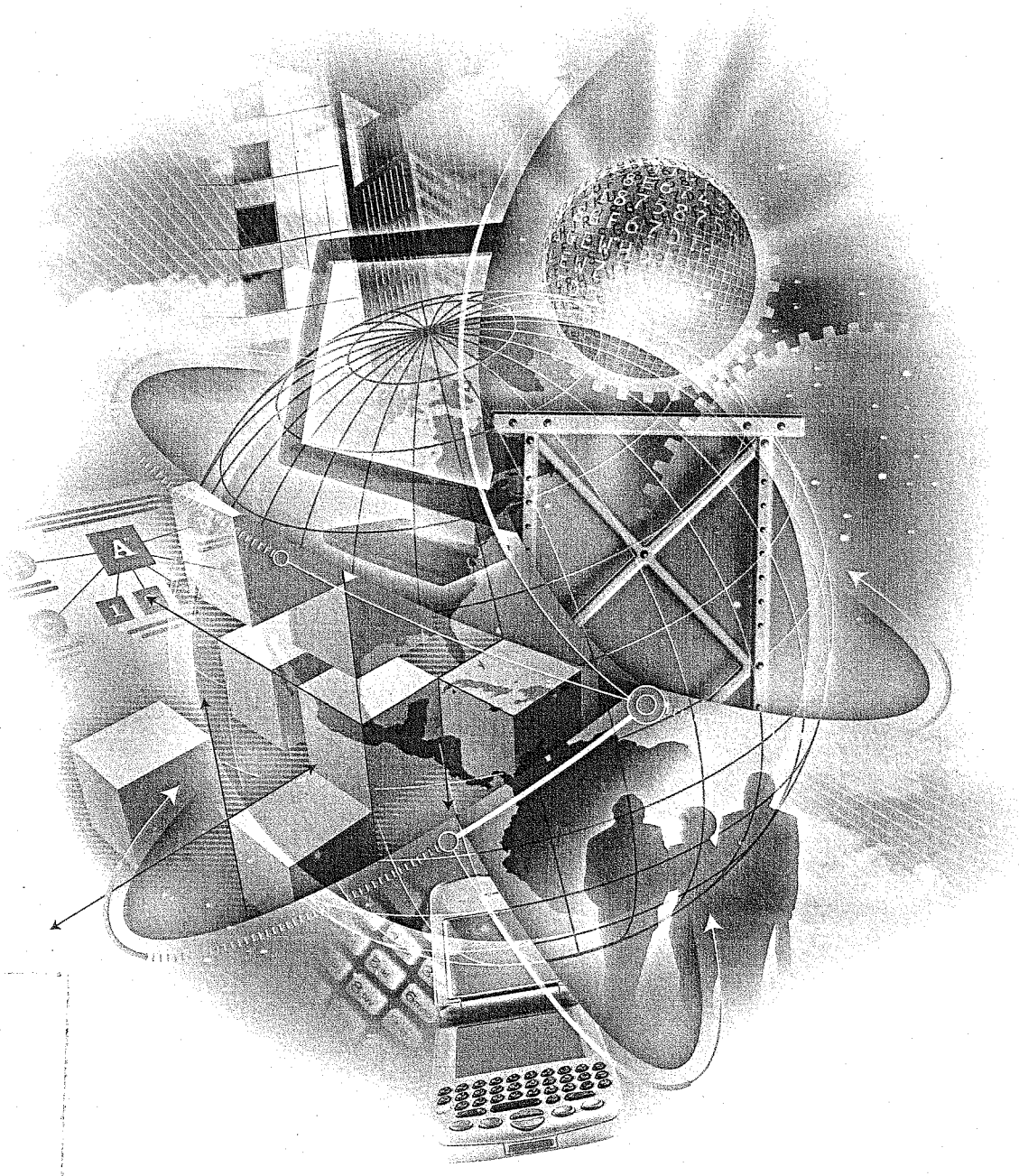


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NINTH EDITION

MANAGEMENT INFORMATION SYSTEMS

MANAGING THE DIGITAL FIRM



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KENNETH C. LAUDON • JANE P. LAUDON

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Management Information Systems

MANAGING THE DIGITAL FIRM

NINTH EDITION

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For Erica and Elisabeth

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Preface

Management Information Systems: Managing the Digital Firm, Ninth Edition, is based on the premise that information systems knowledge is essential for creating successful, competitive firms, managing global corporations, adding business value, and providing useful products and services to customers.

One of the central questions facing managers today is how to optimize their firms' returns on their information systems investments. In the United States alone, capital expenditures for computing and telecommunications equipment and services will amount to an estimated \$1.8 trillion in 2005. Accordingly, one central focus of this book is to help managers make better decisions about technology and to achieve the maximum value from their information technology investments. We do this in part by describing how contemporary real-world managers and firms make these decisions, and in part by providing you with analytic concepts that you will find useful in making decisions in the future. This book provides an introduction to management information systems (MIS) that undergraduate and MBA students will find vital to their professional success regardless of their major area or concentration.

DIGITAL INTEGRATION OF THE ENTERPRISE: THE EMERGING DIGITAL FIRM

A continuing stream of information technology innovations, from the Internet to wireless networks to digital phone and cable systems, is continuing to transform the business world. This continuing stream of innovations is enabling entrepreneurs and innovative traditional firms to create new business models, destroy old business models, disrupt entire industries, build new business processes, and transform the day-to-day conduct of business.

Briefly, the growth of the Internet, the globalization of trade, and the rise of information economies have raised the importance of information technologies and systems in business and management. It is essential that business students understand how information technologies are changing business firms and markets today and how they will likely change in the near-term future as digital technologies continue to evolve.

For example, companies are relying on Internet and networking technology to conduct more of their work electronically, seamlessly linking factories, offices, and sales forces around the globe. Leading-edge firms, such as Cisco Systems, Dell Computer, and Procter & Gamble, are extending these networks to suppliers, customers, and other groups outside the organization so they can react instantly to customer demands and market shifts. Cisco Systems corporate managers can use information systems to "virtually close" their books at any time, generating consolidated financial statements based on up-to-the-minute figures on orders, discounts, revenue, product margins, and staffing expenses. Executives can constantly analyze performance at all levels of the organization. This digital integration both within the firm and without, from the warehouse to the executive suite, from suppliers to customers, is changing how we organize and manage a business firm.

Ultimately, these changes are leading to fully digital firms where all internal business processes and relationships with customers and suppliers are digitally enabled. In digital firms, information to support business decisions is available anytime and anywhere in the organization. Accordingly, we have changed the subtitle of this text to *Managing the Digital Firm*.

Auckland (New Zealand) campus. His primary research areas are information management, electronic commerce strategy, and ubiquitous computing. He has published widely, most recently as co-author of *Electronic Commerce 2004: A Managerial Perspective*.

CASE STUDY QUESTIONS

1. Describe the NZ Health Board and the environment in which it operates. Why did it need a new enterprise system?

2. Discuss the pros and the cons of selecting Oracle11i ERP applications and Windows NT for the operating system for the Health Board's new enterprise system.
3. Why were there performance problems with the new system? What management, technology, and organizational factors were involved?
4. What should James Keen do to solve these problems so that the new enterprise system is successful?

INTERNATIONAL CASE STUDY

CASE STUDY 2:

A Knowledge Platform for the Customer Contact Center of Union Investment

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"Can you help me?"

"Hello, could you please tell me why the stock price of my bond fund dropped so steeply on November 23rd?" asks Mrs. Jones, customer of Union Investment. "Sure, Mrs. Jones, but it will take a few minutes. Can I call you back?" answers the Customer Contact Center (CCC) agent. She first checks out which funds the customer has in her account using a host application. Then she looks up information about the fund in a brochure on her desk. She figures out the solution of the enquiry and calls Mrs. Jones back. This is a typical customer enquiry of which Union Investment has to answer over 4,000 each day.

Founded in 1956, Union Investment is the third-largest German mutual fund company with assets exceeding USD 100 billion as of 2002. Union Investment offers public funds as well as restricted funds. The range of public funds encompasses equity funds, fixed income funds, money market funds, and mixed securities and property funds as well as open property funds. These products are distributed exclusively via partners in Germany in a co-operative of banks called the "Finanzverbund". The Finanzverbund consists of mostly medium-sized banks like the Sparda Bank or the Volks- und Raiffeisenbanken, which pool some of their resources in back-end processes but are otherwise independent of each other.

Besides investment funds, Union Investment also offers services concerning the administration of deposits for more than 3.5 million customers across Europe. Union Investment has its headquarters in Frankfurt, Germany. It also has affiliates and branch offices in Germany, Luxembourg, Switzerland, Spain, Italy, and Poland.¹

Up to the late 1990s, Union Investment only provided customer service to bank representatives and had no dedicated service department. Rather, some employees from the department "Product Information" were available by phone for bank representatives and handled this traffic besides their regular jobs. With the booming stock markets of the

¹Further information about the company can be obtained at <http://www.union-investment.de>.

late 1990s, however, Union Investment experienced significant growth in the number of customers and deposits. As a consequence, the old structure couldn't cope with the increased volume of inquiries anymore. Management therefore decided to reorganize the company in 1999, not only to improve communication to banking representatives, but also to allow customers to contact Union Investment directly.

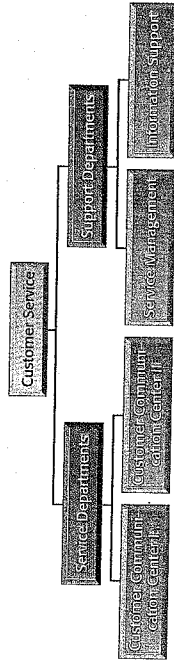
CUSTOMER SERVICE AT UNION INVESTMENT

The Customer Communication Center (CCC)—Interface to the Customer

Union Investment aims at sustaining its competitive position by providing high-value customer service as well as attractive financial products of all sorts. Customers typically have a long-term financial portfolio strategy and quite different levels of financial markets expertise. Therefore, they not only expect a broad spectrum of products and services that fit their investment strategies, but also superior service. This service demand exists regardless of whether the customers turn to their local bank representatives or contact Union Investment directly as their mutual funds specialist.

To achieve a high level of service without sacrificing economies of scale, the organization has been separated into two major units since the reorganization in 1999. One is concerned with the efficient execution of transactions ordered via the bank representatives while the other, the Customer Service unit, is concerned with providing superior service in the interaction with customers. Retail-customers can call Union Investment directly to resolve problems with their existing portfolio as well as to demand information on specialized products of Union Investment. The Customer

FIGURE 1 Organizational structure of customer service at Union Investment



Service unit consists of the Customer Communication Center (CCC), which processes all customer communication and the supporting departments "Service Management" and "Information Support" (cf. Figure 1). In the beginning, the unit was made up mainly of employees of the former "product information" department.

It is the Customer Service unit that is responsible for applying concepts of *Customer Relationship Management (CRM)* in order to increase customer focus and strengthen the competitive position of the company. As a consequence, it is of significant strategic importance. This especially applies to the CCC, which serves as the only interface to the customers of Union Investment. The communication consists primarily of over one million inbound telephone calls a year. Furthermore, the CCC has to manage increasing numbers of enquiries via other channels such as fax, email, or letter. The services of the CCC consist of the provision of solutions for customers having problems or requiring information on their status and past transactions.

The CCC I consists of 80 employees who cover the first level of customer support. The 40 employees of the CCC II cover the second level of support with more complex topics

and process enquiries in the form of emails, letters, and faxes (about 6,000 a month). Most of the 90,000 monthly calls are received on the first level and can be escalated to the CCC II if necessary. Banking representatives may contact the second level directly with questions concerning specific topics. Service Management deals with reporting issues, complaint management and process design as well as application support to the CCC. Information Support provides knowledge to the CCC and resolves questions that agents can not resolve by themselves.

The CCC attempts to increase customer satisfaction by resolving as many enquiries as possible within the first contact (first call resolution rate), making it unnecessary for the customer to call again. If enquiries are resolved immediately, efficient means of escalation are used to reduce overall cycle time. This means that the required expertise needs to be located very quickly if the agent cannot answer the request herself. Keeping the service level constant is quite challenging as the call volume varies significantly during the day but also between different times of the year (cf. Figure 2, Figure 3). The high level of skills of the agents is helpful as each one can rapidly process questions concerning a wide

FIGURE 2 CCC daily call volume in 2002

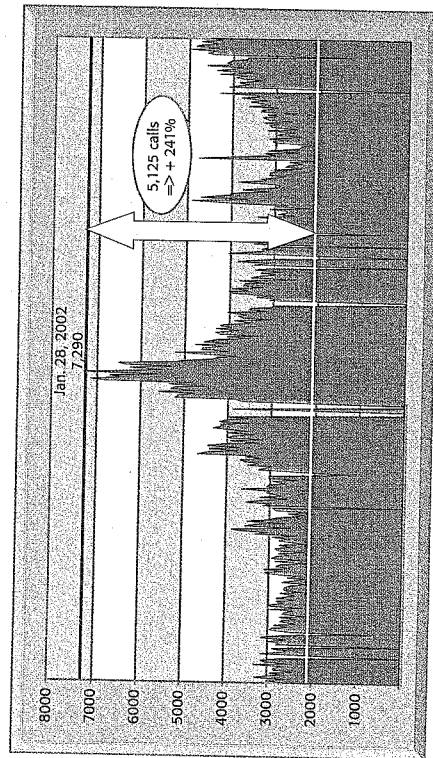
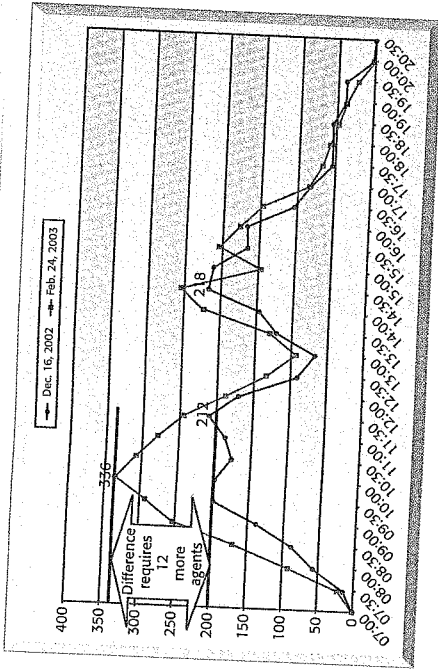


FIGURE 3 CCC spread of call volume/half hour during the day

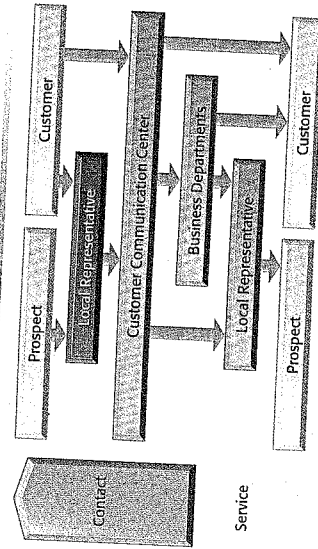


array of topics, making a first call resolution more probable. However, this high skill level needs to be constantly renewed by training measures. Ideally, these training measures are offered electronically to enable agents to study them in off-peak hours. This way, agents who are not busy can still use their time productively and generate benefits to Union Investment by better serving customers later due to their improved skill level.

Figure 4 illustrates the role of the CCC as a communication interface. Prospects or customers either get in touch personally or pose their enquiries to the representative of the local bank who forwards them to the CCC, usually by telephone. Upon an enquiry, there are three possibilities for the CCC agent to answer:

1. If the request can be handled by the agent solely based on her expertise, she can directly respond to the customer, thereby not requiring any further information sources.
2. If the agent is unable to resolve the issue without further information resources, she can try to find the answer in "real-time" in the Web-based knowledge platform "HelpMe", in her email-file, or by escalating the call to a known expert within the CCC who is likely to know the answer. As in the previous case, the customer's issue is resolved instantly.
3. If the needed information cannot be retrieved in "real-time", the agent can engage in further research in "HelpMe." It not only offers short answers, but also information in the form of cases or background stories, which serve as training measures to further deepen one's expertise. If the needed information cannot be found there, the agents have the possibility

FIGURE 4 Communication between Union Investment and its customers



of calling the Information Support team, which will deliver the needed information. If necessary, the Information Support team contacts members of other parts of the organization, thereby serving as an interface between the CCC and the rest of the company. Once the answer is determined, it is forwarded directly to the requesting agent and included in "HelpMe" so that it can be accessed by the other agents. Finally, the agent forwards the answer to the customer or bank representative by phone or (e)mail.

Prior to the project described here, new information was usually sent first by email to deliver it as quickly as possible and create awareness for the news. In a second step, Information Support also published the information to "HelpMe" where it was available on demand. Therefore, CCC agents had two platforms from which to choose. This resulted in email becoming the preferred channel due to better functionality. For one, a full-text search could be applied to the email-file, which was not available in "HelpMe". And just as important was the ability to completely customize the information structure within the email file for faster retrieval. This made it more difficult for a central information repository to gain acceptance. When using email, however, each agent had a different level of information accessible depending on the time spent on the job. New agents started with no information and only developed their own collection slowly.

Supporting the Customer Communication Center with Knowledge

The CCC agents all have a banking background and can be considered highly qualified. Nevertheless, they still need an effective information system to supply them with the required relevant, credible, and timely information. Before the 1999 reorganization, only a small number of employees were involved in answering phone enquiries. They all knew each other and were also aware of where to find information that was stored in disparate locations. But with the experienced explosive growth, management of Customer Service realized that this need required an extra department and created Information Support in 2001. Most of the members of Information Support were initially recruited from the CCC. Its scope of responsibility is essentially knowledge management and training within the Customer Service unit:

1. To provide information of all kinds to the CCC.
2. To resolve enquiries which require information from other departments within Union Investment.
3. To evaluate and process knowledge from the customers in order to enable the organization to improve its processes.

Information Support consists of seven employees who are responsible for creating, editing, and publishing all content

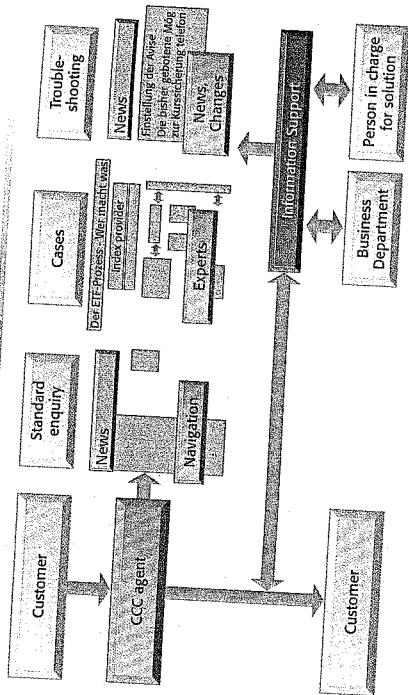
(or information) available to the CCC. Usually, this content is forwarded from other departments to Information Support, where it needs to be reformatted. Upon urgent requests from the CCC, Information Support researches information specifically for that case. Such information is directly passed on to the requesting agent and later published in "HelpMe". As the CCC forms the communication interface between Union Investment and its customers, Information Support forms the communication interface between the CCC and other parts of the organization.

To provide the needed information to the agents of the CCC, the users of the knowledge platform "HelpMe", there needs to be supporting processes in place in the form of editorial and administrative processes. The administrative process is concerned with maintaining the technical infrastructure. Prior to the project, it encompassed such tasks as the manual administration of the navigational structure of the platform and the manual check of consistency concerning hyperlinks between different pieces of content.

The editorial process for Content Management for the CCC consisted of creating, formatting, publishing, modifying and deleting relevant content. These elements were designed as follows:

- **Content Creation and Formatting** Although most of the required content already existed in written and electronic form in the organization, it was edited to meet the needs of the CCC agents. This was done in Microsoft Office applications, which are the familiar working environments of the editors in the Information Support team. In a second step, all content was converted into the HTML-format (Hypertext Markup Language). For this, the editors used a special HTML-tool. Since they were not Web technology experts, they had to acquire deep insights into HTML first. The manual formatting and converting was a laborious process, especially for spreadsheets and tables. For emails, the documents were sent as Office files without any conversion.
- **Content Publication** The publication process did not require any further approval. The editor could save the content to the appropriate folder of the file-server in "HelpMe". In a second step, the new content was inserted into the navigational structure.
- **Content Modification** Modifications were carried out either in the HTML-tool or in the Office application, depending on the degree of revision necessary. New versions of content could not just be inserted into the old ones because there was no separation of content and layout. When a new version of a spreadsheet needed to be published, it was converted as if it were a new document.
- **Content Deletion** Outdated content was removed from the platform by deleting the file and manually adapting the navigational structure.

FIGURE 5 Support of the service process at Union Investment



Information Systems Supporting Content Management for the CCC

With the creation of the Information Support department, management realized that adequate information systems would be crucial to support the knowledge flow to the CCC. Concerning the realization of Content Management Systems, a company-wide project was to provide a solution for different areas such as the intranet, the extranet and also the CCC knowledge platform. With this project in its early phase, all other developments on a departmental level were suspended. Yet, due to several organizational issues and rising pressure to reduce costs, the company-wide project was never completed. Since the problem of explosive growth in call volumes and CCC agents still persisted, Information Support decided to set up its own knowledge platform with very limited funds which became "HelpMe". As a consequence, this project did not have an official project status and because the IT department was not involved, they would not provide support in any way for this new solution.

"HelpMe" is a Web-based Content Management System (CMS) to deliver information to the agents in the CCC. This system provides opportunities for discovering information (navigation) as well as experts in certain topics (so-called yellow pages). Furthermore, it creates awareness for new items and changes in existing content by highlighting these at prominent positions on the platform (Figure 5). As a consequence, "HelpMe" is an important part of the service process at Union Investment.

Technically, "HelpMe" originally consisted of HTML-files stored on a local fileserver. From there, they could be retrieved with a standard Web-browser. In order to create and manage the navigational structure that linked those pages, a tool based on Microsoft Access was developed in-house. The HTML file corresponding to the navigational structure was recreated with this tool each time a document

was inserted, moved, or deleted. Furthermore, hyperlinks between the different documents had to be checked manually with each deletion or revision of existing content. In contrast to the email files, there was no search function available in "HelpMe". This hampered retrieval, especially because the navigational structure had grown historically and was difficult to understand. Security and user management did not have to be specifically administered for "HelpMe" as the system was based solely on a file-server to which everyone in the CCC had access. As a consequence though, it was not possible to restrict access to certain areas or to personalize content, for example by CCC-level.

The platform had been programmed by a single employee of the Customer Service unit who had left the organization when the redesign took place without leaving any documentation. Besides being published in "HelpMe", new information was always sent via email as well. These emails often including attachments of up to ten megabytes in size were sent to all CCC agents. This caused storage problems on one hand, as email files of all agents constantly grew and also caused significant traffic, which put a strain on network bandwidth.

IMPROVING KNOWLEDGE FLOW—THE REDESIGNING OF "HELPMÉ"

Why "HelpMe" Needed to Be Redesigned

While solving the challenge of providing the CCC with knowledge for the customer to some extent, the original version of "HelpMe" required some improvements which would significantly increase usability and efficiency of the content management processes. So the Head of Information

How "HelpMe" Was Redesigned

Support decided to launch a project to address these challenges of improving usability and retrieval in "HelpMe" as well as to streamline the costly content management processes. The project kick-off was in the summer of 2001. To improve the prior solution, the project team wanted to introduce a new technical infrastructure based on a standard software product which was implemented together with a conceptual redesign of "HelpMe". Since there were no experts in the field of knowledge management in the organization, some external consultants took part in the project to a lesser extent. For the most part, however, the members of Information Support gained expertise about knowledge management by themselves in the course of this project.

The redesign addressed the issue of complex structure by providing a new navigational structure based on the terminology of the CCC agents and implementing a search function. By concentrating the knowledge flow on the channel "HelpMe", redundancies to email were eliminated. For the editors and administrators, the redesign aimed at reducing the costs and time needed for the costly content management processes. The new system was to simplify conversion, publication and revision of existing content and provide tools to better manage the navigational structure in "HelpMe".

At the same time, budgetary and organizational constraints needed to be complied with, which meant that the software being selected should be one that was already used in-house, thereby reducing costs and integration efforts. By concentrating on the knowledge platform, the network infrastructure of Union Investment would also be relieved of a significant amount of traffic caused by emails with particularly large file attachments.

To evaluate whether the goals had been achieved, the team proposed a system of performance indicators based on the user, editor, and administrator processes. This allowed an analysis of the changes achieved at the level of the CCC agents as well as the editors in Information Support. The most important criteria were high system performance to make content available quickly as well as high quality of content.

To properly align the new CMS to the processes it was to support, the project team started with a *process analysis*. After the project was delayed for several months, the project team met for a two-day workshop in late January 2002 to analyze the processes of the users, editors and administrators in using "HelpMe". During this workshop, the team also spent some time in the CCC, observing agents doing their work and checking on how they use the different information sources. Figure 6 shows how the different user processes can be supported by "HelpMe".

The process analysis was the foundation for deriving the requirements of the new technical solution in a *requirements analysis*. Each requirement was weighted to be "optional", "important" or "critical", depending on significance. Using metrics for each requirement, the team determined if the evaluated software solutions fulfilled these adequately, extensively or not at all. By aggregating the 29 requirements in a benefit analysis, the different products could be compared. For the comparison, points were assigned to the weights (1 point for optional, 5 points for important, 10 points for critical) and to the fulfillment of criteria (1 for "adequately fulfilled", 2 for "extensively fulfilled", 0 for "not fulfilled"). Figure 7 shows a snapshot of the benefit analysis for the part of the user processes. To avoid selecting a product which required extensive and costly customizing in order to fulfill the requirements, the project team created a benefit analysis for an "out-of-the-box" and a "customizing" scenario.

Besides the requirements analysis, members of the project team were also able to use a live system based on the evaluated products. This proved whether the products could live up to their promises and enabled the simulation of a typical working scenario. Within the simulation some additional factors came up which the team simply hadn't considered when doing the requirements analysis.

Because of the limited budget, only those products would be evaluated that were already in use in other parts of Union

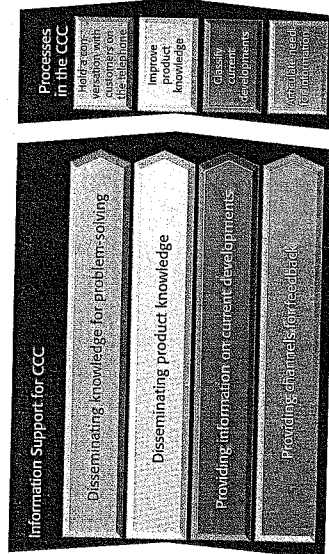


FIGURE 6 User processes are the basis for "HelpMe"

FIGURE 7 Snapshot of the benefit analysis "Out-of-the-box"

No.	Requirement	Importance	Arago DocMe	Pronet Pirobase	Lotus Quickplace
Requirements based on processes of users					
1	High system performance				
2	Structured navigation	critical	10	10	20
3	Sitemap (Overview of structure of HelpMe)	critical	10	20	10
4	High-capacity search	important	5	5	0
5	What's new functionality	critical	0	10	0
6	Consolidated display of relevant content with possibility to delve into details	critical	0	0	0
7	...	critical	10	10	10

Investment. The first system was Arago DocMe, a CMS which mainly focuses on supporting the editor in publishing information and administering the navigational structure, while not integrating its own Web server and therefore not providing any functions to manage users or restrict access to the content via a Web browser. DocMe was already used to manage the extranet and the Internet Website of Union Investment. The second system was Pronet Pirobase. It too was already in use in the organization at a newly acquired subsidiary. It is a typical Web content management system, meaning that it integrates the back-end for the editors and the Web server that controls access for the users via a Web browser. The third product was Lotus Quickplace of IBM. It was recommended by the external consultants as it focuses on managing rather small amounts of content for users engaged in a common project and is easy to implement. This product, however, was not in use at Union Investment yet and would have caused significant costs since the IT outsourcing of Union Investment did not have the expertise required for running this application yet.

Since the benefit analysis yielded very close results, some *Knock Out-criteria* were developed to better differentiate the products. A product that would not fulfill all these criteria would be ruled out immediately. Examples for these criteria were a reliable search function, no limit of the size of documents or the securing of integrity in hyperlinks within the CMS.

With the *requirements analysis* and the *K.O.-criteria* to back up the decision, as well as the financial restrictions and the integration aspect, the Union Investment team members chose Arago DocMe.

To ensure that the requirements were implemented adequately, the project team developed a *system design draft* based on the selected software that described in detail how the requirements were to be implemented. This document also served as a basis for the communication with the software supplier, Arago.

Besides selecting and customizing the software, the structure of the content needed to be determined to fit the preferences of the users when navigating. The project team developed a consistent three-level *navigational structure* that

defines the most relevant business terms in a way they are understood within the organization.

With the use of templates, the 39,000 documents already present in "HelpMe" were migrated to the new structure. In parallel, the project team created the documentation of the customized settings in "HelpMe" and provided training sessions for users and editors to ensure a smooth transition.

The project lasted for about one year. One important reason for this relatively long project duration was the fact that the team was not fully dedicated to the project.

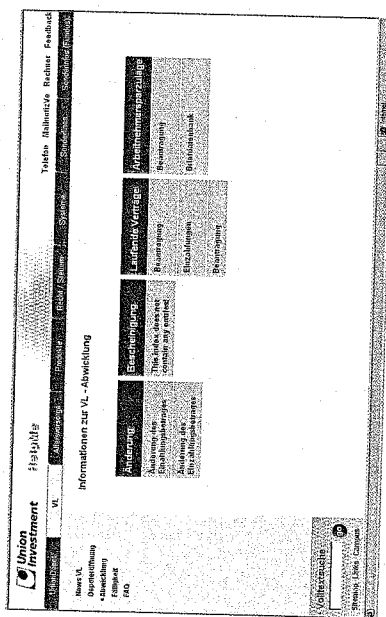
HOW THE NEW "HELPME" CHANGED BUSINESS AND SUPPORT PROCESSES

The goal of the new "HelpMe" was to ease the work of CCC agents and thereby enable increased performance. This was achieved by reducing cycle times necessary for the editors to publish information and facilitating access and retrieval.

The *user process* of the CCC agent is now better supported through improvements in search and navigation. The revised navigational structure facilitates the use of "HelpMe". It consists of three levels, of which the first level can always be accessed on the top bar and the others on the left side, depending on the context (Figure 8). It helps the user find information where she assumes it can be found. If she cannot find the needed information in the navigational structure, the new search function offers an alternative to retrieve it quickly, for example, during a phone call. Since the new system also supports metadata for documents such as topic, author or publication date, agents can search specifically for these keywords in addition to just searching full text. This is quite crucial as agents only have a few seconds on the phone to find relevant answers. So in order to avoid impatient customers, the system needs to have a high performance but also provide a navigational structure that is intuitive to the users.

The knowledge flow now concentrates on "HelpMe", making it an important part of the working environment of

FIGURE 3 User interface of "HelpMe"



each CCC agent. Email is no longer used to publish information. This way, it can be ensured that every agent has access to all information, regardless of the time spent on the job. Furthermore, only the most up-to-date version is available. The "What's new" function reminds the agents of revised content that they would otherwise not notice because they have memorized the old version already.

Within the *editor* and *administrator* processes, some of the time-consuming manual steps are now carried out or at least facilitated by the system. *Templates* accelerate the conversion of content into a format that matches the need of the CCC agents and can be displayed in a Web browser. To support the editors, several templates for different types of documents (i.e., news, charts, reports, etc.) are available. These templates can be used in Microsoft Office applications and define the layout that helps to automatically convert the content into HTML. They improve the performance of the converter, which can be customized specifically for these templates. They also make the use of style sheets possible for a centrally-managed layout. Thus, the editors do not need to redefine the layout and formats each time a document is created. The templates help the editors realize how the final result of their work will look in "HelpMe". Editors are now able to *publish* and *disseminate* content directly from the office application, similar to the way a file is stored on a local disk drive. The conversion is accomplished fully automatically by the CMS, which also publishes the converted HTML files. This offers a great improvement in efficiency compared to the former system. The office applications are used to revise existing content as well, making the introduction of other applications unnecessary.

The *administrator* now uses a separate client. With this client, she can administer the navigational structure of the site to automatically include newly-added content. The administrator can also manage additional components like

the access to experts on certain topics. This would also make the management of competencies of CCC agents possible and indicate gaps on the department level. Finally, a challenging issue is the topic of delivering knowledge directly to the customers on the Internet and to also integrate mechanisms to support the knowledge flow back from the customers to Union Investment to enable continuous improvement in the future.

"Of course, we can help you."

"Hello, could you please tell me why the stock price of my bond fund dropped so steeply on November 23rd?" asks Mrs. Jones, customer of Union Investment. "Sure, Mrs. Jones, just a second," replies the CCC agent. She first checks out which funds the customer has in her account using a host application. Then she looks up information about the fund in

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"HelpMe". "Mrs. Jones, the stock price dropped because on the date you mentioned, there was the yearly disbursement." "Oh, I completely forgot. Thanks for the information."

CASE STUDY QUESTIONS

1. Evaluate the content management process before and after the project. What steps could be taken to improve knowledge flows besides the information supplied by the content management process?
2. Assess the change in information provided for the agent and the customer. What factors benefit Union Investment and how could they eventually affect its bottom line?

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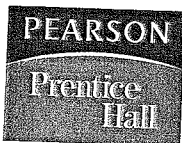
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