the company offer attractive products and services in a competitive environment?
- Business process fit. Are processes and guidelines oriented along customer needs?
- Management commitment. Does upper management consider advisory systems as a powerful means of receiving information for decision making?

*System basis* examines with the help of three indicators whether the advisory system is aligned to the business processes and judges the general quality of the system and of the data stored in it:

- Process alignment. Are the systems integrated and aligned with business processes and customer processes?

- System quality. Do the systems match FLE needs in terms of usability, stability, and adaptability?
- Information quality. Is data and information in the system of high quality?

*FLE qualification and enablement* looks at how qualified and trained the employee is in using the system, and how much support he receives. There are two indicators:

- FLE knowledge. What is the competency level of FLEs in terms of processes, guidelines, and system use?
- Support quality. What is the level of support provided to FLEs through documentation, training, and helpdesk?

*FLE approval and pertinence* describes the satisfaction of the front-line employee with the advisory system and how important the system is for the daily work. Two criteria are examined:

- FLE approval of system. What is the approval rate of the advisory system by the FLEs?

- FLE importance of system. How important is the system for advising customers?
- Net benefits. Does the advisory system help to drive the company's net benefits?

*Business output* scrutinizes the business net benefits and enhanced customer experience attained through using the advisory system. Business output is dissected into two areas:

In the model, every indicator is studied with several questions which are provided in figure 4. As noted before, the questions pertain to the financial services industry.

- Customer experience. Does the advisory system help to increase customer satisfaction?

Area	Indicator	Element	Question / Statement
Business Input	Strategy fit	Product fit to customer needs	The products and services we offer across all channels meet our customers' needs.
		Product fit to competition	Our products and services are most competitive.
		Strategy awareness	I know about our customer and market strategy.
	Business process fit	Process alignment to customer needs	Our procedures and guidelines are aligned with the needs of our customers.
		Process efficacy	Our procedures and guidelines help me with my daily business and to work proactively with my customer.
	Management commitment	Management system vision	My management is committed to provide me with leading-edge tools and systems so that I can perform better.
Management system involvement		My management knows about the issues I have with my tools and systems.	
Management decision information basis		Information I have entered into the systems is taken as a basis for management decisions.	
System Basis	Process alignment	System process guidance	I can rely on the system to guide me in the advisory, sales and service processes
		System integration	The system is integrated. I do not need to call different applications for one business problem.
		Overall system usability	In general, the system is easy-to-use.
	System quality	Overall system availability	The system has no noteworthy down-times.
		Overall system response time	The system response time is - in general - acceptable.
		Overall system adaptability	I can configure the system to meet my personal needs.
		Information quality	Information sufficiency
FLE qualification and enablement	FLE knowledge	Information timeliness and consistency	Critical information in the system is always up-to-date and consistent.
		Information understanding	All displayed information in the system is easy to understand.
		FLE Business understanding	I know about the bank's products, service offerings and the relevant processes, procedures and guidelines.
	Support quality	FLE system proficiency	I know how to use and leverage the system's functionality to provide premier customer experience.
		System documentation	The system documentation is useful in guiding me through the system. It is complete and easy to understand.
		System training	I am receiving sufficient training to confidently handle the system.
FLE approval and pertinence	FLE approval of system	System help desk availability	I can easily contact the help desk
		System help desk readiness	The help desk is able to solve all my system related questions and problems in time.
		FLE system satisfaction	You are very satisfied and happy with the advisory systems?
	FLE importance of system	FLE system communication style	You talk very positively about your advisory systems with colleagues, family and friends?
FLE system behavior		You help and advice other colleagues on using the system more proactively.	
Business Output	Customer experience	FLE system interdependence	Overall, our advisory systems are extremely important for servicing, advising and selling products to the customer
		FLE system indispensability	You would not be able to achieve the same results without using the system
	Net benefits	Observed Customer experience	I feel that the customer is happy with the output and information I extract from the system.
		System support customer satisfaction	I feel that the advisory systems help me to increase customer satisfaction.
		Support in customer acquisition	The advisory systems support me in getting new customers for the bank.
		Cross selling support	The system provides me with useful triggers to contact my customers and recommends which products to offer. Thus I can sell more products to the customer.
		Support level of customer profitability analysis	The advisory systems help me to distinguish between valuable and not so valuable customers.
		Prevention of customer attrition	The advisory systems help me to retain valuable customers.
FLE self governance	The system helps me to manage my time more efficiently.		

Figure 4: Survey questions supporting the model (Source: Author)

Front-line employees are asked to rate these statements on a confirmation scale of 1 to 6 (completely disagree, disagree,

rather disagree, somewhat agree, agree, fully agree).

## 4 Testing the tool

Data were collected from 13 front-line employees in three financial institutions in Germany and Austria in summer 2006. Although statistical significance cannot be derived from a sample of this size, findings (see figure 5) can be logically followed.

- Although the indicators for market alignment show a promising high average, the span of individual answers, and the standard deviation are very high.
- Respondents require the advisory system for their daily work and they seem to be convinced that the advisory system adds to positive customer experience. However, they are more doubtful

when it comes to judging net benefits. This indicator displays only a rating of 'somewhat agree' (4.0) and a rather high standard deviation of 1.1.

- While process alignment of the system is apparently not an issue, the indicator for system quality is rated less with a high standard deviation.

The rather high standard deviation in various indicators asks for a break-down analysis of job related data, such as customer segment, specific business processes, and employee level. However, such an analysis requires more sample data and a concentration on one company only.

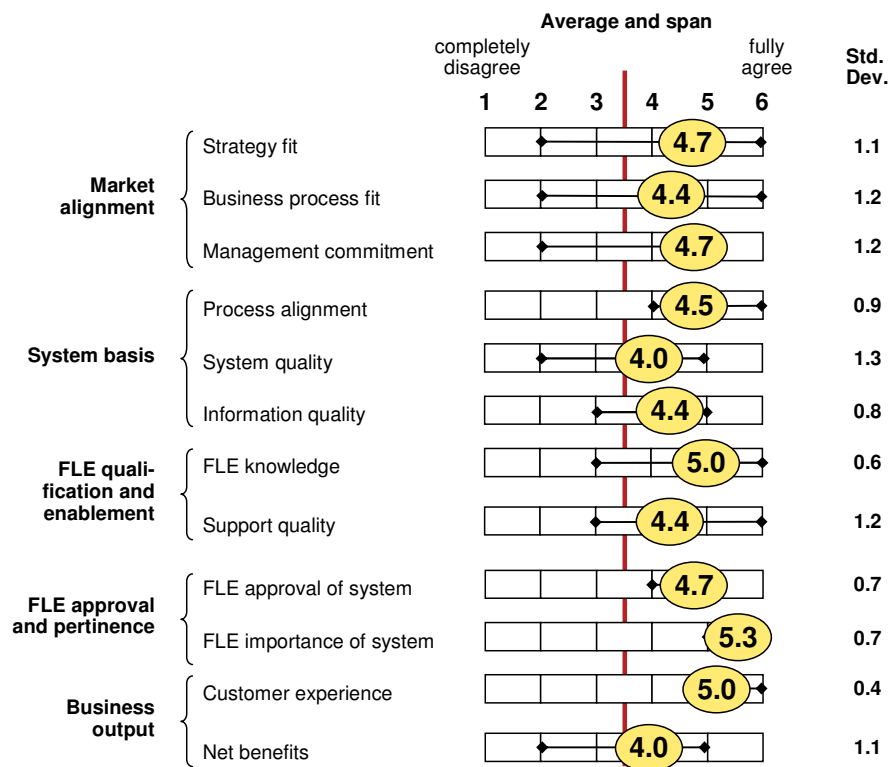


Figure 5: Applying the method to the financial industry (Source: Author)

## 5 Summary and Conclusions

This paper presented a model for measuring the efficacy of a customer advisory system from a front-line employee's perspective. It captures the multidimensional

and interdependent nature of information system success.

While most managers acknowledge the necessity of measuring the effectiveness of customer advisory system, they are often reluctant in conducting a survey. They are

worried about setting expectations to consolidate and enhance the information systems. Future field-study research from outside academics as well as from customer service or marketing managers within a company, need to overcome this perception.

*The author acknowledges the contribution of Holger Junghanns, Senior Consultant with Capgemini, in developing the model described in this paper.*

## Bibliography

- Bailey, J.E., Pearson, S.W.: *Development of a tool for measuring and analyzing computer user satisfaction. Management Science*, 29, 5, pp 530-545, May 1983.
- Bohn, R.E.: *Measuring and managing technological knowledge. Sloan Management Review*, 36(1), pp 61-73, 1994.
- DeLone, W.H., McLean, E.R.: *Information systems success: The quest for the dependent variable. Information Systems Research*, 3, 1, pp 60-95, 1992.
- Doll, W.J., Torkzadeh, G.: *Developing a multidimensional measure of systems use in an organizational context. Information & Management*, 33, 4, pp 171-185, 1998.
- Drucker, P.F.: *The new realities*. New York: Harper & Row, 1989.
- Hochstein, A., Zarnekow, R., Brenner, W.: *Managing IT service quality as perceived by the customer. Proceedings of the ITS 15th Biennial Conference, Berlin, 05th Sep 2004*.
- Kaplan, R.S., Norton, D.P.: *Translating strategy into action: the balanced scorecard*. Boston: Harvard Business School Press, 1996.
- Martinsons, M., Davison, R.R., Tse, D.: *The balanced scorecard: a foundation for the strategic management of information systems. Decision Support Systems*, 25, 1, pp 71-88, 1999.
- Messner, W.: *Customer relationship management technology. A commodity or distinguishing factor? Business Information Review*, Vol. 22(4), pp 253-262, 2005.
- Mirani, R., Lederer, A.L.: *An instrument for assessing the organizational benefits of IS projects. Decision Sciences*, 29, 4, pp 803-838, 1998.
- Parasuraman, A., Zeithaml, V.A., Berry, L.L.: *SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. Journal of Retailing*, Vol. 64, pp 12-40, 1988.
- Seddon, P.B., Yip, S.K.: *An empirical evaluation of user information satisfaction (UIS) measures for use with general ledger accounting software. Journal of Information Systems*, pp 75-92, spring 1992.
- Torkzadeh, G., Doll, W.J.: *The development of a tool for measuring the perceived impact of information technology on work. Omega – The International Journal of Management Science*, 27, 3, pp 327-339, 1999

## Wolfgang Messner Capgemini, Germany

Dr. Wolfgang Messner is a managing consultant with Capgemini in Germany. His focus is on the design of strategic instruments in the area of customer relationship management (CRM), the optimization of business processes, and planning of the underlying information systems. He has a doctorate degree in economics (Dr. rer. pol.) from the University of Kassel

(Germany), an MBA from the University of Wales (UK), and a degree in computing science (Dipl.-Inform.) from the Technical University of Munich (Germany). He is the author of more than twenty contributions to journals, magazines, and books. As visiting faculty he has taught a postgraduate course on CRM at the Indian Institute of Management, Bangalore (IIMB). He can be contacted at:

[wolfgang.messner@capgemini.com](mailto:wolfgang.messner@capgemini.com)