Certification of Information Services

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Abstract

The quality of electronic marketplaces is examined in the present contribution. Six different quality levels are proposed which establish responsibility for different quality criteria. Finally, a discussion is offered of the extent to which certification according to ISO 9000, the certification of information specialists and the development of an index number system are suitable as means for judging electronic market places.

Introduction

The information market is characterized by a broad range of different types and forms of information services, particularly in information brokering. The diversification and individualization of the services offered and the diverse sizes of companies offering information brokering services preclude offering universally applicable recommendations, for example, for the service provision portfolio or for marketing. Thus tradi-

tional management approaches cannot really do justice to the requirements of modern information brokers [Bredemeier 1997].

An important aspect in evaluating information services is their immaterial character, intangibility, instability, individuality and the integration of customers in creating services. The success of information service facilities in competition with other facilities depends less on standard services than on specific value-added services which customers can draw on. Thus the consulting activity for individuals, groups or companies is acquiring increasing value among information services (see also [Meyer 1997, Herget 1995]).

To give customers a sense of trust in the information service provider, the provision of information services must be linked with successful marketing[1]. This is necessary to attract users to information services. The attribute that information is largely a product whose marketing depends on experience and trust makes it difficult to develop a marketing concept. In particular, this is because good information services are considerably more difficult to communicate than, for example, a good haircut or an exceptionally good interest rate for investments. This strong individualization of information products requires a high degree of special competence in providing these services.

A broad spectrum of information services is offered on electronic marketplaces. We will limit our discussion to electronic marketplaces and on this basis discuss first quality levels and second possible evaluation and certification procedures.

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[1] [Kuhlen 1999] deals intensively with the question of trust in the information society.

Quality levels

In the narrower environment of information science, quality criteria are defined less rigorously, which is a consequence of the specific characteristics of information. [Basch 1992] states that, "quality is, like ethics, situational". [Eppler 1998] offers criteria for information quality in regard to oral information, written information, graphic information, multimedia information and criteria for a general information standard. From the user's viewpoint, important criteria have been developed, such as accuracy, comprehensiveness, up-to-dateness, reliability and validity [Fox et al. 1996, Klobas 1995, Taylor 1986]. A comparative study of the development of general criteria for information quality was made by [Barry & Schamber 1998]. [Rieh & Belkin 1998], by contrast, developed, using a survey of searchers in the WWW, seven different quality criteria for evaluation. In an opinion survey of European information specialists from twelve different countries, Wilson asked specialists to rank ten quality criteria for databases which were selected from SCOUG 1990 (see [Basch1990, generalized in Basch 1995]) - [Wilson 1994]. He found the following rank order, based on the significance of the criteria: coverage, accessibility, timeliness, consistency, accuracy, value, documentation, harmonization, output, support. [Huang et al. 1999] name sixteen dimensions of information quality categorized in the groups intrinsic, contextual, representational and accessibility.

Electronic marketplaces offer a general information service for a specialized user group, and a high number of interaction and presentation techniques. To better evaluate such markets, the individual components from which an electronic market is constituted must be used to evaluate the overall quality of the market. The basic functions in general electronic marketplaces are information, presentation, communication and

transaction [Kuhlen 1996a], whereas [Linke 1998], based on [Schmidt 1993], classifies the phases in electronic markets in the categories information, agreement, settlement and after-sales. A more user-oriented view for the evaluation of electronic markets is based on the categories of content, presentation, interaction, system, provider and people. There is a strong relation between content, which becomes information if it is needed and used, and presentation, which describes the way content is offered. In our context, we also speak of marketplaces in the case of offerings which are only intended for the employees of a company, since the most important attributes of electronic marketplaces are also given here [Rittberger 1997]. In particular, the broker role is retained which should offer structuring and orientation aid in the worldwide information space [Kuhlen 1996b].

If we examine information services offered through electronic media, e.g., a company's Intranet marketplace, on the basis of the classification in [Rittberger 1999] we can identify six different quality levels, which describe the different responsibilities for an electronic marketplace:

- The data content available in the electronic information marketplaces: The conventional attributes of online databases are significant at the content level, since a not inconsiderable number of electronic information marketplaces are based on these attribute collections. A major role is thereby played by the scope and coverage, comprehensiveness, currency and timeliness, accuracy and consistency of the content. Besides the information and databases offered by the provider of an electronic information marketplace, the offering is supplemented by a large quantity of data content which is not directly controlled by the providers. These contents are collected and organized by the providers and are not necessarily re-

checked for their accuracy and other quality attributes. The above-named criteria can only be guaranteed for this content domain if the provider chooses to introduce control mechanisms capable of checking the quality of the content. For example, it may suffice to have an indication of whether the content of the external provider is regularly serviced, whether it is up-to-date, etc.

- The presentation level, which describes the stylistic means employed for the presentation of content: Basic design principles [Bertin 1981, Shneiderman 1998, Baecker 1999] should be used in designing user interfaces, e.g., individual pages should not be overloaded, the pages of an electronic marketplace should be set up on the basis of uniform standards; uniform metaphors and easily understood graphic symbols (icons) should be used. Progressive systems should be able to react to user behavior and thereby be able to specifically coordinate and adapt presentation and interaction in the specialized electronic marketplace for users or user-groups.[2]

- The interaction level, with whose aid content can be found by means of navigational exploration or searching: It is of significance for navigation in hypertext structures to have access to suitable navigation aids such as graphic overviews, paths and guided tours which make orientation in the system easier and thus increase effectiveness in navigation. To enhance navigational searches in electronic marketplaces, efficient and effective access to information by means of search and retrieval procedures must be made possible. Retrieval problems in electronic

[2] For example, a metaphor which is accepted in Europe may be unacceptable in Asia.

marketplaces, such as those on the Internet, arise in the resource selection, searching and visualization of retrieved results. Further interactive elements could be discussion forums, bulletin boards or transactions.

- The system in which data content is deposited and with which the hypertext structure is managed: Consistent data management is of enormous importance. The technique of setting up file-based WWW hypertexts, which is often employed, is unacceptable for a professional environment. Changes in the uniform basic design of WWW pages, the management of links and units can no longer be made without appropriate database support. A further essential success factor for an electronic marketplace is based on structuring possibilities typical of hypertext. First, in WWW hypertexts a large collection of information can be arranged and stored on the basis of different criteria or classifications (e.g., alphabetical, chronological, content, geographic). Integration into a hypertext structure based on these classifications is an essential contribution to making the relevant information accessible. Second, every information offering should be multiply integrated in a hypertext to permit access to the information in various contexts. Reaching any information page should require only the minimum number of steps from an entry page. Metrical procedures are suitable to measure these dimensions, in order to determine the density and compactness of a hypertext.

- The provider level, which is responsible for the choice of information and services to be offered on the electronic market. This is where decisions are made about the manner of providing customer service, marketing information, integrating advertising partners and similar matters. Business policy is set on the

provider level, and the importance of success factors for the electronic marketplace is determined there.

- The personal level, which draws on high-value, individualized value-added services, can be provided only by competent, personal efforts by the employees of an information service provider. This type of service is often connected with consulting activities, which require exact knowledge of the subject matter, the client and his environment, and a high level of information science competence.

Standardization plays a particularly important role in quality criteria for electronic information markets. This does not mean uniformity, e.g., of products, but rather consistency in regard to client expectations, e.g., that product services of equal value can be obtained using uniform procedures or that services of equal value will have the same price. In order to create a uniform picture in the product area or in price structures, the distribution of products and communication with customers, it is advisable for the information service provider to introduce quality management.

In the following, we will discuss three aspects of quality management and evaluation. First, the advantages and disadvantages of certification based on ISO 9000 will be presented, and following this an EU project will be described whose aim is to create uniform norms for the qualifications of information service providers in Europe. Finally, a procedure will be discussed for the evaluation of regional electronic marketplaces which was developed at the University of Konstanz.

Certification by ISO 9000

Certification is a "measure performed by an impartial third party which shows that there is suitable confidence that a properly designated event, procedure or a properly

designated service is in accord with a specific norm or other specific normative document"[3] [Pärsch 1994]. If certification is based on the DIN-ISO 9000-Series, it means that an information service provider is certified by an independent bureau to be in compliance with DIN ISO 9001, DIN ISO 9002 or DIN ISO 9003. The certification does not thereby state anything directly about the quality of the information services, but only that quality management has been described in appropriate form, employees have dealt with the topic on all levels and are familiar with audits. It does not state whether employees are really convinced of the desirability of the standards, actually act as described, or that the procedures employed provide what the service promises its customers [Münchrath 1995]. Although just a few years ago certification was not regarded as an especially suitable measure for information service providers, its efficacy is now at least regarded in a differentiated manner. The main advantages and disadvantages can be described as follows:

+ Information service providers can never offer users more than a promise of quality performance. The user must have confidence in the adequacy and quality of the provider's services for meeting his information needs. Certification offers the client a basis for confidence, because it permits a testable, objective evaluation, at least theoretically, of the procedures by which the information service is provided.

+ Certification is also a feature which can be used to attract new customers. In particular, for persons from other industry and service areas who are familiar with the DIN ISO 9000-Series, this aspect could be a criterion which influences the decision as to whether to entrust a task to the certified information service provider.

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[3] Translation MR

+ As long as few information service providers are certified, certification can be used to advantage in advertisements underlining comparisons with non-certified competitors. As soon as certification becomes commonplace, it naturally loses this advantage.

+ Among the many providers of information services, the certified provider stands out not only for new customers, who are negatively affected by the unmanageable extent of the information market, but also for international customers, who do not have available specific culturally-dependent decision criteria. At any rate, with the ISO 9000-Series it is a matter of an international standard which thus provides an objective international criterion.

+ Through the regular monitoring and testing of quality management, there is constant pressure to improve service quality. This can lead to a higher identification of employees with their work and thereby increase employee motivation and satisfaction. But it can also have the opposite effect, if employees regard certification as an added burden and unnecessary pressure.

+ Information service providers often work with other service providers in order to expand and supplement their own service spectrum. Certification can contribute to the confidence needed to begin cooperation, for example, with company or tax consultants, lawyers, software developers and other computer specialists.

+ Certification can be a necessary prerequisite for awarding public contracts. In the European Union the awarding of public contracts for services can, according to EU guideline 92/50EEU, at an estimated value of over 200,000 Euro, be tied to proof of quality management.

- Certification entails high time and personnel investments, as well as financial expenses. These expenditures must be regularly repeated in order to continue to obtain certification in subsequent years.
- Certification is no guarantee that quality management actually functions and produces added value.
- The organization of in-company information service providers is usually characterized by a variety of different tasks which must be managed with a relatively small, heterogeneously trained employee staff. Certification can be counter-productive under these circumstances, since company procedures are thereby strongly regulated.
- In the case of certification according to DIN ISO 9000, it must be noted that this norm cannot be simply transformed into service provider practices. In information services, tasks and products are involved whose value and quality are very difficult to measure. The activities can only be imprecisely specified, and an essential quality factor in the information service domain is employees' competence and experience. Procedural and operating instructions can even be counter-productive. Training and further education are to be regarded more as means of furthering here, in order to improve the provision of information services.

To summarize the discussion, it can be maintained that certification with ISO 9000 is not reasonable for smaller information service providers in particular. In the case of larger providers who produce information products, e.g., databases, certification can be significant for several of the above-named reasons. It should also be considered how the expectation of certification will affect the awarding of public contracts. If

certification should be a necessary condition in regard to the awarding of public contracts, in the mid-term certification will become a 'must' for most information service providers.

Certification of Information Specialists

Starting from the positive and negative effects discussed in the previous section which classical certification of the work process can have, for example with ISO 9000, in this section we describe a possible alternative to this form of certification. Quite diverse requirements arise in the above-named context for the activities of information specialists in their function as information brokers. In many cases these activities are oriented to individual, very specific customer wishes and must be provided by a person who has experience, technical and information-methodical knowledge. Efforts to automate this environment are quite cost intensive. They can only be provided using detailed knowledge and processing the user profile, framework conditions and possibly necessary specialized knowledge. It is only profitable to model this knowledge domain, represent it with suitable formalisms and adapt the user model in the case of domains for which a greater number of customers can be expected. To certify these specialized and individualized activities using process-oriented methods does not appear reasonable. Rather, beside the evaluation of the end product, attention should be paid to estimating the quality of information service providers, to the evaluation and certification of the competencies of the specialists who provide the services.

The University of Konstanz is working on the improvement of a procedure which can be used to certify information specialists and technicians. In the framework of the EU project DECIDoc (Development of Eurocompetencies in Information and Documen-

tation), a unified certification procedure will be developed which can be applied in all participating countries and thereby contributes to the comparability of the information competencies of information specialists of the participating countries. Participating in DECIDoc are not only national information associations of EU member countries (Belgium, Finland, France, Germany, Great Britain, Italy, Portugal, Sweden, Spain), but also of three other European countries (Czech Republic, Rumania, Switzerland). In a first step, preliminary work from various countries was combined and a proposal made for a certification handbook. This handbook is presently being discussed in the individual countries and adapted to national particularities. The professional image which occupies the center of consideration should suffice for searching, producing, distributing, analyzing, synthesizing and evaluating information. An essential aim of these activities is thereby the fulfillment of customer information needs. The competencies to be certified can be classified under the following areas, in which the information specialist should have sufficient knowledge, depending on his or her specialization:

- Information- and documentation-specific knowledge which every information professional must possess and be able to employ in his daily work. This includes the ability to evaluate information need, knowledge of the political, economic and institutional environment in the information industry, inventory management and archiving procedures, formal and substantive search techniques for information units, organization and storage concepts for information collections, information retrieval and information brokering.

- Communication- and information-technical knowledge: oral communication skill, written expression and knowledge of foreign languages, audio-visual com-

munication technique, interpersonal and in-company communication, the ability to employ, implement and operate information technologies and telecommunication techniques.

- Administrative and management knowledge: Office organization, marketing, customer service, acquisition methods, management skills, project management, quality management, human resource management and ability to organize company training programs.
- Additional specialized knowledge from other disciplines which facilitates dealing with e.g. special juridical or historical problems. This competence should not be confused with a double competence which is often also needed in order to connect information-specific knowledge and technical knowledge, for example, knowledge of chemistry needed to solve specialized information problems.

In addition to these four chief categories, the personal qualities of information specialists, such as analytic ability, communication ability, critical ability, curiosity, organizational talent or concentration are also relevant for information professionals. These abilities are, however, no less important for many other professions. In the individual competence areas, four different quality levels are offered which should describe the specific competence of the information specialist in this competency area. The handbook is currently (July 1999) being revised by inducing a broad discussion of information specialists in the professional and scientific environment. The actual certification, which can only be applied for after a certain number of years of professional experience, should guarantee that information specialists have achieved a specific level of competence at a specific point in time. This certification can be regularly

repeated in order to document changes. In addition, it is necessary to evaluate not only the level of training, but also a candidate's professional or project experience. This would be done by an independent supervisory authority within the EU, so that the certification procedure and certified levels will remain transparent for all participating persons and organizations. The actual certification will be carried out in the different countries and should be maximally cost-efficient.

Evaluation of Electronic Marketplaces

A further possibility for quality evaluation of electronic marketplaces consists in external evaluation of the services offered. For the evaluation of technical electronic information marketplaces, an index number system was proposed in [Rittberger 1999] which makes it possible to distinguish among marketplaces on the basis of nineteen main index numbers. In a further study, a more detailed procedure was selected in order to evaluate ten providers of electronic marketplaces in the Lake Constance region. The companies are mainly smaller firms specialized in the Internet area and employing staff of less than ten employees. A semi-standardized interview was held with eight of the ten marketplace providers in order to obtain background information on the different marketplaces and their quality conceptions. The interview was followed by a questionnaire. The marketplace providers had to judge on the basis of a five-step Likert scale for a total of thirty-two quality criteria. In addition, interviewees were asked what the seven most important quality criteria out of the 32 were for them. Both opinion polls showed that the coverage of information needs, the reliability of the information presented, the reliability of the functions offered, accessibility in the Web and the structuring of contents are viewed as particularly important. In order to evalu-

ate the ten regional electronic marketplaces in the Web, an hierarchical, multi-attributive evaluation procedure was employed. An index number system was developed which, based on eighty-four index numbers, permits the evaluation of the selected electronic marketplaces in the areas of information, functionality and technique, communication, social relevance, information handling and external services. Since regional electronic marketplaces address a broad public, different users were defined which are typical of the Lake Constance region. In order to evaluate different requirements from the customer's viewpoint, three types of user with different interests were focused on with the following user profiles:

1. User with general interests: Users chiefly interested in information availability and communication concerning the region. Their interests are in education, cultural life, social contacts, administration information and leisure-entertainment activities.

2. Business-oriented user: Users with chiefly regional business interests. They are interested in job searches, E-commerce, business information and making business contacts.

3. Tourist: External user who seeks information about the region. Above all hotel information, sightseeing, general information about the region, event calendars and English-language information are the chief interests.

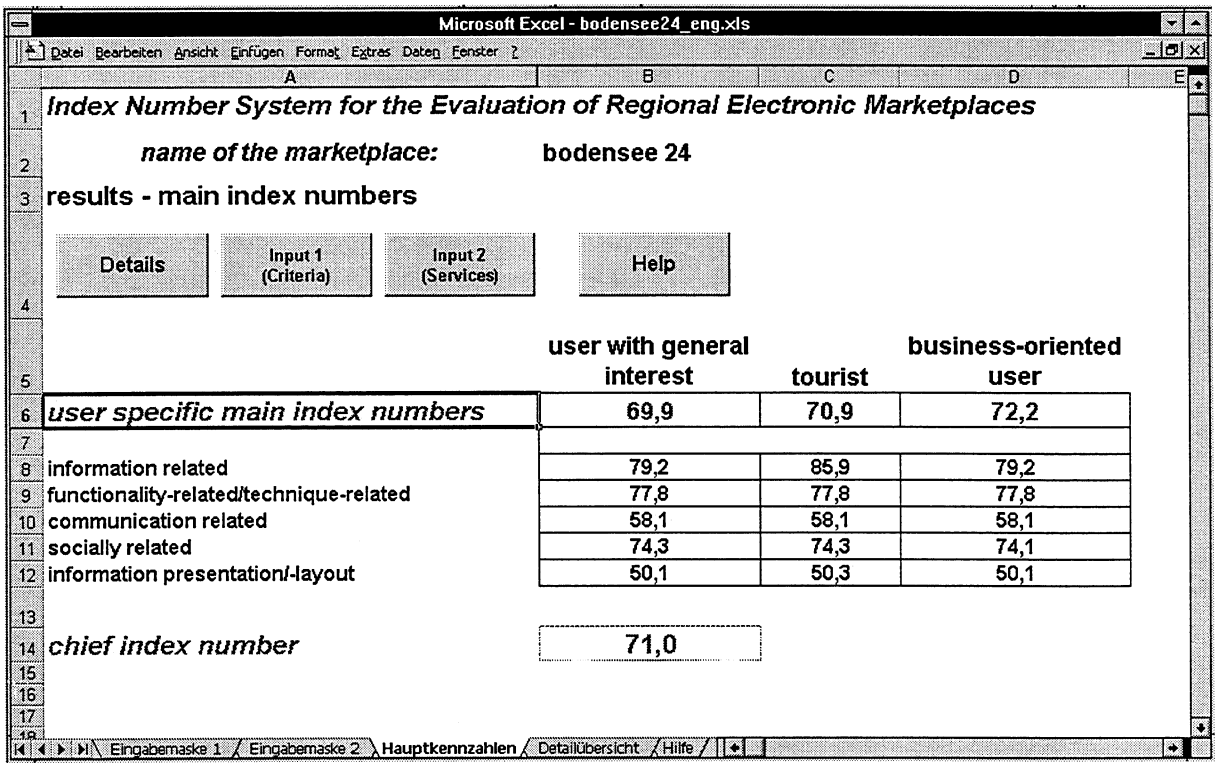

Illustration: The results of the evaluation for the Marktplatz Bodensee24 (www.bodensee24.de)[4] are presented on the basis of main index numbers. By clicking on the 'Detail Overview' button, the individual results can be accessed.

To evaluate the ten marketplaces, a tool was developed with a spreadsheet analysis program which permitts simple handling of the evaluation of the criteria using several input masks. Depending on the user type, the criteria were differently weighted in the index number system. As an example, we can use the main index number of the electronic marketplace Bodensee24 in the illustration. The results for the marketplaces show that the attempt to objectify the evaluation of such marketplaces has succeeded. A detailed, comparable description of the marketplaces can be produced which per-

[4] Bodensee = Lake Constance in German

mits evaluation. It has proved problematic to distinguish the user types. Unfortunately, the differentiation in the weighting did not suffice to be able to make the corresponding distinctions. Thus there were also noteworthy index numbers for the user types 'business subject' and 'generally interested' in the case of electronic marketplaces which clearly address a target group from the tourist area. Also very problematic is weighting the quality of the contents and their completeness, whose influence on the evaluation of a customer is disputed, however.

Conclusion

Using the example of electronic marketplaces, possible evaluation procedures were discussed. The problems connected with information service provision require great attention due to the particular factors and criteria which characterize information services and the service providers active in this field. Successful planning and realization of quality criteria are essential success factors for companies. The responsibility for successful implementation of these criteria in the course of quality management should be sought in the responsibility of the different quality levels. Whether certification is advisable after the successful introduction of quality management depends for information service providers on a variety of factors. In particular, in the case of smaller companies essentially pursuing information brokering activities, certification with ISO 9000 currently still appears inadvisable. For this target group certification of information specialists can be relevant, as is foreseen in the framework of the DECI-Doc project. As a third possibility, an index number system was presented to evaluate electronic marketplaces. A comparative study of the performance of different marketplaces can be effectively performed using the described procedures in the sense of

benchmarking. Since comparable studies in this area are largely lacking and the results of evaluations of the quality of information service providers are still limited, the interpretation of the results is difficult.

Literature

[Baecker 1999] R. M. Baecker. Readings in human-computer interaction. Toward the year 2000. Kaufmann: San Francisco, CA, 2nd ed., 1999.

[Barry & Schamber 1998] C.L. Barry / L. Schamber. Users' criteria for relevance evaluation: a cross-situational comparison. In: Information Processing & Management (34)2-3, 219-236, 1998.

[Basch 1990] R. Basch. Measuring the quality of the data: report on the fourth annual SCOUG Retreat. In: Database Searcher October, 18-23, 1990.

[Basch 1992] R. Basch. Decision points for databases. In: Database August, 46-50, 1992.

[Basch 1995] R. Basch. An overview of quality and value in information service. Introduction, 1-10, Gower Publishing: England, 1995. In: Electronic Information Delivery, 1995.

[Bertin 1981] J. Bertin. Graphics and graphic information-processing. De Gruyter: Berlin, 1981.

[Bredemeier 1997] W. Bredemeier. "Muddling Through" als optimale Strategie für Informationsvermittlungsstellen. In: Strategisches Informationsmanagement. Proceedings der 9. Internationalen Fachkonferenz der Deutschen Gesellschaft für

Dokumentation e.V. (DGD), 29-42, Universitätsverlag Konstanz, 29, Schriften zur Informationswissenschaft, 1997.

[Eppler 1998] M. Eppler. Informative Action. Chapter: quality information standards, Geneva: University of Geneva, 1998.

[Fox et al. 1996] C. Fox / A. Levitin / T.C. Redman. Data and data quality. Supplement 20, 110-122, Marcel Dekker: New York, 57 1996. In: Encyclopedia of Library and Information Science, 1996.

[Herget 1995] J. Herget. New Trends in Information Brokerage in Germany. An overview of the German information market. In: Information Services & Use (15)3, 137-145, 1995.

[Huang et al. 1999] K.-T. Huang / Y. W. Lee / R. Y. Wang. Quality information and knowledge. Prentice Hall: Englewood Cliffs, NJ, 1999.

[Klobas 1995] J.E. Klobas. Beyond information quality: fitness for purpose and electronic information resource use. In: Journal for Information Science (21)2, 95-114, 1995.

[Kuhlen 1996a] R. Kuhlen. Elektronische Märkte in der Informationsgesellschaft oder: die Informationsgesellschaft als elektronischer Markt. Deutscher Multimedia Kongreß '96, In: Perspektiven multimedialer Kommunikation, 43-48, Springer: Berlin, 1996.

[Kuhlen 1996b] R. Kuhlen. Globale, regionale elektronische Marktplätze. Forum und Markt. Proceedings des 5. Internationalen Symposiums für Informationswissenschaft (ISI '96), In: Herausforderungen an die Informationswirtschaft. Informationsverdichtung, Informationsbewertung und Datenvisualisierung, 313-322,

Universitätsverlag Konstanz: Konstanz, Schriften zur Informationswissenschaft 27, 1996.

[Kuhlen 1999] R. Kuhlen. Die Konsequenzen von Informationsassistenten. Was bedeutet informationelle Autonomie oder wie kann Vertrauen in elektronische Dienste in offenen Informationsmärkten gesichert werden? To be published by Suhrkamp: Frankfurt am Main, suhrkamp taschenbuch wissenschaft, 1999.

[Lincke 1998] D.-M. Lincke. Evaluating integrated electronic commerce systems. In: Electronic Markets (8)1, 7-11, 1998.

[Meyer 1997] R.H. Meyer. Erfolgreiches internes Marketing einer innerbetrieblichen IVS im Rahmen eines integrierten Konzepts dargestellt am Beispiel der "Zentralen Marktforschung" der Bayer AG. In: Strategisches Informationsmanagement. Proceedings der 9. Internationalen Fachkonferenz der Deutschen Gesellschaft für Dokumentation e.V. (DGD), 84-94, Universitätsverlag Konstanz: 29 Schriften zur Informationswissenschaft, 1997.

[Münchrath 1995] R. Münchrath. Qualitätsmanagement in Verkauf und Service: kundenorientierte Dienstleistungen nach DIN EN ISO 9000. Campus-Verlag: Frankfurt am Main, 1995.

[Pärsch 1994] J.G. Pärsch. Zertifizierung von Qualitätsmanagementsystemen. 949-958, Hanser: Munich, 1994. In: Handbuch Qualitätsmanagement, 1994.

[Rieh & Belkin 1998] S.Y. Rieh / N. Belkin. Understanding judgement of information quality and cognitive authority in WWW. In: ASIS '98 Information access in the global information economy. Proceedings of the 61st ASIS Annual Meeting of the

American Society of Information Science, 279-289, Information Today: Medford, NJ, 1998.

[Rittberger 1997] M. Rittberger. Gestaltungsoptionen für die Fachinformation durch neue elektronische Mehrwertdienste. In: Strategisches Informationsmanagement. Proceedings der 9. Internationalen Fachkonferenz der Deutschen Gesellschaft für Dokumentation e.V. (DGD), 109-120, Universitätsverlag Konstanz: Konstanz, 29 Schriften zur Informationswissenschaft 1997.

[Rittberger 1999] M. Rittberger. Quality measuring with respect to electronic information markets and particularly online databases. To be published in Encyclopedia of Library and Information Science, Marcel Dekker: New York, NY, 1999.

[Schmid 1993] B. Schmid. Elektronische Märkte. In: Wirtschaftsinformatik (35)5, 465-480, 1993.

[Shneiderman 1998] B. Shneiderman. Designing the user interface. Strategies for effective human-computer interaction. Addison-Wesley: Reading, MA, 3rd ed., 1998.

[Taylor 1986] R.S. Taylor. Value-added processes in information systems. Ablex: Norwood, NJ, 1986.

[Wilson 1994] T. Wilson. EQUIP: A European survey of quality criteria for the evaluation of databases: report on the questionnaire survey. European quality management programme for the information sector, 1994.