

# eBusiness & eCommerce

Andreas Meier • Henrik Stormer

# eBusiness & eCommerce

Managing the Digital Value Chain

Translated by Elizabeth Gosselin

 Springer

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# Foreword

Over a decade ago, the European Union adopted a “plan of action for a European information society.” Internet technologies should broaden the capacity to act of organizations and of individuals, promote transnational contact and exchange relationships, and lead to an open society with cultural originality and variety. To achieve this, the opportunities and risks of utilizing electronic means of communication must be weighed against each other, and privacy and intellectual property rights must be protected.

Due to technological development and the use of Internet technology, the production of information has gained economic significance. An information company creates value primarily by designing, processing, and relaying information; in other words, through the exchange of digital products and services.

This textbook progressively describes all of the elements of the value chain for electronic business and electronic commerce. A process-oriented approach is used to present the electronic business transactions that occur between companies, consumers, and public administration, and these are illustrated with case studies. Along with the organization of digital products and services, special attention is paid to marketing, distribution, and customer relationship care.

This textbook is intended for students of economics at universities and technical colleges who would like an overview of the state of the art in electronic business and electronic commerce. It is also suitable for executives, project leaders, and company experts who deal with the digital value chain.

The book focuses on the members of value chains in electronic business relationships. Each of these members has a chapter devoted to it:

**Chapter 1** describes the terms of electronic business, electronic commerce, and electronic government, and gives meaningful examples of their application.

**Chapter 2** presents the organization of electronic products and services using suitable forms of cooperation or business webs.

**Chapter 3** is dedicated to the strategic and operational procurement process performed using electronic means.

**Chapter 4** examines marketing for electronic markets and shows possible business relationships with online customers.

**Chapter 5** deals with coding procedures, digital signatures, and certification sites associated with the receipt of legal contract work.

**Chapter 6** describes the distribution of digital products and services as part of a comprehensive supply chain.

**Chapter 7** discusses different electronic currencies, including small-sum or pi-copayment accounting schemes.

**Chapter 8** illustrates computer-supported procedures like multichannel management for the acquisition, connection, and retention of customers, as well as the customer data warehouse.

**Chapter 9** describes basic characteristics of portable devices and network architecture, including mobile applications.

**Chapter 10** discusses opportunities for and risks to the individual and the company when market participants engage in electronic business independent of time and location.

This textbook came into being as a result of Bachelor's-level and Master's-level courses run at the Technical College of Northwest Switzerland, at the University of Fribourg, and at the University of Economics in Ho Chi Minh City. Parts of it are used regularly in practicum courses. The eDVDSshop electronic trade case study (<http://www.edvdshop.ch>) developed in each chapter of this textbook is based on experience with the electronic shop system eSarine (<http://www.esarine.ch>), which is marketed through the eTorrent Company (<http://www.eturrent.com>).

At this point we would like to thank all of the students and colleagues who critically reviewed and added to our lecture documents and case studies. This textbook would not exist without the talents of Elizabeth Gosselin from Fairbanks, Alaska, who translated it from German to English. In addition, we would like to thank the publisher staff at Springer and SPi for the pleasant cooperation.

Fribourg, February 2009

Andreas Meier and Henrik Stormer

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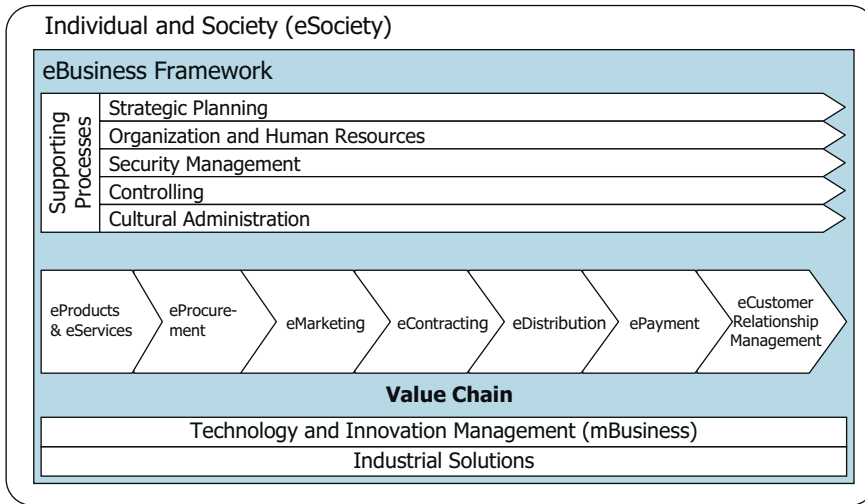
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# 1 eBusiness Framework



*This introductory chapter clarifies terms, presents fundamental concepts of Internet economics, and provides an overview of the chapters. Section 1.1 explains the various electronic business connections encountered in eBusiness, eCommerce, and eGovernment. In Sect. 1.2, case studies illustrate some of the options for electronic business; applications include eShopping, eHealth, eVoting, and eCollaboration. Section 1.3 states the most important arguments for Internet economics and gives a long-range overview of the structural changes in this sector. Section 1.4 describes the digital value chain, defining relevant terms and using examples, and it provides an overview of the chapters based on this explanation. Literary references follow in Sect. 1.5.*

## 1.1 Defining Electronic Business

*Emergence of  
the  
information  
society*

The evolution of the information society is often compared to the Industrial Revolution in terms of its consequences. The use of information and communication technologies provides the opportunity to extend the abilities of individuals and organizations to act, to reinforce cross-border contacts, and to develop an open society with cultural originality and variety.

Due to technological changes and economic development, the information factor has become more significant than the production factor. Many companies and organizations have moved their business processes onto the Web and realized customer relationships with the help of electronic means of information and communication, leading to the term electronic business.

*What does  
electronic  
business mean?*

Electronic business means initiating, arranging, and carrying out electronic business processes; in other words, exchanging services with the help of public or private communication networks, including the Internet, in order to achieve added value. Companies (business), public institutions (administration), as well as private persons (consumer) can be both service providers and service consumers. What is important is that the electronic business relationship generates added value, which may take the form of either a monetary or an intangible contribution.

Figure 1.1 shows the three most important groups of market participants, along with their possible business connections. Each of these participants can appear as a provider or consumer of services. Thus, nine basic business relationships develop in total.

*The two  
business  
options for  
electronic  
commerce*

In business-to-consumer (B2C) and business-to-business (B2B) service exchange relationships, companies offer products and services for customers or other companies. These are therefore the two options for electronic trading (electronic commerce or eCommerce). An example of B2C is an electronic shop (see Sect. 1.2.1 on electronic shops and the case study of the startup company eDVDShop). A supplier relationship between companies provides an example of B2B.

*Defining  
electronic  
government*

A further subset of exchange relationships are termed electronic government (eGovernment), namely the options A2A, A2B, and A2C. Administration-to-administration means the use of information and communication technologies by local government to electronically organize internal administrative channels. This can take place within a single level of administration (see the virtual community in Fig. 1.1), or between different levels of administration. In addition, officials can make offers to citizens (option A2C, where C means “Citizen”) or to companies (A2B). Electronic votes and elections, examples of A2C, are explained in more detail in Sect. 1.2.3.

The letter A stands for administration and concerns not only government but also nongovernmental organizations (NGOs), such as nonprofit organizations (NPOs).

		Service Consumer		
		Consumer	Business	Administration
Service Provider	Consumer	<b>Consumer-to-Consumer (C2C)</b> e.g., classified ad on a personal homepage	<b>Consumer-to-Business (C2B)</b> e.g., web page with personal ability profile	<b>Consumer/Citizen-to-Administration (C2A)</b> e.g., citizen evaluates public environment project
	Business	<b>Business-to-Consumer (B2C)</b> e.g., products and services in one eShop	<b>Business-to-Business (B2B)</b> e.g., order with suppliers (supply chain)	<b>Business-to-Administration (B2A)</b> e.g., electronic services for public administration
	Administration	<b>Administration-to-Consumer/Citizen (A2C)</b> e.g., possibility of electronic elections	<b>Administration-to-Business (A2B)</b> e.g., public advertisement of project plans	<b>Administration-to-Administration (A2A)</b> e.g., forms of cooperation in virtual communities

Fig. 1.1: Various electronic business relationships

The letter C stands for consumer or citizen. It is important to note that people can also appear as providers in the service provider and service consumer matrix. For example, option C2C refers to an electronic business relationship between individuals (see the case study in Sect.1.2.4). Moreover, consumers or citizens can provide services for companies (C2B) or for administrative units (C2A).

The term mobile business (mBusiness) can be considered a subset of electronic business, since here the exchange relationship between market participants takes place over mobile networks and devices. Mobile business supports the possibility of conducting electronic relationships and business independent of location and time (see Chap.9).

Due to the diverse business relationships associated with electronic and mobile business, a market participant can take on a variety of roles. This promotes the market and exchange relationships in the so-called multioption society, which is illustrated by case studies in the next subchapter and discussed in greater depth in Chap.10.

*Mobile business as a subset of electronic business*

*Multioption society*

## 1.2 Case Studies on Electronic Business

### 1.2.1 Electronic Shop (B2C)

There are a multitude of electronic shop systems in the electronic market. This spectrum ranges from free software packages (open source) to extensive and expensive standard products which can cost several hundreds of thousands of Euros.

*Main functions  
of a webshop*

An electronic shop (also often called a webshop or an online shop) is a Web-based software system that offers goods and services, generates bids/offers, accepts orders, and handles delivery and modes of payment.

*Interaction of  
the storefront  
with the  
backfront*

Figure 1.2 shows a rough outline of an electronic shop based on the product eSarine. In principle, any webshop consists of a storefront and a backfront. The online customers only have access to the storefront and can seek information on products and services, order them as needed, pay and receive them. Access to the backfront is exclusively reserved for the shop operator. Here products and services are inserted into the product catalog and the various procedures employed for ordering, paying, and purchasing are stipulated. The most important functions of an electronic shop are now discussed using Fig. 1.2.

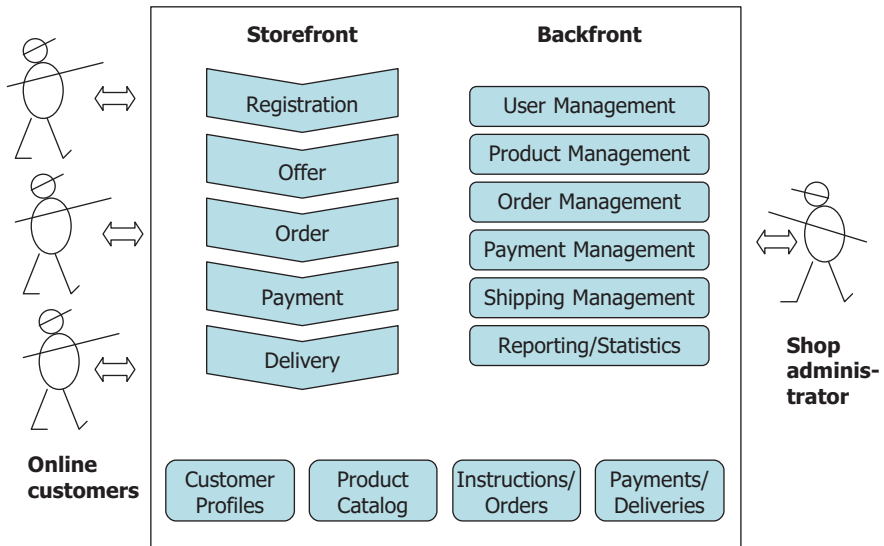


Fig. 1.2: Rough architecture of the electronic shop eSarine

*Registering  
user profiles*

**Registration of online customers.** A visitor to the electronic shop can find out about the products and services offered by it. Intending to buy, he communicates a minimum amount of data about himself and establishes a user profile, along with payment and delivery arrangements.

**Customer profiles and customer administration.** The data on the customer is put into a database. Moreover, an attempt is made to construct specific profiles based on customer behavior. Thus, the most appropriate offers can be presented to each customer. However, the communication and information rules requested by the user must be considered and respected (see behavior with the customized push of online advertising in Sect. 4.4).

*Appropriate offers based on customer profiles*

**Product catalog with catalog listing.** Products and services are recorded in the product catalog, with or without quoted prices. Depending upon the discount system selected and individual customer price fixing (Sect. 2.5), a quoted price is computed and specified only when creating the offer. The individual products are summarized in categories so that the organization of the webshop is clear (see explanations of catalog management in Sect. 3.4).

*Maintaining a product catalog*

**Offering and ordering.** Using this software component, offers can be generated and goods and services can be bought as needed. The electronic shopping basket or shopping cart is used by the user to reserve the goods and services selected for possible purchase, and if necessary to show the total price with any discount.

*Electronic shopping basket*

**Modes of payment.** If the customer is satisfied with his order and the associated price and delivery arrangements, then he can activate the purchase with the order button. Depending on the payment system (see the different modes of payment in Chap. 7), either a payment process is triggered (e.g., an invoice is rendered) or the payment is credited directly (e.g., payment with credit card and Payment Gateway).

*ePayment options*

**Shipment options.** Depending on the category of the product and the offer provided by the shop operator, it may be possible to obtain goods and services in a digital form. In this case, a download is necessary, which demands varying amounts of time depending on the computer equipment involved and the Internet connection with the customer. The advantages and disadvantages of online and offline distribution are discussed in Chap. 6, which also presents hybrid distribution systems.

*Offline vs. online distribution*

**Measures of customer connection.** Customer contact is maintained after a purchase by offering important after-sales information and services. These measures make customer contact possible through the goods and services and enhance the customer connection. In eCustomer relationship management (Chap. 8), an attempt is made to maintain a customer relationship and connection by electronic means throughout the lifetime of the customer.

*Lifelong customer connection*

The construction and operation of an electronic shop must be planned and prepared in detail. In addition, important decisions must be made. Which of the products and services should be offered online? Does the electronic shop need to be offered in several languages, and if so, which languages are preferred? Are there differences in the arrangements for supply, payment, and conclusion compared

*Organizational issues for electronic shops*

to a conventional business model, and how can the differences be justified and communicated if necessary? Are customers with enhanced customer value (see Sect. 8.2) treated preferentially, and if so, how? How can interested customers and potential customers be integrated into the value chain?

### Shopping mall

The operator of an electronic shop can become involved in a shopping mall. A shopping mall (or an electronic department store) is an Internet platform that allows various providers to present their products and services together. This allows the customer to perform all of their shopping in one “mall.”

## Case Study eDVDSHOP: Business Idea for an eShop

Marcel Anderson is the managing director of a small shop which sells movies on DVD (Digital Versatile Disc). In order to offer his products on the Internet too, Anderson plans to set up his own web page. This should present the range of products offered (which at present includes DVDs as well as older video cassettes and various promotional material, like movie posters) and allow the customer to order the product (by sending an email to Anderson). Anderson finds a reasonable Internet provider that is prepared to host the pages. Through this provider, Anderson registers the domain name `http://www.edvdshop.ch`. He begins to describe the products in HTML format. At the same time he produces a simple Web page:

```
<html>
<head>
<title>eDVDSHOP</title>
</head>
<body>
<h1>Welcome to the eDVDSHOP</h1>
Please take a look at our offer. If you are interested in
a product, send an e-Mail to
<a href= "mailto:anderson@edvdshop.ch">anderson@edvdshop.ch</a>.
</h1>offer</h1>
<table>
<tr><td>name of DVD</td><td>description</td><td>price</td></tr>
<tr><td>Mystic River</td><td>Released in 2003, the movie
Mystic River directed by Clint Eastwood is based upon a
book by Dennis Lehane.</td><td>22.90</td></tr>
<tr><td>Mississippi Mermaid</td><td>A good film by F. Truffaut with
J.-P. Belmondo and C. Deneuve.</td><td>22.90</td></tr>
<tr><td>25 Hours</td><td>S. Lee shot this movie in which E. Norton
plays the main role.</td><td>27.90</td></tr>
</table>
</body>
</html>
```

This web page presents itself in a web browser in the following way:

## Welcome to the eDVDSHOP

Please take a look at our offer. If you are interested in a product, send an e-Mail to [anderson@edvdshop.ch](mailto:anderson@edvdshop.ch).

offer

name of DVD	description	price
Mystic River	Released in 2003, the movie Mystic River directed by Clint Eastwood is based upon a book by Dennis Lehane.	22.90
Mississippi Mermaid	A good film by F. Truffaut with J.-P. Belmondo and C. Deneuve.	22.90
25 Hours	S. Lee shot this movie in which E. Norton plays the main role.	27.90

After a short time Anderson realizes that this solution is not optimal. He can make out the following problems:

- The page does not look professional. In order to improve the appearance of the page, Anderson must either extend his work in HTML or make use of a tool that can automatically produce web pages.
- There is no search function. Although Anderson has divided his products into several categories, it is difficult to search for a particular product.
- The statement that asks customers to send emails to the eDVDSHOP is not optimal for customers since information on shipping, shipping costs, and payment options is missing.

In order to improve the present solution, Anderson decides to employ an on-line shop. After scouting out several providers of online shop systems, he decides to use the online shop eSarine, which is offered by the company eTorrent. eSarine provides a Web-based backfront through which the whole system can be administered.

### 1.2.2 Electronic Health Market (B2B)

Medical progress over the last few decades has led to a continuous rise in the efficiency of health care and in the life expectancy of the general population. This has resulted in, among other things, rising costs of health services. In many countries, these costs are increasing more rapidly than the consumer price index, which is why reforms are on the political agenda. According to Fig. 1.3, the health market is characterized by four groups of market participants:

- Care/service providers such as hospitals, physicians, pharmacies, and laboratories

*Cost explosion  
in the health  
market*

*Classification  
of market  
participants*



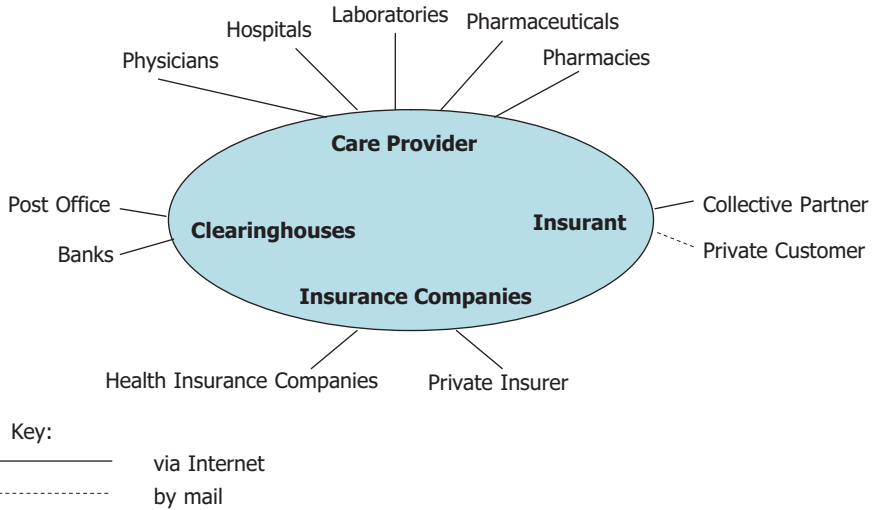


Fig. 1.3: Market participants in the electronic health market in Switzerland

- Insurers or health insurance companies
- Clearinghouses, such as banks and post offices
- Insurant (the insured party)

The electronic business known as eHealth is worthwhile, particularly among care providers, between care providers and their suppliers (e.g., of pharmaceuticals), as well as between care providers and insurance companies. In Europe, billions of invoices per year are made out and conveyed predominantly by post to insurance companies, recorded manually or partly with optical scanning technology, and then paid. In the future, data exchange between care providers, clearinghouses, and insurance companies will take place electronically, as in the following example. If a hospital requires a cost assurance for a treatment case, then this is given automatically with sufficient coverage by the information system of the appropriate insurance company. After the treatment, the hospital makes out an electronic invoice to the insurance company; electronic data exchange formats based on XML (Extensible Markup Language) have been defined and published in Europe. The insurance company in turn subtracts the customary deductible from the patient with the appropriate software, and checks the invoice with a regulation-based software package. In addition, an electronic tariff database for medical services is applied. Afterwards, the necessary computer-aided payment streams are run through the customary clearinghouses such as banks or post offices via communication networks. Only the final statement is sent in paper form to the insurant, assuming that this person has no Internet connection or wishes to receive correspondence in paper form.

Another element (see report [http://www.europa.eu.int/eur-lex/de/com/cnc/2003/com2003\\_0073de01.pdf](http://www.europa.eu.int/eur-lex/de/com/cnc/2003/com2003_0073de01.pdf)) of the electronic health market is the electronic patient card (Patient Health Card), as proposed by the European Commission. This card contains the following administrative data:

*Administrative data with the health card*

- Insurance specifications, including modes of payment
- Authorization status in relation to treatment in foreign European countries (replaces the so-called E111 form)
- Paperless transmission option for medical prescriptions

Apart from these technical insurance elements, the Patient Health Card includes additional medical instructions/specifications:

*Care-oriented health data*

- Documentation of medications being taken
- Emergency information such as blood type, chronic organ disease, allergies, heart conditions, dialysis, or asthma
- Additional health information such as current diagnoses, operations, inoculations, or X-ray examinations
- Personal data provided by the patients themselves

The health card increases the quality and efficiency of health care. It ensures that health data is available in order to optimize patient treatment whenever it is needed. The Patient Health Card is designed to be secure; it is coded, with access and acquisition protection being ensured via electronic signature (see Sect. 5.3) and the corresponding trust center.

*Secured access*

In this example of the electronic health market, the various changes that participants in the business-to-business market must implement are evident: business processes must not only be analyzed and adapted internally, but connections to hospitals, pharmacies, laboratories, insurance companies, and financial institutions must be reconsidered and automated. This necessitates organizational rearrangements, adjustments to processes, and changes to employee job profiles.

### 1.2.3 Electronic Voting and Elections (A2C)

eGovernment refers to the electronic services and processes that occur within administrative units (A2A), between public institutions and companies (A2B), and between an administrative unit and the public (A2C). If the exchange relationships between an administrative unit and citizens are studied, then in accordance with Fig. 1.4, the different application types (eAssistance, eProduction, eDemocracy) can be broken down into various degrees of interaction (information, communication, transaction). The degree of interaction at the information stage includes the retrieval of information by citizens. At the communication stage, information is exchanged and inquiries are made to the administration. The

*The path to eDemocracy*

	eAssistance	eProduction	eDemocracy
Transaction	<ul style="list-style-type: none"> <li>• electronic reservation of public areas</li> <li>• electronic orders</li> </ul>	<ul style="list-style-type: none"> <li>• electronic tax declaration</li> <li>• registration</li> <li>• census</li> </ul>	<ul style="list-style-type: none"> <li>• electronic elections (eElection)</li> <li>• electronic voting (eVoting)</li> </ul>
Communication	<ul style="list-style-type: none"> <li>• web services for inquiries</li> <li>• feedback</li> </ul>	<ul style="list-style-type: none"> <li>• email</li> <li>• online forms</li> <li>• discussion forums</li> <li>• project announcements</li> </ul>	<ul style="list-style-type: none"> <li>• discussion forums for elections and voting</li> <li>• notifications</li> </ul>
Information	<ul style="list-style-type: none"> <li>• announcements</li> <li>• rules of behavior</li> <li>• recommendations</li> </ul>	<ul style="list-style-type: none"> <li>• procedure for official approval</li> <li>• instructions</li> </ul>	<ul style="list-style-type: none"> <li>• legal principles</li> <li>• decrees</li> </ul>

Fig. 1.4: Degrees of interaction and application types in A2C

transaction stage concerns the completion of electronic processes and services. eAssistance involves the electronic support of the citizen, whereas in eProduction the administrative workflow is carried out electronically. The demanding application type of eDemocracy involves electronic elections and voting.

eVoting requires the security of information systems and web platforms as well as a guarantee of data protection. Electronic voting systems must meet the following requirements:

- Only registered voters may submit a vote
- Each voter has exactly one vote
- Citizens do not have access to the electronic ballot box outside of the official opening times
- Third parties do not receive access to the contents of electronically submitted votes (guarantee of data protection)
- Electronically submitted votes cannot be intercepted, changed, or rerouted
- In the event of a system crash, no vote that has already been submitted may be lost

*Pilot for  
electronic  
voting*

In order to ensure the above security and protection conditions, procedures and special algorithms were developed (see the sections on electronic contracts and digital signatures in Chap. 5). Pilot attempts at eVoting could only be successfully accomplished after the legal basis for such business had been created. The following example illustrates this. In 2003, a total of 741 voters in the municipality of Anières near Geneva took part in a vote. 323 of these citizens (43.7%) voted electronically. The voter turnout for the conventional and electronic elections combined was about 63.77%. It is obviously important to take into account that in this field test the public was particularly motivated to either go to the ballot box or to try out the new electronic voting channel.

One challenge with eVoting and with further applications of eGovernment is the principle of equal treatment: all citizens of the state have the right to the same services, regardless of their social, intellectual, and technical access opportunities. In contrast to electronic business, public bodies do not have selection criteria and for the time being must provide workflow and services on paper as well as electronically.

*Principle of equal treatment*

### 1.2.4 Knowledge Exchange via Electronic Books (C2C)

Electronic books (eBooks) can be used to carry a large amount of information at any time. Possible uses range from electronic interpreters and travel guides to novels. Furthermore, it will soon be possible to use them to call up city plans, traffic directories, or information on sights worth seeing when needed through location-based services.

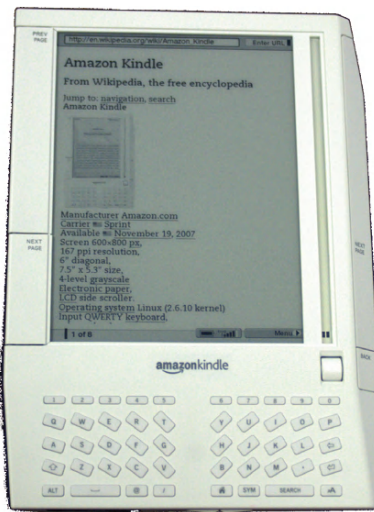


Fig. 1.5: The electronic book from the online merchant Amazon.com

As Fig. 1.5 illustrates, electronic books are portable computer devices with flat screens that are loaded with digital book content via communication interfaces (e.g., the open eBook specification based on HTML and XML, <http://www.openebook.org>), and this is classified, annotated, or prepared into a personal knowledge file by the user. In principle, any hyperdocument can be downloaded from the Internet and reused for personal use, perhaps upon the payment of a fee (ePayment in Chap. 7). Keyboards or additional input and output devices for the eBook can also be obtained (Chap. 9 on the use of mobile devices). It is a computer, cell phone, organizer and handheld joined together into one personal digital information agent.

*Functional modes of electronic books*

*Lifelong learning*

Electronic books or similar personal information agents can be used in a C2C mode to exchange know-how with professional colleagues or other people and to enrich the personal knowledge bank. This electronic knowledge bank is constantly expanded and updated during training periods and work activities; it supports lifelong learning (Chap. 10 on the information society).

An electronic book exhibits the following advantages over paper books:

- Electronic books can be updated at any time by calling up Internet services or by exchanging information with colleagues and information suppliers.
- The user of an electronic book can select his own typeface size and format. The electronic magnifying glass provided in the software for the eBook is a great help to older people. The ability to select the background color and brightness is another obvious benefit.
- The storage capacity of an electronic book is very large. One eBook can already save up to 1,000 digital books simultaneously (see EveryBook at <http://www.everybook.net>).
- An integrated dictionary, an index, and text search commands can aid the discovery of requested information.
- The content of the digital book can be extended into a personal knowledge bank. Summaries can be added, new classifications devised, and unimportant passages eliminated. Sophisticated retrieval functions help to keep things in order.
- The integration of text, pictures, and sound can transform the electronic book into a multimedia device. Economic or technical connections can be described more comprehensively through animation and simulation.

*Use of digital watermarks*

Many legal questions regarding electronic books are still unresolved and are curbing their distribution. Digital watermarks promise to improve copyright protection. The electronic watermark is directly embedded in the original file without detracting from the appearance of the original document (Sect. 6.5). Cost-effective copying and the rapid distribution of digital information objects are therefore controlled.

### 1.3 Arguments for Internet Economics

*Information professions dominate*

The change in sectoral structure—the gradual shift of employees from the area of agriculture to the production sector and then to services and to information processing—is well known. This evolution is depicted in Fig. 1.6 so that the growth of the service sector can be viewed more clearly. The information professions already clearly dominate over other occupational areas. More and more people are involved with the production, processing, and distribution of information. The search for qualified economic information scientists—not only in many European countries but also in the USA, Australia, and Japan—is an indication

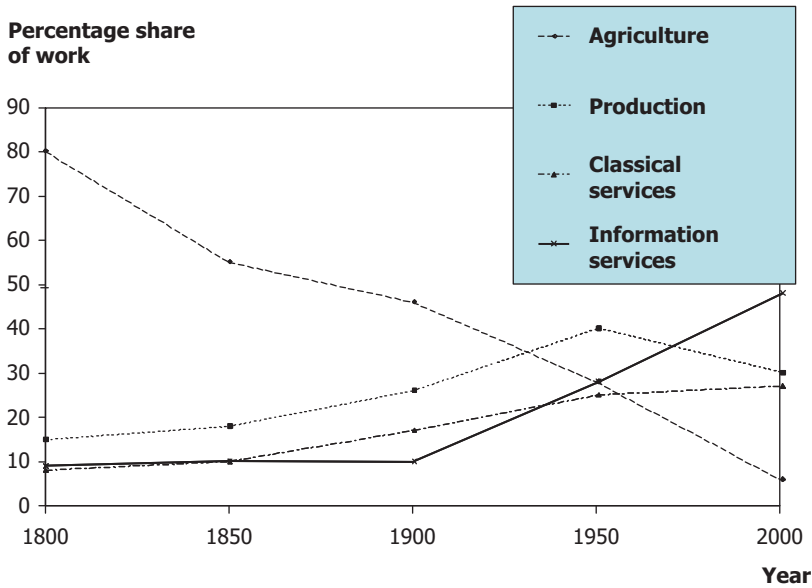


Fig. 1.6: Long-term view of the change in sectoral structure

of this evolution toward an information society. In a technical book on Internet economics by Zerdick et al. (see Sect. 1.5), economists bring forth arguments to counter the strategic challenges. The most important are as follows:

**The creation of value is digitized.** A change to the digital economy takes place, with the products and services becoming more and more digitized. Digital objects fundamentally differ from material economic goods because they can be easily copied and distributed. Their value grows through use; however, they may be poorly identified and protected.

*Digital  
economic goods*

**Critical mass as a key factor.** Not scarcity but abundance determines the value of goods. A large customer base must be found in a short time in order to obtain the lead in the market. By achieving critical mass, standards can be set, an important condition for success. Only standards allow navigation in the network economy.

**Cannibalizing yourself.** Traditional distribution channels are placed in competition as digital products and services are offered and sold over the Web. The challenge, “cannibalize yourself, before others do it!” means that a company should align its marketing and sales to the electronic market. Thus, transaction costs remain low, a wider variety of more individual services develop, and attractiveness in the market rises.

*Usage of digital  
distribution  
channels*

**Follow the free.** Giving away partial products and partial services can be a recipe for success. Using an appropriate price strategy (see Sect. 2.5), components

are given away in order to achieve a critical mass. Proceeds are only obtained in a second step, when complementary services or more efficient supplementary programs are offered. The profitable cost structure for the production and distribution of digital products supports this strategy; however, this argument was weakened somewhat by the bursting of the dot-com bubble at the beginning of 2002.

**Product differentiation through versioning.** Content can be updated at minimal cost with digital products and services, easily altered, and presented anew. At the same time, such service packages can also be offered to the individual customer at favorable prices. The networking of specialized providers allows the customer-oriented intermediary to furnish differentiated and individual market services. With costs decreasing and offers differentiating, no opposition remains in the Internet economy (see individualization of the mass market and mass customization in Sects. 4.1 and 6.3).

**Cooperation through value-creating networks.** Core competency concentration requires both the construction of virtual networks and cooperation (see b-webs by Tapscott in Sect. 2.3). In this way, the strategic focus of a company becomes both narrower and broader: narrower due to the limitation of the particular competence, broader through the formation of alliances.

*Legal validity  
of electronic  
documents*

Apart from the challenges listed here, the authors of technical books on Internet economics draw attention to the fact that valid regulation models sometimes become obsolete, although a backlog in demand for new regulation content relating to electronic business exists. How then can electronic documents and legal contracts be explained? Some countries have done pioneering work in this area. Italy (with the Bassanini Law of 1997) and Germany (with the Information and Communication Services Law of 1997) rank as the first countries to have legally established an equivalency between a digital signature and a hand signature. Other countries are attempting to get onto this track; they are introducing and applying signature laws with appropriate electronic certificates.

## 1.4 Value Chain and Chapter Overview

*Meaning of the  
digital value  
chain (this  
chapter)*

This book focuses on the members of the value chain and devotes a separate chapter to each member (see Fig. 1.7). The aim of this first chapter, on the framework associated with eBusiness, has been to explain and illustrate with meaningful examples the terms electronic business, electronic commerce, and electronic government. Apart from the discussion of economic challenges, important changes in the electronic marketplace are described (intermediation and disintermediation). The supporting processes of strategic planning, construction and development organization, technology and innovation management, and control/supervision are briefly mentioned in this book. Knowledge of these processes is assumed or must be obtained from the management literature. However, examples of applications from different branches of industry are discussed in detail in every chapter.

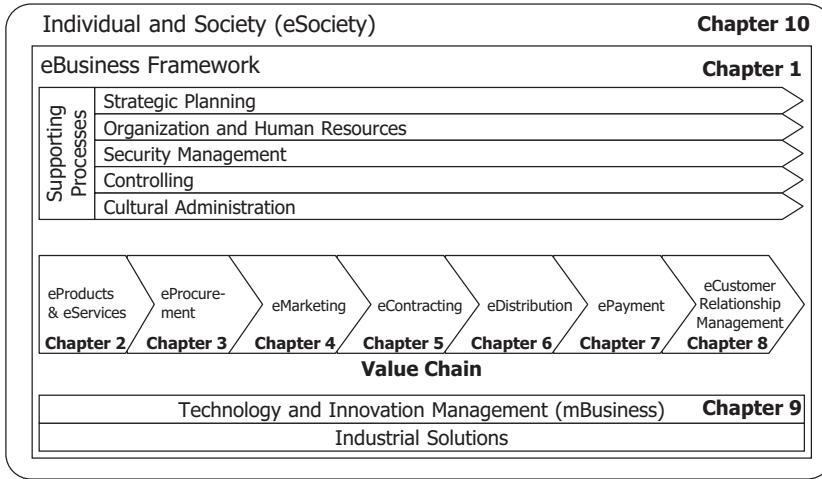


Fig. 1.7: Value chain and overview of the chapters in this book

When considering the organization of electronic products and services (Chap. 2) the point for the time being is to find a suitable form of cooperation (business web or b-web) with the help of a business model. Such forms of cooperation vary from open marketplaces with negotiable goods and value (business web of the agora type) realized over tightly organized hierarchical networks (aggregator, integrator, and distributor types) to self-organized and loosely coupled communities (alliance type). The question of the appropriate pricing of electronic products and services is important, since intangible goods are difficult to value. Along with options for price differentiation, the selection of either linear, nonlinear, or dynamic price formation must be considered. The question of price bundling also arises.

*Organization of digital products and services (Chap. 2)*

Chapter 3 is devoted to strategic and optional electronic procurement processes (eProcurement). In principle, there are a variety of eProcurement solutions depending on whether product catalogs and services for product selection and product procurement are made available on the customer side (buy side) or on the supplier side (sell side). In a third variant (electronic marketplace), a third party provides software solutions and catalogs for procurement. Thus product and service comparisons can be employed and valued. Catalog management constitutes a special challenge; appropriate classification criteria must be standardized across manufacturer and supplier boundaries.

*eProcurement (Chap. 3)*

eMarketing (online marketing) is presented in Chap. 4. Using electronic means of providing information and communicating, market potentials are tapped and business relations are cultivated. The division of online customers into categories allows for a diversified marketing process to be carried out and services to be adapted on the web site at any time. Appropriate key indicators allow the broadcasting of an online offer to be measured (online surfer), the degree of interaction to be calculated (online consumer), online customers to be stimulated

*Customer model for online marketing (Chap. 4)*



into creating value (online prosumer), business deals to be transacted (online buyer), and the connection to the customer to be maintained (online key customer). At the same time, the peculiarities of online advertising must be studied and analyzed.

*Documents  
with digital  
signatures  
(Chap. 5)*

In Chap. 5, the concept of eContracting is dealt with. Here, an electronic contract is considered a legally valid document. To achieve this, trust centers must be set up that register actual people, issue digital certificates, and supply pairs of electronic keys for the digital signature. Asymmetric cryptography processes that use private and public keys are a basic requirement when using such certificates and signatures. Electronic documents can be coded on the one hand, and on the other, authentication can be performed with digital signatures. An electronic negotiation process therefore involves recording and managing the negotiating positions, agreeing on rights and obligations, completing legal contracts with digital signatures, and controlling the elements needed to supervise the execution of the contract.

*Distribution in  
the electronic  
market  
(Chap. 6)*

Issues related to the distribution of a digital product or service are discussed in Chap. 6 on eDistribution. If the consumer of services has a mobile device with an Internet connection at his disposal, he can take advantage of the time-independent and location-independent purchase of services (online distribution). Electronic products do not necessarily have to be obtained online, since offline distribution also has advantages. Furthermore, hybrid distribution forms that combine online distribution with a variant of offline distribution can be envisaged. This can be useful when hybrid variants distribute large software packages for data carriers offline and offer release number changes or debugging services online. The distribution is just one part of a comprehensive supply chain. With the help of a reference model, the steps involved in planning, procurement, manufacture, and delivery must be coordinated.

*Methods of  
electronic  
payment  
(Chap. 7)*

In Chap. 7, we deal with different means of electronic payment (ePayment). Such methods make it possible to pay small sums involving just a few cents (picopayment), medium sums of several Euros (micropayment), and larger amounts (macropayment). To ensure that the transaction costs for picopayments and micropayments are low enough to make them worthwhile, methods based on the use of electronic coins were developed. In addition to this, there are a number of account-based and owner-based procedures for electronic payments. In order to guarantee the security of electronic payment processes, cryptographic procedures and digital signatures must be used. Thus, the SET (secure electronic transaction) protocol requires that a dual signature procedure is employed so that both the order data (in relation to the dealer) and the modes of payment (in relation to the bank) are safeguarded.

*Management of  
customer  
relationships  
and  
communication  
channels  
(Chap. 8)*

Chapter 8 about eCustomer Relationship Management shows how the focus on product concerns shifts to customer management. Moreover, the customer's capital must be captured and valued in addition to the customary financial key indicators. The model of customer valuation by Blattberg et al. makes it possible to include steps in customer acquisition such as customer support and the customer relationship. Relevant facts are stored in the customer data warehouse,

which yields a complete analysis of customer behavior and customer use. Aside from analytical customer relationship management, the customer buying cycle (i.e., suggestion, evaluation, purchase, and use) supports all operations. Multi-channel management represents a special challenge, since the different customer communication channels must be evaluated and suitable for use.

Chapter 9 on mobile business illustrates the basic characteristics of mobile devices and the corresponding network architecture along with the most important communication protocols such as GSM (global system for mobile communication) and Bluetooth (shortwave radio technology for wireless communication). Applications for mobile devices must be aligned with the device's characteristics, since the size of the display is limited, the storage capacity in relation to PCs and workstations is small, and the bandwidth at the moment is still modest. In addition, the mobile devices have primitive input and output possibilities. For these reasons, methods such as a location-based service or personalization must be used. Mobile electronic payment procedures and mobile web sites are examples of such applications.

In the future, any market participant will be able to take care of business electronically at any time and any place on Earth (the "global village" concept). This will have consequences for the individual and for society, as summarized in Chap. 10. The primary risk is the "digital divide:" the separation of society into population groups according to who can establish a connection and those who remain excluded from the electronic markets. The anonymity of the Internet provides both opportunities and dangers; for example, if criminal or pathological factions form and then proceed to misuse cyberspace. On the other hand, the development of the information society allows the individual to act as an entrepreneur and to become involved in the electronic market through constellations such as C2A, C2B or C2C, and to offer services. At the same time, the entrepreneur can take on time-limited jobs as an employee or knowledge worker and support him- or herself through several job relationships. Multioption companies only function well, however, when the different forms of cooperation developed are based on respect, integrity, and trust.

*Aspects of  
using mobile  
business  
(Chap. 9)*

*Opportunities  
and risks  
presented by  
the  
information  
society  
(Chap. 10)*

## 1.5 Literary References

Possible business models and forms of cooperation for the electronic market are demonstrated by Tapscott et al. [Tap00]. The arguments for Internet economics come from Zerdick et al. [Zer00]. The book of Brousseau and Curien [Bro07] provides another introduction to the digital economy. Shapiro and Varian [Sha99] describe the strategic conditions for electronic business in their technical book. In a manual on electronic trade by Shaw et al. [Sha00], the most important methods and techniques are made clear using application examples. The work by Timmers [Tim99] illustrates business models for electronic trade with practical examples. The work by Turban et al. [Tur06] and the book of Schneider [Sch07] explain all of the essential aspects of electronic business relations and can serve as textbooks.

*Business  
models and  
business webs*

*eSarine online  
shop*

A deeper introduction to the online shop, eSarine, presented in this book is given in the paper by Werro et al. [WSFM04]. eSarine has also been used in a number of different research projects [Sto06, Mei07]. An open source version of eSarine can be downloaded from the homepage of the authors (<http://diuf.unifr.ch/is/research/esarine/download.php>).

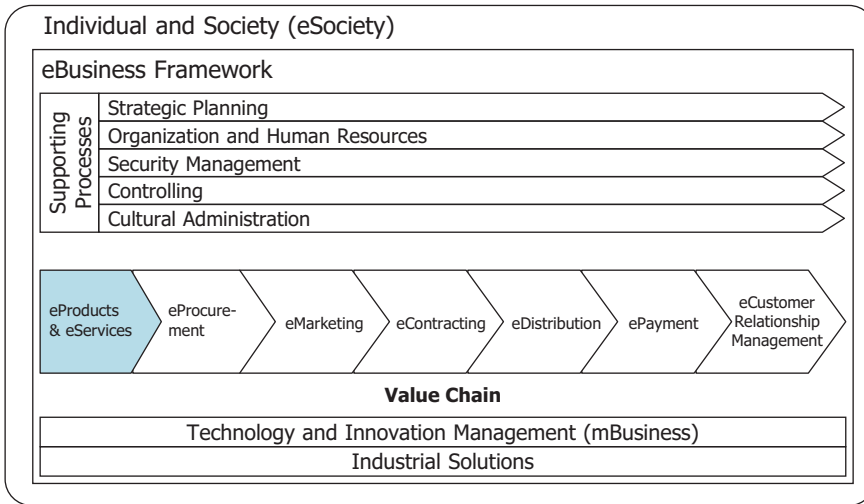
*eBusiness  
strategies*

eBusiness strategies have been outlined by a number of authors. The work from Porter is well known and shows that eBusiness must be considered a complement to and not a cannibal of traditional business [Por01]. Interestingly, a chapter from Tapscott argues that elements of Porter's argument are incorrect [Tap01].

*Information  
society*

Individual aspects of and developmental trends for the information society are demonstrated in various works. Edvinsson and Malone [Edv97] call for an expansion of the financial key indicators to include an evaluation of the intellectual capital of a company. Gross [Gro94] examines the development and effects of multioption companies from a sociological perspective. Ethical principles for information management are illustrated in the work by Johnson [Joh01].

## 2 eProducts and eServices



*The organization of digital products and services requires the aid of a business model to evaluate both forms of cooperation (business webs) and use potentials. Section 2.1 explains the components of a business model which include the organization of the business process, the establishment of a price model, and security policy. Section 2.2 follows with an explanation of the anatomy of the electronic marketplace. Section 2.3 describes and exemplifies different types of business webs, such as agora (open marketplace), aggregator, integrator, alliance (self-organized community), and distributor. These forms of cooperation are compared and evaluated in Sect. 2.4, and an illustrated example is given. Section 2.5 is devoted to the process of price formation, which involves price differentiation, linear, nonlinear and dynamic price development, and price bundling. Section 2.6 summarizes profit models in electronic markets. Literary references can be found in Sect. 2.7.*

## 2.1 Components of a Business Model

*Web utilization—a strategic challenge*

The goal for companies that use information and communication technologies is to procure and analyze information on market participants as well as on existing and potential customers and thus develop and sell products and services that are promising. While doing so, Web-based information systems naturally become a strategic tool. On the one hand, they allow the development of the market and the behavior of market participants to be studied and interpreted (see eCustomer Relationship Management in Chap. 8). On the other hand, information systems support the design and production of goods and services.

*Contrasting marketplace and market space*

As we evolve towards a networked information society, a change in the market system for companies can be observed. On the one hand, the physical marketplace, concerned with existing physical raw materials, products and resources, is still present. Here, physical value-creating processes are required in order to procure, develop, and distribute material goods. However, due to the development of the Internet, the physical marketplace is now being supplemented. As a result, one can now speak of a digital market space where digital products and services can be developed and sold inside networks.

*Product mix of material and digital goods*

Companies must decide upon a business model to see if and how both the physical and the electronic market space can be worked. The company strategy must include both market options in most cases. In other words, the fundamental questions to consider are: how should a promising mix of materials and/or intangible product parts and services be determined, and how should the appropriate business transactions be carried out?

*Components of a business model for eBusiness*

When creating a business model for electronic business, it is necessary to clarify the following issues:

**Defining products and services.** It must be decided whether the existing range of products should be supplemented, replaced, or extended by digital information objects and services. The degree of digitization of individual products and services depends upon the market and upon acceptance by existing or desired customers.

**Defining target customers and sales markets.** Analytical methods are used to evaluate which customers and customer segments possess high customer value (through the use of a customer data warehouse, see Sect. 8.3). Customer groups that can potentially increase customer capital and reduce startup risk or exposure to loss are also highlighted.

**Evaluation and selection of suitable business webs.** A business web is a network used for the creation and marketing of digital products and services (see Sects. 2.3 and 2.4). The aims and principal characteristics of business webs range from open marketplaces with negotiable goods and services (agora type) to tightly organized hierarchical networks (aggregator, integrator, or distributor types) to self-organized and loosely coupled communities (alliance type).

**Organization of business processes.** The organization of the business processes involved determines which activities are to be carried out automatically and which are to be realized manually. The logistics of distribution (Sect. 6.2) and the establishment of the supply chain (supply chain management, Sect. 6.3) are also important, but in this case online, offline, or hybrid distribution and reference structures can be chosen.

**Price model and methods of payment.** The original production of a digital good is cost intensive, whereas the marginal costs of reproduction (i.e., the production of copies) are negligible in all respects. Moreover, the profit generated grows with the number of consumers that use the products and services (network effects, see Sect. 2.5). Apart from price formation, price differentiation, and price bundling, it is necessary to examine and—as required—offer suitable electronic payment options (see Chap. 7 on electronic payment and Sect. 9.3 on mobile payment).

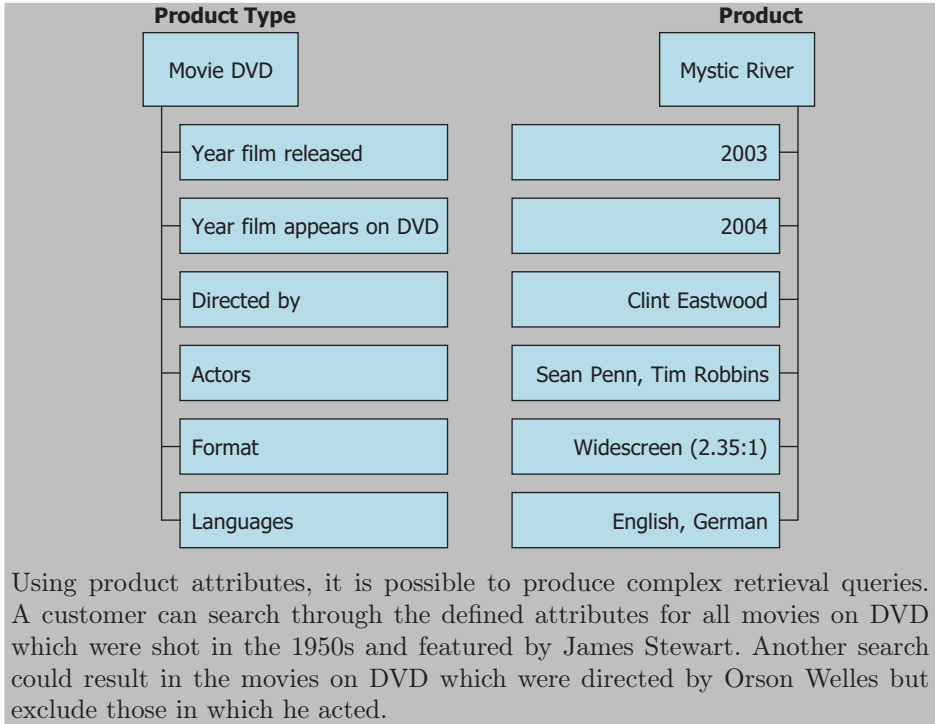
**Creation of a security policy.** A risk assessment matrix with opportunities and risks of electronic business can help to weigh up existing resources and means, and when required can help with transacting additional investments. A security policy must be adopted in order to ensure the integrity, availability, and privacy of electronic business (see cryptography procedures and digital signatures in Chap. 5 on electronic contracting).

Due to the expansion of the physical marketplace into an electronic market space, the globalization of many business activities, and the constant development into an information society, each company must reconsider its own market focus. At the same time, concentration on core competencies and network formation with promising partners (as in the construction of suitable business webs) helps in this regard.

*Developing an  
eBusiness  
strategy*

## Case Study eDVDSHOP: Web Presence

After eTorrent has set up the eDVDSHOP on one of its servers, Anderson can begin to configure the shop according to his wishes. eSarine is totally language independent. Consequently, a shop can be run in as many languages as desired. Anderson decides to maintain the shop in English and German. The entire range of goods must therefore be recorded in two languages and filed with pictures and descriptions in the shop. Anderson can use the English labels and descriptions of the products from the existing pages and simply translate them into German. eSarine, however, like many other webshops, offers the possibility of defining product attributes for products. One product attribute for a DVD could be the director of the film. In eSarine, all product attributes are grouped into so-called product types. Anderson sets up the DVD product type and defines several product attributes.



## 2.2 Anatomy of an Electronic Marketplace

*Intermediaries  
and  
infomediaries*

Market participants change the intermediation in electronic markets by offering services in lieu of particular value-creating stages. With this sort of intermediation, the value chains are broken up by third-party providers (intermediaries and infomediaries). This enables companies to concentrate on core competencies and to delegate less important activities to collaborating partners (see different b-webs in Sect. 2.3). In the process, specialized companies take over a certain domain of the value-creating chain by acting as intermediaries. This is meant to reduce costs and to achieve specialization.

*Horizontal and  
vertical  
integration*

Horizontal and vertical integration variants exist in intermediation: certain members of several value-creating chains support the provider horizontally when the procurement of goods is involved (see Sect. 2.2.1 on horizontal integration). In a comprehensive producer portal, however, market participants organize themselves within an industry and integrate their value chains vertically (see Sect. 2.2.2 on vertical integration).

*What is disin-  
termediation?*

Along with intermediation, disintermediation is observed at the same time in electronic markets. With disintermediation, intermediate stages of the value-creating chains are dissolved, and in extreme cases direct access of customers to the range of services of the respective provider is facilitated. This threatens the existence and intermediary function of middlemen (intermediaries).

For companies that would like to gain a foothold in the electronic market, the advantages of disintermediation are as follows:

*Advantages of disintermediation*

- By avoiding middlemen, cost advantages and margin gains can be realized.
- With the aid of Internet-based means of communication, an electronic customer relationship and customer connection is established (see eCustomer relationship management in Chap. 8).
- Direct access to the customer allows for the analysis of customer behavior and the appraisal of customer preferences. Qualified customer feedback aids in the appropriate expansion of the product and service range.
- Depending on the customers' willingness to pay, certain products and services can be offered to specific customers (see mass customization and on-demand production in Sect. 6.3).

Some forms of disintermediation can also have an unfavorable effect. Issues with trade partners often develop when existing middlemen are avoided or their freedom of action is reduced. Moreover, for direct customer contact, appropriate relations management must be developed and customer processes efficiently supported.

### 2.2.1 Horizontal Integration

In horizontal marketplaces, market participants characteristically take over activities which do not directly belong to the core business of the company. Thus the individual company is relieved of some of the burden; at the same time, optimization and enhanced quality are strived for through the bundling over industries. Figure 2.1 schematically shows horizontal integration for the example of a procurement process. Some companies have recognized that they can optimize their relationships with providers of MRO services (maintenance, repair, and operations), and thus the procurement processes associated with them. Using so-called desktop purchasing systems (see Sect. 3.5), the collaborators receive current information from the product and supplier catalogs of companies, generate their orders, and initiate subsequent delivery and payment processes. According to data from industrial enterprises, an average of approximately 80% of all purchase transactions have their origins in the procurement of indirect MRO services. If one takes into account the tangible assets in these indirect services, then they result in one-third of the external costs of a company on average. Aside from the costs of direct services and personnel, indirect MRO services thus represent the largest cost block for a company.

*Outsourcing options for procurement*

*Optimization with MRO services*

The Ariba ORMS (operating resource management system) software system from Ariba Technologies, Inc. is probably the most well-known desktop purchasing system (see Sect. 3.5). It includes a high-performance search engine and a graphic workflow component for the procurement process. Ariba ORMS is an

*Application of desktop purchasing systems*



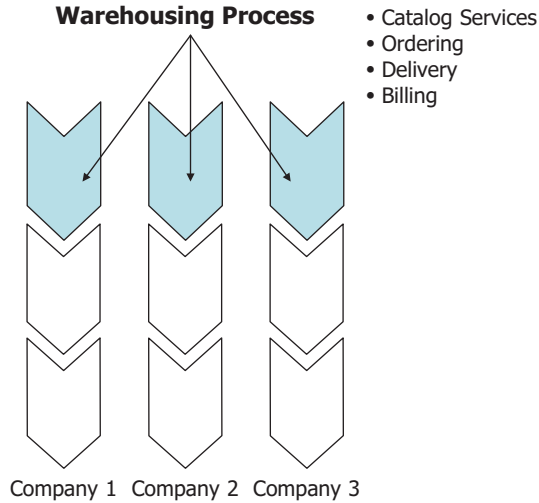


Fig. 2.1: Horizontal integration of the procurement process for MRO goods

application that is installed on the buyer's intranet which reflects the company-specified procurement rules and realizes the posting of ordered goods for the company. In the process, purchasing companies generate a contract with Ariba Technologies, Inc. for the desired number of MRO transactions. Subscription fees for software adjustments and hotline services are charged. Maintenance of the supplier catalogs is carried out by either the suppliers themselves or a third party (see Chap. 3 on eProcurement). Both products (such as preconfigured computers, software, magazines, books, office supplies, office furniture, or industrial products for maintenance) and services (such as advertisements, bank services, cafeteria, hotlines, copying services, courier services, travel, and training) can be administered in the same way.

Desktop purchasing systems automate the procurement process. Due to refined software, this is less error-prone and ties up fewer personnel resources in the other company. In addition, orders within the company can be bundled in order to negotiate favorable prices with the suppliers. The procurement process itself, the stock, and the delivery schedule can be viewed at any time by the individual employees.

### 2.2.2 Vertical Integration

#### *Development of a one-stop shop*

Selected participants in vertical marketplaces become one-stop shops for companies of a particular industry. They offer additional information services aside from transactions. Extensive information offers, relevant industry identification numbers, and annotated link collections demonstrate the competency of the operator in the market and force individual companies into integration. If the business model of the vertical integrator in a particular industry works well, then the

recipe for success is transferred to other industries. Thus, vertical integrators act as market makers—they establish new marketplaces as they bring customers and suppliers of fragmented marketplaces together (see Sect. 3.3.4).

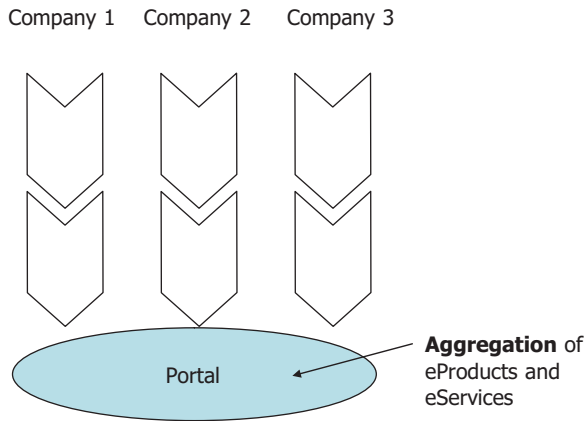


Fig. 2.2: The one-stop shop as vertical integrator

If a multitude of geographically distributed customers and suppliers exist for whom communication with their respective market partners involves high expenditure, then a one-stop shop may proffer its services. These are market participants who vertically integrate the value chains of various providers. The source of income for a one-stop shop usually consists of transaction commissions, fees for listings, banner advertisements, as well as sales of POS (point of sale) data (see Fig. 2.2). The one-stop shop operates its Internet platform as a portal; it takes over the online marketing, editing and maintenance of supplier catalogs, and sometimes also customer service and the design of new product components or services.

*From the Internet platform to portals*

Apart from the one-stop shop, there are other forms of vertical integration, such as Internet auctions and Internet spot markets. An Internet auction house supports the seller with regard to an optimal price strategy, takes over marketing, and carries out credit assessment and payment handling. In Internet auctions, market participants need to be fully aware that they are dealing with legally binding transactions with quality standards that are customary to the industry (see Sect. 2.5.4).

*The auction as a form of vertical integration*

Internet spot markets are real-time stock exchanges where smaller groups of providers and consumers carry out last-minute transactions. By means of vertical integration, companies with unused capacity can realize additional sales with acceptable prices. Pricing takes place online. For the operator of an Internet spot market, success depends on whether it can procure relevant market participants and develop a trustworthy image.

*Internet-based real-time stock exchanges*

## 2.3 Classification of Business Webs According to Tapscott

### 2.3.1 Agora B-Web

The term “agora” originates from antiquity, and was used to designate the people’s assemblies held at that time. Later, the term was also used for a public meeting place where business was conducted, including trade.

*Agora b-web*

The agora business web or b-web is an electronic marketplace where buyers and sellers meet in order to openly negotiate over the goods offered and their prices. What is important in the agora is the process of dynamic price discovery. In an agora there are no fixed prices; the prices are negotiated. An agora promotes the exchange of digital and material goods and services, as providers and buyers haggle among themselves over the price. In Fig. 2.3 the basic structure of

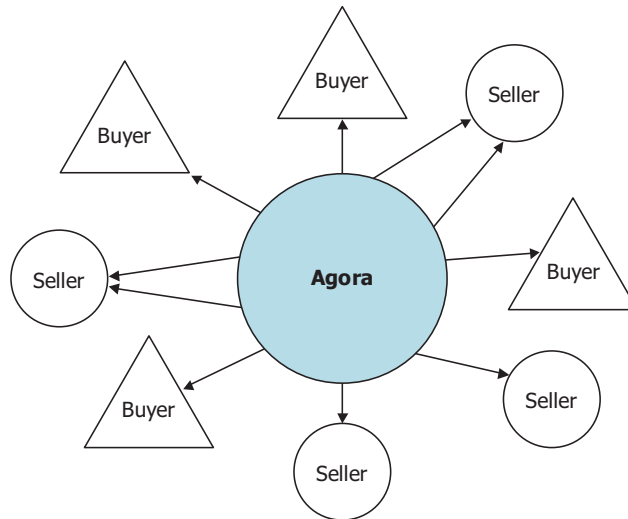


Fig. 2.3: The agora: an open marketplace with dynamic price discovery

the agora b-web is shown: providers or sellers (symbolized by circles) offer their goods and services in the virtual marketplace. Consumers or buyers (symbolized as triangles) inform themselves and discuss elements of the products, including rights to use and individual prices.

Different service providers can offer and sell products and services in an agora. Though the offer is manifold and not viewed beforehand, the value integration remains decided. Indeed, well-functioning marketplaces acting as agoras show advantages for both providers and consumers. The buyers profit since there are a high number of providers offering various products and services. Conversely, the presence of many consumers with different ideas about the value of a certain product will push up the value of the product offered, to the benefit of the provider.

*Advantages for customers and providers*

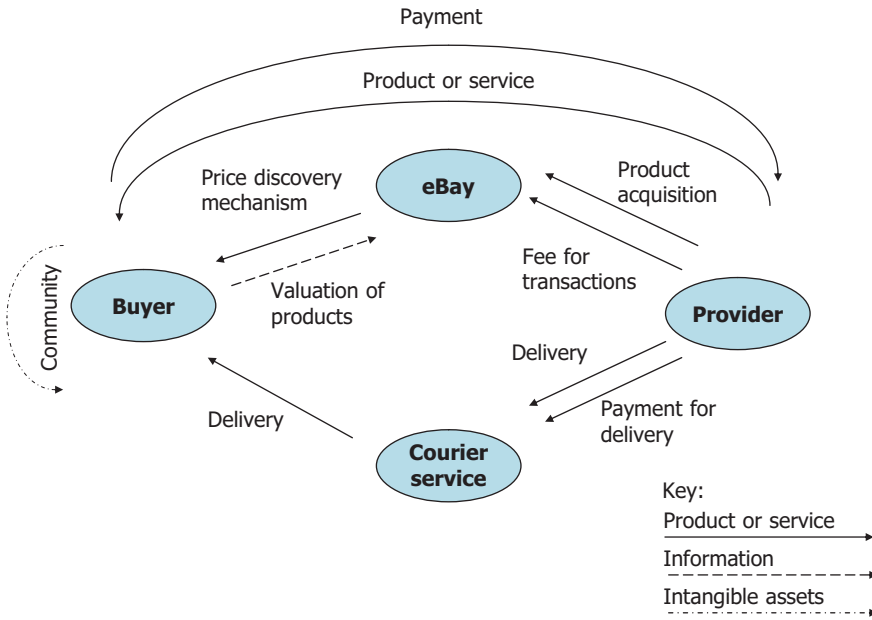


Fig. 2.4: Value contributions for eBay (an agora)

An agora normally offers diverse information on all aspects of the business. At the same time, it keeps marketing and distribution costs low. Bargain hunters often lend it a special appeal and offer sought-after entertainment to market participants. The Internet can transform the agora into an interesting meeting place with efficient market channels. Goods or services that were previously sold in flea markets or through the classified ads of daily newspapers suddenly show up in global auctions and stock exchanges.

*Demand for auctions*

The well-known agora, eBay.com, is presented in Fig. 2.4, along with its value contributions. eBay started at the end of the 1990s, acting as a low-key collectors exchange and junk market, but it has since developed into an important electronic marketplace. eBay is a neutral third party that provides customers (buyers) and content providers (sellers) with a platform for negotiations and transactions. The central value of eBay lies in the offer of a trust-building platform for the exchange of information, the opportunity for dynamic price discovery, and the impetus for service completion.

*Business idea of eBay*

Platforms such as eBay put low transaction costs to use: the customers—providers and consumers—perform most of the work and cover most of the costs and risks. Such platforms for trading material and digital goods have the following advantages:

*Potential benefits of eBay*

**No storage costs.** The providers store their own products.

**Minimal marketing costs.** The providers describe and illustrate their products on the platform themselves.

**Reduced distribution costs.** Buyers and providers regulate dispatch and payment among themselves.

**Low product liability.** Products are auctioned (process of price formation, see Sect. 2.5); the buyer carries the risk.

**Low financial risk.** The providers authorize the operator of the exchange platform to collect an auction fee.

In an agora, the customers or customer groups often develop into a community. The participants of auctions agree to an organized process involving negotiation, pricing, and distribution of goods.

### 2.3.2 Aggregator B-Web

A b-web of the aggregator type is a digital supermarket: it selects suitable products and services from different producers, decides on the appropriate market segments, sets prices, and supervises the fulfillment of the transaction.

*Hierarchical control of suppliers*

In Fig. 2.5 the constellation of an aggregator is depicted in an abstract manner. A single company in this b-web controls several producers in a hierarchical fashion. The aggregator buys products and services according to its own discretion, and to a great extent sets the purchase prices. It then determines the selling prices and discounts for the assortment of goods. It also controls the sale and distribution of the goods. Aggregators take on an intermediary function between

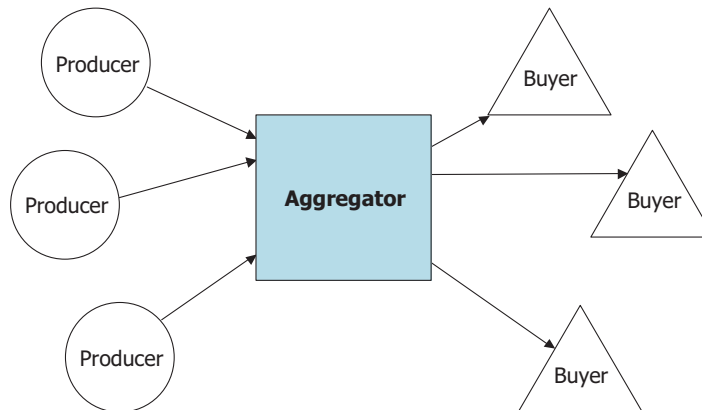


Fig. 2.5: An aggregator combines products and dictates prices

producers and customers. Normally they offer a large selection of products and services without or with only minimal value integration (see also the value chain of the integrator b-web in Sect. 2.3.3).

*The Amazon aggregator*

Probably the most well-known aggregator is the book/video/CD shop, Amazon.com. The products sold by this supermarket are to a large extent standardized. They are easily cataloged and described and visualized electronically in

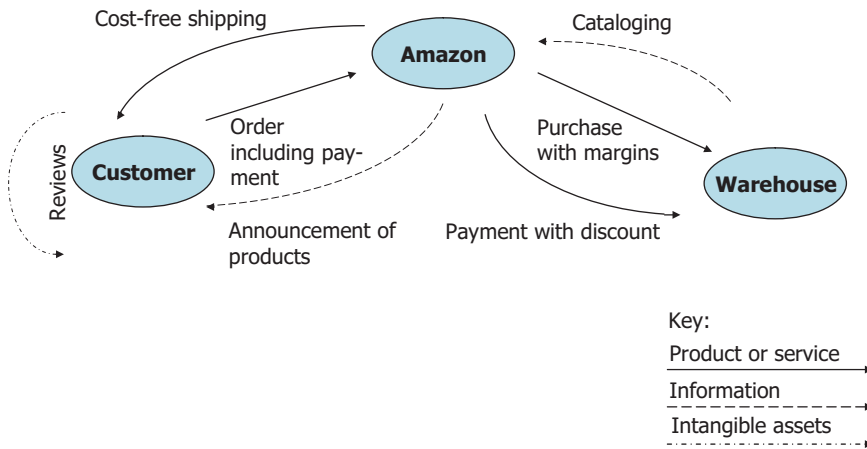


Fig. 2.6: Goods and information flow through the aggregator Amazon

varying detail. In addition, samples (textual, visual, and audio) are provided. By skillfully recording the behavior of visitors and sales, it is also possible to make recommendations.

In comparison to many consumer goods, books and CDs are relatively easy to transport. Since the handling volume at Amazon is large, the shipment costs can be waived from a fixed sales gross upon accounting.

In Fig. 2.6, the value contributions for Amazon are visualized. The customer can find books or CDs with a simple search procedure and study the different summaries. In addition, reviews from customers and experts can act as purchase recommendations. Shipment normally takes place free of charge with an order. Amazon can make use of its market power when dealing with publishing houses and negotiate special offers. The cataloging of the books and CDs takes place through the publishing houses themselves. Modes of payment to customers such as publishing houses are specified and accomplished by the aggregator.

*Customized offer*

Amazon’s fulfillment model has changed and developed since the initial phase of the company. In the past, orders received by Amazon were passed on to partners, who then packed and delivered the books and CDs. Now, popular products are kept in a warehouse and delivered by Amazon itself. When orders are fulfilled from the warehouse it means higher profit margins and faster delivery to customers. Cross-selling measures can also be adapted more efficiently in this case.

*The path to cross-selling*

Using their market volume and market power, aggregators can lower their transaction costs, particularly through the use of Internet technologies and appropriate digital agents. The digital supermarket can be operated to a great extent by intelligent software agents. Simple agents advise the buyers and look for and value the desired products in their own supermarket or directly among the providers. Intelligent agents help the customers to clarify their desires and to select an attractive combination from the variety of offers. In individual cases,

*Employing intelligent software agents*

software agents can themselves negotiate the value mix, quality requirements, price, delivery conditions, and modes of payment.

*Advantages of  
an aggregator  
b-web*

To summarize, aggregators possess the following advantages:

**Strong negotiation power.** The aggregator selects the products and establishes the price.

**Employment of digital advisors.** Software agents help with search and comparison procedures and advise the customer.

**Independent product valuation.** Advantages and disadvantages of products are understood by the customers and published by the aggregator as a decision-making aid.

**Sale stimulation.** In the digital supermarket, products can be bundled and cross-selling measures realized.

**Customer saves on shipping costs.** The aggregator can create incentives by utilizing scale effects and low transaction costs.

There are aggregators in both the B2B and the B2C realms. Apart from consumer goods, digital products such as financial and insurance services are also sold with aggregators.

### 2.3.3 Integrator B-Web

*Integrator as a  
value chain*

A business web of the integrator type is a value-creating chain that includes all of the components—from specification, production and delivery to support for products and services—desired by the customer. An integrator does not itself produce services or product components, but rather works as a context provider. As such, it integrates the value contributions of various content providers such as external developers, parts suppliers, dealers, solution integrators, operators, and other partners. In other words, the integrator controls the organization of the products and the services and directs the steps toward value integration.

*Function of the  
integrator  
b-web*

In Fig. 2.7 the basic principle of an integrator is illustrated: different producers with different capabilities and services are combined into value chains and directed by the integrator. The motivation to implement such a value chain is provided by customers who are striving for an individual and usually complex solution, possibly with a high investment volume. When an individual producer is not able to offer or does not want to offer the optimal solution, the integrator will assume this responsibility; often the integrator takes the role of a general contractor, with the corresponding responsibilities. This again forces the integrator to merge the content providers into an optimized supplier relationship and to competently control the planning, development, installation, and service processes (see supply chain management in Sect. 6.3). An integrator's goal is to make the value chain demand-oriented. In other words, an offer is only created upon demand. A customer need therefore triggers the construction of what may be an individually shaped supply chain.

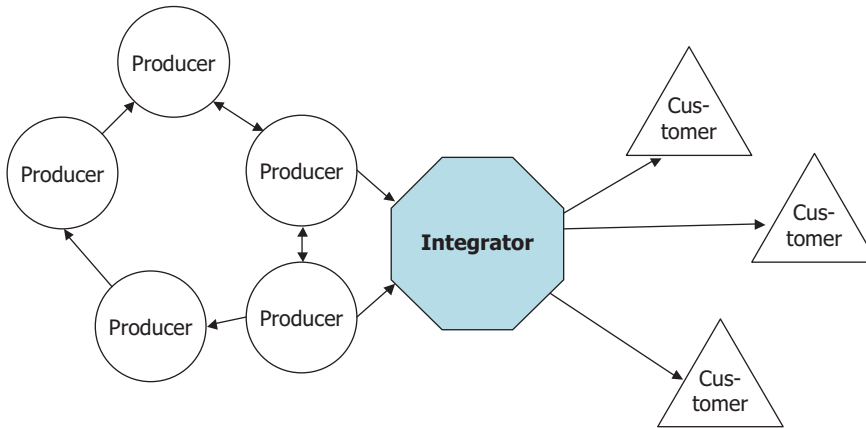


Fig. 2.7: An integrator b-web controlling the optimized value chain

A real-world example of a b-web of the integrator type is given in Fig. 2.8. Cisco is a well-known provider of telecommunication networks and components. In the value chain, Cisco connects and supervises semiconductor producers, dealers of component parts, logistics companies, as well as system integrators.

One normally thinks of a value chain as being associated with mass production or routine production with large-scale logistics and storekeeping. However, Cisco is a value chain of the shop production type; in this case, custom-made networks are developed for customer-specific problems.

Shop production differs substantially from mass production. First of all, the activities necessary in shop production are not routine procedures, since they are planned and carried out based on the customer's problem. Moreover, the workshop does not follow the "make and sell" logic; it begins production of the commodity only when it is already sold. Shop production therefore orients itself to the consumer and only produces "on demand" (see Sect. 6.3.3). The customer placing the order sets the value chain into motion. After all, the customer in a shop production process participates in the conception and occasionally also in the realization of a solution. Cisco represents a mixture of routine production and shop production. The networks supplied by Cisco, including hardware and software, are configured and produced when ordered. At the same time, individual components from mass production are also used in the value chain.

Content providers in a b-web of the integrator type are often spread out and specialized. The success of an integrator therefore depends on good planning and coordination of the different partners. Project management plays an important role in the process, including the use of knowledge resources.

The advantages of using an integrator b-web can be summarized as follows:

**Customer-oriented solution.** The customer order comes first, with initial partial payments being made when the order is placed.

*Shop  
production*

*Advantages of  
an integrator  
b-web*



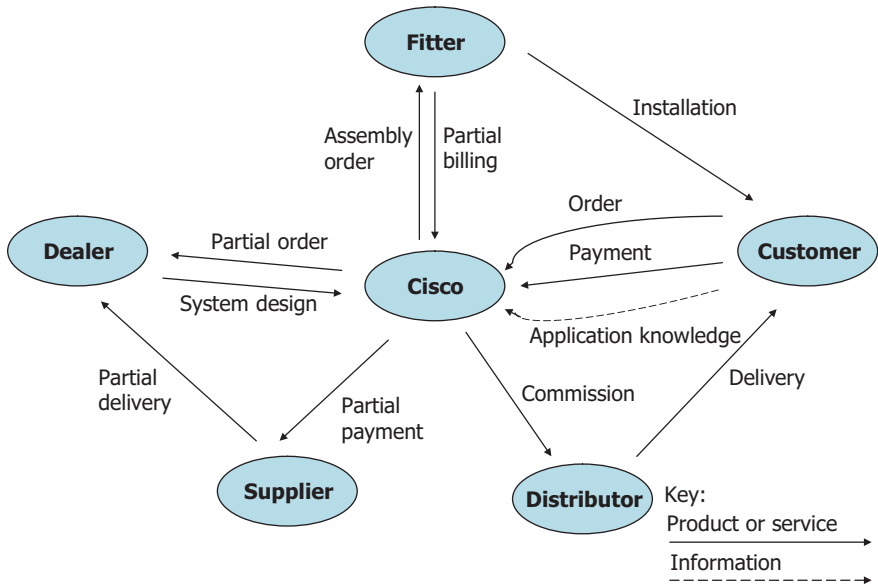


Fig. 2.8: Value integration in the Cisco b-web

**General contractor.** The integrator assumes full responsibility for the customer order.

**Formation of a value chain.** The selection of suppliers, the networking, and appropriate negotiations are all realized by the integrator.

**Shop production instead of routine production.** All components are custom-made.

**Project and method knowledge.** The integrator controls project management and knowledge use.

In the digital economy, the best value chains compete in terms of both cost and differentiation. They must look for customer-oriented solutions and offer individual and service-supported production in place of mass-produced goods.

### 2.3.4 Alliance B-Web

*Why promote  
an alliance  
b-web?*

Alliances are business webs that are loosely coupled and self-organized partner networks (also often called communities) which pursue a common goal. The individual partners bring their specific know-how to the table, and at the same time take part in developing the solution. They are—and remain—independent, and try to compensate for a lack of competency by producing suitable network partners.

Figure 2.9 illustrates an alliance business web. The members of this partner network have dual roles: they are each consumers that have a need and are looking for a solution (graphically expressed by triangles), and at the same time each participates in solution development as a producer (graphically suggested by circles). The word “prosumer” has been created to express this dual producer and consumer role. A b-web of the alliance type is a dynamic creation with equal partners which, upon encountering various challenges, reorganizes itself each time and develops further. In this way, no partner dominates and controls the partner network. Rather, the loosely coupled partner network is held together by a few behavioral rules.

*An alliance as a prosumer*

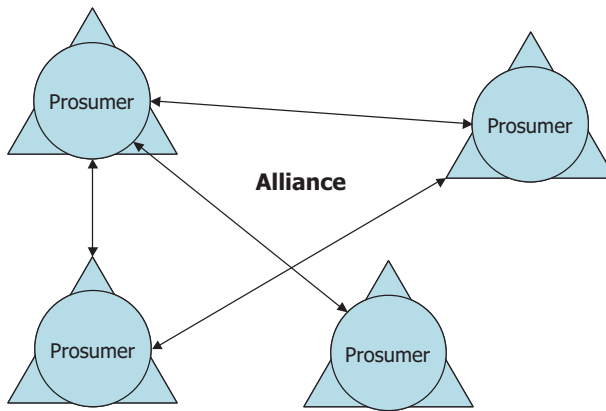


Fig. 2.9: The alliance b-web forms a value module

B-webs of the alliance type develop on a voluntary basis, motivated by a common need. At first there is a creative idea which needs to be adapted by the partners as a group. Mutual respect, intangible assets, and unconventional ideas are the drivers of such partner networks. Alliances distinguish themselves as being a high-value form of integration; they can be considered “value modules.”

*Network of equal partners*

In many cases, alliances are temporally limited. They come into being when small companies or individual persons congregate and develop a mutual solution. If the solution is found, it is circulated and passed on, normally free of charge.

*Establishment of a value program*

The development of the Linux operating system serves as an example of a b-web of the alliance type (Fig. 2.10). After the Finnish student Linus Torvalds developed a simple kernel for a Unix clone for PCs, he made the software available for free on the Internet (i.e., as open source) for further development. The users were merely obligated to pass the program and possible extensions on with the source code. In the years that followed, qualified programmers around the world developed innumerable improvements and extensions to this operating system.

*The development of Linux*

Today Linux is a stable and extensive software product which remains available to open source companies and private individuals. It is installed on millions of different servers around the world and fulfills its purpose. Web browsers, email services and other applications can all be operated on this system.

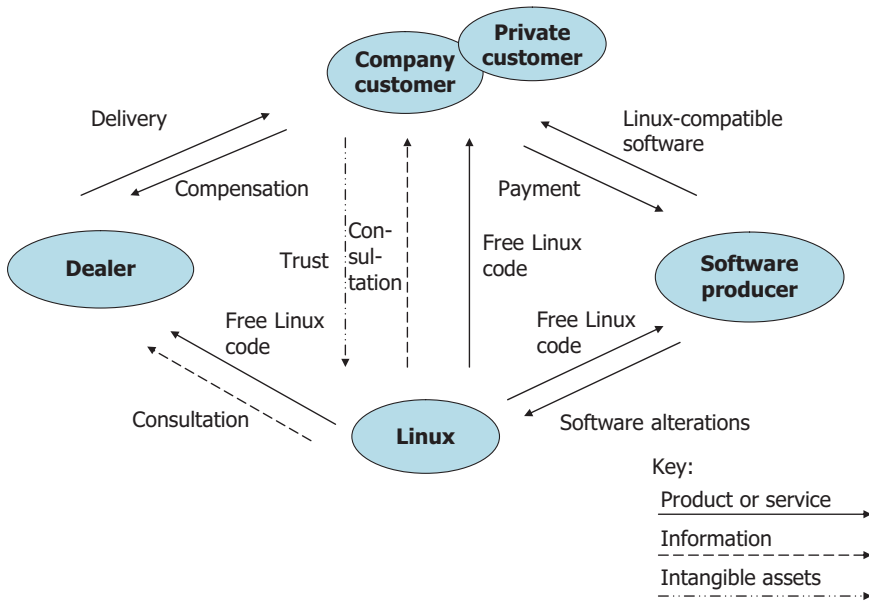


Fig. 2.10: The value module of the Linux alliance

*Success of open source developments*

In their spare time, scientists, self-employed individuals and employees have voluntarily and without monetary incentives downloaded the source code from Linux and then tested and extended it with ingenious functions. The users of Linux can download the source code over the Internet free of charge, or they can buy a version on CD for a minimal fee from companies such as SuSE or Red Hat, and acquire the right to unlimited use. Alliances are formed in a variety of ways. Apart from networks for the development of open source software packages, there are social communities, specific discussion and help forums, networks for freelance artists, expert communities, etc.

A b-web of the alliance type exhibits the following advantages:

*Advantages of the alliance b-web*

**Network formation.** Partners in an alliance form a network of equal rights.

**Self-organization.** A few behavioral rules promote collaboration.

**Prosumer.** The partners are simultaneously producers (supplying creative products and services) and consumers (demanding solutions).

**Value module.** Intangible assets are created together.

**Idealized objective.** Mutual respect, trust, and common value creation form the basis of the alliance.

An alliance is a virtual network that aims to develop creative solutions and does so without hierarchical guidance structures. The participants of an alliance form

a creative community aligned towards a goal. It therefore remains one of the most transitory and at the same time most innovative types of business web.

### 2.3.5 Distributor B-Web

A distributor b-web is a distribution network that transfers material products, intangible products and services from the producer to the user. Distributors fulfill a distribution function, acting (for example) as a transportation company, electricity provider, financial service, courier service and postal service, communications network operator, or logistics company.

*Definition of the distributor b-web*

Integrators and alliances contribute to the value chain by refining raw materials or ideas into products or services. An agora and aggregator selects goods, offers them, and negotiates the price. Distributors, however, in their original form, assist the four previously discussed b-webs by ensuring that the information, goods, and services are exchanged.

Figure 2.11 shows the basic form of a distributor b-web. The distribution network connects the producer of products and services with the purchaser or customer. It can therefore consist of a physical or digital network and distribution system.

One special type of digital communications provider is the so-called infomediary. This is a unit that collects, manages, and passes on information from customers. Private consumers and companies make use of infomediaries as buyers of goods and services. Apart from management and distribution functions, they also offer services related to data protection. They aid consumers and the other b-webs by offering the following services:

*Emergence of infomediaries*

- Management of the access to digital communications networks (user identification, authorization)

*Services provided by infomediaries*

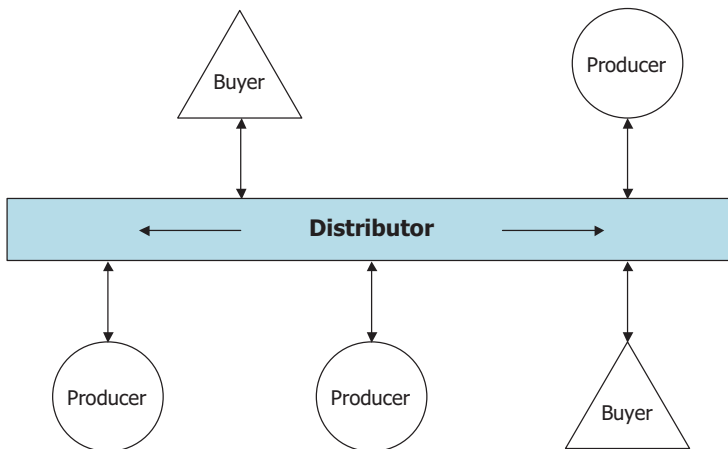


Fig. 2.11: Basic concept of the distributor b-web

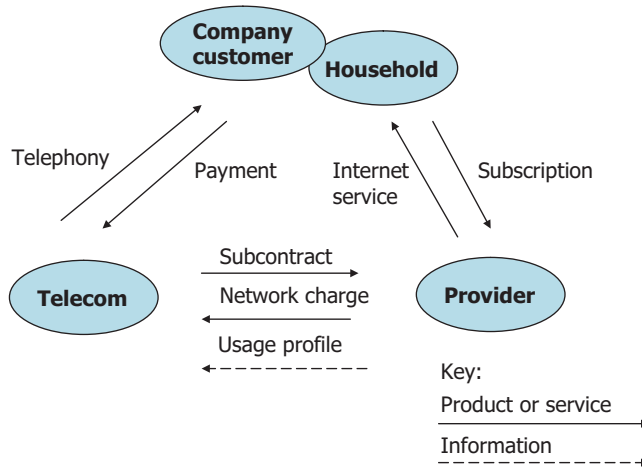


Fig. 2.12: Value creation with a distributor, Telecom

- Management and representation of benchmark figures of different transaction data
- Maintenance of preference profiles for different subject areas, such as health, entertainment, cultural offers, etc.
- Representations of the behavior of customers and customer groups as buyers of goods and services

Infomediaries and distributors therefore specialize in offering companies and private individuals network services with graduated service throughput and varying levels of security. Internet-based distributors try to react to events in real time and to offer optimized distribution processes.

*Telecom as a distributor b-web*

Figure 2.12 shows value creation at Telecom when a subcontractor acts as an Internet provider. Telecom is increasingly acting as an infomediary for providers of digital services. Distributors can support three forms of offer, depending on the goods being transported:

**Network services for divisible goods.** They collect and distribute divisible goods such as electricity or bandwidth for the transport of multimedia objects over digital communications networks.

**Network services for forwarded goods.** These include carriers, postal services, airlines as well as language, picture and sound mediators in digital communications networks.

**Network services for usable goods.** Financial and insurance companies loan capital or cover risks.

The advantages of a distributor b-web are:

*Beneficial aspects of distributors*

**Internationalization.** The distributor fulfills its distribution function in global component markets.

**Scale effects.** Scale effects can be obtained through the bundling of transport and distribution functions.

**24-h operation.** Many distributors, particularly those with digital communications suppliers, offer around-the-clock service.

**Specialization based on the type of goods.** Distributors act as network services for divisible, forwarded, or usable goods.

**Special function of the infomediary.** An infomediary controls the access function and prepares the transaction data.

A distributor facilitates the exchange and delivery of information, goods, and services. Distribution networks contribute to the transformation of regulated monopolies into competitive disaggregated markets (see electronic health market in Sect. 1.2.2).

## 2.4 Comparison and Valuation of Networks

When a business model is being developed, two fundamental questions arise: which is the most promising b-web for the core business of that particular company, and which b-web should be used to offer supplementary services?

Five basic types of b-web are available: agora, aggregator, integrator, alliance, and distributor. The classification of b-webs reinforces their fundamental characteristics and features when used; a comparison of them is shown in Fig. 2.13.

The aims and main characteristics of b-webs are quite different, and range from open marketplaces with negotiable goods and values (agora type) over tightly organized hierarchical networks (aggregator, integrator, or distributor types) to self-organized and loosely coupled communities (alliance type).

*The variety of b-webs*

The role of the customer also differs between the individual b-webs. With the agora, the customer is a market participant who orients himself to the market activity and negotiates the exchange of goods. The buyer role of the customer in the aggregator and the customer's role as receiver in the distributor are expanded in the integrator, where the customer becomes a value driver. However, an alliance only functions if the customer gets involved and contributes to the search for and development of solutions.

*Different customer roles*

In real-world electronic markets, the market participants do not always appear to form clearly definable b-webs. Rather, a b-web often exhibits characteristics of several types of b-web. In addition, various b-webs can be integrated into a particular network of providers and customers. Furthermore, it is obvious that each b-web must exhibit a distribution function, perhaps distributing out via a common market distributor.

*Delimitation is problematic with b-webs*

	Agora	Aggregator	Integrator	Alliance	Distributor
Objective	market place for goods and values	digital supermarket	optimized value chain	self-organized value module	exchange of information, goods and services
Characteristics	<ul style="list-style-type: none"> <li>market information</li> <li>negotiation process</li> <li>dynamic price discovery</li> </ul>	<ul style="list-style-type: none"> <li>distribution of products</li> <li>firm price</li> <li>easy fulfillment</li> </ul>	<ul style="list-style-type: none"> <li>targeted supplier selection</li> <li>process optimization</li> <li>product integration</li> </ul>	<ul style="list-style-type: none"> <li>innovation</li> <li>trust building</li> <li>relinquishment of hierarchical control</li> </ul>	<ul style="list-style-type: none"> <li>network optimization</li> <li>unlimited use</li> <li>logistic process</li> </ul>
Customer role	market participant	buyer	value driver	contributor	recipient
Benefits	negotiable market service	comfortable selection and fulfillment	customized product	creative and mutual solution	just-in-time delivery
Examples	eBay auctions.yahoo	etrade amazon	Cisco Dell	Linux Music.download	UPS AT&T Telecom

Fig. 2.13: Comparison of the main characteristics of the various types of b-web

Aside from characterizing the b-webs, the different roles of the participants of such networks can also be discussed. The roles change depending on the selected b-web. Despite the changes in a particular participant's role, some fundamental functions are evident:

**Customer as creator.** Depending upon the type of b-web, the customers behave both as consumers and as creators that actively participate in value creation.

**Content provider.** These are responsible for the development of goods, services, and information in order to satisfy customer needs.

**Context provider.** The context provider forms the interface between customers and b-webs. They are jointly responsible for coordination, the rules of the system, and value realization.

**Transactions provider.** The transactions provider makes it possible to conclude electronic business processes while taking into account data protection and data security.

**Infrastructure provider.** They make communications and transport networks available and maintain the infrastructure.

*Meaning of open standards*

The partners and participants associated with b-webs must know and follow the rules of the market. Voluntary consideration of open standards and technologies aids and increases independence. In many cases, the context or transactions

provider creates the rules and supervises their adherence. However, all of the market participants can set rules or suggest changes.

## 2.5 The Price Formation Process

### 2.5.1 Options for Price Differentiation

Price management aims to establish an optimal pricing policy based on the strategic goals of the company, and to carry it through in the market. Price formation represents a special challenge in electronic business, since intangible goods and digital product components must also be included in the calculation.

Valuation of intangible product parts is a difficult task, since no generally valid computation method exists for these components. The reason for this is that the first copy is very expensive to produce, while additional copies can be produced at much lower cost. The development of a software package, for example, requires a large investment until a stable, up-and-running first version is completed. However, it is relatively inexpensive to produce additional copies of software, even taking into account distribution costs.

The task of fixing prices of the products and services in a b-web is not a simple one either, because network aspects come into play here. The customer evaluates the service of a b-web as a whole, and also expects an offer. Within the b-web (obviously depending on the type), it is difficult to classify the different cost contributions. Despite these problems, a price management system for b-webs must be developed and adapted in order to regulate the distribution competition and the value creation of companies associated with the network.

For the reasons mentioned above, fixed prices are circumvented if at all possible in electronic business, and a differentiated pricing policy is favored. Price differentiation can flexibly adapt to changing market conditions. Moreover, differentiated prices allow consumer demands to be reconciled temporally, thus enabling the necessary resources and capacities to be optimized.

Differentiated prices guarantee higher profits in many cases. Consider Fig. 2.14. With a high pricing policy (option a) of 800 Euros as the unit price, only 3,000 products must be sold in order to make the same profit as a low pricing policy (option b) of 300 Euros as the unit price, which requires 8,000 samples to be sold. If the differentiated prices (300 and 800 Euros, respectively) allowed easily altered product versions, then an added value (option c) could be obtained with the same sale. It is assumed that with suitable marketing and advertising, different large buyer groups could be found for the economy version of the product for 300 Euros and for the deluxe version for 800 Euros. In other words, it would be disadvantageous to not sell both product versions at different prices.

Price differentiation can be based on different criteria, such as customer segments, time, quantity, or range of services:

**Time-related price differentiation.** It is assumed here that customer groups display a special high or low willingness to pay at a certain time. Thus, a service provider can arrange access to the Internet according to the time of day and

*Price discovery for intangible goods*

*Considering aspects of the network*

*Advantages of price differentiation*

*Profit considerations with price differentiation*

*Weighing up the willingness to pay*



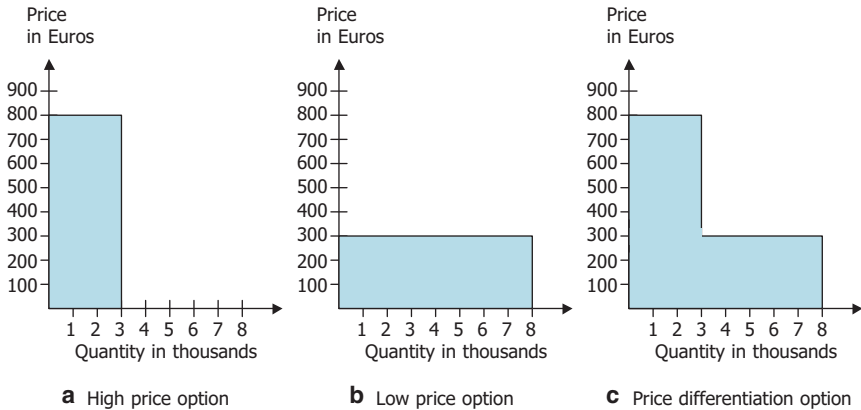


Fig. 2.14: Beneficial effects of price differentiation

offer specific price terms; or purchasable information on market activity is more favorably traded the older the information is.

*Differentiation based on age, sex, or social status*

**Customer-related price differentiation.** In this variant, customer groups that receive different quotations will be formed. The differentiation can depend on age, sex, or social affiliation. A software supplier could sell some of its products to women or adolescents at more favorable terms in order to lower the entry level threshold for these segments. Naturally, price differentiation based on customer groups requires additional expenditure, as proof of affiliation to the particular group must be furnished and checked. It is assumed, however, that this additional expenditure pays for itself through multi- or additional sales, as exemplified here by women or adolescents.

*Quantity-related discounts*

**Quantity-related price differentiation.** The purchase quantity is a frequent criterion for price differentiation. Quantity-related price differentiation means that the quantity ordered in an electronic transaction offers a discount. Thus, an online bookshop delivers books free of charge if a certain quantity of books or a previously declared sum of money is exceeded. Naturally, a quantity-related differentiation can be limited to the products ordered within a fixed period of time.

*Gradation based on function and service*

**Service-related price differentiation.** If customers and buyers expect different services, service-related price differentiation is imposed. Different versions of a product with intangible properties prove to be relatively convenient to implement. In a digital product with so-called versioning, the range of services differs in terms of user-friendliness, functionality, or service. For example, trained specialists or experts can buy a software package for data mining without training course documents, case studies, etc., and can do without support services.

Price differentiation is advantageous for b-webs or companies since it increases the profit potential of clever pricing policies. Differentiated prices can also be

attractive from the perspective of the buyer, especially when they draw customers or customer groups that are willing and able to pay.

### 2.5.2 Linear and Nonlinear Price Formation

In many cases, a proportional connection exists between the performance of a product, or rather a service, and the price asked. This is a case of linear price formation; an example is billing for support services based on the number of hours worked.

*Basic principle of linear prices*

In nonlinear price formation, there is not a linear dependency between product service and price. This is a significant difference, because it allows the behavior of consumers to be better copied in many cases. Many consumers evaluate product prices relative to the quantity of the product that they already possess or have consumed. In other words the margin benefit decreases with the satisfaction that a consumer gets from consuming the products or services (Gossen's law). The first release of a software package brings the user a greater benefit than any of the product versions supplied later. As the product is revised, the buyer's willingness to pay will likewise decrease. Thus, it is essential to impose a nonlinear pricing policy.

*Meaning of nonlinear prices*

A nonlinear price consists of various price components. Usually the price curve is a combination of a basic charge and a variable usage charge (see Fig. 2.15). This price is nonlinear because the basic charge is fixed but distributed across all of the units ordered, and so the basic charge per unit drops as the number of units ordered increases. In other words, the greater the sales volume, the lower the average cost per unit.

*Construction of nonlinear prices*

Electronic trading platforms, such as those used for B2B businesses, often strive for nonlinear price fixing. The operators of such platforms require a basic charge and negotiate a usage charge which depends on the volume of the products and services ordered. When price fixing is applied, the total cost increases steadily with the trading volume, but the average cost does not fall linearly (see Fig. 2.15). So-called service providers select nonlinear price formulations, sometimes with

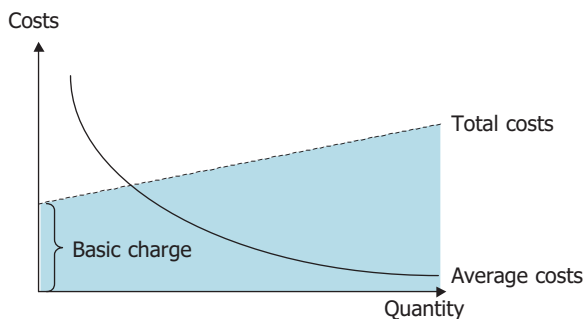


Fig. 2.15: Cost development with nonlinear price formation

more than two components. For example, AOL (America Online) used to impose a basic charge per month and a variable usage charge per minute. On top of this there was an additional charge per Web dial-up.

*Offer with multistage tariffs*

Multistage tariffs can also be offered to the customers. In this way, the buyer can better adapt the tariff structure to his individual network structure and usage purposes. The fundamental question of how a combination of basic charges and usage charges can best portray the individual course of the customers' willingness to pay remains, however.

### 2.5.3 Forms of Price Bundling

In electronic business and the trading of digital goods, the bundling of products or services is of the utmost importance. An example of this is a publishing house that offers the following services as a bundle:

*Example of a product bundle*

- Subscription to the quarterly magazine “Electronic Business” (physical product)
- Electronic archives of the contributions already published, supported by search procedures (full-text search, search by description, etc.)
- Electronic glossary and collection of links for the topics Electronic Business, Electronic Commerce, and Electronic Government
- Optional news service for current events in the field of eGovernment upon submitting an interest profile

The above example illustrates that the four parts—subscription, archives, glossary, and news service—can be offered as a bundle. Depending upon the policy of the publishing house, the purchasing of individual products or services is not intended (pure bundling), or different bundling variants may be authorized (mixed bundling).

*Price fixing for product bundles*

If products and services are not offered individually but bundled, then the pricing policy must plan for so-called price bundling; these are quotations for bundles of products and services. Information objects are suitable for bundling, since digital distribution allows the marginal costs to be kept low. Conversely, an interesting bundle of digital and material goods (see the above offer upon the purchasing of a subscription) can create an incentive to get a rather expensive physical object (here a magazine) in a bundle with additional benefits.

*Meaning of mixed bundle*

The term “mixed bundling” refers to the simultaneous offering of individual products and bundles. As a result, the sum of the prices per unit is many times higher than the price of the bundle. Mixed bundling is a promising approach if the willingness of consumers to pay varies significantly. In a software offer for office automation, one should consider whether components such as word processing, spreadsheet, presentation technology, calendar management, etc., are offered as a mixed bundle. Thus the prospective customer can purchase individual parts at a relatively high price or obtaining the bundle at a reasonable price overall.

Naturally, price bundling is beset with risks, particularly when individual products and bundles compete strongly against each other (tendency toward cannibalization). Individual providers of software products use bundling in order to strengthen market positions and market shares. Thus Microsoft bundles its Windows operating system with the Internet Explorer browser. In this way, its supremacy in the area of operating systems is transferred to the browser market.

*Risks of price bundling*

### 2.5.4 Dynamic Price Formation

Dynamic price management reacts to market changes. Dynamic price formation rejects fixed prices in favor of negotiable prices open on the market.

Auctions are regarded as an important instrument for dynamic price formation. These must provide a standardized sequence of events that make the buying and selling of products and services visible. Auctions make it possible to set up flexible prices based on supply and demand in accordance with market conditions and the terms of competition.

*Auctions promote dynamic price formation*

There are various types of auctions, namely English, Japanese, Dutch, first-price sealed bid auctions, and Vickrey auctions:

*On the multitude of auction types*

**English auction.** In the English auction, the bidding process begins with a minimum price. Here each participant bids several times and can also exceed his previous bid. In electronic auctions, the gathering of bidders in one physical trading place does not take place. Since one does not know how many bidders are participating in the auction, electronic auctions are concluded at a time specified during the run-up. The winner of the auction is the one who submitted the highest bid at that time. In other words, in electronic auctions it is not long until only one bidder remains, and this bidder is then awarded the lot.

**Japanese auction.** This type of auction is equivalent to the English auction except that the bidder does not call out the price himself. The price rises successively higher until only one bidder remains.

**Dutch auction.** In this auction, events proceed in reverse. At the start of a Dutch auction, a high price is set which is then successively lowered until a bidder is found who accepts that price. In this mechanism of continuous price lowering, the first bidder is awarded the lot. Dutch auctions are proffered with ocean-going ships which auction off the remaining storage space in cases of insufficient capacity utilization. Since the unsold transport capacity is worthless when the ship sails, it is worth holding a Dutch auction with a price clock, for instance.

**First-price sealed bid auction.** In a first-price sealed bid auction, secret bids are made by the auction participants and simultaneously opened at the end of the auction. The bidder with the highest bid is awarded the lot. The bidders are forbidden to change their bid or to introduce more bids. First-price sealed bid auctions are seldom found on the Internet; mostly industrial products or real estate are sold this way.

**Vickrey auction.** This auction is largely equivalent to the first-price sealed bid auction. The winner is again the bidder with the highest bid. However, in this case the winner does not pay the price of the highest bid, but that of the second highest bid. For this reason a Vickrey auction is often called a “second-price sealed bid auction.”

*Objective of auctions* It is the goal of auctions to reveal the bidders’ willingness to pay, if possible. In English and Dutch auctions this happens during the bidding process, and it happens at the end of the secret auction in a first-price sealed bid auction. Some

Pros and Cons for Bidders	Description
Admission costs	Possible participation fee for co-bidding in the auction
Search time	Time invested in searching for and evaluating the offer
Negotiation time	Time invested in participating in the auction (opportunity costs)
Price advantage	The price obtained for the auctioned object is better than that obtained by purchasing through other channels
Additional benefits	Fascination with the bidding process
Winners curse	The price obtained from the winner is too high
Risk	Desired objects can be bought by co-bidders
Addiction risk	Competitive tendency can lead to symptoms of addiction

Fig. 2.16: Advantages and disadvantages of various auctions (from a bidder’s perspective)

advantages and disadvantages of bidding at auctions are arranged in Fig. 2.16. The responsibility for fixing prices and negotiating is placed on the shoulders of consumers who want to acquire goods and services at a good price, or who are interested in the dynamics of the auction process. The emergence of strong competitive instincts can lead to prices being tendered beyond the usual fixed prices, or to the bidder succumbing to a frenzy and gambling away his fortune in auctions.

Auction providers aim to open up a new sales channel in the hope of producing advertising effects. Of course, auctions primarily help to expand potential clientele. Auctions on the Web are often focused on certain products and customer segments and supplement the traditional methods of selling.

The operators of auctions and auction portals are intermediaries who increase the volume of transactions using innovative services (advertising campaigns, catalog services, expertise, animation during the auction, handling of payments, etc.). To achieve this, the operator must gain the provider's trust and guarantee to run a high-quality auction.

*Auction operators*

Due to the popularity of auctions, some providers of electronic shops present their customers with the choice of acquiring the desired article in the electronic store or in the auction arena. Thus, newly published books can be offered in the electronic store while antiquated or officially out of print books are sold in auctions. This allows cannibalization of a particular work to be ruled out. Consequently, auctions present alternative ways of selling for some business models.

One special idea is the organization of inverse auctions. This type of auction is comparable to an invitation for tenders, where the customers make their preferences known and the providers of products and services must compete. There are Web platforms (such as <http://www.travelbids.com>) where the customers submit travel requests and the travel provider can present interesting offers within 2–3 days.

*Principle of inverse auctions*

## 2.6 Profit Models for Electronic Markets

Business models for electronic business can be characterized according to positioning, customer benefits, products and services, choice of business web, and profit model. Establishing the sources of profit with which the company refines itself constitutes a central element of the business model. The profit model describes the financial and intangible benefits from the business activity (see Sect. 8.6 on controlling customer relationship management).

*Profit model as a central element*

The profits in direct profit models result directly from the business activity of the company. In indirect profit models, financial means are made available from the money market. Figure 2.17 shows the direct and indirect profit models for companies in electronic markets. Direct profit models include the following types:

*Direct and indirect profit models*

**Advertising model.** The provider of electronic products and services sells advertising surface on its web site. This is only possible if the company has a strong market position and has a considerable number of online customers.

**Price model for products and services.** This model is obvious and requires a discussion of price differentiation and the selection of suitable parameters for a price model (see Sect. 2.5). An assumption here is that the entire process of procurement to distribution can also be organized economically. With digital products or product parts, costs can be reduced if order procedures, deliveries, and system services are also realized digitally.

**Admission model.** The customer must pay an admission fee here for the time-limited use of an offer or rather, for access to content. This profit model is suitable for target groups that need information, know-how, or entertainment.

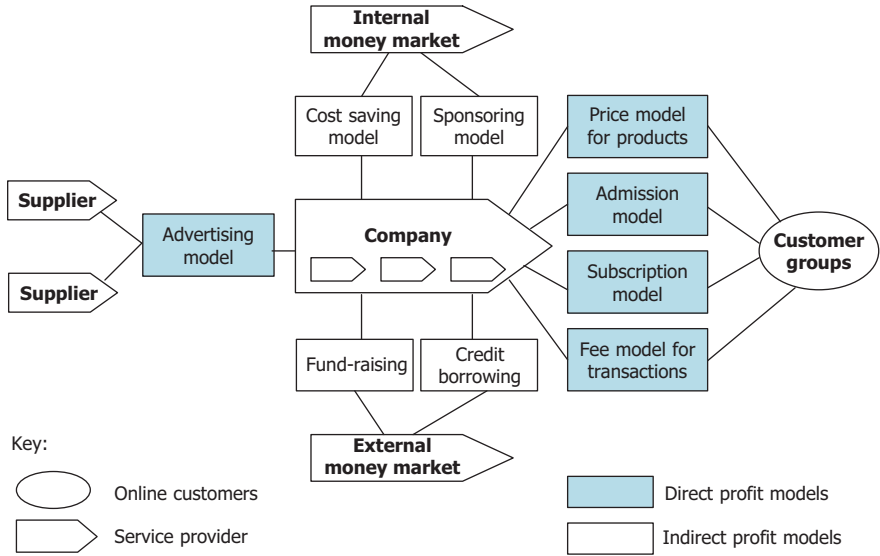


Fig. 2.17: Profit models in electronic markets (according to Birkhofer)

**Subscription model.** The sale of content is allowed after a fixed subscription fee which is paid periodically.

**Fee model for transactions.** Here a transaction fee is charged to the customer. This can depend on the duration of use (usage fee), on the content of the downloaded information (content delivery fee), or on the support offered (service fee).

#### *Indirect profit models*

The cost saving model is a type of indirect profit model. In this model, it is assumed that the investment in web technologies and in appropriate electronic business processes pays off in the long run and reduces costs.

In the sponsoring model, sponsors financially support the presence of the business on the Web for a certain length of time until its services allow it to become self-supporting.

Fund-raising and credit borrowing profit models rank among those that are dependent on an external money market.

## 2.7 Literary References

#### *Handbook on eBusiness*

The Handbook on Electronic Commerce by Shaw et al. [Sha00] deals with the fundamental technical and legal conditions of eBusiness.

Promising business models, primarily intended for the B2B realm, are discussed in detail in the work by Timmers [Tim99]. The design, architecture, and technology of electronic business systems are outlined in a book by Daun and Scheller [Dau00]. The work by Salouer and Spence [Sal02] discusses opportunities

and risks associated with the use of electronic businesses. In particular, case studies contain information about technologies, industries, firms, and organizational structures. The impacts of eCommerce on industrial structures as well as trading mechanisms for the Internet economy are described in the work of Werthner and Bichler [Wer01].

The organization of electronic services in the financial industry is shown in the work by Cronin [Cro98]. The book describes transaction, production, and management systems in the area of finance.

Business models are illustrated using business webs in the work by Tapscott et al. [Tap00]. Such networks are expanded forms of cooperation and can be subdivided into what Tapscott et al. proposed as agora (exchange platform), aggregation, integration, alliance, and distributor types.

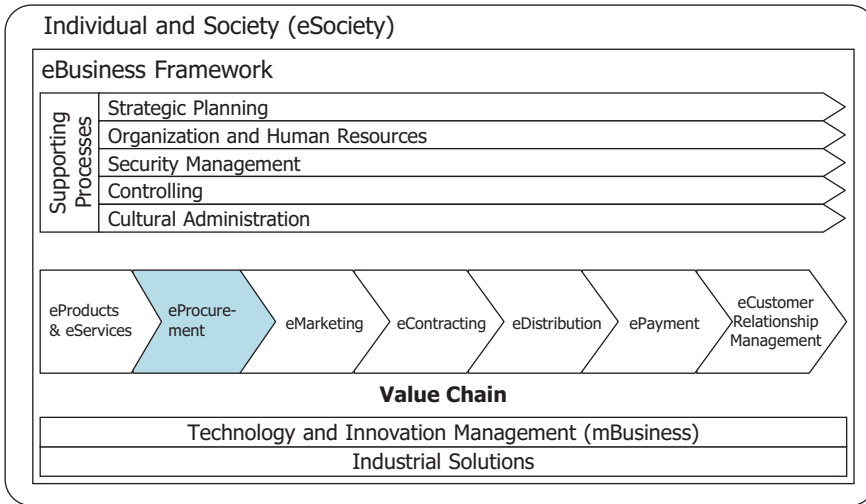
Aspects of price formation are dealt with in the works by Shapiro/Varian [Sha99] along with other topics in electronic business. A contribution addressing profit models in electronic business has been provided by Birkhofer [Bir02]. The study done by Graber [Gra05] analyzes the pricing of Internet transport services and interconnection.

*Fundamental  
works on  
b-webs*

*Literature on  
price formation*



# 3 eProcurement



*This chapter deals with the fundamental market models for eProcurement solutions and illustrates catalog management. Section 3.1 is dedicated to strategic and operational electronic procurement processes. Apart from direct goods, information systems must also support the procurement of MRO goods (Sect. 3.2). Product catalogs and services are used in the selection and procurement of products on the customer side, the supplier side, or in marketplaces; these three basic eProcurement solutions are characterized in Sect. 3.3. Section 3.4 describes multi-supplier catalogs and their mode of operation in view of the SPSC standard. Software systems and service categories for desktop purchasing are presented in Sect. 3.5. Section 3.6 illustrates the market for eProcurement service providers. Literary references are given in Sect. 3.7.*

### 3.1 Strategic and Operational Procurement

The terms procurement and purchasing are often mixed up, and sometimes treated as the same thing. However, it is important to draw some distinctions between them. A procurement process is divided into six substeps:

*Substeps in procurement*

1. Standardizing and specifying the procurement
2. Selecting the supplies for products and services
3. Carrying out contract negotiations
4. Ordering the products and services
5. Supervising the delivery
6. Subscribing to additional services

The tasks described above can be divided within a company into strategic, tactical, and operational subtasks according to Fig. 3.1. The strategic level involves standardization of the procurement, deciding whether to make or buy, as well as control. Analyses of demand patterns and ordering patterns or negotiations of general contracts are found on the tactical level. The operational level is however responsible for advertising, deciding on offers, as well as ordering, supervising, and purchasing associated services.

*Explaining the term eProcurement*

eProcurement refers to all of the connective processes between companies and suppliers that are enabled by electronic communication networks. eProcurement includes strategic, tactical, as well as operational elements of the procurement process.

Operational, administrative, and market-oriented activities are combined with ePurchasing whenever these include electronic aid. ePurchasing is just one part of eProcurement; it refers to the technical transaction elements of the purchase.

From the point of view of the company, the products and services to be procured can be classified in different ways. Direct goods are commodities or provisions which flow directly into the manufacturing activity. Also included are raw materials and resources, which directly provide basic materials for the product.

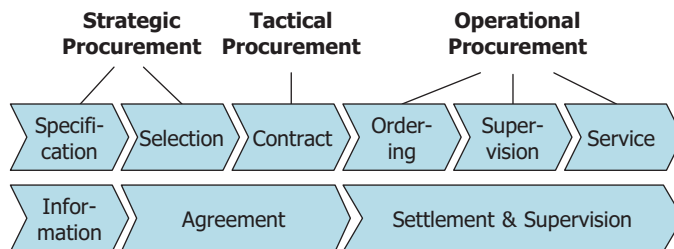


Fig. 3.1: Steps in the procurement process

Indirect goods are products and services that are used to run the company. They do not go into the end product. They are often termed “MRO goods” (maintenance, repair, operations). These include fuels required for the production process, like energy. Utility goods and tangible assets needed for the production of the finished product are also included here.

*Procurement of direct goods*

According to data from industrial companies, an average of up to 80% of all purchase transactions originate with the procurement of MRO goods. If the tangible assets are also included in the indirect services, then these create an average of approximately one-third of the total external costs in companies. Aside from the costs of direct services and personnel, MRO services represent the largest cost block for a company. Because of this, eProcurement—the efficient procurement of goods via communication networks—becomes very important.

*Meaning of indirect and MRO goods*

### 3.2 Information Support for Procurement

ERP (enterprise resource planning) systems are used for the information–technical support of procurement in companies; in the past, the terms MRP (material resource planning) or rather MRP II (manufacturing resource planning) were used instead of ERP. Apart from procurement, these systems also support other areas of operation in the company, such as financial accounting, production, sales, or customer relationship management. A wide range of ERP systems are available, because with standard software it is possible to circumvent the separate development of information systems. Examples of standard software products for ERP are SAP R/3, Peoplesoft, OneWorld, Oracle, and Baan.

*Use of ERP systems*

The focus of so-called ERP systems is the procurement of direct products. The systems are optimized for this type of product. Indirect or MRO products are supported to a degree by ERP systems.

*Focus of ERP systems*

The most important characteristics of direct and indirect goods procurement are compared in Fig. 3.2. Procurement process organization and information–technical support must be carried out differently for these product classes.

<b>Procurement of direct goods</b> (Material Requirements Planning)	<b>Procurement of indirect goods</b> (Maintenance, Repair and Operations Planning)
Scheduling	No scheduling
Defined material for production	Different fuels for operation
Specially manufactured material	Utility goods and tangible assets
Procurement requirements of experts	Consumers are in principle all employees
No approval necessary	Partial approval necessary
Elimination of unit listing	Catalog purchasing

Fig. 3.2: Comparing the procurement of direct and indirect goods

*Just-in-time  
manufacturing*

The quality, availability, and prices of direct goods are of great importance for the company. Accordingly, a great deal of attention is given to the selection and maintenance of the supplier relationship. To reduce tied-up capital, the principle of just-in-time procurement is often used. Prerequisites for using this approach are a good ability to plan for need, delivery date reliability, and supplier flexibility. The best case is when the company obtains an unstored supply of the material from the supplier chain.

*Planning is  
made more  
difficult with  
MRO goods*

The procurement of indirect goods can only be planned ahead in very few cases. Since in principle all of the employees in a company are consumers, the procurement process becomes costly. A now and then type of procurement is used with goods that are not time critical. An example of this is a workstation setup that includes a personal computer. It is possible that the stock procurement process for low-value goods or for goods in general involves long delivery periods. Office material falls into this category; further examples of MRO goods and services are listed in Fig. 3.13.

According to Dolmetsch, the following problem areas can arise during the procurement of indirect MRO goods:

*On high  
process costs  
with MRO  
goods*

- Purchasing expends too much time and routine administrative work on the procurement of indirect goods instead of accomplishing tasks with a higher creation of value. Lack of automation, manual clarification, and the need to obtain approval have negative effects on process costs. Are the two-way checks (verifying the invoice against the order) or three-way checks (verifying the invoice against the delivery note and against the order) commonly used for direct goods also worth applying for indirect MRO goods when the commodity value is frequently lower than the process costs?

*Bypassing  
purchasing*

- Due to the overburdening of purchasing departments and long procurement times, maverick buying flourishes. Maverick buying is the procurement of MRO goods by circumventing the purchasing department, such as the procurement of office material at the stationery shop around the corner. According to a survey by Intersearch, companies pay on average 16% more when purchasing non-negotiated products. Long delivery times result in a building up of stock reserves in the workplace or in small storage; this in turn leads to greater capital commitment.

*Problems with  
printed catalogs  
and manual  
orders*

- For products with short life cycles and dynamic price structuring, printed catalogs are not suitable for ordering. The purchase planning manager must inquire about the price each time, thus resulting in additional expenditure.
- Orders carried out manually and individually frequently cause wrong deliveries and delays.
- Due to the lack of automation of repetitive purchases (e.g., using a complete office workstation), the potential to save costs is thrown away.

It is clear from the above explanations that the procurement process for MRO goods presents a double challenge: on the one hand, the procurement process

for indirect MRO goods should be optimally structured; on the other hand, the opportunities presented by information and communication technologies must be utilized.

### 3.3 Basic Types of eProcurement Solutions

#### 3.3.1 Market Models for eProcurement

In practice, different models for electronic procurement have developed according to who controls the marketplace. There are platforms controlled by the provider (sell side) or by the consumer (buy side), as well as those controlled by market organizations which in turn are provided and controlled by a neutral third-party authority. Figure 3.3 gives an overview of the three market models.

*Three fundamental market models for eProcurement*

In the sell-side market model, the supplier provides the purchase software and an electronic catalog. Here the buyer must register with each supplier and familiarize himself with different software solutions and navigational aids. Some suppliers with sell-side solutions provide extensive functions for personalization, for product configuration, or for compatibility testing. Thus the buyers can establish rules for the individual customer in the procurement process.

*Sell-side market model*

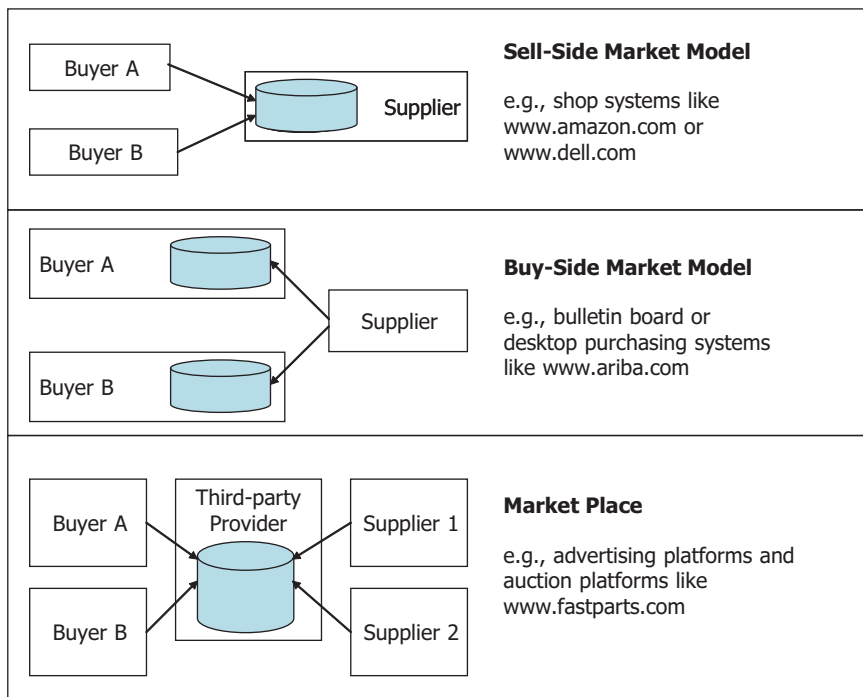


Fig. 3.3: Three fundamental market models for eProcurement

Many eShops used in B2B businesses are based on the sell-side market model. One example is Amazon, which can be thought of as a supplier of information (books and other articles). Another example is Dell, which supplies computers and peripheral devices.

*Buy-side  
market model*

In the buy-side market model, the buyer must run and maintain the appropriate software together with extracts from the product catalog. Some self-defined catalogs consolidate articles from different suppliers into a multisupplier catalog. Use within a company increases, since the procurement can be realized with a uniform product view. Moreover, procurement process rules like observance of contract conditions, authority when ordering, or procedures for approval can be realized for the individual customer, but with corresponding expenditure. At any rate, the procurement process remains largely supplier independent and the process data obtained can be collected and analyzed.

*Software for  
desktop  
purchasing*

Both bulletin boards and so-called desktop purchasing systems (DPSs) are software solutions that support the buy-side market model. The provider Ariba is well known in this arena, and its solution is more closely detailed in Sect. 3.5. Furthermore, the company can outsource its procurement logistics and collaborate with an eProcurement service provider (see Sect. 3.6).

*Marketplace  
for  
eProcurement*

In the electronic marketplace for eProcurement, the required software solutions and the catalogs are operated by a third-party provider. This platform is used simultaneously by several companies (buyers) as well as by several suppliers. The third-party provider can uniformly display and describe the products with his software solution. Perhaps he provides supplier-wide valuation criteria and the opportunity to perform comparisons in order to obtain added value over the sell-side and buy-side market models. One such marketplace is the auction platform Fastparts (<http://www.fastparts.com>), which deals with standardized electronic components.

Bilateral sales relationships and procurement relationships are, as a rule, created on an individual basis between the demanding and supplying companies. Such relationships are closed to outsiders. Frequently, general contracts or volume contracts are concluded from the formation of the relationship.

As expected, the purchasing usually takes place on the web site of the suppliers (sell side); the buy-side market model is only worthwhile with larger companies or concerns. Electronic marketplaces (auctions, stock exchanges) have also gradually developed and, according to estimates, already cover a quarter of the eProcurement market volume.

*Focusing on  
industries*

Electronic marketplaces frequently differ according to whether they are vertical or horizontal. Vertical marketplaces focus on specialization or on an industrial solution. One such well-known platform is ChemicalConnect (<http://www.ChemConnect.com>), which is used for procurement in the chemical industry. Another example, originally put together for the three large American automobile manufacturers Daimler-Chrysler, Ford, and General Motors, operates under the name ANX (<http://www.anx.com>). ANX developed into an exchange platform for automobile manufacturers, aviation, transport, and logistics.

Horizontal marketplaces, in contrast to the vertical ones, do not have an industrial focus. A well-known representative is Thomas Register (<http://www.thomasregister.com>), a platform for the procurement of software in industry and also for ordering mechanical and electromechanical component parts.

According to a market study in Switzerland on the use of eProcurement, general goods such as books and magazines (51%) and computer and office supplies (47%) are bought online. Less than a fifth of all companies buy raw materials over the Internet. When one considers companies from the production sector, this proportion rises to 32%. It is interesting that almost a third of all companies book business trips (flights, overnight accommodation, car rentals) online. Thus, as well as physical products, services are increasingly being bought over the Internet too. Today's companies are prepared to procure more complex services and products over the Internet.

*Backlog of demand for eProcurement*

### 3.3.2 Sell-Side Model

eProcurement based on the sell-side approach requires the supplier to provide the entire business logic for the procurement process, including the product catalog in an information system (purchasing software, eShop).

The most important software modules and functions on the supplier side are listed in Fig. 3.4. The user profile of the buyer, as well as his rights and obligations (login, authorization, purchasing limits, cost center assignment, among other things) must be recorded and maintained by the supplier software. If the buyer uses several suppliers with sell-side systems, a high work and maintenance expenditure arises.

*Storing the user profile*

The supplier performs content management of the electronic catalog entries. He maintains the product description and classification and specifies the changing

*Content management for catalogs*

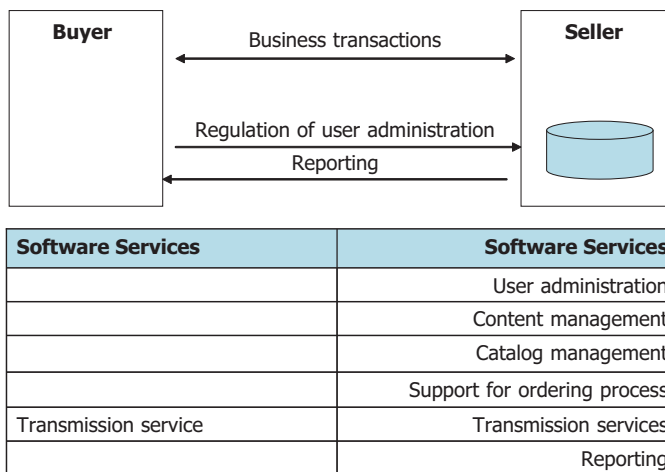


Fig. 3.4: Electronic procurement (sell-side model) (according to Schubert)

workflow. Ordering processes and settlement processes are likewise supported by software. Search mechanisms for articles and services enable the preparation of a basket of goods as well as the acquisition of orders and commissions. Invoicing takes place with the help of ePayment solutions (see Chap. 7). Depending upon the operational status of the supplier software, various reports on the buying behavior and the purchasing of products and services are requested.

*Coordinating  
an eShop with  
the ERP  
system*

An eShop is a classical variant of procurement based on the sell-side principle. It supports the information, agreement, and fulfillment phases with online orders. Such a system facilitates integration with the ERP system of the supplier, depending upon the stage of development. The system can then supply additional information such as stock, availability, or prices for the individual customer. The repeated issuing of orders to the supplier's ERP system is unnecessary. Depending upon the operational status of the eShop, the buyer can specify complex products using a configurator. For the supplier, this means automation of consultancy services, a reduction of acquisition expenditure, and the possibility of delegating responsibilities to the procuring company.

*Need for  
change  
management*

It is obvious that a relationship between the procuring company (buyer) and the supplier must be developed in order to successfully operate a sell-side variant. In particular, the shop system also requires information on the organization of the procuring company. At the same time, changes must be suitably organized. The company is confronted with a multitude of information systems as soon as it procures products with several suppliers. This requires considerably more information and training.

Figure 3.5 summarizes the most important advantages and disadvantages of sell-side solutions.

*Integration  
into existing  
infrastructure*

One problem area is the integration of the procurement process into the buyer's information system. A possible solution to this, as offered by Dell USA for its large customers, is the cXML standard (XML specification for catalog formats, see Sect. 3.4). Electronic orders can be sent over the Internet using cXML. The otherwise open cycle is thus closed.

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Configuration of complex products possible</li> <li>• No capital outlays for an ordering system</li> <li>• Operating costs for maintenance of current product lists and prices do not apply</li> <li>• Short delivery times through direct input of the order into the supplier's system</li> <li>• Can query current availability and prices</li> </ul>	<ul style="list-style-type: none"> <li>• No possibility of automatic product comparisons</li> <li>• Limited support of the procurement process with the buyer</li> <li>• Consumer or requesting customer must use a different information system for each provider</li> <li>• Limited integration of the procurement process into the operational information systems of the customer</li> </ul>

Fig. 3.5: Advantages and disadvantages of sell-side solutions



### 3.3.3 Buy-Side Model

The buy-side option in eProcurement requires the company (the buyer side) to install and maintain the purchasing software, including the product catalog. The supplier is only responsible for the content management, and regularly transmits changes in the product catalog.

*Buy-side solution*

Here, as shown in Fig. 3.6, most eProcurement services run on the company side. In particular, user management (with the administration of authorization and access rights) is conducted by the company. The steps in the ordering process with company-specific characteristics (licensing procedure, workflow control, etc.) are likewise determined by the company. The product catalog can be enlarged with offers from additional suppliers and expanded into a purchasing catalog for all MRO goods. In this way, although the company may incur administration and maintenance expenditure, a company-specific solution for eProcurement is achieved. Integration into existing software environments and connections to ERP systems are easier to manage. Figure 3.7 summarizes the most important advantages and disadvantages of buy-side solutions.

*Administration expenditure for user management*

Procurement applications that are operated by the company are called desktop purchasing systems. They are established at the workplaces of both the consumer and the solicitor and are aligned with the procuring company's process. They offer a uniform user interface, can take into account company-specific standards, and are usually well integrated into the operational information systems of the company. One prerequisite to the successful operation of such a system is the maintenance of a catalog of the products that can be ordered and negotiated with the suppliers. This catalog is often called the "multisourcing product catalog" because it contains product data from different suppliers.

*Desktop purchasing with a multisupplier catalog*

DPSs on the user side are mostly laid out as web applications. They support all of the positions within the company involved with procurement. Thus, the

*Desktop purchasing as an integration platform*

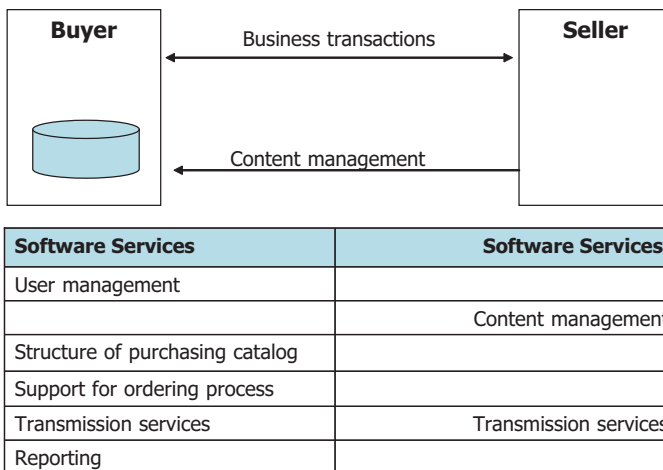


Fig. 3.6: Electronic procurement (buy-side model) (according to Schubert)

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Procurement process can be organized in a company-specific manner</li> <li>• Internal authorization and licensing procedures are well supported</li> <li>• Process turn around times can be reduced</li> <li>• Stocks can be kept small</li> <li>• Central administration produced by negotiated products</li> <li>• Elimination of maverick shopping</li> <li>• Consumer/solicitor can operate system themselves</li> <li>• System with uniform menu prompting</li> </ul>	<ul style="list-style-type: none"> <li>• Complex products are not usually supported</li> <li>• Advertisements are not planned</li> <li>• Capital outlays for information systems are with the procuring company</li> <li>• Operating costs for content management are to be supplied</li> <li>• Not all suppliers have an electronic product catalog</li> <li>• Suppliers sometimes provide poor-quality product data</li> <li>• Coordination of the exchange format must be achieved by the procurer and supplier</li> </ul>

Fig. 3.7: Advantages and disadvantages of buy-side solutions

consumer can deposit his purchase order request over the intranet, the cost center manager can grant approval, the buyer can order the product, the consignee can confirm the supply, and the accounts department can pay the invoice. The depth of integration with the supplier determines the extent to which products can be procured without additional interaction and whether the invoice should be delivered electronically to the customer by the supplier.

### 3.3.4 Marketplace

*Range of tasks  
of an  
infomediary*

When the marketplace option is employed in eProcurement, the platform is operated by an intermediary. This intermediary (often called an infomediary or information broker when digital products are involved) has the task of bundling information (products) and making it available on the platform. The intermediary consolidates the offers from the providers and supplies comparable product offers to the consumers. He creates contact between providers and consumers and also carries out procurement transactions in the name of the company (the buyer side) according to demand.

In Chap. 2, it was pointed out that the Internet often eliminates intermediate trade (disintermediation), with providers and consumers meeting directly. So why do intermediaries and infomediaries develop and offer their services in this case? There are three main reasons:

*Comparability  
of products*

1. Since the Internet is based on an open standard, the number of rules that must be followed is kept as low as possible. This leads to a multitude of solutions that are all based on Internet technology but are not uniform between each other. This makes it difficult for procuring companies to compare products (price, quality, availability). Thus, the intermediary undertakes this service and can be paid for it.

2. The second argument is the association of supply and demand. Empirical studies show that a lot of time is spent searching for suitable providers and consumers. An intermediary can unite a multitude of providers and procuring companies on his platform and thus considerably reduce the search expenditures of the market participants.
3. Thirdly, there is the issue of location independence. The depersonalization associated with this conceals the risk of the business transaction for the procuring company. A successful transaction is assured by the intermediary, who can be compensated for doing this. On request, the intermediary carries out the business transactions while preserving anonymity.

*Saving time with eProcurement*

*Preserving anonymity*

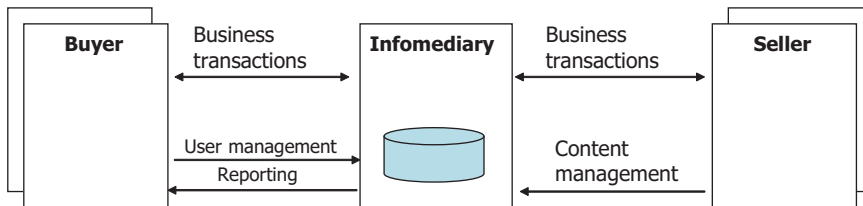
Various forms of intermediary platform used for procurement exist. They range from trade books (Yellow Pages), advertisement platforms, and auctions to industry-specific platforms. A multitude of price models are also used by the platform operators.

The software services of an intermediary in the procurement process (buyer side) and in offer representation (supplier side) are shown in Fig. 3.8. The platform operator tries to achieve an added value for the procuring company using his own software services; in other words, by providing offer representations and offer comparisons. The suppliers regularly transmit their product catalogs and remain responsible for the content management of their offers.

*Software service for the procurement process*

Therefore, that the work of the intermediary essentially consists of providing high-quality information to both providers and consumers and guaranteeing the smooth execution of business transactions. Previous experience with such platform providers has shown that intermediaries can only achieve the demanded

*Specialized infomediaries become accepted*



Software Services	Software Services	Software Services
	Comparison of offers	
	User management	
		Content management
	Structure of purchasing catalog	
	Support ordering process	
Transmission services	Transmission services	Transmission services
Reporting	Reporting	

Fig. 3.8: Software services of an intermediary in eProcurement

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Reduction of search time</li> <li>• Representation of current and detailed market offerings</li> <li>• Efficient transactions</li> <li>• Comparability of different offers</li> <li>• Anonymous procurement opportunity</li> <li>• Bundling of supply and demand in order to achieve better conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Lacking integration into the ERP systems of the procuring company</li> <li>• Intermediaries usually cover only a narrow product range in sufficient depth</li> <li>• Frequently a large company can negotiate directly with the provider/manufacturer for better prices</li> <li>• Classified directories are frequently not upto-date</li> </ul>

Fig. 3.9: Advantages and disadvantages of marketplaces

quality and liquidity with sufficient specialization. This also explains the greater overall success of vertically organized intermediaries compared to horizontally established platform operators.

*Contribution to the efficiency of electronic markets*

Figure 3.9 summarizes the most important advantages and disadvantages of marketplaces: unlike the sell-side and buy-side solutions, comparisons between different providers are made possible by intermediaries. The bringing together of several providers increases the liquidity of the market and ideally results in efficient markets, even in regard to price fixing. Depending upon the needs of the providers and consumers, the anonymity of market participants can be guaranteed when products and services are requested.

### 3.4 Catalog Management

*Display of product information*

Catalog management makes functions available for the construction, maintenance, and use of product data. Information on products and ranges must take place according to certain selection and inquiry criteria, supplemented by detailed data on material, quality, price, etc. If possible, the product catalog should be adapted to the wishes of the consumer (ordering company).

*The need for a multisupplier catalog*

All three solution variants presented above (sell-side, buy-side, and marketplace models) require the maintenance of a product catalog. In the buy-side and marketplace models, this catalog must combine the product data from several suppliers (multisupplier catalog or multisourcing product catalog, MSPC). It should contain all of the products along with their specifications and their suppliers and customers.

*Problem areas in catalog management*

However, a number of problems arise when attempting to realize a multisupplier catalog:

- Providers, intermediaries, and consumers have different ideas about the catalog format
- Classification criteria for products and services vary among the market participants

- The products must be described distinctively and illustrated in detail
- The data quality differs between procuring companies
- Individual prices are arranged between the contracting parties

Providers of buy-side solutions must overlook the fact that the procuring companies have individual product catalogs and instead make sure that the companies periodically update their electronic product catalogs. The provider can achieve this using suitable content management. The operators of marketplaces essentially perform the same tasks as the providers of buy-side solutions. The information must also be optimized for review by a multitude of customers that possibly have different requirements regarding the catalog, the degree of detail, and the prices.

Different catalogs can be brought together if they have a uniform meta-structure. This facilitates hierarchical searches through product hierarchies and enables different providers.

One metastructure that is suitable for a horizontal marketplace and covers both products and services is the Standard Product and Service Code (SPSC) from Dun & Bradstreet (also see the current development of the United Nations standards derived from the SPSC on the web site <http://www.unspsc.org>). The SPSC is a classification scheme which leads to a well-defined classification of goods and services. It was first published in 1996, and is now used by American Express, Mastercard and Visa, among others.

*SPSC standard*

The SPSC is a hierarchical set of numbers involving five standard classification levels. Each classification number consists of ten digits which, if required, can be supplemented by an additional two digits. These ten digits are divided into three-, four-, six-, eight-, and ten-digit groups which gradually specify the item in question. Figure 3.10 shows an example of the use of SPSC numbers.

*Hierarchical structure of the SPSC*

SPSC Number	Description
511	Paper and office supplies
5112	... Office supplies
5112 04	... Computer and copier supplies
5112 04 05	... Printing supplies
5112 04 05 01	... Toner cartridges

Fig. 3.10: Example showing some Standard Product and Service Code (SPSC) numbers

The SPSC is used foremost in applications which require the identification and classification of goods. The service spectrum of the supplier is included. In addition, an entry can be made into electronic catalogs with information systems as well as with data warehousing such as during the evaluation by item class and degree of detail given.

*SPSC number system*

In order to describe products in even greater detail, the ten-digit SPSC number system can be extended by two digits. Digits 11 and 12 represent services associated with the product. Typical services are repairing (91), servicing (92), leasing (93), or renting (94).

*Industry-wide use*

The SPSC system is regarded as stable due to the relatively restricted level of detail employed. If the level of detail was higher, the information in the system would have to be continuously revised with the development of new products. Because of the scope of the system, it can be used in different industries. Aside from the prominent credit card companies, numerous software manufacturers such as Ariba (<http://www.ariba.com>) align their structures with the SPSC.

*BMEcat standard for the exchange of product data*

XML-based document formats are chosen for the exchange of electronic product data and services. BMEcat is a standard for the transfer of electronic product data drawn up by the German Bundesverband Materialwirtschaft, Einkauf und Logistik (BME). The catalog documents allow for the integration of multimedia product data such as pictures, graphics, technical representations, or video recordings. The header of a catalog document in the BMEcat format is given in Fig. 3.11.

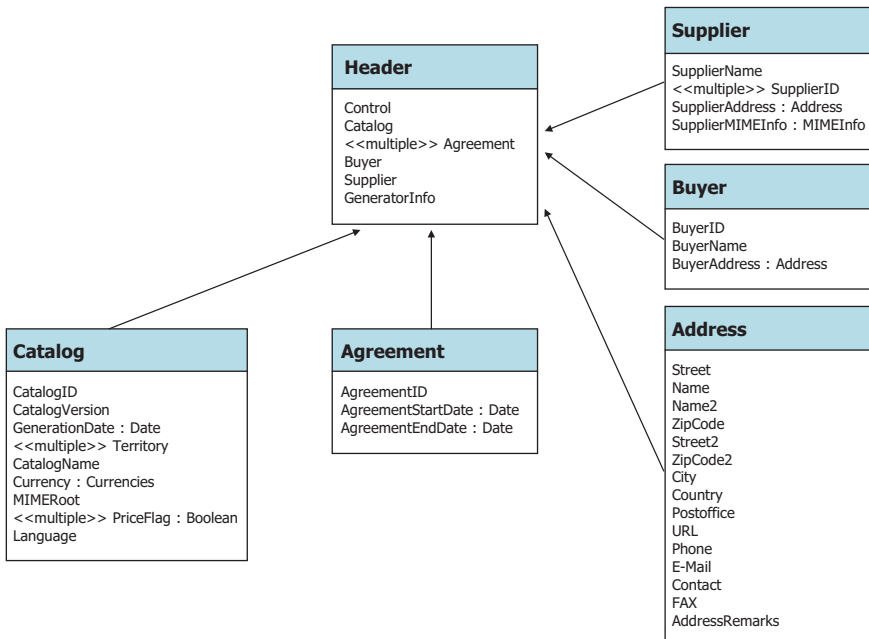


Fig. 3.11: Header of a catalog document in the BMEcat format

## Case Study eDVDSHOP: Use of Electronic Product Catalogs

The eDVDSHOP has been generating good sales for some time. There are some institutional customers (such as libraries) that also purchase several special DVDs from the eDVDSHOP. More than 2,500 products are offered, and the institutional customers are for the most part only interested in a small number of these products. Consequently, Anderson considers creating an electronic catalog which will present the products of interest graphically. Apart from this selection of products, each product should get an individual write-up and the valid price of each should be included in the catalog. The valid price is necessary because larger customers of the eDVDSHOP are granted special discounts. The product catalog should be realized in the form of a PDF (Portable Document Format) file. This format has established itself as a quasistandard on the Web. In this way, Anderson can also dispatch the catalog by email to interested customers.

In a first step, Anderson tests different alternatives for the construction of the catalog. One possibility is offered by the LaTeX typesetting system, which has been used successfully for text production for more than 20 years. This solution has several advantages:

- It is available for free, perfected, and well documented
- A multitude of extensions exist for it; for instance, PDF files can be created along with standard Postscript files
- It can be used for all kinds of documents, such as invoices, offer inquiries, reports and statistics
- Other Web-based applications also draw upon this solution; for instance, the financial accounting system SQL Ledger (<http://www.sql-ledger.com>).

Despite the advantages, Anderson does not decide in favor of LaTeX. The basic reason for this is that LaTeX has no desktop publishing application. Therefore, it is difficult to create visually appealing product catalogs. Moreover, LaTeX must be started as an application external to the web application. This means that in the event of any errors in the production of the PDF files, the system cannot react adequately.

Another alternative which is particularly interesting for the production of PDF files comes from the company PDFlib (<http://www.pdfli.com>). This offers a library for the automatic production of PDF files. The advantage of this solution is that the seller can produce his own drafts and hand these over to the system. The draft is a PDF file which has replacement characters at certain positions. PDFlib offers an Adobe Acrobat plug-in which can be used for the production of the replacement characters. Since the open source version available from PDFlib is relatively limited (e.g., it does not allow for the integration

of drafts as described above), and a commercial version would blow the fixed budget, Anderson makes inquiries about other alternatives.

During these inquiries, Anderson learns about the BMEcat standard, as well as the possibility of producing PDF files from XML documents through a procedure named Formatting Objects (FO), as specified by the World Wide Web Coalition. A combination of both procedures seems sensible to him.

In a first step, the web application produces an XML document (Doc1) in accordance with the BMEcat standard. This document contains all of the necessary catalog data. Furthermore, the solution uses an XSL template which meets the FO standard (Doc2). An FO processor program produces a PDF file from both documents in the second step. One popular FO processor is the FOP derived from the Apache Project, which was developed in Java and is open source. This solution offers a number of advantages:

- The installed webshop eSarine is already largely based on XML documents.
- FOP was developed in Java, like eSarine, and is available under the Apache software license. The fact that both systems are implemented in Java considerably aids the integration of FOP into eSarine, especially in relation to errors arising from potentially defective documents. All of the errors that arise in FOP are displayed by eSarine in the browser. This is especially important for the user who plans to produce his own detailed FO copies in the future.
- The BMEcat standard was developed before the definition of a platform-independent XML-based exchange format. This is why the document Doc1 produced during the creation of the catalog could also be used as an exchange document.
- XSL-FO is not limited to PDF files. It is, for example, also possible to produce HTML pages instead of PDF files with FOP.

*On the cXML language*

The language Commerce XML (cXML) is open and flexible. It allows electronic business transactions to be carried out for product catalogs. As well as suppliers, products like transaction data can be specified using this language.

*Standardization with xCBL*

The XML format developed by CommerceOne is known as xCBL (XML Common Business Library, see <http://www.xcbl.org>). This defines product-oriented business data for product catalogs, order entry, invoicing, and settlement.

*Catalog engine by Inktomi*

A software supplier, Inktomi (<http://www.inktomi.com>), offers a catalog engine which supports the classification of content among other things. It can generate hierarchical or network-like category systems and supply XML documents which contain cross-references like “see also under.” The search engine Yahoo uses catalog software from Inktomi.



### 3.5 Standard Software for Desktop Purchasing

The problems mentioned above for the procurement of indirect goods and MRO services can be remedied by appropriate information systems—so-called desktop purchasing systems. These systems consolidate the product and service offerings of different suppliers into multisourcing product catalogs. Their browser-based user interfaces support irregular use by employees who, when required, examine offers for the MRO goods and other material individually. Progressive DPSs offer extensive interfaces with operational information systems and ERP systems and guarantee the integration of the procurement of indirect goods into the company’s activities. There are currently various providers of software systems for desktop purchasing. Figure 3.12 gives an overview of the variety of functions performed by desktop purchasing systems.

*Software requirements for the procurement of MRO goods*

The search for potential suppliers is already supported by the DPS. Using so-called reverse marketing, the search for and selection of suppliers is simplified. The point of reverse marketing is that the procuring company, aided by the DPS, publishes site-specific information intended for potential suppliers (guidelines for procurement, quality characteristics, points of agreement, etc.) on the Web, or announces its need for goods, its delivery terms, and its modes of payment. In other words, the company that wishes to buy takes the initiative and performs the marketing.

*Objective of reverse marketing*

The entire ordering process along with settlement and delivery is also supported by the DPS, as the approval process is initiated by company-specific activity and carried out step by step. The tracking functions are interesting. They

*Tracking the ordering process*

Desktop Purchasing - Basic Function	Software Support
Sourcing, identification, potential suppliers, settlement	Online inquiry on the Internet, reversed marketing Use of software agents Electronic catalogs Online advertisement and online auctions Direct selection through software system
Ordering process	Support of the ordering process Approval procedure Order transmission by Web browser
Order completion and delivery	Status information on ordering process (supplier side) Online control of the order completion (tracking)
Incoming goods and posting, storage, assessment of suppliers	Automatic posting Electronic complaint management Electronic payment Supplier assessment

Fig. 3.12: Software support through desktop purchasing systems

continually indicate the status of the order with the supplier and the status of the goods in transport on the DPS. Thus, the status of an order is always up-to-date.

*Interface to  
ERP systems*

Incoming goods and postage are handled by the DPS, and (depending upon the depth of integration) are updated directly in the corresponding ERP system. After the commodity has been examined and the date noted, statistics are compiled, and (if necessary) complaints are attended to. This means that the procuring company always has up-to-date information on the quality of the supplier. Typical examples of MRO goods (products and services) are listed in Fig. 3.13.

Products	Services
<ul style="list-style-type: none"> <li>• Ppre-configured computer</li> <li>• PDAs and mobile devices</li> <li>• Software</li> <li>• Magazines and newspapers</li> <li>• Books</li> <li>• Office furniture and office equipment</li> <li>• Vehicles</li> <li>• Work clothes and work equipment</li> <li>• Advertising material</li> <li>• Maintenance material</li> <li>• Office supplies</li> <li>• etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Travel services</li> <li>• Training courses</li> <li>• Advertising services</li> <li>• Consultation and hotline</li> <li>• Financial services</li> <li>• Cafeteria</li> <li>• Copying service</li> <li>• Courier service</li> <li>• Parking lot reservation</li> <li>• Light entertainment programs</li> <li>• Cultural programs</li> <li>• etc.</li> </ul>

Fig. 3.13: Service categories for desktop purchasing systems

*On the variety  
of MRO  
products and  
services*

DPS can greatly relieve the burden placed on the logistics and purchasing departments of companies. Different services, from the workplace layout and office equipment to services for business trips and company socials, can be efficiently procured and supervised via such systems.

Well-known examples of DPSs are those offered by Ariba Technologies, Inc. and the CommerceOne Corporation:

*The desktop  
purchasing  
system from  
Ariba*

**Ariba Operating Resources Management System.** A DPS with a user-friendly (Java-based) front end is offered by the company Ariba Technologies, Inc. The system contains an efficient search engine that allows the product groups desired to be specified by means of selectable criteria. The individual work procedures involved in procurement are supported by a workflow component. Providers of product catalogs must supply their specifications in CIF format (Catalog Interchange Format) so that the data can be aggregated into a multisupplier catalog.

*The  
eProcurement  
solution from  
CommerceOne*

**BuySite by CommerceOne.** The company CommerceOne sells an eProcurement solution under the name BuySite. This platform supports the procurement of MRO goods, settlement with the issuance of an invoice, and process control.

Apart from offering independent DPSs, the manufacturers of ERP systems have begun to extend their product ranges with functions for the procurement of direct and indirect goods (see for example SAP Enterprise Buyer Professional).

### 3.6 Market for eProcurement Service Provider

An eProcurement service provider specializes in the procurement processes of companies and mediates different supplier relationships.

The basic structure of an eProcurement service provider is shown schematically in Fig. 3.14. The most important components concern the ordering service, the catalog service, and system administration. In the request and ordering services, the requirements of the procurement as well as the approval rules for each procurement company are established and recorded. The ordering itself is supported by software, as both settlement and payment arrangements are recorded.

*Request and ordering services*

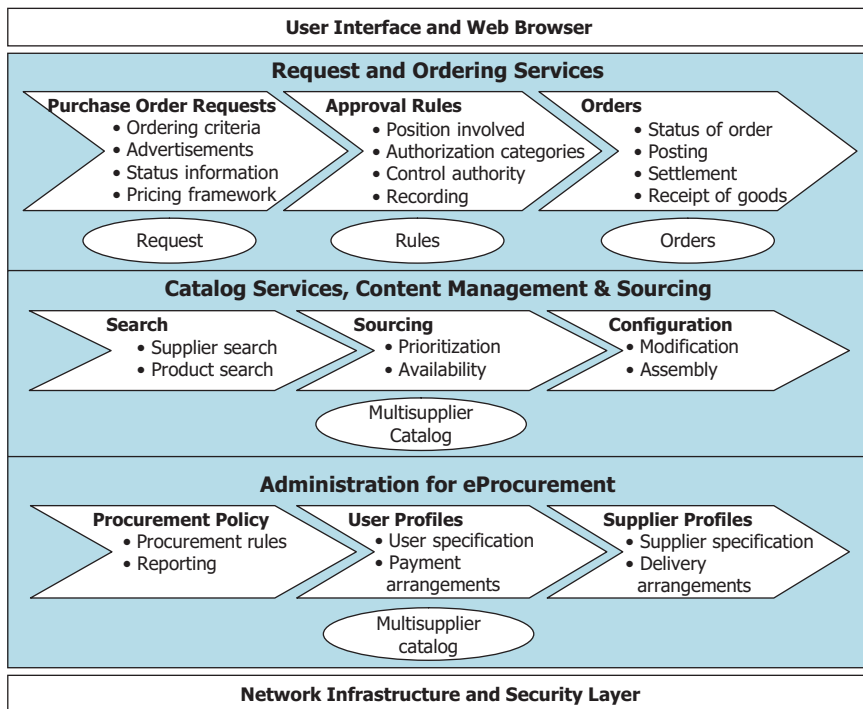


Fig. 3.14: eProcurement service provider (according to Dolmetsch)

The catalog service and content management enable suppliers, products, and services to be searched for. At the same time, a multisupplier catalog must be put together and maintained. Some eProcurement service providers offer the possibility of configuring complex goods and product groups.

*Configuration of complex goods*

System administration involves recording and maintaining user profiles and supplier profiles. When desktop purchasing systems and eProcurement service providers are used, the following savings are made possible:

**Procurement process.** This is automated to a large extent and is therefore less error-prone. The status of an individual order can be queried at any time. Quality characteristics and procurement times can be evaluated periodically.

**Stock.** According to agreements with the suppliers, stock can be kept small or reduced to zero. Employees can see current order quantities and delivery data.

**Price advantages.** When a procurement policy is derived, quantity discounts and price terms can be negotiated. In addition, the purchase order volume can be bundled, which in turn leads to price advantages.

**Control.** During and after the procurement process, evaluations of the appropriate databases can be performed at any time. This provides a good basis for making decisions that involve adapting the procurement and pricing policies if necessary.

Due to the advantages of eProcurement, more and more companies and public institutions are stocking up with appropriate DPSs or demanding the services of an eProcurement service provider.

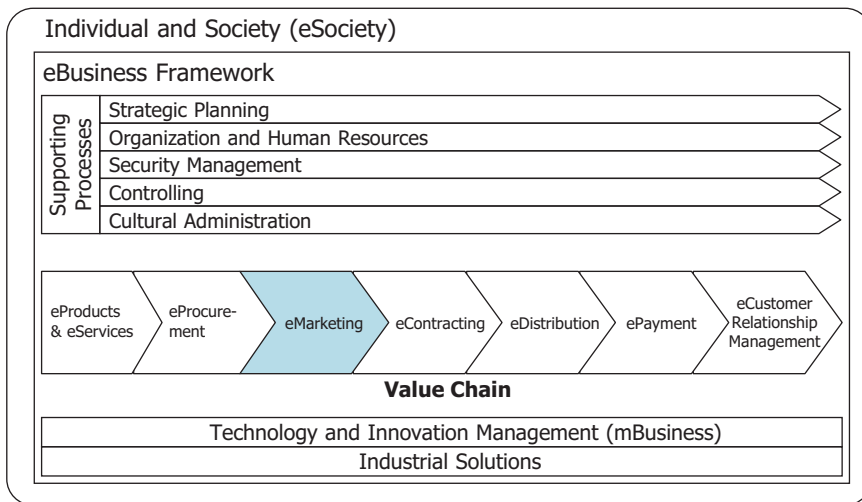
### 3.7 Literary References

*eProcurement  
literature*

The dissertation by Dolmetsch [Dol00] gives an overview of the topic of eProcurement. This work is distinguished by concrete applications, functionalities, and aspects of architecture from other investigations. The emphasis is on desktop purchasing systems (buy side). The article by Saarinen and Vepsäläinen [Saa94] shows a framework of different eProcurement strategies that help managers to optimize their supplies. The work by Schubert et al. [Sch02] deals with different case studies (based on experience) that illustrate the market models for eProcurement (sell-side, buy-side, and marketplace models).

Documents that describe the SPSC can be found on the associated web site (<http://www.unspsc.org>). The BMEcat standard discussed earlier also has a web site that provides further information (<http://www.bmecat.org>). Current research in the area of eProcurement is focusing on the introduction of new technologies like RFID [Wam06] or mobile devices [Geb03], as well as improvements to supplier relationship management [Hou04, Gro07]. Baron et al. [Bar00] examine eCatalog issues from the business buyer's viewpoint. In the book by Turban et al. [Tur06], procurement methods are listed and discussed. In addition, desktop purchasing systems and reverse auctions are described.

# 4 eMarketing



*This chapter shows how eMarketing or online marketing develops market potential and business relations by effectively utilizing information and communication. The change from undifferentiated and later segment-oriented to mass customized marketing is illustrated in Sect. 4.1. A comparison of the various communications media is performed in Sect. 4.2. In Sect. 4.3, online customers are divided into classes in order to carry out a differentiated treatment of electronic markets and to adapt appropriate services on the web site. Performance indicators measure the awareness of an offer by online surfers, the degree of interaction with online consumers, the value contributed by the online prosumer, the number of deals with online buyers, and connections with key online customers. The characteristics of online promotion, namely customized push, content management and advertising banners, are summarized in Sect. 4.4. Prospects for the development of eMarketing are discussed in Sect. 4.5. Additional literature are compiled in Sect. 4.6.*

## 4.1 The Path to Individual Marketing

*The Internet  
as an  
additional  
communication  
channel*

eMarketing, also often referred to as online marketing, assumes that the classical rules of marketing hold. In addition, market potentials are developed and existing business relations are strengthened with eMarketing by using the Internet as a communication channel. The well-known AIDA (Attention, Interest, Desire, Action) formula or modified forms of it are still valid: attention must be attracted to a web site, interest aroused, desire created, and sales actions triggered. The goals of marketing are not new, but the ways and means of achieving them are.

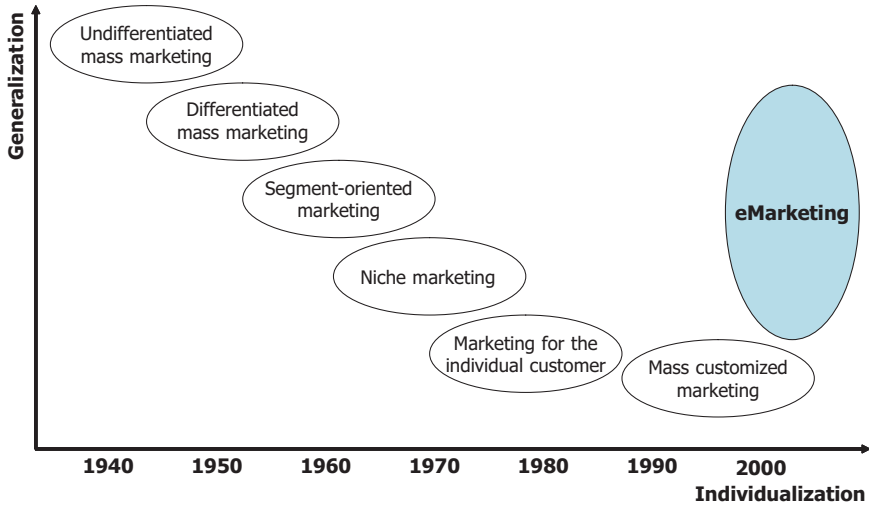


Fig. 4.1: Transformation from generalized to individualized marketing

*Moving  
towards mass  
marketing for  
the individual  
customer*

If we consider the development of marketing over the last few decades, changes in business marketing patterns can be detected (see Fig. 4.1). Generalized mass marketing has evolved into mass customized marketing. Greater individualization is normally associated with higher costs. In mass customization, however, information and communication technologies help to adapt mass production to customization. As a result, increasing individualization does not result in higher costs in every case. Through the effective use of electronic means of communication, multimedia, and software agents, the customer can be served more purposefully and more economically on a case-by-case basis.

*Historical  
development*

After centuries of the production of handcrafted, individual products, the degree of individualization dropped with the advent of industrialization. The mass production of identical goods was initially characterized by production bottlenecks and so a sellers' market developed. After the first signs of saturation, markets opened and so marketing and sales gained in importance. To stand out in a buyers' market, products and services have to be appropriately designed. With the emergence of mass customization, the ability to provide products and services that correspond to the individual needs of customers arrived.

eMarketing develops mass customization further by strengthening the individual and interactive customer focus through multimedia, online processing, and with business transactions triggered by the customer. The multimedia part of the Internet allows market relations to be personalized without the need to give up the cost advantages of mass marketing.

*Interactive customer focus*

eMarketing uses electronic communications networks and the Internet, and exhibits the following characteristics:

**Associative information acquisition.** Visitors to web sites determine not only the depth and scope of information, but they also choose between sequential and associative information acquisition. At the same time, special services are offered with multimedia (i.e., with images, text, and sound).

**Market pull and customized push.** Instead of pushy advertising, a noncommittal dialog offer is made, with the visitor taking the role of the business transaction initiator. He determines the appropriate time to procure information and generate an offer, as well as the scope of the desired service palette. The provider's information is made available only on express agreement with the visitor and with his personally deposited interest profile (see push vs. pull in Sect. 4.4.1).

*Initiative remains with the customer*

**Integration of customers into the creation of the value chain.** Users of a web site can be merged into the value chain due to their interest (see Sect. 4.3 on the customer development model). A visitor can become a partner or coproducer, possibly together with customers with similar needs. It may even be that the visitor helps with the creation of the product or supplies essential information and clarification for the service process.

*Customer becomes the coproducer*

**One-to-one marketing.** Mass markets can be purposefully served by digital agents that provide consultation and sales support. Instead of a widely spread mass media message, an individual form of communication is selected.

**Ubiquity.** Ubiquity means equal rights for all market participants. In electronic business, geographic distance, time zones, language barriers, etc. become less important. Size or power is also less critical than in traditional markets. Customers can form purchasing communities in order to strengthen their positions with providers.

*Location becomes less important*

**Disintermediation.** The electronic market affects new distribution structures; middlemen are avoided and new intermediaries (brokers) with strong portals gain influence. Different logistical service providers (Sect. 6.3) facilitate the distribution of goods (differentiated according to transmission size or region).

*Changes in distribution structures*

The Internet is the most important medium for eMarketing. In principle, the methods and techniques associated with mass marketing, direct marketing, database marketing, or one-to-one marketing are also possible over the Internet. In contrast to direct marketing or database marketing, in eMarketing computers are not only analytical instruments; they also provide the environment in which one presents, communicates, and sells.

## 4.2 Comparison of the Communications Media

*Change in promotion*

In the last few years, the communications media used for promotion have changed in terms of content and cost, which has had implications for companies. The production of media content is a unique form of production due to the combination of creative ideas and special resources involved. Since this production process is independent of the number of copies sold, fixed costs are associated with it (first copy costs). These fixed costs arise with any medium, whether it is a type of printed medium or an electronic medium such as radio, TV, or the Internet. Besides the production of media content, there are additional fixed costs associated with marketing and promoting the content to the desired target group.

*From a unique product to a mass product*

Copying and selling the media product converts this unique product into a mass product. The variable costs associated with this process differ according to media type. Within the print domain, the variable costs due to the costs of printing and selling make up more than half of the total cost of the media product. With electronic media, however, the marginal costs are small in relation to the fixed costs. The process of copying and distributing media products over the Internet is so efficient that the marginal costs are almost disregarded in this case.

Aside from cost considerations for different media, other factors also play a role, such as those included in Fig. 4.2. In this scheme, four classes of media can be differentiated: print (classical media), audio, video, and multimedia (all electronic media):

**Print.** Newspapers, magazines, ads, books, etc.

**Audio.** Radio programs, sound carriers (e.g., CDs), audio cassettes

**Video.** Television programs, movies, and video programs

**Multimedia.** Internet, mobile PC devices, CD-ROMs, among others

	<b>Print Promotion</b> e.g., brochure	<b>Audio Promotion</b> e.g., radio	<b>Video Promotion</b> e.g., TV	<b>Multimedia Promotion</b> e.g., Internet
<b>Interactivity</b>	none	little	little	well developed
<b>Quantitative range</b>	local to regional	regional	regional to global	global
<b>Qualitative range</b>	private and companies	private	private	private and companies
<b>Topicality</b>	limited	average	average	high
<b>Use situation</b>	independent of place and time	tied to place and time	tied to place and time	independent of place and time
<b>Advertising contact</b>	chance	chance	chance	active

Fig. 4.2: Comparison of selected communications media



The term “multimedia” refers to a medium which combines text, image, and sound. While print media are not interactive, and only limited interactivity is possible with the radio and TV, the Internet and mobile devices that possess an Internet connection are interactive in nature (see Fig. 4.2).

*Advantage of interactivity*

One can also distinguish between the quantitative and a qualitative ranges of medium, which relate to the penetration of the medium. Again, the Internet also stands out here due to its global presence. Moreover, it is equally suitable for private individuals, companies and organizations. The remaining media used for promotion only cover regional markets and are primarily suited for private individuals.

*Global presence*

The Internet also offers high topicality, whereas most radio and television programs spend a limited amount of time on the air and are therefore less current. Print media are also limited in terms of their topicality.

*High topicality*

It is also important to consider the extent to which the use of the promotional medium depends on the place and time. Print media and the Internet are independent of place and time. Radio and television have a limited transmission area and thus remain subject to location, and—depending upon the transmission time—are also time-dependent.

*Place and time dependence*

Finally, it has been established that with print media as well as TV and radio, promotional contact occurs only by chance. With the Internet, however, menu prompting and contact can be actively arranged.

### 4.3 The Development Model for Online Customers

In the following sections, we analyze the consumer behavior of customers on web sites in order to derive various buyer groups. If a customer has access to the Web, then he goes through different phases in his purchasing behavior. The more experience he gains, the sharper his judgment concerning electronic services and products becomes. At the same time, provided there is professional dialog management and support, the trust extended toward an online provider grows; the probability of a purchase rises. With the successful completion and distribution of the product, the customer’s inhibition is finally diminished, personally felt risks are placed into perspective, and the chances of gaining a loyal customer are increased.

*Behavior of online customers*

The customer development model distinguishes between the following five customer groups: online surfer, online consumer, online prosumer, online buyer, and online key customer. By organizing customers into groups, a differentiated market treatment can be carried out and the services of the web site can be adapted at any time (see also performance indicators for customer development in Sect. 4.3.6).

*Five classes of the customer development model*

#### 4.3.1 The Online Surfer

The online surfer behaves according to the motto “I will just take a look.” He would like to become acquainted with a brand, a service, or a company, be

*Behavior of the online surfer*

informed, or quite simply be able to chat. Often online surfers surf aimlessly on the Web and jump from one web site to the next. They use the offer passively, pick up information by chance, and move around emotionally rather than cognitively (see Fig. 4.3).

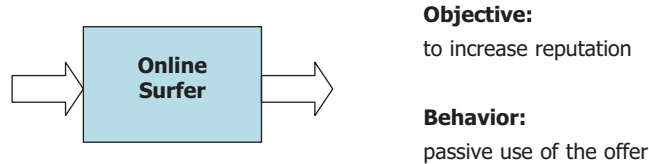


Fig. 4.3: Behavioral pattern of the online surfer

*Issues related to web site promotion*

In order to attract online surfers, the address of the web site must be known or be attainable via different links. The selection of a clear address (domain name) is a difficult undertaking from a marketing point of view. Should the company name be used? If so, is it necessary to register the address per country, or is general ".com" address sufficient as a top-level domain name? In which languages should the company name be registered? Should well-known product names or names of services be designated as domain names next to the company name? Should the registered domain name be protected as a brand? These and similar questions must be resolved before the model of online customers can be refined.

*Protection of web addresses*

Since web addresses are assigned according to the principle "first come, first served," marketing must clarify such issues early on, and aside from protecting brands, also register important web addresses. Chapter 5 on eContracting goes into more detail on the legal aspects of registering a web address and the problems associated with domain names that have already been assigned.

*Publicizing domain names*

After it has been selected and registered, the web address is published. At the same time, classical means of promotion such as print media, TV, and radio can be used, or online means of promotion can be employed (see Sect. 4.4). Marketing endeavors to ensure that the web address appears on well-frequented portals, search engines or web sites as banner advertisements. Furthermore, it must be entered into online listings, and a high prioritization with well-known search services must be obtained.

The goal of the first stage is to lure as many surfers as possible to the web site and to generate a high visitor count. At the same time, the reputation of the web site must be checked regularly.

### 4.3.2 The Online Consumer

*Characteristics of the online consumer*

The surfer develops into an online consumer if the company succeeds in establishing goal-directed and repeated contact with the customer (see Fig. 4.4). The online consumer keeps the web address in his collection of bookmarks and clicks on it for certain services and information. He reads the desired information, prints it out, or stores it locally in his personal computer for further use.

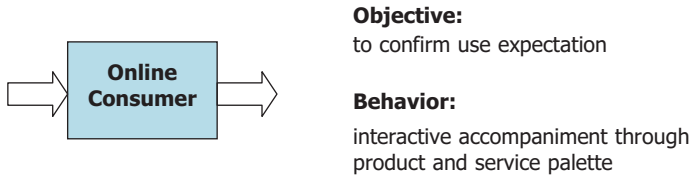


Fig. 4.4: The behavioral pattern of the online prosumer

The online consumer is interested not only in the service offered but also in the dialog offered. How the information content is presented and how the dialog is conducted now become important factors. Of course, the performance characteristics of the products and services must be pointed out and commented on. In addition, the online consumer is interested in price structuring and delivery terms.

The effect of being able to view a product should not be underestimated. Modern computers allow products to be simulated and displayed graphically. Thus the online consumer gets a clearer picture of the extent of the services offered. Examples would be a supplier of fine custom cabinets (see, e.g., <http://cabinet-solutions.com>), or a carpenter with an online simulation of kitchen furnishings.

*Product  
inspection by  
mouse click*

Among the activities performed by an online consumer is the provision of simple feedback, such as the ordering of brochures or the downloading of visual material. He demonstrates a greater interest than a passive consumer customer (surfer) through the retrieval of goal-directed information. The company therefore has the chance to encourage and fulfill a need of the online consumer. Targeted interactive applications include the online consumer and motivate him to behave actively.

The goal of the second stage is to keep the customer on the web site and to increase the length of stay for targeted services. The online consumer repeatedly comes onto the web site.

### 4.3.3 The Online Prosumer

The term prosumer is a combination of the two terms producer (manufacturer) and consumer (purchaser, user). This combined term means that the online prosumer participates as both provider and consumer. In other words, the prosumer is a customer who would like to acquire not only standardized products, but also products and services fashioned according to individual criteria. Therefore, the prosumer is not simply a normal consumer; he is also a partial producer who is willing to contribute to the value chain (see Fig. 4.5).

*Characterization  
of the online  
prosumer*

The online prosumer is active and becomes personally involved. He is ready to express his opinion and to participate in the creation of the offer. At the same time, he perhaps cultivates an exchange of experiences with other consumers.

*Prosumer as  
cocreator*

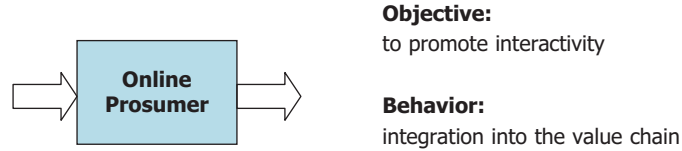


Fig. 4.5: The behavioral pattern of the online prosumer

*Integration into the creation of value*

The company endeavors to integrate the online prosumer into the value chain. In the electronic book shop <http://www.amazon.com>, for example, visitors can write their own reviews for any book whatsoever. These are published online, along with the name and email address of the reviewer. Moreover, the customer rating appears along with the details for the corresponding book.

When the online prosumer has sufficient trust in the web site, then he is ready to specify his customer profile (if necessary). This happens above all when additional services are associated with this action. This customized push plays an important role in eMarketing (cp. Sect. 4.4.1).

*On community formation*

Prosumers of a web site can get into contact with one another and exchange their wishes and experiences. Progressive companies actively support such communities. However, courage and candor are needed for the promotion of specific customer platforms. Many companies still hesitate because they fear the reinforcement of critical voices or an increase in consumer negotiating power.

*Individualization of the offer*

An examination of personal customer requests can lead to the gradual individualization of offers. The versioning of product parts and service parts (as addressed earlier) is not ultimately advanced by engaged prosumers. The goal of the third stage must be to actively integrate the online prosumer into the value chain. In the best case, both sides profit: provider as well as consumer.

#### 4.3.4 The Online Buyer

*From prospective customer to buyer*

The customer requires more and more detailed information on the scope of the service offered and the terms of the price for his purchase decision. With an online offer in his favor, he manifests his decision through the act of purchasing and becomes an online buyer in accordance with Fig. 4.6.

*A trouble-free conclusion is indispensable*

The fourth stage of the customer development model is therefore delicate, because the organization of the web site is put to the test. If the offering and ordering processes are difficult to realize or are incorrect, then the customer's confidence is soon affected. The positive dialog that was maintained until then can suddenly turn negative if the payment process is time-consuming and complicated.

*Maintaining the customer relationship*

The company must endeavor to not only gain the prosumer as a buyer but also to retain him as a satisfied and returning customer. The format and maintenance of the web site should not therefore be aimed solely at concluding sales (see eCustomer relationship management in Chap. 8).

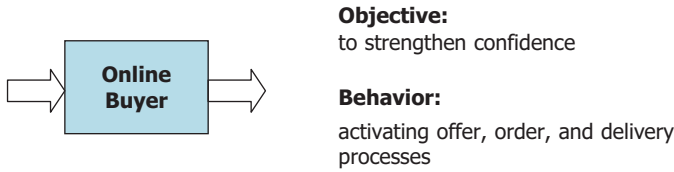


Fig. 4.6: Behavioral pattern of the online buyer

Pure impulse buying is quite rare on the Web. Indeed, online customers often pull in competitive offers and consider their purchases carefully. The goal of the fourth stage must therefore be to strengthen confidence in the online services of the company.

*Strengthening confidence*

### 4.3.5 The Key Online Customer

The key online customer is prepared to make repeat purchases. He differs from a buyer by the frequency and regularity of his business deals (see Fig. 4.7). However, the sales cycles of the products and services can be very different.

*Returning online customers*

Due to his purchasing experiences, the key customer requires less time for subsequent purchasing decisions. Interactivity can also decrease with subsequent transactions. For this reason, the company must think about how it can also maintain the attraction of the web site for key customers.

Through specific customer connection programs, the company attempts to involve the key online customer for longer periods. At the same time, the customer relationship must be cultivated and activated (see Sect. 8.4). This can be done by making the key online customer exclusive supplemental offers. A personal line of communication may also be developed and encouraged (see collaborative customer relationship management in Sect. 8.4.2).

*Encouragement of personal communication*

Key customer satisfaction must be periodically queried and evaluated. However, customer satisfaction alone is not sufficient; the customer value should also develop positively according to the various life cycles of the customer (see the customer equity model in Sect. 8.2).

*Customer value increases*

The goal of the fifth stage is a satisfied and loyal regular customer. A key online customer is motivated by special customer connection programs and served with individual supplemental services.

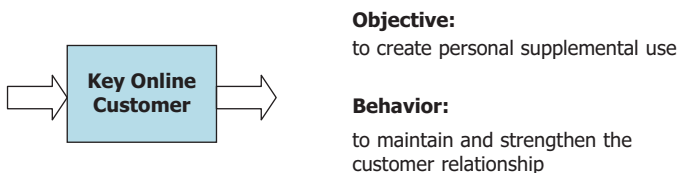


Fig. 4.7: Behavioral pattern of a key online customer

### 4.3.6 Measuring Success with Online Customers

*Process management and control*

Electronic business is characterized by the fact that all user interactions are recorded, including their associated search strategies. There is a great deal of potential for process management and process control due to this variety of available information. In particular, the organization of one's own sales platform can be evaluated and if necessary adapted.

*Recording user interaction*

Classical effectiveness models are mostly based on the probability of a contact; in electronic business, however, the actual contact is captured. Each time a web page or related content (e.g., the contents of a database) is accessed, this action is recorded in a log along with the date, time, page, file name, etc., and the address of the inquiring server. Various suggestions regarding the most important parameters for comparing and evaluating such log files have been made. For example, the page call-ups, the clicks on ads, number of visits, or the advertising contacts are counted. The length of stay is informative, since it provides clues about the attractiveness of an individual page.

*Behavior analysis*

Aside from these rather technical parameters, a record of the behavior of the visitor is interesting. What are his search habits? Which methods of dialog management are preferred? Where and when is the visitor motivated to provide data about himself and request information? Which users are prepared to give feedback on the creation of products and services?

*Performance indicators for customer groups*

Performance indicators that can capture and evaluate the process of customer development have been discussed. These performance indicators are targeted at the five previously discussed customer groups: online surfer, online consumer, online prosumer, online buyer, and key online customer.

Figure 4.8 shows the system of performance indicators used for the customer development process in eMarketing.

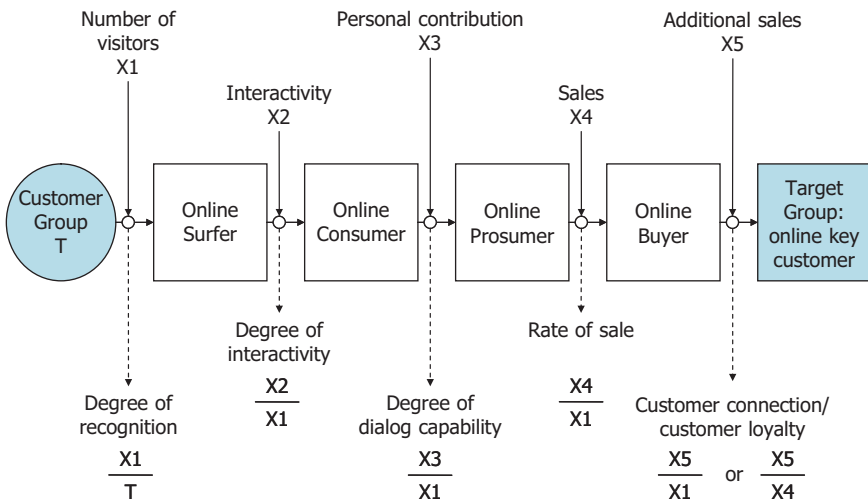


Fig. 4.8: Performance indicators for eMarketing (according to Gräf)

The first performance indicator refers to the perceptibility of an online action measure and expresses the effectiveness of the publication of an online offer, even over classical media. In addition, the number of visitors during a period of time (X1) compared with the size of the target group aimed for (T) is derived in order to express the degree of recognition.

*Performance indicators for degree of recognition*

Both passive and active users are seen as potential online consumers. Active users are interested in the online offer and hope that certain needs can be satisfied; they are prepared to actively inquire (active information search). Passive users however arrive by chance at the web site and are ready with adequate incentive to test the online offer (passive information search).

*Positive and active users*

The next challenge involves converting online surfers into online consumers using attractive dialog management. At the same time, the number of online customers is labeled X2, which corresponds to the technical interactivity. The degree of interactivity is assessed by comparing the number of interactive customers X2 with the number of online visitors X1.

*Performance indicator for degree of interactivity*

X2 is determined by the the number of page visits. However, it is important to make sure that more than just the homepage is called up. An online surfer who only visits the first page of the web presence (visiting card) is not an online consumer. Therefore, for someone to qualify for the X2 group, they must call up three or more pages or remain on the website for longer than 3 min.

*Measuring the length of stay*

Besides the technical interactivity—i.e., the pages or content called up by the user—personnel interaction processes are also of interest. Here, active dialog takes place between the user and a software agent. In accordance with the earlier discussion from Sect. 4.3.3, the online prosumer is prepared to get personally involved in voicing ideas and wishes, and perhaps even in depositing his profile. The ability to make online users into active dialog partners is an indicator of dialog effectiveness: here the number of dialog-oriented customers X3 is compared with the number of surfers X1.

*Performance indicator for dialog capability*

The sales rate is another performance indicator, and is obtained by comparing the number of buying customers X4 with the number of visitors X1. However, loyalty or connection implies that the user repeatedly accesses the web site or carries out repeated purchases from it. Such connection measures can also be characterized by performance indicators. One possible performance indicator for customer connection or customer loyalty is the behavior of the returning buyers X5 compared with the visitor groups X1 or X4.

*Performance indicator for customer loyalty*

Performance indicators for the measurement of loyalty are derived from the number of identified users. Such users must either be registered (which involves the user choosing a password) or marked using a cookie. If only the address of the customer's server is known, then the user's profile must be maintained and gradually developed on subsequent visits.

*Identification of online customers*

Using these performance indicators, business recommendations can be developed in order to optimize eMarketing. The highest possible value of a performance indicator is 1. Changes in the organization of the web site, dialog management or content management can be better measured and evaluated with the aid of these performance indicators.

*Deductions from business recommendations*

## 4.4 Online Promotion

### 4.4.1 Push Principle vs. Pull Principle

*The problem with classical promotion*

Classical promotion aims to influence the perception of a target group through appropriate promotional methods. As many prospective customers as possible should be addressed through mass media such as newspapers, radio, or TV or through printed matter. Although actual communication with the customer does not take place, a kind of customer interaction is facilitated in some such cases by including an answer coupon.

*Avoiding spam*

The broad scattershot approach adopted by some companies when sending out promotional messages using the Internet is a controversial one. The term “spam” has been introduced to refer to the unsolicited dispatching of promotional material to email accounts, newsgroups, or other online forums, comparable to direct mail advertising and unsubscribed telephone calls for marketing purposes.

Figure 4.9 compares the well-known principles of push and pull when the Internet is used as the communication channel.

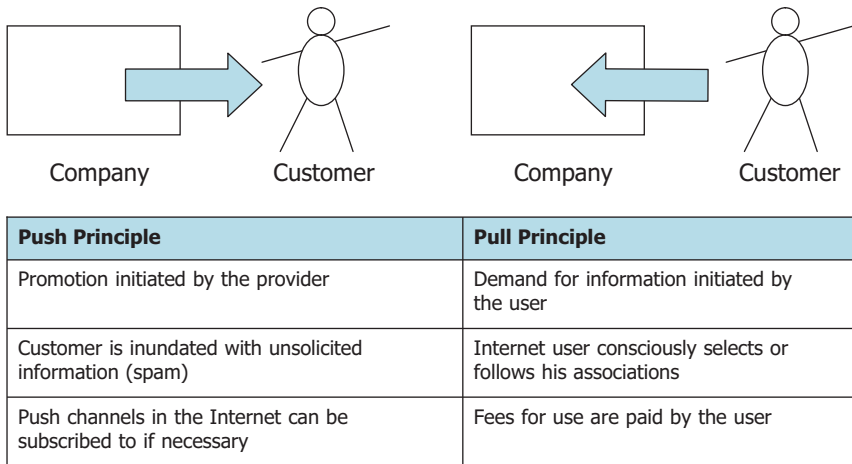


Fig. 4.9: Differences between push and pull on the Internet

*Push as a function*

In the push principle, information or promotional messages from different sources are automatically delivered to the Internet user according to subject by the company or provider. If a push channel is opened on the Internet, then this corresponds to a type of service. Depending upon the arrangement (subscription), the content provider periodically conveys thematically organized content (news, stock market prices, weather reports, etc.) at agreed times or during special events.



The push principle is effective for many promotional forms. The action is initiated by the company or promoter; the respondents often have little control over it. This traditional form of mass promotion is unpopular on the Internet and is often counterproductive. It only makes sense if the Internet user registers for a subscription and can record his preferences regarding how the information should be supplied. In this context it is known as a customized push (a customer-tailored push principle).

*Meaning of customized push*

In the pull principle, the Internet users decide which web sites they want to visit and what information they want to pull from the Internet. The actual action of procuring information is initiated by the user. He selects the information at his own discretion and independently decides which offers he wishes to examine or download.

*Pull as a function*

### 4.4.2 Content Management

The term “content”, as used in the context of this book, refers to prepared digital information (text, graphics, images, audio, video, etc.) that is offered on the Internet and/or an Intranet and is displayed in different ways. The purpose of content management is to plan and to coordinate all of the activities associated with content supply and content use. At the same time an architecture with suitable software components must be developed and maintained (see Fig. 4.10).

*Purpose of content management*

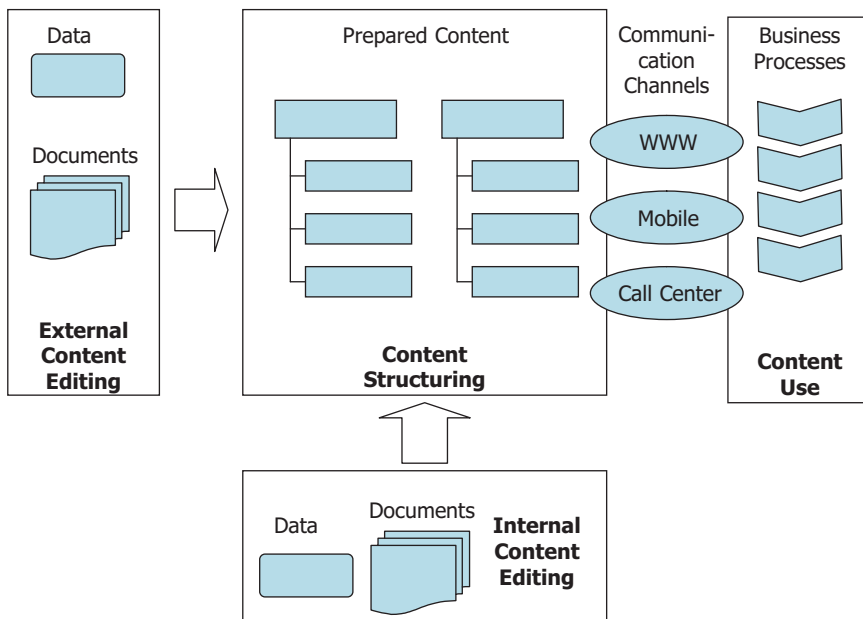


Fig. 4.10: Architecture of a content management system

*ICE protocol  
for information  
exchange*

Content is procured externally by information brokers in digital form; this may be news, stock market prices, product information, etc. Specialized providers like Reuters or Bloomberg offer additional content and services. More often than not, the structured content is recorded and exchanged using the ICE protocol (Information and Content Exchange); this protocol is based on XML, and includes subscription services as well as exchange formats.

*Purpose of  
internal  
content editing*

Aside from the external procurement of structured content, internal content editing is also performed in order to prepare data and documents. At the same time, information objects are created that show different attributes. Further details are required to describe the information objects via descriptors so that they can be efficiently sought and used.

*On the  
structuring of  
content*

The heart of a content management system comprises the tools used to describe and structure the content. These tools mainly access the database, which contains structured data as well as arbitrary documents and multimedia objects.

The design principle for content management systems is the separation of structure, content, and representation:

*Construction  
of structure  
templates*

- The arrangement of the individual portions of content is defined separately from the content itself. Also considered is the order of paragraphs, the composition of headings, and the positioning of images. These structural characteristics can be described hierarchically, which is why XML is used as the markup language. The construction of structural templates to satisfy different requirements occurs automatically. In order to represent different contents using the same structural description, placemarkers are indicated by special tags.

*On the reuse of  
content*

- The desired content is inserted at the positions in the structural description that are marked by appropriate placemarkers. For this reason, the content is broken down into individual elements by digital assets. The granularity of such assets varies from a few words (e.g., product names) to images, and from reference collections to organized content passages. Editors assign an asset to each placemaker in the structural description that allows the same content to be used again in other structures. In an electronic shop, different products can be represented with the same structure but with different distinguishing characteristics.

*Transformation  
into version  
format*

- The layout of a document is specified with the aid of XSL stylesheets. This allows the rules for the transformation into the desired version format to be established.

Several communication channels connect the content management system to various business processes. Apart from using the Internet as a communication channel, mobile devices or Call and Communication Centers can provide the content for these business processes. Depending upon the operational status of the content management system, workflow management systems may also be used.

### 4.4.3 Types of Promotion

Online promotion is predominantly employed for products and services which are offered on the Internet. Along with this a media break, as often found in classical promotion campaigns, is dropped.

*Avoiding the media break*

The number of promotional methods is relatively limited for online promotion, although a multitude of options do exist. Worth mentioning are banners, buttons, nanosites and microsities, as well as branded content:

**Banner advertising.** Banners function in a similar manner to conventional promotional billboards and printed ads. The promoter tries to address prospective customers with an attractive promotional surface. However, traditional means of promotion do not offer the interactive and link possibilities associated with banner advertising. A banner can be provided with a link to an offer or can be deposited with a purchase order form. The classical banner consists of a graphic design (in GIF or JPEG format), a promotional text-based message, and a hyperlink that is activated by clicking on the banner. Animated banners are increasingly being used to attract the attentions of Internet users. Though reaction rates to banner advertisements are generally not high, rates of just a few percent are still a success.

*The banner as a promotional message and reference link*

**Buttons.** Buttons can be regarded as a special type of banner. They are designed to be smaller and more discreet and therefore detract less from the content of the page. The button is always located in the same place on the posted page, often in contrast to a banner advertisement, which can change with each page view. Although buttons do not stand out in terms of size and placement within the page, the long-term promotional effects of buttons can be higher than those of banner advertising. Buttons are suitable for image promotion and for increasing brand recognition.

*Buttons enhance brand recognition*

**Nanosites.** As the name suggests, nanosites are small web sites that are displayed within a banner. Services can be procured from a nanosite without ever having to leave the main promotional page. Thus, product information can be downloaded from a nanosite, newsletters subscribed to, or orders placed.

*Web sites within web sites*

**Microsites.** These are specially organized web campaigns. In contrast to the methods of promotion discussed above, microsities are displayed only when the Internet visitor shows interest in the product being promoted. When the campaign ends, the microsities are switched off. Such microsities allow the campaign to vary according to the specific target group. The success control of campaigns that are carried out with microsities is significant.

*Microsites for specific target group campaigns*

**Branded content.** In this case, the content of a specific area of the web site is visibly organized by the promoters. For example, a financial institute may organize content according to a particular outline, attach its logo to the content, and then publish this branded content on the web site of a search engine. The operator of the search engine receives access to current and usable financial

*Renting parts of the web site*

information; the financial institute gains promotional surface and distinguishes itself as a sender of current stock exchange information.

When online methods of promotion are employed, it becomes possible to evaluate success and interaction diversity using various measures. The formulation of use promise, organization of image content, degree of animation, or coloration and arrangement of logos can be varied and optimized.

## **Case Study eDVDSHOP: Marketing for Key Online Customers**

The eDVDSHOP already has over 1,000 registered customers. Of those, over 95% have bought a product at least once and can thus be classified as online buyers. However, only 60% of these are key online customers. The remaining 40% made less than three purchases over six months ago.

Marcel Anderson would like to encourage this 40% to become interested in the eDVDSHOP again. To do this, he researches different online marketing methods. One popular method, especially with webshops, is the newsletter. However, there are problems with newsletters (see Sect. 4.4.1). Customers frequently feel irritated when they receive newsletters via email. This is why it should be handled according to the previously described customized push principle. The customer should have the chance to cancel the newsletter during registration. Since the eDVDSHOP has not sent out a newsletter yet, it is not clear whether the registered users wish to be informed about updates by email. Anderson decides to integrate the newsletter function into the eDVDSHOP and to give all new customers the chance to cancel it. He informs all of the other customers about the newsletter once by email. Interested customers still have to register themselves independently for the newsletter.

After three months Anderson evaluates the results, which are found to be rather sobering. Only 10% of the customers that registered over 3 months ago registered for the newsletter, and only 50% of the new customers wanted to receive the newsletter.

Anderson considers other ways to inform customers about updates. One solution could be RSS. Since version 2.0, RSS has stood for Really Simple Syndication and is used to make information on a web site available in machine-readable format in the form of XML. RSS was developed for news presentation; many newspapers offer RSS channels. Special RSS readers can be used to read from RSS, while some web browsers support RSS.

In order to be able to use RSS, an interested user of the eDVDSHOP must register himself via the RSS reader for an RSS channel. He then gets the current messages displayed in the RSS reader and is informed as soon as an updated page is available. An RSS channel involves an XML document which for the eDVDSHOP appears as follows:

```

<rss version="2.0">
  <channel>
    <title>eDVDSShop News</title>
    <link>http://www.edvdshop.ch</link>
    <description>Newsletter from eDVDSShop</description>
    <language>German</language>
    <item>
      <title>New Special Edition by Demys Lola available</title>
      <link>http://www.edvdshop.ch/product/1232</link>
      <description>
        The new special edition by Jacques Demys Lola has arrived
        here today. The film is presented with remastered picture,
        original French soundtrack as well as optional English, German
        and French subtitles. Furthermore on the DVD are extensive
        extras, for instance a two-hour documentary on Jacques Demys.
      </description>
    </item>
    <item>
      <title>eDVD Sweepstakes</title>
      <link>http://www.edvdshop.ch/sweepstakes/</link>
      <description>
        Take part in our film quiz and win yourself a DVD.
      </description>
    </item>
  </channel>
</rss>

```

The advantage for the user of the eDVDSShop is that while he does not have to visit the web page again, he is still informed if something changes on the page. In addition, RSS channels can be placed in files and read offline.

RSS has several advantages for Anderson in comparison to the newsletter. On the one hand, an RSS channel is automatically generated by the shop if Anderson posts an update. On the other hand, the users can decide for themselves whether they want to be informed about updates by registering for the RSS channel.

## 4.5 Prospects for eMarketing

The use of the Internet by private individuals and companies has increased in recent years. It is now hard to imagine business life without the ability to use email as a means of communication. The World Wide Web initially primarily supplied static information. Today, interactive content is increasingly produced, information tailored to the customer is published, and business transactions are even concluded in online marketing.

Marketing assumes that an electronic business passes through four stages of maturation (see Fig. 4.11) on the way to exhausting its marketing possibilities:

*Internet use by  
private  
interests such  
as companies*

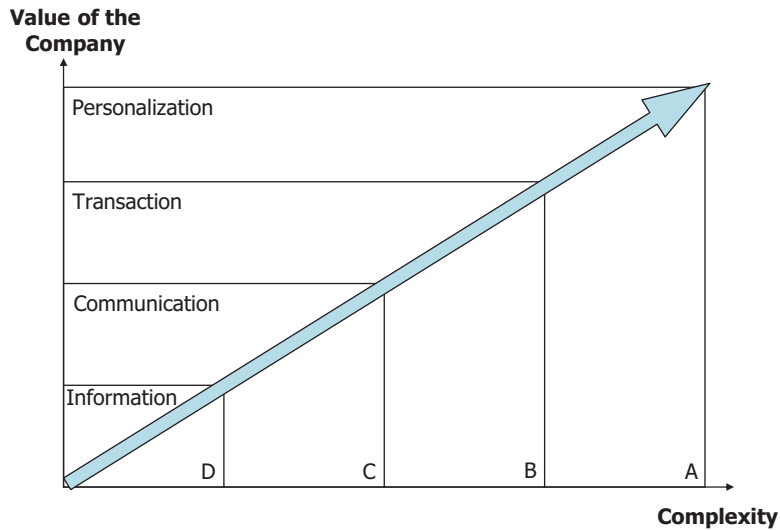


Fig. 4.11: Maturity model for organizations offering electronic services

**Stage D.** Information such as general company information, product catalogs, or the job market is provided

**Stage C.** Communication using services such as search functions, email, newsletters, newsgroups, FAQs, chat rooms, or discussion forums is realized

**Stage B.** Business transactions are performed with online offer generation, ordering, payment, and distribution

**Stage A.** Personalized products and services, customer connection through one-to-one marketing, or individual online order tracking is facilitated, or digital agents are employed for personalized consultation and sales

*Maturation  
model for  
eBusiness*

The level of development of an eBusiness in terms of its web presence and electronic activities can be rated according to this maturity model. Companies or institutions which possess their own web platforms can be classified into one of the four stages of information (D), communication (C), business completion (B), or personalization (A).

*Higher  
developmental  
stages gain  
significance*

According to empirical studies in Europe, electronic business has matured over the last few years. There is an overall shift to higher stages. Organizations that start with a web site very often belong to a maturity level of D or even C (i.e., they offer information and communication tools). Afterwards they invest in Web-based applications and services and therefore reach stage B. However, more and more companies and organizations have recognized the potential of individual and personalized services; they have attempted to reach maturity stage A. In conclusion, the investigations in Europe and other Western countries and comparative

market studies have clearly shown that eMarketing has grown in prominence in the last few years, especially in smaller and medium-sized companies.

## 4.6 Literary References

Some standard works on marketing, such as the one by Kotler et al. [Kot06], deal with isolated online marketing issues. There are also specific books about Internet marketing, such as the work by Chaffey et al. [Cha06]. The authors describe a marketing strategy for Web-based offers, a marketing plan, and distribution channels and market structures.

*Standard  
marketing  
literature*

In the last few years, some works on electronic business have emerged which devote individual sections to eMarketing; the books by Schneider [Sch07] and Turban et al. [Tur06] are worth mentioning in this context. The work of Scott [Sco07] describes how the Web has changed the rules of marketing and public relations.

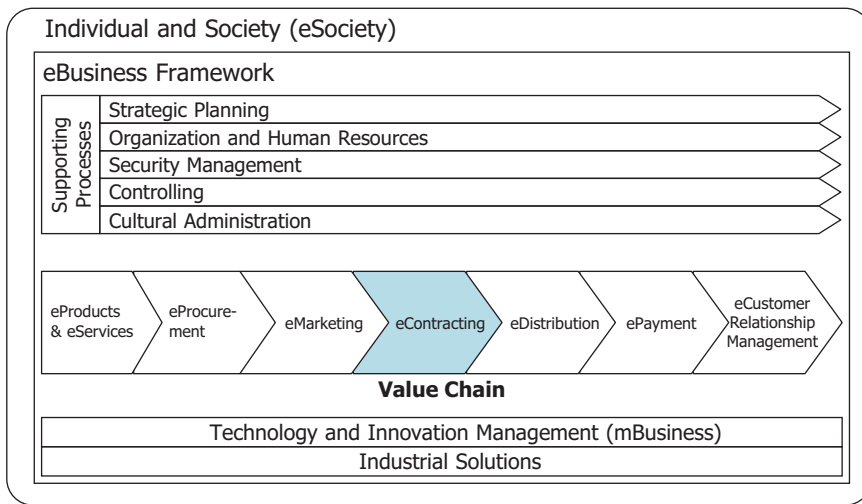
The work of Gräf [Grä99] is based on promotional work that analyzed marketing research and practice projects. The classification of web customers as well as the corresponding performance indicators described earlier in this chapter are taken from Gräf's work.

*Performance  
indicators*

The work of Pine and Davis [Pin99] on mass customization gives for individually customize products and services. Research on this problem by Meier and Werro [Mei07] led them to propose that a fuzzy classification model should be applied to online customers in order to improve customer equity, launch loyalty programs, automate mass customization, and facilitate personalization.

*A fuzzy  
classification  
model for  
online  
marketing*

# 5 eContracting



*eContracting supports the electronic negotiation process by creating standards for the production of a legal document with a digital signature. Section 5.1 describes the electronic negotiation process and the requisite activities for it. Generic services must be made available for negotiation, validation, signing, transactions, archiving, and arbitration (Sect. 5.2). In Sect. 5.3, asymmetric coding procedures are discussed, the digital signature is described, and the utility of trust centers is explained. Section 5.4 describes how electronic contracts can be administered using XML. The legal rights of an information society are summarized in Sect. 5.5. Section 5.6 provides literature references in this field.*



## 5.1 The Electronic Negotiation Process

*Concluding a contract without personal contact*

In electronic markets, business transactions can be carried out without the business partners ever coming into physical contact with one another. At the same time, suitable software systems must be used to record the mutual agreement between the market participants over the exchange of goods or services, to facilitate the signing of contracts in a legally binding manner, and to archive for monitoring purposes.

*What does eContracting mean?*

In electronic contracting, or eContracting the electronic negotiation process involves the following actions:

- Valid recording of the negotiating positions
- Administration and electronic filing of the various parts of the contract
- Agreement of rights and obligations
- Legal conclusion of a contract (with digital signatures)
- Monitoring the fulfillment of the terms of the contract

*Electronic contract*

If the electronic negotiation process is successful, then an electronic document called an electronic contract results. This document legally binds the contracting parties to their tasks and responsibilities. Of course, the electronic contract also regulates remuneration modalities; for example, electronic payments are redeemed (see Chap. 7 on ePayment).

*Negotiation process for eContracting*

Figure 5.1 shows the process of negotiation during a business transaction schematically. In electronic contracting, the corresponding steps in the agreement are recorded and supervised, beginning with information on the business partner, the negotiation (with the offers and demands), the conclusion of an electronic

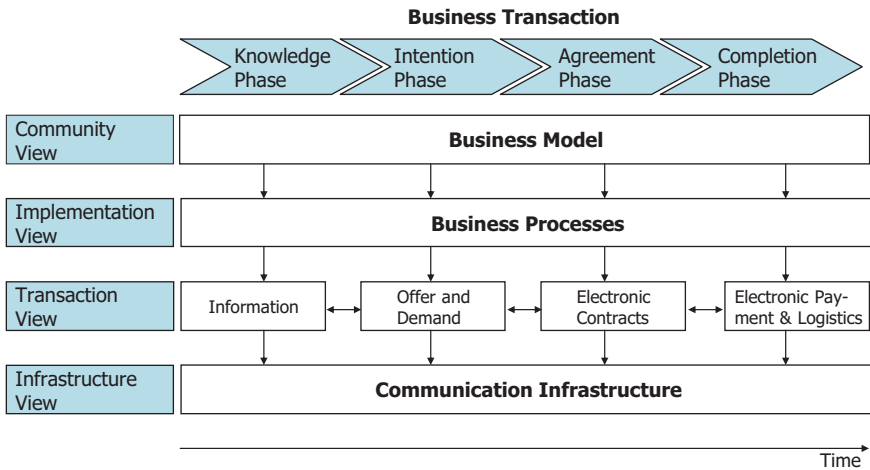


Fig. 5.1: The negotiation process (according to University St. Gallen)

contract, right up to the electronic payment and distribution steps. An electronic contract therefore covers points of agreement from all phases of the business transaction process.

The definitions of the electronic negotiation process and electronic contracts raise a set of questions. Which services have to be made available by market participants so that an electronic contract can be concluded via the Internet? What is an electronic signature, and what does the infrastructure for the allocation of public certificates look like? Which security precautions are required so that an electronic contract meets the standards of a court? What does online arbitration mean, and which foundations for complaint and legal action does it cover? What is the legal basis for the accomplishment of electronically arranged claims or services?

The following sections describe methods and techniques that can be used to answer the questions above.

*Questions relating to the electronic negotiation process*

## 5.2 Generic Services for the Negotiation Process

One important goal of an electronic negotiation process is the conclusion of a contract and/or the provision and signing of an electronic contract. Compared with paper-based contracts, electronic contracts have the advantage that their contents can be examined and processed by programs and software agents for completeness. Supplementary services can be provided for in the completion of a concluded contract, such as notification when goods are yet to be delivered.

*Difference from paper-based contracts*

In order to fully realize the potential of an electronic negotiation and completion process, an electronic contract must include categories of information that answer the following questions:

*Elements of an electronic contract*

- Who are the contracting parties?
- What is the content of the agreement?
- How is the electronic contract to be realized?
- Which basic legal conditions apply?

Generic services (software) that can answer the above questions are available. These cover the following aspects: identifying the contracting parties; electronic negotiating (including concluding the contract); contract archiving; contract enforcement; and electronic arbitration (Fig. 5.2).

*Meaning of generic services for eContracting*

Before market participants enter into electronic negotiations, they would like to find out about the identity of their opposite party. To achieve this, sites or institutions are needed which issue legal identity certificates for individuals. These so-called certification authorities or certification sites must be able to guarantee that the market participant is in fact the person he presents himself as (authentication). In order to issue such certificates electronically, a certification authority requires identification documents from the market participant (for instance a passport), as well as a physical contact in most cases. The certificate issued by a

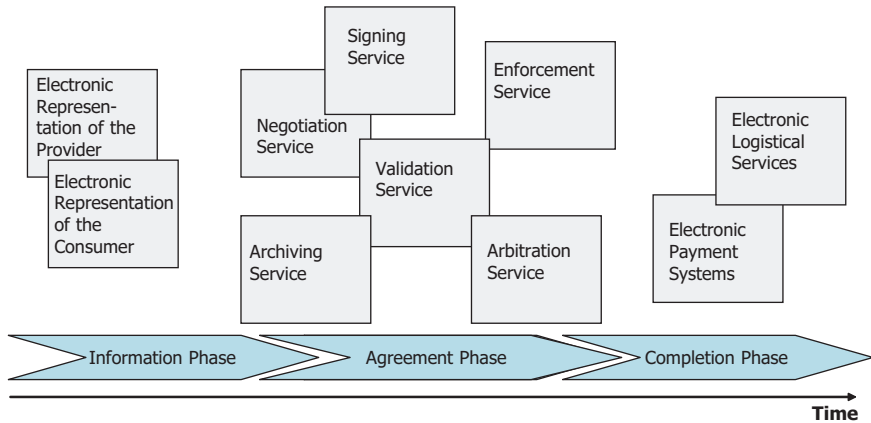


Fig. 5.2: Generic services for eContracting (according to Runge)

certification authority for the market participant is limited and can be brought into the contract negotiation process (see Sect. 5.3). The identification of the contracting parties is regarded as a generic service since each of the relevant certification authorities can always be relied upon in different negotiation processes. Thus, the classification of the partners that appear in the electronic market into real-world individuals and institutions is guaranteed.

*Validating of contractual content*

The generic service used to identify the contracting parties can be supplemented by a validation component. Thus, it is possible to verify whether the contract framework is formally structured in the correct manner using contract templates (i.e., drafts for specific business transactions). This service can highlight risks and suggest modifications. Depending upon the needs of the parties, the validation service can be realized through software agents or through excellent sites.

*Tasks of the negotiation service*

The negotiation service helps the market participants when they are negotiating their points of agreement. Specific software systems—electronic negotiation support systems—support the negotiation process through multimedia communication components and cooperative negotiation environments. Depending upon the degree of maturity of these software systems, proposals for solutions can be generated and previously negotiated partial positions can be optimized.

*Generic archiving service*

Making use of electronic catalogs (see Chap. 3 on eProcurement), the software system determines the optimal conditions for exchange and records these in the intended contract. A supplementary archiving service classifies the different contract versions and secures the respective results of the negotiations. Both the administration and the completion of the negotiation process are supported, including a description of the relevant status. The negotiation service can engage in comparisons of offers and demands, or can be expanded through online auctions (see Sect. 2.5.4 or, e.g., <http://www.ricardo.de>), as well as through mature software agents for extensive electronic negotiations.

In the case of a mature software agent, the negotiation service makes functions available for supervising and monitoring the negotiation process. This service steers the negotiation process and examines the particular documents of the agreement and their associated security aspects. In the completion phase, this service can take over the supervision of the delivery times and payment modalities.

*Monitoring and supervising contract completion*

Naturally, the electronic market is not protected a priori from market participants who do not want to or cannot keep to their agreed negotiating positions. If a contracting party does not fulfill its obligations, then an assurance service must be used. On the one hand, this service may contain proactive measures to secure the fulfillment of particular parts of the contract and obtain remuneration for the act of defaulting on these parts. On the other hand, reactive measures like rating systems or blacklists are set up in such a way that, in an extreme case, the defaulting party is no longer certified for subsequent business transactions.

*Search for defaulting contracting parties*

If a legal dispute comes about despite these precautionary measures and security measures, then an online arbitration court can be consulted for the purpose of conciliation. This arbitration court only becomes active with the consent of the contracting parties, and the proceedings take place via electronic media. The online arbitration court negotiates and consults with the contracting parties via Internet conferencing or a chat room for example. If an amicable agreement is reached, then the arbitration proceedings are stopped after the publication of the settlement. The proceedings can also conclude with an arbitral award. This is effectively a judicial verdict and is enforceable (see electronic arbitration, for example at <http://www.cybersettle.com>).

*The online arbitration court*

## 5.3 The Digital Signature

### 5.3.1 Asymmetric Coding Procedures

With the growth and development of electronic business, the security of electronic business transactions has become an important issue. Since business deals are often concluded in the electronic market over great distances and therefore often without any personal contact, special security precautions must be established in order to build trust. It must be guaranteed that any electronic documents do actually come from the source that they are believed to come from, and sensitive data like electronic contracts must not be changed en route. Moreover, the receipt of the electronic documents must be confirmed by the receiver.

These requirements can be fulfilled through the use of asymmetric coding techniques. In contrast to symmetric coding procedures, where the same key is used both for coding and decoding, in the electronic market the user receives an asymmetric pair of keys. In other words, two different keys are used for coding and decoding: a private key and a public key. The public key is generally accessible and can be published on the user's homepage or in public listings. However, the private key is kept secret by the negotiating and contracting parties.

*Function of asymmetric coding techniques*

Figure 5.3 illustrates an asymmetric coding procedure that uses a public key  $R_{\text{public}}$  and a private one  $R_{\text{private}}$  (the letter  $R$  stands for the receiver). In this

*Public and private keys*

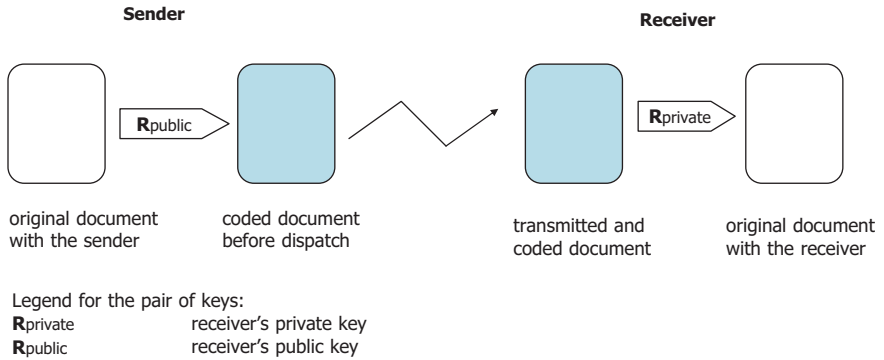


Fig. 5.3: The asymmetric coding procedure

asymmetric cryptography procedure, the sender encodes his original document and his contract using the public key of the receiver,  $R_{\text{public}}$ , before he conveys the document to the receiver. This document remains illegible to all other market participants aside from the receiver, who possesses the required private key for it. On the receiving side, the document is then decoded using the private key of the receiver  $R_{\text{private}}$ . The receiver can read and understand the document with it.

The asymmetric coding procedure is used not only to encode and decode documents, but also to seal documents with digital signatures. We deal with this topic in greater detail in the next section.

### 5.3.2 Generating Digital Signatures

*What is a digital signature?*

A digital signature or electronic signature is a procedure that guarantees the authenticity of a document. If the sender is identified and recognized by his name, the “authenticity” of the sender must also be proven. In other words, the receiver of an electronic document or a contract would like to have a guarantee that the sender is in fact the person he presents himself as.

*Implementation of digital signatures*

A digital signature can be achieved using an asymmetric coding procedure. Figure 5.4 illustrates how the digital signature is generated and added to the electronic document. It should be noted that under normal conditions the asymmetric coding procedure is used twice:

*Double usage of asymmetric coding techniques*

- Using the receiver's pair of keys (i.e., the receiver's private key  $R_{\text{private}}$  as well as the receiver's public key  $R_{\text{public}}$ ) for the purpose of coding and decoding the electronic document
- Using the sender's pair of keys (i.e., the sender's private key  $S_{\text{private}}$  as well as the sender's public key  $S_{\text{public}}$ ) for the purpose of the digital signature and for guaranteeing the authenticity of the sender of the electronic document

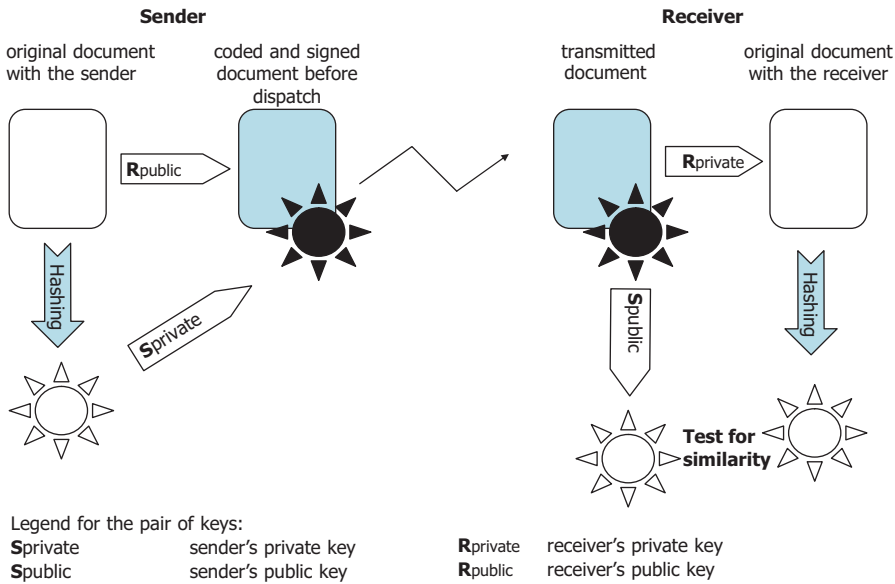


Fig. 5.4: Coding and sealing of electronic documents

In Fig. 5.4, it is evident that the encoded document (created with an asymmetric coding procedure used for cryptography) is overlaid with a “seal” (created with an asymmetric procedure that is used to create a digital signature). For this a so-called hashing algorithm is used. A hashing algorithm determines a hash value or a fingerprint (represented in Fig. 5.4 by the sun-like seal) from the original document. This hash value has the following characteristics:

- The hash value or the fingerprint has a fixed length for any document, and its length depends on the hashing algorithm used
- The original document cannot be revealed by the hash value or by the fingerprint
- Each change in the original document leads to a different hash value or to a different fingerprint

These important characteristics of a hashing algorithm allow the fingerprint or the seal to be used as a digital signature. Digital signatures are therefore nothing more than encoded hash values. At the same time, the hash value generated from the original document must be encoded with the sender's private key and attached to the already encoded document. After the document has been transmitted, the receiver (or the receiver's software) separates the digital signature from the coded document. The coded document is converted into the original document with the help of the receiver's private key  $R_{\text{private}}$ . At the same time, a hash value is calculated from the original document using the same hashing algorithm as the sender used.

*Characteristics of hash values*

*Test of the similarity of two signatures*

The digital signature (black seal on the receiver side in Fig. 5.4) that was separated from the transmitted document is then decoded with the sender's public key  $S_{\text{public}}$  into the original hash value. The seals are then compared; if they match, the receiver can assume that the original data arrived intact and that they were actually sent by the sender. This allows the receiver to check whether or not the original document was changed after dispatch. The receiver can also verify whether the sender is the market participant he says he is.

*The RSA algorithm*

There are various encoding procedures, but we will not examine them in detail here. One well-known method is the so-called RSA procedure, which was invented and published by the researchers Rivest, Shamir and Adleman. This procedure is based on prime number factoring which can be considered secure depending upon the length of the keys selected and is not decipherable within a sufficiently long period of time.

### 5.3.3 Tasks of the Certification Site

*Task of a trust center*

A certification site (certification authority or trust center) is an institution which certifies the allocation of public signatures to real people. The fundamental task of a certification site is therefore to reliably identify people and for the electronic market to confirm the allocation of the required public key to this person.

The certification site is responsible for the production, issuance, and administration of certificates. In the process it must reliably identify the applicant. This requires a personal contact and the presentation of a valid identity card or officially certified documents. This is the case if the applicant uses a professional title and professional affiliation, as in the case for a physician, attorney, tax consultant, or certified public accountant.

A certificate contains the public key of the certified person. A person can independently generate a pair of keys and have the public key certified by a certification site, or the certification site will produce a pair of keys and securely store the private key. If this is lost, for instance due to a computer failure, the person can fall back upon the private key.

*Registration authority*

In order to simplify the complexities involved with identifying people, so-called registration authorities exist. These do not actually issue certificates; instead, they store certificates and identify people.

*On the ISO X.509 standard*

Figure 5.5 shows the elements of a certificate like that of the X.509 standard promoted by the ISO (International Organization for Standardization). This scheme utilizes a set of uniform characteristics that are then used to facilitate the exchange of certificates worldwide and the use of digital signatures.

Aside from the public key of the certified person, additional information about this person, the technology employed, and the digital signature of the certification authority are stored. The authenticity of the certificate can be verified beyond the digital signature.

*Certifying with time stamps*

Apart from the tasks already outlined, certification sites must maintain a time-stamp operation. In electronic contracting, it can be important to ensure that parts of the negotiation are time stamped. In such cases, the certification site

Name of Characteristic	Description of Characteristic
Version	version number of the X.509-Standard
Serial Number	specific serial number of the certificate
Distinguished Name	name of the owner
Organisational Unit	company or organization
Country	owner's country
Issuer	name of the certification site
Public Key Algorithm	algorithm for the public key
Public Key	owner's public key
Signature	digital signature of the certification site
Signature Algorithm	algorithm for the signature
Validity	validity

Fig. 5.5: Contents of a certificate that complies with the X.509 standard

act as a trustworthy third party in confirming the validity of these time stamps. A time-stamp procedure must securely guarantee that a particular version of a document from a particular point in time is available. When deadlines are involved, a time-stamp operation is inevitable.

A certification site can also (upon request) permit the use of a so-called pseudonym instead of a name in the certificate. Thus, the owner of a digital signature does not have to divulge his identity to the electronic market. This is legally permissible because the applicant is known by name to the certification site. Pseudonyms can be useful for larger companies or authorities. Since a digital signature can only be applied for by real people, the pseudonym for a business serves the same function as “on behalf of” or “as the representative of.” Owners of a signature key with a pseudonym are covered by legal data protection. The identity of a key owner is communicated only when it is necessary in order to track criminal offences and in the case of emergency for the sake of public safety.

*Pseudonyms  
are permissible*

### 5.3.4 Verification of Certificates

Different countries have passed national signature laws (see Sect. 5.5 on legal aspects), and there are also some international agreements (e.g., for Europe). The point of these laws and decrees is to recognize electronic documents as legal goods and to establish the basic conditions that certification sites must adhere to. Connected to this is the PKI (public key infrastructure), which is the infrastructure required for the allocation of digital signatures and certificates. What happens if two business partners with different certification sites want to create an electronic agreement with each other? An example of this is given in Fig. 5.6:

*The PKI  
infrastructure*



Anton Miller from Switzerland is registered in his country with the certification site Verify (a fictitious trust center in Switzerland). His business partner, Pete Shaw from New Zealand, possesses a certificate from the trust center SignOn (a fictitious trust center in New Zealand). Each of these certification sites can verify the certificates of its participants. Who then verifies the two certification sites Verify and SignOn? If the two trust centers do not recognize themselves directly, then a chain of mutual verification can be sought through other trust centers. If this verification chain can be closed through mutual recognition by other trust centers, then the two business partners Anton Miller and Pete Shaw can complete the business electronically with one another securely and reliably. Otherwise the two trust centers Verify and SignOn would have to establish a contracted business relationship either directly or indirectly, and the two business partners would have to agree on which trust center should be asked to secure their relationship.

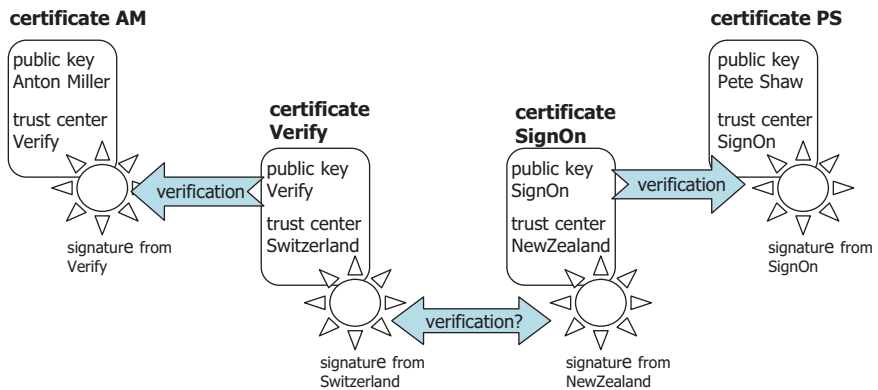


Fig. 5.6: Cross-national verification of certificates

### *Blocking certificates*

If a participant's keys are lost or misuse is suspected, then precautions must be established for the blockage of the corresponding certificates. So-called stoppage lists (certificate revocation lists) are used to announce that particular public keys are invalid. However, delays until the participants in the electronic market experience the blockage of public keys can occur. For this reason, there are also other types of certificates that are supposed to increase security. The instant certificate is generated whenever the public key of a business partner is used. Although this may mean lots of work for a certification site with frequent business activity, a multitude of instant certificates must nevertheless be produced.

Solutions that allow the correctness of certificates to be queried online have been developed. Since certificates are worthless without valid and precise time stamps, sophisticated time-stamp procedures have been developed and implemented especially for the allocation of certificates.

## Case Study eDVDSShop: Using SSL

Ever since it was hooked up, the eDVDSShop has used a secure connection for transmitting the personal data of the buyer, for the checkout process in the storefront, as well as for the entire backfront. This connection is constructed using the secure sockets layer (SSL) protocol. This encodes the transmitted data and also offers the possibility of authentication based on certificates. SSL is employed in the eDVDSShop for secure communication between the web server and the client browser.

In a first step, Anderson had a pair of keys produced and a certificate drawn up at a certification site for the public key. The customer's web browser can internally examine certificates from several certification sites. So that this examination was facilitated, Anderson selected the global certification site VeriSign. A certificate with VeriSign can be obtained at three levels; it costs \$399 annually for 40-bit coding (Secure Site), \$999 for 128-bit coding (Secure Site Pro), and \$1,499 for 128-bit coding that complies with the extended validation certificate standard (Secure Site Pro with EV). The difference between the two encryption levels is that the Secure Site certificates provide only 40-bit coding with older browsers, while Secure Site Pro (with EV) guarantees 128 bits with these as well. Marcel Anderson has a Secure Site Pro with EV certificate drawn up by VeriSign for his public key.

The SSL protocol initializes the connection from the web server to the client via a "handshake." The coding algorithms employed are openly available for client and server and are negotiated during the handshake. The SSL handshake at the eDVDSShop consists of the following steps:

1. The client sends a "ClientHello" message to the server. The message contains some basic information, like the SSL version employed, the actual time, a random number, the supported compression algorithms, as well as a session ID.
2. The server can recognize from the session ID whether a connection to the client already exists. If this is not the case, it sends a "ServerHello" answer to the client, which likewise contains a (shorter) version number as well as a session ID, a random number, and a compression algorithm selected by the server and supported by the client. Apart from the "ServerHello" message, the eDVDSShop server sends the described VeriSign certificate in a "certificate" message to the client. In addition it produces a "ServerKeyExchange" message in which it gives a possible key exchange algorithm that can be used for further key exchange. The RSA described above is one of the possible algorithms. Finally, the server ends the exchange of messages by transmitting a "ServerHelloDone" message to the client.
3. SSL ensures that the client also possesses a certificate, although it is not required by the eDVDSShop in this case. The client's browser

therefore examines the VeriSign certificate. If this is correct, it answers the “ServerKeyExchange” message entered by the server with an appropriate “ClientKeyExchange” message. The client inserts a random number (the so-called premaster secret) into the message, which it encodes with the public key of the server. Afterwards the client sends a “ChangeCypher-Spec” message to the server, which indicates that any data exchanged from now on will be encoded.

4. The server receives the premaster secret with the “ClientKeyExchange” message. Using the previously exchanged random numbers in the “ServerHello” and “ClientHello” messages, the client and server independently compute the master secret. Well-known hashing algorithms like SHA (Secure Hash Algorithm) and MD5 (Message Digest 5) are used in the process. The master secret forms the basis for the computation of the secret key for the agreed-upon coding method. The client sends the server a “Finished” message, which the server can only decode if both have computed the same master secret.
5. The server then sends the client a “Finished” message in return. Again, the client can only then decode this if both have calculated the same master secret.
6. If all goes well, the SSL handshake ends at this point and a coded connection is produced. All of the data exchanged between browser and web server will then be transmitted through this connection.

## 5.4 XML and Electronic Contracts

*XML scheme  
for electronic  
contracts*

XML-based procedures for producing electronic contracts have been at the developmental stage for some years now. For instance, within the organization OASIS (Organization for the Advancement of Structured Information Standards), the LegalXML Committee deals with an XML scheme which is to be used as a standard for defining electronic contracts in XML. The LegalXML Committee cites the following advantages of employing an XML standard for the description of contracts:

- XML is a standardized and application-independent document format
- Electronic contracts can be exchanged
- Automatic processing and validation of contracts are made possible
- XML documents can be converted into any output format
- Parts of contracts can be reused

One essential characteristic of a contract is the signature of each party involved in the contract. Such a signature is hand-written in the nonelectronic domain. An equivalent digital signature can be used in electronic contracts.

In February 2002, the World Wide Web Consortium (W3C) published the XML Signature standard in order to allow XML documents of any kind to be signed with a digital signature. Using this standard, either parts of or the entire XML document can be digitally signed. The signature created is actually an independent XML document that still can be inserted into the signed document. Figure 5.7 shows an example of an XML signature for an electronic contract.

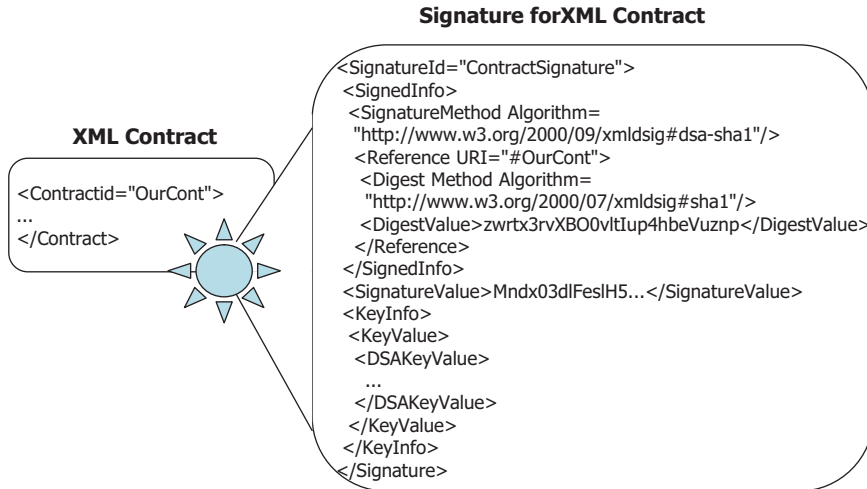


Fig. 5.7: Example of an XML signature

The contract document possesses the ID “OurCont.” The signature produced is located in the “signature” part of the infrastructure. It contains a “SignedInfo” branch which contains information on the algorithms used. The XML signature is not tied to a concrete signature or rather hashing algorithm, but permits the use of any algorithm. In the example shown, the hashing algorithm SHA1 was selected, and the signature was produced by applying the DSA algorithm to the calculated hash value. The signature computed with the DSA algorithm is found in the “SignedValue” branch. Finally, information on the keys required is given in the “KeyInfo” branch. In the example, the public DSA key—which is needed to examine the signature—is mentioned.

## 5.5 Legal Rights of the Information Society

Basic legal conditions for using electronic information and communication services have existed for some time now. The most important of these laws and regulations concern the following areas:

*Data protection laws guarantee rights to information and amendment*

**Data protection and data security.** Data protection means the protection of personal data from incorrect use. In contrast, data security is the protection of data from loss and falsification. Both of these concerns are regulated in law. Moreover, in some countries data protection commissioners work to advise citizens and to clarify their rights (right to information and right to amendment).

*Advocacy of copyright*

**Copyrights and patents.** Dealing with digital goods requires adjusting and extending appropriate bills relating to copyright protection and patents. As is made clear in Sect. 6.5 on digital watermarks, it is difficult to protect the rights of the creators of information objects. Watermarks must be embedded into information objects, and when information objects are illegally copied and used, it is important to prove that this is the case.

**Right to a domain name and trademark law.** Each computer connected to the Internet possesses a specific number. In addition, a specific name can be assigned to a computer to identify it. Quarrels over these so-called domain names have already occurred several times in the past, leading to lawsuits. Both the allocation of domain names and the regulation of the requirement for a unique name are currently still in a state of flux, although the initial legal framework associated with these issues has been created at both national and international levels.

**Digital signature.** Signature laws regulate how the allocation of private and public keys and the issuance of certificates are organized. Aside from rules for the construction of a PKI infrastructure, the most important of these are security regulations that concern the electronic exchange of legally secured documents.

*Competition conditions in the telecom market*

**Telecommunications law.** In the last few years, the telecommunications market has become strongly liberalized. Providers that previously had a monopoly have had to accept fair competition from alternative market providers. Aside from these actual network carriers, Internet access providers and Internet service providers that facilitate access to the Internet and provide electronic services have also emerged.

*Prevention of spamming through the ICC*

**International advertising guidelines.** The International Chamber of Commerce (see <http://www.iccwbo.org>) in Paris has developed guidelines concerning online advertising. The point of this is that every provider must reveal its identity to Internet users. The sending of messages on a massive scale is only allowed for commercial newsgroups, and the sending of advertising messages within these newsgroups is not exclusively forbidden. These guidelines are to help stem the flood of unwanted advertising mail (spam).

This brief review of relevant legal regulations and efforts shows that basic global conditions must be established to deal with electronic communication channels. Since the Internet is a global phenomenon, mere national laws cannot suffice. Rather, separate regions as well as the world community as a whole must act to protect the private sphere in the electronic market.

## 5.6 Literary References

Electronic contracting is still a young subject, and so there are only a few publications on it. Standard works are predominantly limited to aspects of rights in this area. The Handbook on Electronic Commerce [Sha00] offers a chapter on security, privacy, and legal issues. A book on the European data privacy law for electronic business by Kuner [Kun03] has been published. Digital signature law is outlined in the works of Campell [Cam05] and Vacca [Vac04]. Public key infrastructure and digital signatures are also discussed in the electronic commerce literature; for example in [Sch07, Tur06].

*Basis for  
public key  
infrastructure  
and digital  
signatures*

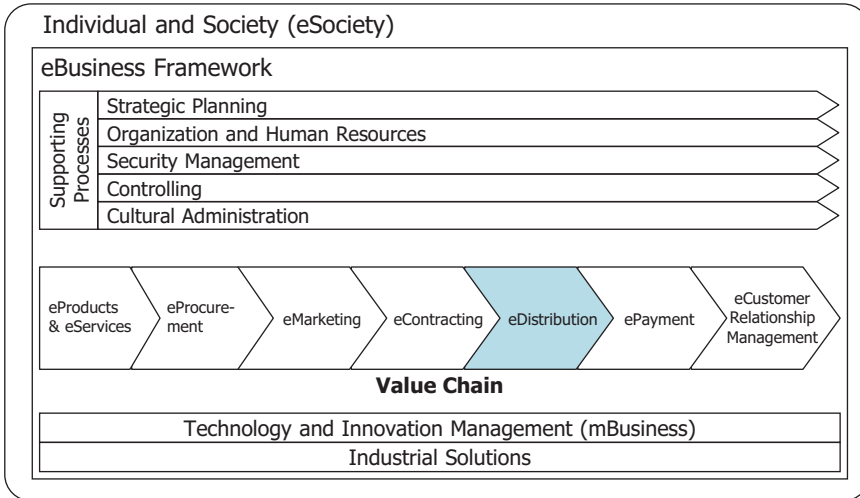
The dissertation by Runge [Run00] illustrates the role of electronic contracting in electronic trade. As well as a theoretical reference framework for negotiation, Runge provides structural elements and presents a case study from the American insurance industry.

*Literature on  
eContracting*

There are a set of publications on cryptography and coding procedures; worth mentioning are the works by Ferguson and Schnedier [Fer03] and Katz and Lindell [Kat07]. The SSL protocol presented in the case study was specified by Netscape Communications Corp. in 1996 and is described online [Fre96]. This is also true of the W3C's XML Signature standard [Bar02].

*Extensive  
literature on  
cryptography*

# 6 eDistribution



*In order to distribute digital or material goods, the distribution channel must be selected and the distribution logistics specified. Section 6.1 describes the components of a distribution system. As well as online distribution, there are also offline and hybrid forms of distribution (Sect. 6.2), which have their own advantages and disadvantages. Distribution is just one part of a comprehensive sales chain or supply chain (Sect. 6.3) that involves customer, dealer, distributor, manufacturer, and supplier. The SCOR (supply chain operations reference) model describes the information flow relating to orders such as material flows in which on-demand production constitutes a special challenge. Section 6.4 illustrates electronic software distribution. Section 6.5 deals with digital watermarks for protecting the copyright of digital products. Several literary references are given in Sect. 6.6.*

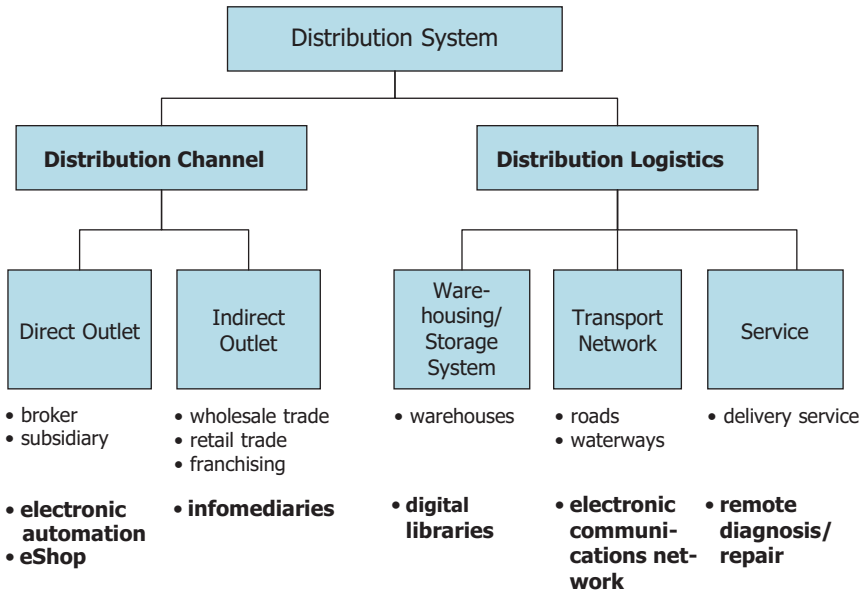
## 6.1 Components of a Distribution System

*What is distribution?*

Distribution is the transfer of merchandise to customers. Many manufacturers do not sell their products and services directly to the end customer but are instead connected to a multitude of partners in the distribution system. Wholesale and retail dealers buy a commodity from the manufacturer, acquire ownership, and resell the commodity under their own names. Other distributors such as brokers or agents simply acquire customers on behalf of the manufacturer and carry out sales negotiations.

*Part of the company strategy*

The selection and arrangement of the distribution system (i.e., the establishment of distribution channels like distribution logistics) constitute strategic tasks for the company. Figure 6.1 shows the most important components of a distribution system.



Key: digital channels and digital components in bold

Fig. 6.1: Distribution channel and distribution logistics

*Direct and indirect outlet channel*

Direct or indirect sales outlets are specified within the distribution channel. The outlet channel chosen depends upon the features of the product or service. Are the goods material or digital? How long will the product last? What are the price terms? How much explanation is needed for the product or service? An indirect outlet channel occurs when another partner is placed between the manufacturer and the customer. Apart from wholesale and retail trade, such market partners can also be infomediaries who primarily conduct intermediate



trade in digital goods. Franchising refers to an outlet channel where the franchisor transfers the responsibility for selling its products and services to the franchisee, according to uniform rules. To the customer, the franchisor's business appears to be a subsidiary since the sales rooms are arranged similarly and products and services are offered with common labeling and trademarks.

Organizing the distribution logistics involves establishing the warehousing or storage system, selecting the transport network, and arranging service (i.e., delivery or repair). Expeditors and warehousing companies support the manufacturer or agent by distributing their goods. For digital products such as software, documents, recorded music, and financial or insurance services, digital storage systems with appropriate security components can be selected or operated on a personal basis. For service, the question of whether support, instructions, or training should be offered arises, and if so, in what form.

eDistribution or online distribution is the distribution of a digital product or service with the aid of an electronic communications network or the Internet. It is important to clarify whether the distribution channel, like the distribution logistics, will be digitally organized or not. Naturally, there are also hybrid forms; a digital product can be sent by CD indirectly via an infomediary through the post.

What is online distribution, and how does it differ from offline distribution? What kind of opportunities and risks are associated with online or offline distribution? What technical conditions do these distribution options require? These and other questions are examined in depth below.

*Components of the distribution logistics*

*Characteristics of eDistribution*

## 6.2 Types of Distribution Logistics

### 6.2.1 Online Distribution

Online distribution can play a role in both the direct and indirect outlet channels, considering the respective distribution logistics and service quality.

In a direct outlet channel, the manufacturer is directly connected to the end customer by an electronic means of communication. In the indirect outlet channel, one or all intermediate steps can be organized online with the manufacturer, intermediary, and buyer. An example of completely online distribution would be the marketing of digital recorded music: the producer makes his music available to a mail order company via the Internet, and this company operates a digital music collection with corresponding services. The customer, an individual or an agency, obtains the music pieces directly from the mail order company.

Figure 6.2 shows the characteristics of online distribution. The manufacturer or provider is connected via an electronic transmission medium to the end customer, as in case (a), or to an intermediary, as in case (b). The customer therefore requires access to the communication system or an Internet connection.

The advantages of online distribution are:

- The customer's wish to buy can be fulfilled immediately and at any time.
- The dealer or producer has direct customer contact.

*Characterizing online distribution*

*When is online distribution worthwhile?*

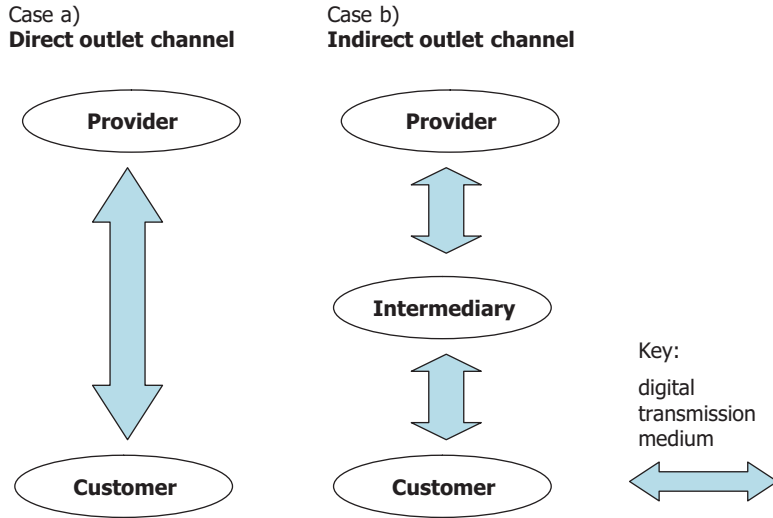


Fig. 6.2: Characterizing online distribution

- Bottlenecks in the reproduction of the digital goods and long delivery times do not occur if the provider's computer system and the public or private communications network make the appropriate capacity available.
- Price and cost advantages result from the lower production, storage, and distribution costs involved.
- Niche products with low circulation can be sold more economically with appropriate organization of the distribution system.

Simply put, online distribution promotes ubiquity in the economy. That is to say, any amount of digital goods and services can be offered and distributed to any place.

eDistribution or online distribution is independent of time and place provided the customer has access to mobile devices (electronic books, mobile phones with Internet capability, palmtops, or portable computers with appropriate connections). If the technical conditions (including availability and capacity of the communications network) are fulfilled, then online distribution makes the distribution of goods possible regardless of the time, the time zone, or the customer's address (see Chap. 9).

*Caution is required*

So, are there any disadvantages whatsoever with online distribution? Naturally the providers of digital product components seldom speak of the disadvantages, although these should not be underestimated. Moreover, the negative aspects of online distribution are often hidden or masked.

Some important disadvantages of online distribution are listed below:

- Digital products can be copied and distributed illegally. Procedures for protecting the rights of the creators of such products, such as digital watermarks (see Sect. 6.5), are only used in isolated cases.
- Not all customers have access to the communication system, or it may be that their connections are too slow/weak or that they are not secure enough.
- Customers have their search, decision, and purchase behavior recorded and they are then marked for targeted sales actions.
- The distribution costs are in most cases passed on to the customer directly.
- Social and interpersonal contact are often missing from purchases on the Internet and when delivery is performed through online channels.
- Due to capacity bottlenecks, digital products are compressed during distribution, which can lead to a loss of quality.

*Online distribution also has its disadvantages*

Since online distribution is partly based on hard-to-control software solutions, it can lead to copyright abuse (i.e., the distribution of pirated copies) and to a loss of privacy (when customer preferences are passed on). Therefore, when planning and implementing an online distribution, special consideration should be given to data protection.

*The need for creator and privacy protection*

### 6.2.2 Offline Distribution

Is online distribution limited to the distribution of digital goods, or can it also apply to material goods too? Many companies barely consider this important question. There is often a groundless acceptance that online distribution is only useful for software products and digital text, video, or audio. There is little or no discussion as to whether the marketing of material goods with auxiliary digital components could represent an alternative.

*Online distribution of material goods*

Products and services consist of both material and nonmaterial component parts. In most (if not all) cases, any material product has nonmaterial components. Examples of this are product descriptions or information that promotes sales, such as endorsements by well-known customers or reviews in consumer magazines. These information-related components of a product are extremely well suited to distribution through direct or indirect outlets via an electronic channel. Digital byproducts can be structured and marketed with the associated material goods; an example would be the sale of know-how relating to the use and maintenance of consumer goods.

*Forms of auxiliary digital component*

Conversely, a material component can also be added to a nonmaterial product in order to boost sales. A digital computer game can be marketed with a little physical mascot or with printed T-shirts and usable objects that draw attention

*Material and digital products side by side*



- Adherence to copyright is generally easier to ensure (see digital watermarks in Sect. 6.5).
- Immense quantities of data or information can be stored onto new types of storage media.

Naturally, the disadvantages of an offline or a possibly hybrid distribution structure must also be considered. If a high-performance electronic network is established between the producer and the distributor, hybrid distribution may be chosen. The nonmaterial goods are received online by the intermediary, who then stores them onto data carriers and forwards them to the end customer over conventional channels.

*Hybrid  
distribution  
forms*

The most important disadvantages of the offline distribution of digital goods are:

*Risks with an  
offline  
distribution*

- Defective data in the product is difficult for the end customer to repair. Most of the time, the data carrier must be exchanged or re-recorded.
- Over time the set of physical data carriers owned by the user becomes confusing and must be organized.
- Different formats and technical improvements in equipment degrade the compatibility of the existing infrastructure.
- The distribution of the digital goods is no longer independent of time and place.

Despite these disadvantages, this distribution option will remain important. In particular cases, it can be supplemented by an online channel if necessary. So different grades of quality can be envisaged for the same product. The high-quality version of the product can be distributed to professional users, and lower-quality versions intended for domestic use can be sold via the Internet to a broader audience.

*Differentiated  
distribution  
planning*

### 6.2.3 Hybrid Distribution

Particularly in the case of hybrid distribution (i.e., a combination of online and offline distribution), and when the Internet is used as a distribution channel, new forms of distribution and collection systems have been devised and implemented. Figure 6.4 attempts to clarify the meaning of hybrid distribution.

*Potential of  
hybrid  
distribution  
forms*

In the example shown in Fig. 6.4, a supplier of digital goods (software, information, multimedia products) is connected via the Internet to an intermediary. This middleman of the infomediary type then serves the customer via either an electronic communication channel or a physical storage and distribution system. The distribution of software serves as an example: customers or companies with a sufficiently fast Internet connection can obtain software packages or new releases

*Example of  
hybrid software  
distribution*

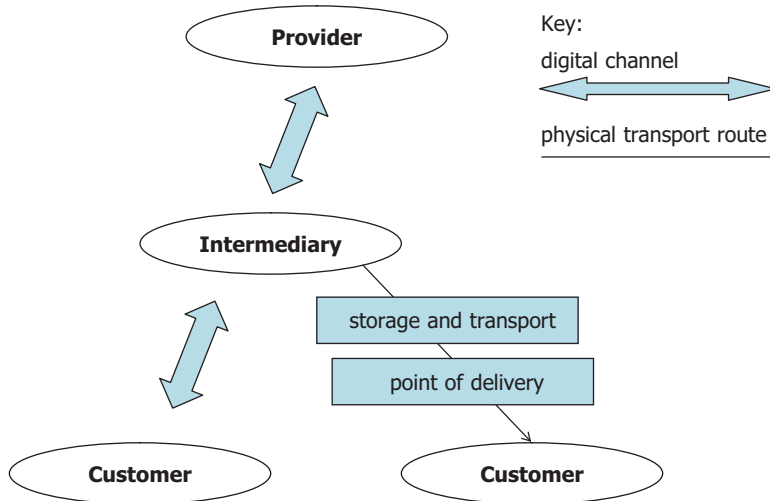


Fig. 6.4: Example of a hybrid distribution structure

directly online, while small customers or customers without Internet access can acquire the appropriate software parts on CD through the affiliated mail order company (infomediary).

*Win-win situation*

Using a hybrid distribution structure, the advantages of both online and offline distributions can be combined. Thus flexible solutions for customer segments with different demands in terms of technical infrastructure, willingness to pay, time requirements, or security standards are possible.

*Timely distribution*

Since most products and services have material as well as digital components, partial components can be distributed in an optimal and timely manner with a hybrid distribution network. The appropriate production and delivery processes must be coordinated and carried out efficiently in the so-called supply chain.

## 6.3 Supply Chain Management

### 6.3.1 Cycles Within the Sales Chain

*About the term "supply chain"*

Distribution is only one part of the comprehensive sales chain or supply chain. A supply chain contains all of the processing steps required to fulfill the customer's request. As well as suppliers and manufacturers of the goods and services, dealers or middlemen, transporters and storage providers, as well as the customers themselves must be considered.

A sales chain is characterized by four basic cycles, as shown in Fig. 6.5.

*Illustrating the customer buying cycle*

- The customer buying cycle is examined in greater detail in Chap. 8 on eCustomer Relationship Management (see Sect. 8.4.1). From the provider's perspective (here, supplier companies), it covers the processes of marketing, sales, and service or after-sales support. Partial steps result in the

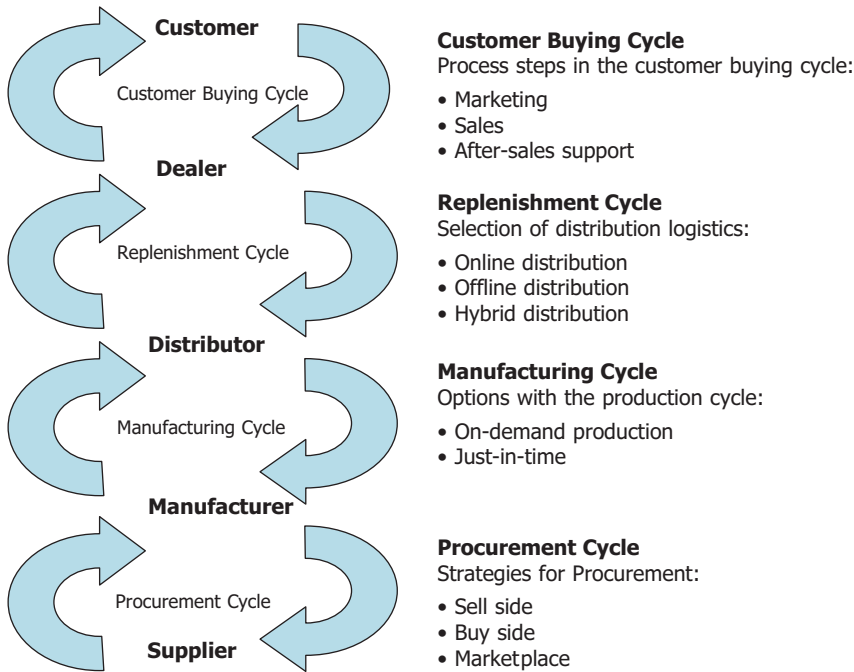


Fig. 6.5: The four main cycles of the supply chain

customer being able to evaluate, order, obtain, and use his desired products and services. The providing company or dealer must therefore control multichannel management (see Sect. 8.4.2); in other words, find the right mix of contact channels and contact media. Establishing the customer buying cycle and embedding it into the supply chain requires diverse clarification and critical decisions. Thus, ordering, completion, payment, supply and distribution of the products must be designed and realized in the product management of an eShop (see <http://www.esarine.com> or <http://www.oscommerce.com>).

- The replenishment cycle of the supply chain can be considered the cycle of supplies or stock replenishment. Along with the selection of the distribution channel (direct, indirect), the distribution logistics must be determined. It must be established whether supply and replenishment support is to take place through the distributor offline, online, or in hybrid form. The advantages and disadvantages of these types of distribution are discussed in detail in Sects. 6.2.1–6.2.3. Of course, it is important to establish not only the distribution between dealer and distributor, but also each distribution step within the supply chain.
- In the manufacturing cycle or production cycle, the method of fabricating the product is conceived. Apart from classical production process cycles

*Elements of the replenishment cycle*

*Manufacturing cycle*

(mass or standard production), newer forms such as on-demand production (see Sect. 6.3.3) or just-in-time production are gaining in importance. Under traditional conditions, based on market analyses and customer analyses, goods are produced in large quantities as uniformly as possible and placed in storage, and so the on-demand production method is not carried out until actual customer orders are received. Through the use of computer-aided planning systems and production systems, products customized to individual customers (mass customization) can be generated at costs comparable to those associated with the large-scale manufacturing of standard goods.

*Components of  
the  
procurement  
cycle*

- The procurement cycle was previously discussed in Chap. 3 on electronic procurement. If electronic procurement is intended within the supply chain then the sell-side, buy-side, or marketplace models (discussed in Sects. 3.3.1–3.3.4) can be used. In the sell-side market model, the supplier makes the purchasing software and an electronic product catalog available. The electronic shops used in B2B business, for example, are based on this type of procurement. In the buy-side market model, the purchasing company installs and operates the appropriate procurement software, and also provides extracts from the product catalog. Examples of this approach are the desktop purchasing systems dealt with in Sect. 3.5. Finally, there are also market arrangements for electronic procurement that are offered and operated by an independent intermediary.

*Optimization  
beyond  
company  
borders*

Successful companies align their supply chains upon consultation with customers and suppliers for efficient and general completion. In this way, the joint optimization of the supply chain gains great importance beyond the borders of the company. In the future, competition will occur less between individual companies and more between competing supply chains and supply networks (see the discussion of the b-web in Sect. 2.3). The reference model examined in detail in the next section represents an important aid to such an interpretation.

### 6.3.2 The SCOR Reference Model

*The SCOR  
reference model*

The development of a reference model for supply chains is based on the idea of bringing the complexity and various versions of the supply chain systematically under control through process descriptions. Along with descriptions of the activities of the individual process steps, the SCOR reference model (SCOR, supply chain operations reference) also includes performance measures, best practices, and software functions.

*Elements of the  
reference model*

The SCOR reference model classifies all of the tasks of a supply chain into four basic processing parts: planning (P = plan), procurement (S = source), production (M = make), and delivery (D = deliver). Figure 6.6 shows processing from the viewpoint of the SCOR model. Steps (1) to (4) are associated with the information flow relating to orders for the particular processing part in question: the customer provides a customer order (1), which is received by the subprocess



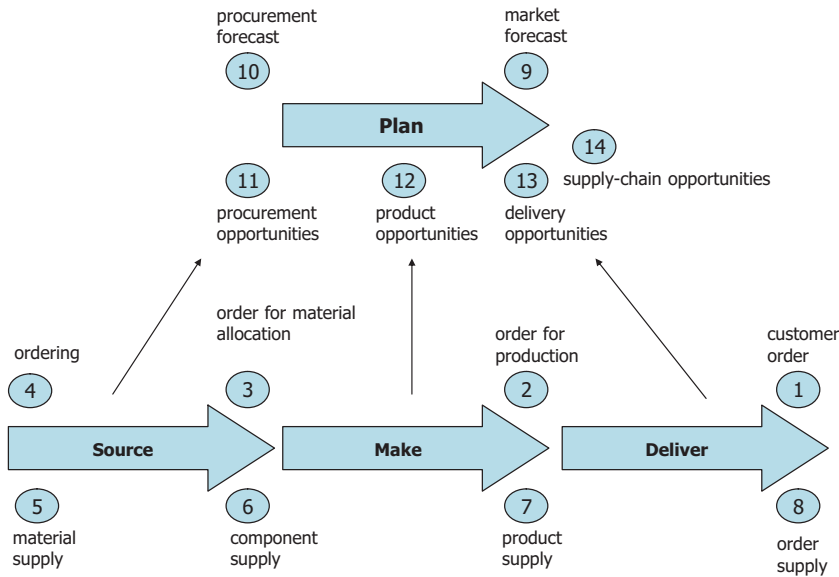


Fig. 6.6: Substeps within a supply chain, according to the SCOR model

D (deliver). This generates a production order (2) if the customer transacts the order. In the production subprocess M (make), a material allocation is provided (3), which causes an order for material components to be sent to the suppliers (4). In doing so, the procurement subprocess S (source) is called upon. In steps (5) to (8), the flow of material in the supply chain in Fig. 6.6 runs opposite to the flow of information. The supplier makes the required material available (5). The procurement subprocess S (source) supplies the production process based on the material allocation orders (6). In the production subprocess M (make), the products and services are actually made (7). In step (8), the delivery subprocess D (deliver) involves commissioning, packing, and sending the ordered products to the customers. Many of the subprocesses in the supply chain cannot be triggered by the arrival of customer orders alone. Rather, because of planning procedures, they must be prepared and initialized in advance, especially when material procurement and time-consuming production processes are involved. For this purpose, a planning subprocess for the supply chain is provided for in the SCOR model: based on market forecasts (9), appropriate procurement scenarios (10) are developed while the procurement opportunities (11) in the market are promptly analyzed and negotiations take place with the appropriate suppliers. Similarly, the key data for production flow into the planning process at step (12), supplemented by the delivery specifications (13) of the respective distributors. Altogether, planning, production, and delivery data (steps 11–13) form the planning horizon for the supply chain.

*On the flow of material in the supply chain*

Using suitable measured variables, customer service, delivery service, as well as expenditures for production and logistics in the supply chain are constantly

*Performance measurement*

evaluated and the corresponding data are made available for reporting. In order to optimize order fulfillment, the group of customers supplied without error and delay can be analyzed in detail. Creation of value productivity, inventory range, and capital turnover are other characteristic variables used to evaluate the quality of a supply chain.

### 6.3.3 On-Demand Production

*From mass production to variant production*

In conventional mass production based on market and customer analyses, products and services are produced as uniformly as possible in large quantities and made available in a warehouse. Such mass production advantageously increases scale yields (economies of scale) due to the large number of items manufactured and promotes broad standardization. Using it, the supply chain can be planned and well structured. However, it results in a high capital commitment since, among other things, warehouses need to be built and maintained. In addition, there is need to market the products and services over the (expensive) mass media.

Changing customer requirements and the resulting price war in the mass market have prompted many companies to develop modification strategies. In variant production, a customized offer is sought through the modular design of products and services. Individualization of the products remains limited, since the complexity of manufacturing is primarily reduced through modular design. Higher costs are usually connected with this sort of production, particularly with increasing variant number.

*What is order production?*

In order production, the customer—with his individual product and service requirements—becomes the focal point. Here, production takes place on the basis of a concrete customer order and no longer from stock. Under normal circumstances, specific construction, manufacturing, and distribution processes must be performed; this requires flexible production and logistics systems. Order production results in high costs, particularly during the individual manufacturing process, although warehouses are largely avoided.

*Goal of on-demand production*

On-demand production attempts to combine the advantages of mass production (cost leadership) with the advantages of order production (customer orientation)—referred to in this context as mass customization and mass production for the individual customer. Based on concrete customer orders (i.e., on demand), an attempt is made to manufacture products and services at prices comparable to mass production.

*Activities for the individual customer*

Figure 6.7 shows the supporting activities of company planning and management along with the specific main activities of on-demand production. It differs from mass production or variant production in that individual customer activity is required in the value chain (see the shaded activity boxes in Fig. 6.7). The supporting activities, such as company organization, financial planning, personnel development, research and development, or use of information and communication technologies, also differ from those of mass production or variant production because they are aligned with customer-oriented design and action. Here, it is

*Arrangement of support processes*

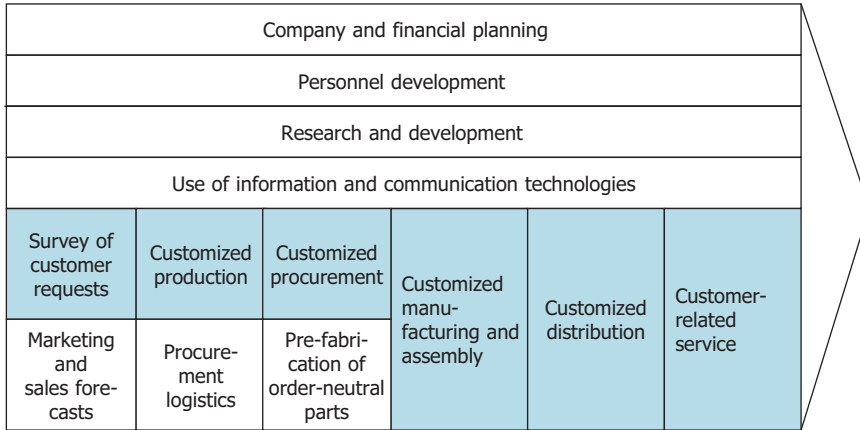


Fig. 6.7: Value chain with on-demand production (according to Piller)

up to research and development to put together and operate a production line that is as flexible as possible but which minimizes manufacturing complexity. In addition to this, an attempt is made to use information and communication systems to record specific customer requests and requirements and to use them in the offer.

In on-demand production, customer communication can be improved in the following ways:

- A customer data warehouse (see Sect.8.3) systematically maintains the customer relationships and uses them for the entire value chain.
- The use of modeling, simulation, and visualization tools enables the customer to concretize and to partially specify his product idea based on given electronic product catalogs.
- By comparing different product configurations, the customer can calculate different price models and select the optimal product configuration in terms of manufacture and delivery.
- After the customer’s order for products and services has been distributed, an order tracking system enables the customer to follow the completion process right up to delivery.
- Customer dialog is maintained through different channels with multichannel management (Sect.8.4.2), and is managed in the customer data warehouse in terms of updating the customer profile and computing the current customer value.

*Increasing customer communication*

In the customer-oriented manufacture and assembly of material goods, computer-aided manufacturing cells (fractal factories) become more and more useful. In

*Fractal factories*

order to keep the logistical and transportation expenditure low, and to optimize delivery times, the on-demand production of material goods requires proximity to the sales market.

*Importance of  
business webs*

Virtual organizations or specific business webs (e.g., alliances; see Sect. 2.3.4) are used for information products and information services and for the production of software packages aimed at the individual customer. Such organizations try to offer on-demand products and services that are time- and place-independent.

One on-demand production model for written documents is that used for the production and selling of books by Books on Demand (under <http://www.bod.de>). Here, authors can submit their works in electronic form, including layout and cover design. Individual copies are printed and delivered with concrete orders through bookstores or online shops. This means that book storage costs can be circumvented and order receipts can be processed without delay.

## 6.4 Electronic Software Distribution (ESD)

### 6.4.1 Architecture for Software Distribution

*Model for the  
distribution of  
software*

The Software & Information Industry Association (<http://www.siiia.net>), a worldwide umbrella organization for the software industry, has developed and published a model for the distribution of software. To avoid annoying partners in the conventional network of distributors, the suggested sales channel also integrates existing distributors.

*BOB farm and  
license  
certificate*

The service exchange touches upon two basic elements in the model:

- The digital software box, here the Box of Bits (BOB), contains the encoded program code for the software package
- The digital license certificate (DLC) regulates the legal rights of the producer

*Purchase of  
software by  
online  
customers*

Figure 6.8 outlines the electronic distribution system for the software industry. According to Fig. 6.8, the online customer looks for suitable software among various online dealers. If he is lucky, he can then download the desired software package from the BOB farm via the dealer's shopping system. After successful online payment, he receives a digital key as well as the license certificate via the clearinghouse (see Chap. 5). Now he can use the software package with the digital key.

*Tasks of the  
software  
producer*

The software supplier or producer creates different versions of his software packages and allows them to be converted by the packer software at the BOB farm. The packer software has an interface that allows the software manufacturer to register his products and store the payment modalities in the clearinghouse. This software also generates a unique product identification number per software product. After successful registration, the manufacturer makes his products available with appropriate marketing information from the BOB farm. The BOB farm functions as a digital warehouse for the different distributors.

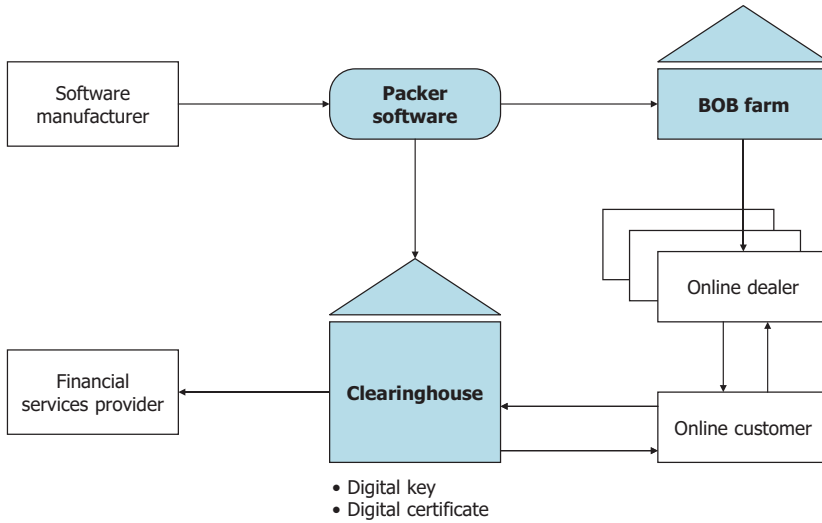


Fig. 6.8: A distribution system for software packages

The clearinghouse registers the software packages in the BOB farm based on their unique product identification numbers. It administers the assignment of keys and acts as gateway for the payment streams between the customer and the financial institute. The online dealer concludes a contract with the software house and can obtain the desired products from the BOB farm. He advertises the software products in his shopping system and supplements it with suitable marketing information and explanatory aids. As well as acting as a software distributor, he also offers consulting and support services.

*What is a clearinghouse for?*

*Tasks of the online dealer*

### 6.4.2 ESD Functions and Services

Figure 6.9 shows the architecture of an electronic distribution system used by an online dealer of software packages. The dealer’s online shop includes an electronic product catalog, an ordering system with a shopping cart, as well as a merchandise management system that handles completion and payment processes.

*Architecture for software distribution*

The system used for software distribution consists of a set of ESD functions and ESD (electronic software distribution) services. In particular, it establishes a connection to the BOB farm (see Sect. 6.4.1) and supports the purchasing of software packages. A shopping system selling software includes the following components as standard:

*ESD services*

- A product catalog describing software packages and outlining price and payment modalities
- An access control system that identifies the customers, verifies their authenticity through passwords or other procedures (authentication), and provides unrestrained user privileges (authorization)

*Components of an eShop selling software*

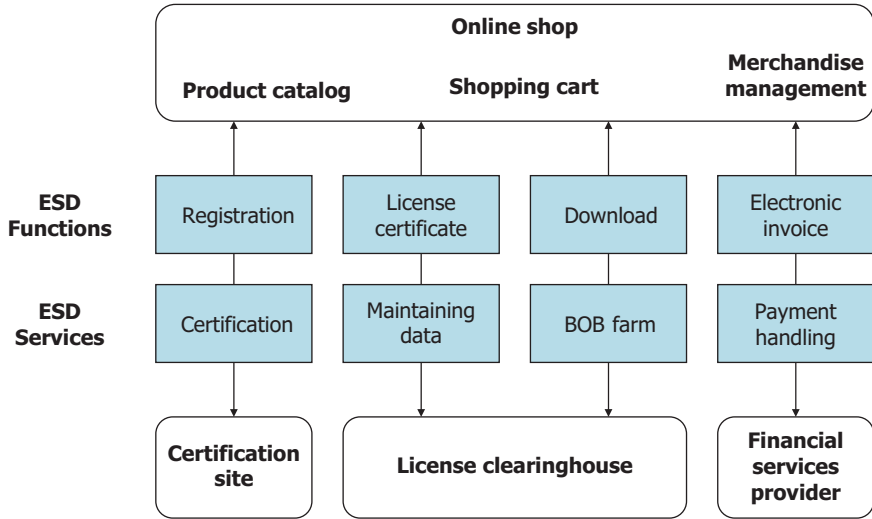


Fig. 6.9: Architecture of an ESD system

- A shopping cart that is used by the customer to select and order software products
- A merchandise management system that supervises accounts and renders invoices
- A distribution system that makes it possible to deliver ordered and purchased software products

According to Fig. 6.9, the ESD functions and services connect the online shop with the certification site (see Chap. 5 regarding public key infrastructure) of a clearinghouse for software licenses as well as various financial service providers. The following two modes of software purchasing can be differentiated in terms of the completion of ESD services:

**Pay before download.** The customer orders the software from the dealer's online shop under the terms of his customer profile as well as the licensing and payment modalities. Then the customer is requested to trigger the payment process upon successful order confirmation. If the customer uses an ePayment procedure (see Chap. 7), he can obtain the software directly after payment. This is downloaded using appropriate ESD functions and services of the BOB farm.

*How to meet  
software  
configuration  
needs*

**Pay after download.** The customer of an online shop can first download a demo version of the software onto his computer free of charge and test it. At the same time, depending on the solution variant, there is an expiration date on the use of the software. If the customer is convinced of the functionality and efficiency of the software, he can procure and use the full version of it. In this

case, license agreements and modes of payment are specified after the test phase. In this purchasing mode, since the customer can examine the general range of functions of the software in a test phase, he can arrange his software configuration to meet his needs and better evaluate the appropriate license agreement.

In general, the ordering process, purchase modalities and delivery times, the level of support services, order completion, and the distribution of the software and associated parts (updates, bug fixes, additional functions among other things) can all be improved by creating an online software shop and employing appropriate ESD functions and services.

## 6.5 Protection Through Digital Watermarks

When digital products and services are distributed, it is desirable to protect authorship and prevent the unauthorized copying of data. Watermarks, which have long been used to protect authorship rights over material goods, can also be applied to digital products (software, pictures, video and sound sequences, and text). Some important aspects of digital watermarks are discussed below.

A digital watermark is an imperceptible pattern that records the authorship of the digital product. The algorithm associated with the digital watermark supports both the embedding process (watermark embedding) as well as the selection process (watermark retrieval). The embedding or marking process inserts the digital watermark into the data as an invisible pattern. The retrieval or selection process allows the authorship of the digital product to be recognized.

Steganography is the art of hidden communication; it concerns embedding and selection processes that guarantee the authenticity of the creators of digital products. The watermark contains important information about the carrier document as a secret message. At the same time, the watermark itself remains invisible.

Depending on how it is used, a digital watermark can contain the following data:

- References to the copyright
- Details regarding authentication (the authenticity of the digital product)
- Keywords for characterizing the carrier document (annotations)
- The date and time of production
- The serial number of the recording device

Digital watermark procedures make repeated marking of the digital product possible. Indeed, a document with several watermarks is quite useful. For example, a digital work can then contain watermarks for creators, producers, and publishers.

Digital watermark procedures were primarily developed to identify the creator(s) of the product, but they are now used for other purposes too. With digital

*Copyright protection with digital products*

*Elements of a digital watermark*

*Watermarks as secret messages*

*Repeated marking*

*On customer marking*

fingerprints, the names of both the copyright owner and the customer are invisibly embedded in the document. This prevents the customer from passing on or selling unauthorized copies, since they can be traced back to the customer through the hidden watermarks.

## Case Study eDVDSHOP: Using Digital Watermarks

Marcel Anderson has put a lot of effort into the presentation of products in the eDVDSHOP. Unlike his competition, he photographs each of the DVDs he offers. Since some DVDs are offered in special packages, the customer can see exactly how the product will appear when it is received. To achieve this, Anderson actually set up a small photo studio and procured a high-quality digital camera. However, he has recently discovered that a competitor now provides similar product pictures on his site. Although the pictures are slightly altered, Anderson immediately recognizes (due to the unmistakable lighting and arrangement that he used) that they are undoubtedly copies of his product pictures. However, he cannot prove this to the competitor.

For this reason he decides to embed a digital watermark into each product picture. The company Digimarc Corp. (<http://www.digimarc.com>) offers a set of plug-ins that can be integrated into popular picture processing programs such as Adobe Photoshop, Corel Graphics, or Micrografx Picture Publisher. Such a plug-in enables a digital watermark to be embedded into a picture. Marcel Anderson embeds a copyright notice into all his product pictures, and hopes that this approach will allow him to prove that his pictures are being copied by his competitor.

However, there are several ways that watermark procedures can be attacked, as shown in research literature. One well-known type of attack involves creating doubt over the true creator, and is termed the rightful ownership problem or invertibility problem. This can occur if an aggressor inserts his own copyright information into already-marked data.

For example, if Anderson adds a watermark to a picture, the competitor could also mark it. Mathematically, this attack can be represented as follows, if  $P$  is the original photo and  $W_A$  is Anderson's watermark:

$$P_A = P + W_A.$$

In the first step, Anderson embeds his watermark into the photo and obtains the marked photo  $P_A$ . The competitor steals  $P_A$  from Anderson's server and extracts his own watermark  $W_K$  from this:

$$P_B = P_A - W_K.$$

It is now unclear which of the two marked documents ( $P_A$ ,  $P_B$ ) is the original. To solve the invertibility problem, the watermarks must be made dependent on the original in a noninvertible manner.



## 6.6 Literary References

There are a number of books that deal with the topic of eDistribution. The work by Lawrence et al. [Law02] covers different distribution models used in eBusiness. Another book with the same topic has been written by Sellers et al. [Sel03] and focuses on strategic distribution planning. The Handbook on Electronic Commerce by Shaw et al. [Sha00] describes important aspects of supply chain management and illustrates the connection with electronic trade in several contributions.

*Books on  
eDistribution*

Standard works within the marketing domain, like that by Kotler and Keller [Kot06], only deal with online distribution on a few pages.

The work by Tseng and Piller [Tse03] deals with mass production for the individual customer. They present different case studies from companies that have used mass customization concepts in the past. Some of them also show aspects of distribution.

*Mass  
production for  
the individual  
customer*

Meanwhile, there is extensive literature on supply chain management, where the employment of information and communications technologies are covered in great depth. The standard work by Chopra and Meindl [Cho01] dedicates a chapter to the coordination of supply chain management and electronic business. The book by Hugos [Hug06] on supply chain management also has a chapter on information technology. The same is true of the book by Handfield and Nicols [Han03], who also examine business-to-business integration from a technological point of view.

*Extensive  
literature on  
the supply  
chain*

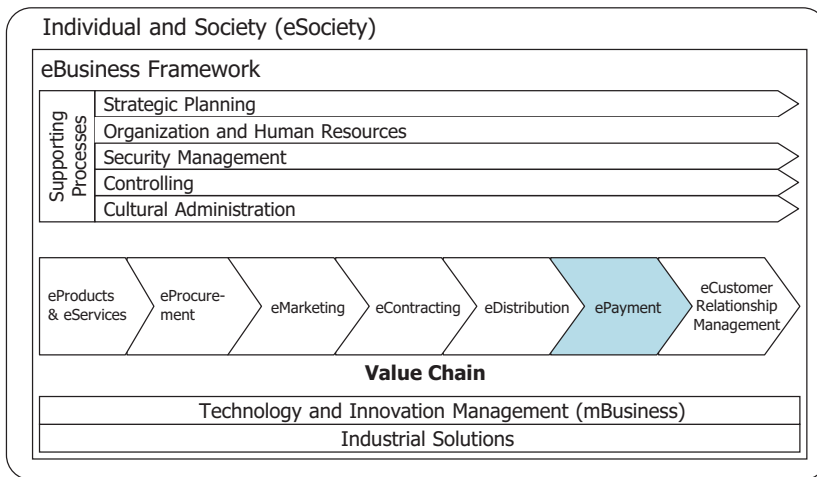
Version 8.0 of the SCOR (supply chain operations reference) model has been published by the Supply Chain Council and is obtainable on the Web [SCC08].

*SCOR model*

The work by Zeng et al. [Zen06] compiles the most important procedures for digital watermarks and describes outstanding problems in this field. The inverting problem with digital watermarks was discovered during research done by Qiao and Nahrstedt [Qia99].

*Digital  
watermarks*

# 7 ePayment



*This chapter on ePayment highlights electronic monetary transactions. In Sect. 7.1, various classification schemes for payment solutions are presented. Section 7.2 discusses the most popular means of electronic payment—those based on credit cards—and describes the PayPal and SET (secure electronic transaction) procedures based on it. Section 7.3 presents asset-based procedures. Section 7.4 shows innovative solutions that were introduced some time ago but did not gain market acceptance. Section 7.5 concentrates on solutions that are used to pay for fee-based web pages. A comparison of four different payment systems in use today is provided in Sect. 7.6. The chapter closes with literary references in Sect. 7.7.*

## 7.1 Overview and Classification

The term ePayment refers to the completion of payment processes electronically. In other words, a person or an institution sends a sum of money electronically to a receiver. For example, a product that is bought in an online shop is paid for using ePayment.

ePayment solutions can be classified in various ways:

*What is the amount?*

**By amount.** ePayment solutions can be classified by the size of the amount to be paid. Three categories are defined: picopayments, micropayments, and macropayments. Solutions for small amounts (less than one cent to one Euro) are found in the picopayment category. Such solutions are suitable for the operation of a fee-based web site for example. In order to look at the web site, a person pays a small amount of, say, approximately ten cents. The micropayment category contains payment solutions for amounts of between one Euro and ten Euros. Payment solutions for larger amounts are placed into the macropayment category. Such a classification is useful since the requirements depend upon the target market. Solutions for picopayment should be very simple to implement, since users do not want to go through a long and complex process in order to pay such small amounts.

*When is it paid?*

**By the time of payment.** The time of the transaction is also used to classify payment solutions. Here the categories prepaid, pay now, and pay later can be differentiated. Well-known nonelectronic examples are prepayments (for the prepaid category), cash on delivery (for pay now), and invoices (for pay later).

*How is the solution realized?*

**By technological concept.** Payment solutions can be differentiated according to the technology employed. Possible categories differentiate the settlement of accounts and methods used to store electronic money. This is deposited into an account or stored in the form of virtual coins in software or hardware.

*Does the seller or the bank know the buyer?*

**By the degree of anonymity.** Payment solutions differ in terms of the degree of anonymity. If a person pays for a product with cash in a nonelectronic payment process, then this is considered an anonymous transaction. When a credit card is used, the transaction is not anonymous because the seller knows the name of the buyer. There are anonymous ePayment solutions and there are also ePayment solutions that are not anonymous.

A number of ePayment solutions are presented below.

## 7.2 Credit Card-Based Procedures

The most successful electronic payment solutions are based on credit cards, which have long been a popular payment solution in offline trading.

### 7.2.1 Credit Cards with Secure Sockets Layer

Larger amounts are usually paid with a credit card (macropayment). Credit cards are a very popular means of ePayment. Payment is made with the number imprinted on the card. To ensure that only the online trader receives this number, it is transmitted over a secure line. Over the last few years, the use of credit cards over a secure sockets layer (SSL)-encoded connection has established itself as a means of ePayment. The SSL protocol is available in most browsers and provides an encoded connection between the client (the customer's browser) and the server (the provider). A set of cryptographic procedures is also used (see Sect. 5.3).

*Secure sockets layer for a secure connection*

The following reasons can account for the popularity of credit cards:

*Reasons for the popularity of credit cards*

- Credit cards have already been in use for decades in offline trading.
- Credit cards are available and accepted worldwide.
- Credit cards are simple in terms of implementation and do not need special software. Online payment simply involves entering the credit card number along with the name of the card owner into a form.
- Credit cards are generally convenient for the buyer. Many banks add a small basic charge for processing payments by credit card and lure in corresponding turnover with additional discounts or premiums.



Fig. 7.1: Back of a credit card with a security number of 999

However, credit cards also have some disadvantages:

*Disadvantages of credit cards*

- Credit cards do not possess any security mechanism. If an attacker steals a credit card number, this is sufficient to buy products online. Therefore, some online traders require a three-digit card security number (security code) along with the credit card number (see Fig. 7.1). This is to reduce the risk of fraud, since the card security number does not appear on any related receipt (credit card company invoice, payment order, etc.). However, this measure can only be moderately successfully since this number is imprinted on the back of the credit card and is therefore visible to everyone when paying.

- Credit cards are not anonymous. When a product is purchased, the owner of the credit card and its number become known to both the seller and the banks involved in the transaction, which again represents a security risk.
- Credit cards are not suitable for payments between private individuals. A special contract must be concluded with the credit card company and bank to enable a person to receive money through a credit card.
- Credit cards are expensive for the seller. Credit card institutions and banks require the seller to pay relatively high basic charges as well as a percentage of sales to them.

### 7.2.2 PayPal

PayPal was created in 1998 as an independent company and was taken over in 2002 by the auction house eBay. PayPal is a credit card-oriented payment system. In contrast to the direct use of credit cards described above, it makes payments between two private individuals possible. A US-based company, for a long time PayPal only offered accounts in US dollars, but has recently backed other currencies, such as Euros or British pounds.

*Registration  
process*

In order to be able to use PayPal, it is necessary to register with it. PayPal employs a simple yet effective means to protect itself against credit card abuse. A newly registered user enters his credit card information but cannot use PayPal until his account has been activated. PayPal subsequently debits a small amount (normally \$1) from the credit card entered. The description of this deduction on the credit card statement contains a number. The user then sends this number to PayPal in order to activate the account. This method makes it difficult to register a stolen number with PayPal, since the thief normally has no access to the credit card account. If the user has successfully registered himself with PayPal, he can then carry out a transaction to another PayPal member (see Fig. 7.2).

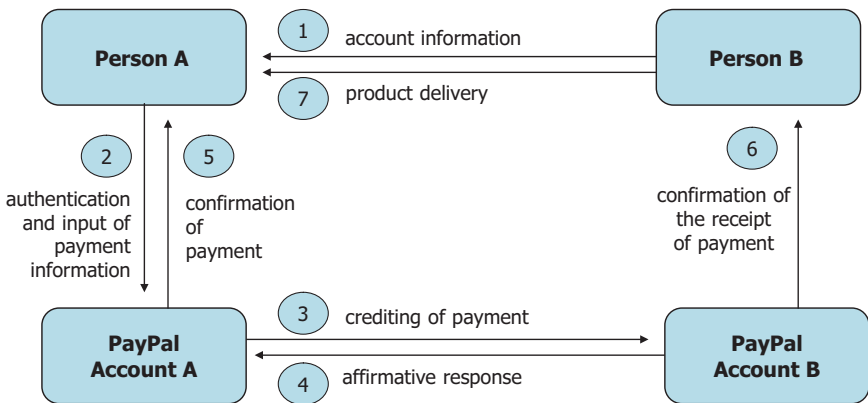


Fig. 7.2: The PayPal payment process between two individuals

If person A wants to buy a product from person B, then B first sends the necessary payment information. Included is the account name, which corresponds to the email address, as well as the amount to be paid (step 1). Person A subsequently authenticates himself on the PayPal web server and enters the payment information received into a form (step 2). PayPal debits A's credit card and credits the money to the receiver's virtual account (steps 3 and 4). With the money in this virtual account, the receiver either starts his own transactions or allows it to be transferred to a bank account. The receiver of a transaction pays PayPal a fee which depends on the turnover. This is deducted directly from the amount received. Afterwards PayPal generates a letter of confirmation to person A (step 5) and person B (step 6). Person B can now deliver the product to person A (step 7).

*Example of a  
PayPal  
transaction*

The popularity of PayPal is closely connected to the success of the auction house eBay. Since it was bought out by eBay, PayPal has been tightly integrated into it, and many users of eBay are also PayPal users.

*PayPal belongs  
to eBay*

## Case Study eDVDSHOP: Electronic Payment with PayPal

At the moment, the eDVDSHOP only offers cash on delivery shipping as well as shipping by invoice as payment options. These procedures are suitable for the German-speaking area. However, the number of international customers is rising at the shop. Marcel Anderson would like to create an online payment option for these customers.

After some research he decides on PayPal. The integration of PayPal into the online shop is a simple task. On the PayPal web site he discovers that there are different integration possibilities. He decides on the simplest solution, an HTML form which must be added to his web site:

```
<form name="_xclick" action="https://www.paypal.com/cgi-bin/webscr"
  method="post">
<input type="hidden" name="cmd" value="_xclick">
<input type="hidden" name="business" value="marcel@edvdshop.ch">
<input type="hidden" name="currency_code" value="EUR">
<input type="hidden" name="item_name"
  value="eDVDSHOP: Lola Montez SE">
<input type="hidden" name="amount" value="15.99">
<input type="image"
  src="http://www.paypal.com/en_US/i/btn/x-click-but01.gif"
  border="0" name="submit"
  alt="Make payments with PayPal">
</form>
```

Anderson must fill in the hidden fields with the correct values of the impending payment. For the currency (`currency_code`), he selects the Euro (EUR). He then

inserts his email address. The rest of the data is variable and must be integrated dynamically for each order. The above example contains variable names, for instance the product name (`item_name`; in the example *Lola Montez SE*) and the amount to be paid (`amount`; in the example *15.99*).

In addition there are other options. For example, shipping costs (`Shipping`) can be shown separately. A return address can be given for the attribute `return`; the customer is directed here after the successful input of his payment information. The same applies if the customer breaks off the payment (`cancel-return`).

Marcel Anderson integrates the above form into his checkout process. When someone is looking at the form in a web browser, a button is displayed (see `<input type="image">`). If the customer clicks on this button, he is automatically transferred to the PayPal site. There he must authenticate himself with PayPal in order to start the payment process. Since Anderson set the `return` attribute correctly, the customer is subsequently transferred back to the eDVD-Shop site, where he is thanked for his order.

### 7.2.3 Secure Electronic Transaction (SET)

*SET is a  
secure protocol*

The SET protocol was developed by some of the large credit card companies (VISA, Mastercard) in cooperation with technological companies such as IBM, Microsoft, and Netscape. SET is considered one of the most secure protocols in ePayment. Its use requires a set of conditions from all parties involved. In particular, SET is based on a public key cryptosystem (see Sect. 5.3). All of the parties involved need a pair of keys. This condition has only been partially fulfilled up to now. In addition, there are other conditions for the parties involved:

*SET wallet for  
the buyer*

- The buyer needs a SET wallet, a type of electronic purse. The SET wallet stores the necessary data and communicates with the seller.

*SET server for  
the seller*

- The seller must install and operate special software (SET server) on his web server. The SET server communicates with both the buyer's SET wallet and the seller's bank.

*SET payment  
server for the  
bank*

- The buyer's bank and the seller's bank must make a SET payment server available.

*Example of a  
SET  
transaction*

SET is a credit card-based solution. If a buyer wants to acquire a product, he enters his credit card number into his SET wallet. Afterwards, the following steps are implemented (see Fig. 7.3):

1. The buyer sends his coded and digitally signed payment information along with his order to the seller.
2. The seller (or his SET server) likewise signs the payment information and passes it on to his bank.

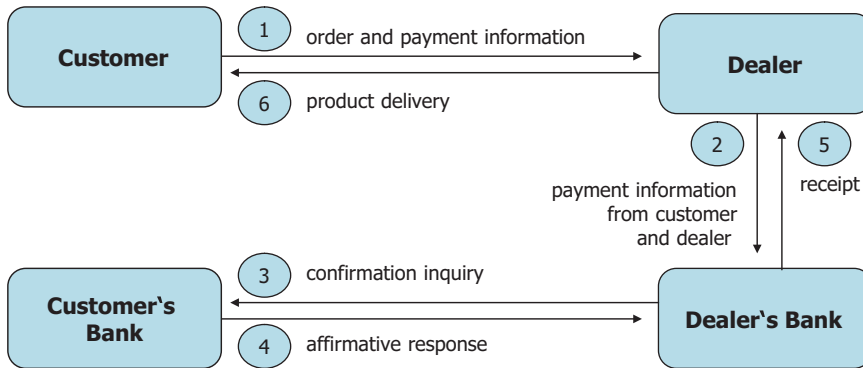


Fig. 7.3: The payment process with SET

3. The data from the SET payment server is decoded there, and the digital signature is checked. If the data is correct, the buyer's bank is asked for confirmation.
4. If the buyer's bank responds affirmatively, the payment can be carried out.
5. A receipt is sent to the seller as confirmation.
6. The dealer can deliver the product to the customer.

One important SET procedure is the dual signature. It is used in Step 1. There the customer provides a message to the seller ( $M_1$ ) as well as to the bank ( $M_2$ ). The message to the seller contains the order information, and the message to the bank contains the payment information. Both messages are encoded with the respective public keys ( $PM_1, PM_2$ ) ( $M_1$  with the seller's public key ( $K_{\text{pub,seller}}$ ),  $M_2$  with the bank's public key ( $K_{\text{pub,bank}}$ )). A hash value is calculated from both messages as well ( $H_1$  and  $H_2$ ). Using the two hash values, the SET wallet produces another hash value ( $H_3$ ). This is digitally signed by the buyer ( $SH_3$ ). The two coded messages ( $PM_1, PM_2$ ) are sent together with the signed hash value ( $SH_3$ ) to the seller. This seller can decode the order message ( $PM_1$ ) with his private key (generating  $M_1$ ), but cannot read the payment message ( $PM_2$ ). He produces a hash value from the order message ( $M_1$ ). He can examine the correctness of the order message by means of the signed hash value ( $SH_3$ ). The seller subsequently signs the payment message encoded by the buyer ( $PM_2$ ) as well as the hash value already signed by the buyer ( $SH_3$ ) and sends everything to his bank. This bank first examines the seller's signature, then it decodes the payment message ( $PM_2$ ), computes a hash value from this message in order to verify the correctness of ( $M_2$ ) and the signed hash value ( $SH_3$ ). If everything is in order, it sends the previously mentioned receipts and carries out the transaction.

*The dual signature of SET*



### 7.2.4 Conclusion

Credit card-based procedures are currently the most widespread online payment solutions. There are relatively few disadvantages with credit card-based methods, such as problematic private exchange or a lack of security. Based on the few SET protocols, it is apparent that the security can be greatly improved. Currently there are undoubtedly too many conditions on the user. However, if credit card abuse continues to increase, then the credit card companies may commit the users to the SET procedure. An alternative solution to PayPal is BidPay, which is popular in the USA. The customer arranges for private payment using a credit card with BidPay. BidPay provides a check (a money order) and sends it to the receiver, who can exchange it for cash at any bank.

## 7.3 Asset-Based Procedures

With asset-based procedures, in contrast to credit card-based procedures, a certain amount is deposited in advance into an account (prepaid, see the previous classification based on time of payment). The invoice can be settled with this money.

### 7.3.1 CASH

*Virtual money  
is stored on a  
smartcard*

CASH is an electronic currency for small amounts that is offered in the form of a smartcard in Switzerland. Many banks have integrated CASH and Mastercard. A CASH card can also be obtained by itself. An amount can be placed onto a CASH card. Most card terminals can be used to load the card.

*CASH is a  
micropayment  
solution*

The big advantage of CASH is the ability to use it to pay small amounts offline. To do this, the dealer needs a card reader, and he uses this to deduct the appropriate amount from the customer card. However, the CASH card cannot be used online yet.

### 7.3.2 Geldkarte

*The Geldkarte  
is the German  
version of  
CASH*

In Germany, the Geldkarte is a popular asset-based procedure that is used instead of CASH. Up to 200 Euros can be stored onto the Geldkarte, which is issued by commercial banks and savings banks. As in the case of CASH, money can be loaded onto the card at a terminal and used afterwards for payments. The dealer requires a terminal and a dealer card with which he can authenticate himself.

*Geldkarte is  
usable online*

In contrast to the CASH system, the Geldkarte can be used in online payment transactions. The customer needs a card reader which he attaches to his computer. Figure 7.4 illustrates the online payment process. The customer sends an electronic order to the dealer (step 1) and receives an electronic invoice from this dealer (step 2). The payment is initiated by the customer inserting his Geldkarte into the card reader (step 3), whereupon the customer and dealer cards identify themselves (step 4). The card reader shows the name of the dealer, the name of

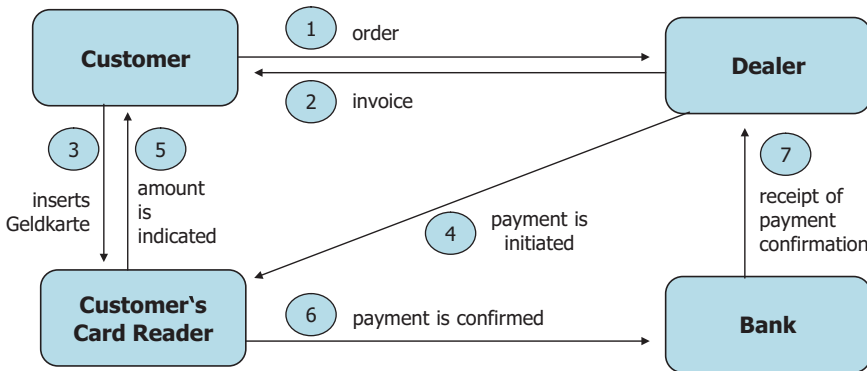


Fig. 7.4: The payment process for online purchasing with the Geldkarte

the online shop, as well as the amount being paid (step 5). After confirmation from the customer, payment is initiated (step 6). The dealer receives a message confirming successful payment (step 7) and can then deliver the product.

As well as one-off payments, incremental payments can also be carried out with the Geldkarte. Just like a phone card, a small amount is deducted from it at a certain time. Thus time-dependent online payment services can be realized.

*Geldkarte for incremental payments*

### 7.3.3 Conclusion

The asset-based procedures presented above were developed for the offline payment of small amounts (micropayment). They offer the greatest advantages within this range. For the buyer, the need to get hold of hard cash is eliminated, the seller no longer has to count coins, and regular deliveries to the bank are discontinued. However, CASH and the Geldkarte are only conditionally suitable for online business since a card reader is required. Few private households have these.

An important advantage of cash payment is the anonymity of the buyer. The providers of CASH and the Geldkarte emphasize that anonymity remains guaranteed with the solutions offered. However, it is easy to store the receiver's details that are required when the card is issued. It is also possible to log the purchases made with the card.

*Are CASH and Geldkarte anonymous?*

With asset-based procedures, the security of the assets is of the greatest importance to the providers. If an attacker succeeds in increasing his assets on the card away from a load terminal, he can transact any purchase. Providers have resolved the issue of asset security by employing smartcards.

VISACash by VISA is an alternative and internationally available asset-based procedure which is similar to the solutions presented.

*VISACash as an alternative*

## 7.4 Innovative ePayment Solutions

Many ePayment solutions were introduced in the mid-1990s. Although they were conceptually interesting, they did not gain market acceptance. Some of these ideas are described briefly below.

### 7.4.1 eCash

*eCash utilized electronic coins*

eCash was a development of the DigiCash Company. It was a coin-based system which combined the advantages of cash with those of electronic payment transactions. With eCash, there was no difference between buyer and dealer; each user possessed the same electronic purse. “Electronic coins” were deposited into this purse. When the user made a payment, coins from one purse were transferred into another purse.

*User generated his own coins*

The transfer of electronic coins attracted the same difficulties relating to copy protection as encountered in asset-based procedures. However, a smartcard was not used with eCash; instead, eCash used a procedure based on digital signatures. This was referred to as a blind signature in order to emphasize the anonymity of the procedure. The user of eCash generated his own coins and had them signed

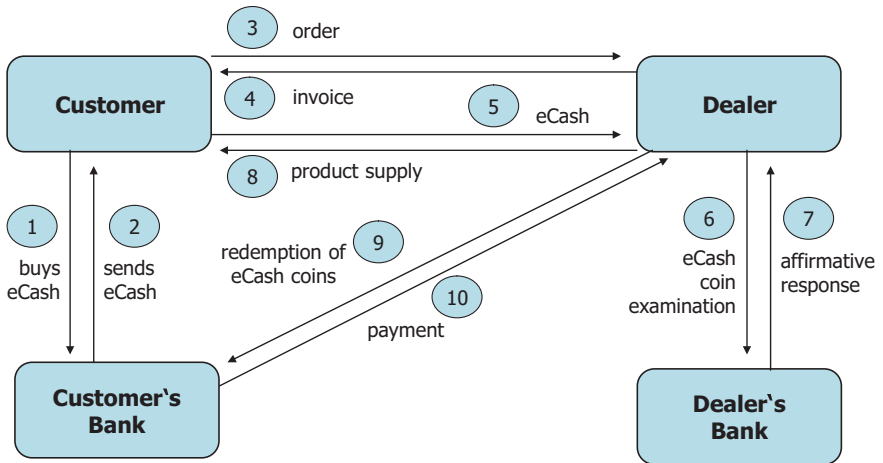


Fig. 7.5: eCash payment process

by his bank (see Fig. 7.5, steps 1 and 2). Provided the bank accepted the coins, it withdrew the appropriate amount from the user’s account. The coin had a value (a second power of 0.01) and a serial number.

*Random serial number*

The user’s electronic purse randomly generated a unique serial number. This was encoded and sent along with the payment information to the bank. The bank

marked the encoded number. For each coin value it used a special signature key that allowed the value of the coin to be recognized upon payment. Along with the value and serial number, another version number and an expiration date were also stored in the electronic coin. The marked coin was sent back to the user's electronic purse. The bank, however, noted (in a database) that the coin was distributed. The user then removed the encoding of the serial number.

When a customer wanted to buy a product and pay with eCash (steps 3 and 4), he sent his coins to the dealer's electronic purse (step 5). The coins were passed on from there to the eCash server (step 6) in order to check whether they had already been spent. Provided the coins were valid (step 7), the dealer supplied the product to the customer (step 8), and either credited the amount to his account or exchanged it for new coins (steps 9 and 10).

eCash was rejected by the banks involved (Deutsche Bank, Mark Twain Bank, USA, among others) after a short test phase because of a lack of acceptance by customers. Part of the reason for this lack of acceptance were the prerequisites for using eCash, including the need to register for the service and the need to install software for the electronic purse. Another problem was the complex scaling of the eCash server that examined the validity of the coins.

*Example of an eCash transaction*

*eCash lacked customer acceptance*

### 7.4.2 Millicent

The Digital Equipment Corporation developed the Millicent solution, which was based on electronic coupons. Millicent was a type of collection system, comparable to the handling of gaming chips in casinos. As the name suggests, it was a micropayment/picopayment solution. The customer bought a chip from a broker, called a Millicent scrip. He then used this to buy products from the dealer. The dealer collected the chips and traded them in for money at the brokers.

A goal of Millicent was to reduce transaction costs in order to make micropayments attractive. In 1998, field tests carried out by Digital showed that transactions of just 0.2 cent were still profitable. However, Millicent is no longer available. In order to be able to use Millicent, the customer required a virtual purse (wallet). This would be integrated into the web browser. The dealer used the Millicent software on the web server. When the customer wanted to acquire a product and pay by means of Millicent, he first bought corresponding scrips through a broker (see Fig. 7.6, steps 1 and 2). Since the broker scrips were purchased only infrequently, payment with a macropayment solution was made possible. Each scrip possessed a unique serial number so that numerous payments were possible.

During the payment, some of the broker scrips were exchanged for dealer scrips, which the customer likewise settled with the broker (steps 3 and 4). He then paid for the product with the dealer scrips received (step 5). The dealer supplied the product (step 6) and collected all of the dealer scrips he received, redeeming them periodically with the broker (steps 7 and 8).

*Millicent is a type of collection system*

*Reduction of transaction costs*

*Example of a Millicent transaction*

*Broker and dealer scrips*

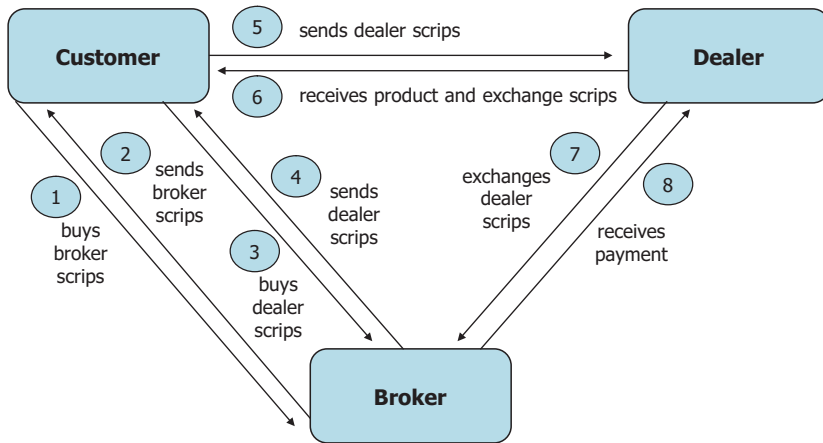


Fig. 7.6: Millicent payment process

### 7.4.3 PayWord and MicroMint

*PayWord is based on asymmetric coding*

Two other interesting payment procedures were proposed by Ronald L. Rivest and Adi Shamir. The PayWord procedure was based on the computation of virtual coins and required an asymmetric pair of keys. The customer first opened an account with a broker and received from this broker a certificate with the customer's name, broker's name, a public key, as well as other information. Using the certificate, the dealer determined whether the customer could produce PayWords and whether these should be accepted by the broker. When the customer wanted to acquire a product, he produced the PayWords by means of a one-way hash function (see Sect. 5.3.2). He sent the first computed hash value to the dealer before beginning the payment. When he wanted to make a payment, he simply computed the values and forwarded them on. Each computed value corresponded to a fixed quantity (e.g., one cent). The dealer examined the payment using the customer's public key and thus accepted the validity of the virtual coins. Afterwards he exchanged them with a broker.

Rivest and Shamir also suggested the MicroMint procedure for cases where asymmetric pairs of keys would not be used by customers. In this procedure, a broker provided the coins and sold them to customers. They then used them to purchase from a dealer, and the dealer examined the validity of the coins. The coins were, however, computationally expensive and could require special hardware.

### 7.4.4 Random Payment

*One user pays for everything*

An unusual approach to micropayments was also proposed by Ronald L. Rivest. Rather than processing every single transaction, he suggested that customers should pass lottery tickets (each with a known chance of winning a known

amount—some large multiple of a single micropayment) to a particular trader. A lottery would ensue where the customer supplying a winning ticket would be required to pay the winning amount to the trader. This would mean that only one transaction would be required on behalf of all of the customers. Assuming each user makes many micropayments (i.e., hands out many lottery tickets), the laws of statistics mean that the winning amounts paid for by each user will be approximately equivalent to the micropayments that he made (in the form of lottery tickets).

### 7.4.5 Conclusion

Apart from the solutions described above, many other ePayment solutions of the 1990s have also disappeared, since customers did not want to resort to a different system for each online payment. Based on the ePayment solutions that are now generally accepted, it is clear that customers attach great value to a simple solution that does not require software updates on their system. The solution should have favorable transaction costs, basic charges, and worldwide acceptance.

*Customers prefer simple solutions*

## 7.5 Solutions for Fee-Based Web Sites

### 7.5.1 Firstgate Click & Buy

The Click & Buy payment system developed by the Firstgate Company offers a solution for fee-based Internet sites. In order to be able to use Click & Buy, both the customer and the provider must register. The provider must register the fee-based parts of his Internet presence with Click & Buy and adjust the web pages. Upon visiting the web site, the customer is transferred to the Firstgate Click & Buy server and must authenticate himself. Firstgate deducts the cost from the customer and credits it to the provider, minus a fee. Along with credit cards, checks or debit notes are also accepted as means of payment.

*Click & Buy requires registration*

A variety of services are offered with Click & Buy. Apart from fee-based web sites, a payment system for smaller software solutions, electronically filed transcripts, and reports can also be realized.

### 7.5.2 Allopass

Another micropayment solution for the payment of web content comes from the French company Frog Planète. The Allopass system is paid through the phone bill. When the customer wants to enter a fee-based site, he must access it through a page with a form that requires that a pin code is entered. The form also shows a telephone number. If the customer calls this number, he receives the pin code required for entry to the fee-based site. Payment is therefore made through the phone bill.

*Allopass payments occur through the phone bill*

An advantage of Allopass is that it is relatively condition-free. Registration of the user is unnecessary; only a telephone is needed. Allopass is anonymous, since payment is not limited to a certain telephone and so public telephones can also be used. Its disadvantages include the relatively large expenditure involved in administering the web server, as well as the bad reputations of fee-based telephone services.

### 7.5.3 Conclusion

The solutions presented in this section concentrate on paying for web content and are popular in Europe. So far there has been no international payment standard for web content payment. The main reason for this is that commercial services are usually financed by online advertising.

## 7.6 Comparison of ePayment Solutions

Figure 7.7 compares the solutions presented in this chapter: PayPal, Geldkarte, Click & Buy, and Allopass. The costs of these solutions vary greatly, and they





	 <b>PayPal</b>	 <b>Geldkarte</b>	 <b>Firstgate</b>	 <b>Allopass</b>
Number of users	more than 50 million	Geldkarte: more than 60 million online: no data	2.5 million	no data
Charges for the seller	1.9% - 2.9% of the turnover + \$0.30	0.3% of the turnover (at least 0.01 €)	registration fee: 49 € monthly charge: 5 € up to 35% of the turnover	around 30% of the turnover
Usage area	worldwide supporting different currencies	only in Germany	predominantly Europe and America	western Europe
Classification according to the amount	macropayment	micropayment	micropayment/ picopayment	micropayment/ picopayment
Classification according to the time of payment	pay later	pre paid	pay later	pay later

Fig. 7.7: Comparison of ePayment solutions

are designed for different purposes. The number of users shows the dominance of PayPal as one of the most successful payment solutions. However, PayPal is not a suitable macropayment solution for every purpose. ePayment systems such as Allopass or Firstgate concentrate on fee-based web offers. These micro/picopayment

*The costs of the solutions vary greatly*

solutions try to lower the transaction costs of a call so that a profit can even be made with small sums. Nevertheless, the costs for the seller are up to 30% of the turnover—significantly higher than for PayPal.

The Geldkarte is commonly used in offline trade in Germany; however, the customer needs a card reader to use it in online trade, so only a few online dealers currently accept the card.

## 7.7 Literary References

ePayment is a popular topic in eBusiness. Therefore, most works on eBusiness, such as that of Turban [Tur06], deal with this topic. Some books deal solely with the topic, like that of Kou [Kou03].

*Standard works  
on ePayment  
in eBusiness*

Information on the PayPal payment system can be obtained on PayPal's homepage [Pay08]. A list of costs is also there (see Fig. 7.7). There is also documentation on the integration of PayPal into webshops.

The SET protocol was published in three volumes, which comprise over 1,000 pages in total [SET97a, SET97b, SET97c].

The CASH card is described in more detail on the corresponding homepage [Tel08]. Interested providers as well as card users can register themselves at this site. The same applies to the Geldkarte [EUR08a].

The eCash procedure was based on two works by Chaum [Cha82, Cha90] published at different symposia. Schoenmakers presented a work on the security of eCash [Sch97].

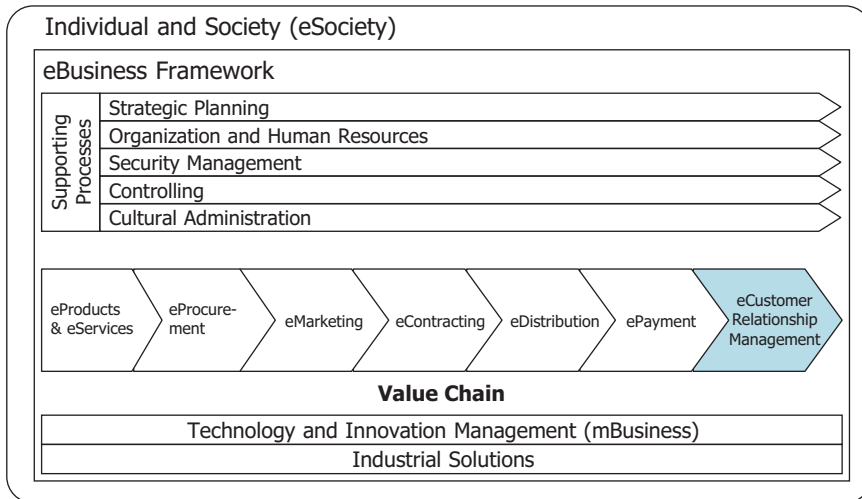
*The eCash  
procedure*

The theoretical procedures presented, PayWord, MicroMint, and random payment are referred to in articles by Rivest and Shamir [Ron96] or Rivest [Ron97].

The approaches presented in this chapter for the payment of fee-based web sites are discussed in more detail on the homepages of the providers Firstgate Click & Buy [Fir08] and Frog Planète Allopass [Fro08].



# 8 eCustomer Relationship Management



*This chapter deals with fundamental aspects of the customer relationship in electronic business. A general movement from product orientation to customer orientation is emphasized (Sect. 8.1). Section 8.2 introduces an approach proposed by Blattberg et al. for the computation of customer equity. Section 8.3 deals with analytical customer relationship management and outlines a customer data warehouse used for long-term maintenance of customer relationships. The point of customer relationship management, as discussed in Sect. 8.4, is to support the customer buying cycle and communication with the customer. The use of information systems is summarized in Sect. 8.5. Section 8.6 discusses the control of customer relationship management. Section 8.7 gives literary references.*

## 8.1 From Product Orientation to Customer Orientation

*What is CRM?*

Customer relationship management (CRM) focuses on caring for the customer relationship. It involves building and managing the relationship between a company or an organization and its stakeholders.

*Objective of customer relationship management*

CRM requires the formulation of a company-wide business strategy, including all sales and communication channels, for the systematic maintenance of the customer relationship. The focus is product-oriented, service-oriented and customer-oriented, and a high value is attributed to the usefulness of the customer. The goal of all CRM activities is to obtain and to increase customer value (i.e., customer satisfaction and customer loyalty) as well as customer profitability during the entire duration of the customer relationship (customer lifetime value).

Figure 8.1 highlights the fact that CRM developed out of quality control and process management. In contrast to classical total quality management, here the emphasis is placed on customer processes and not production and selling processes. This requires knowledge of the customer profile and customer behavior.

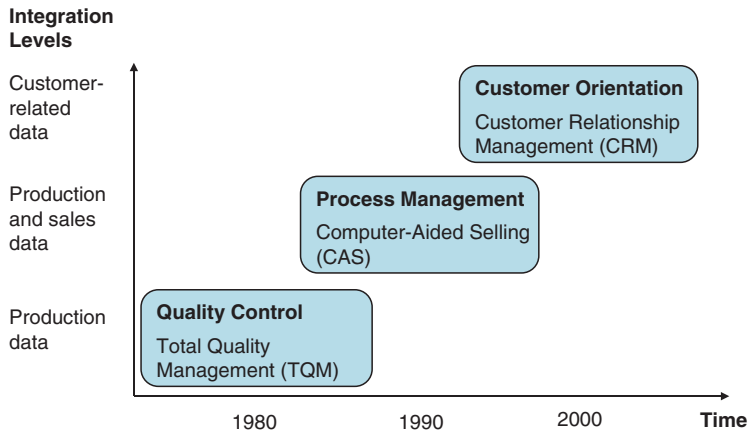


Fig. 8.1: Integration and development levels for CRM

*Elements of quality assurance*

Since the 1980s, comprehensive quality concepts have been established in companies. Quality assurance includes methods and procedures designed to recognize and avoid potential faults or errors in the products. The standard series ISO 9000 was developed by the International Organization for Standardization at the end of the 1980s in order to standardize quality assurance. It regulates the procedures put in place by companies and organizations to avoid errors, the comprehensive documentation of production processes, control mechanisms used for the substeps, as well as their procurement through external consultants. ISO 9000 certification was originally primarily important in industry. However, more and more companies in the service sector as well as software suppliers have undergone costly certification processes too in recent times.

At the beginning of the 1990s, the quality-oriented approach achieved through the analysis and reorganization of business processes was expanded. A business process is a connection of activities which must be processed in a particular order by different organizational units. Business processes are structured, labor-divided activity chains; for example, the settlement of damages through an insurance company or the purchase of goods through a commercial company. Originally, internal development and processes were up for discussion; now it is the optimization of the sales and service processes that has moved into the foreground. Information systems and databases for sales and marketing are used in, for example, sales force automation, computer-aided selling, and call centers. Central to this is an increase in the efficiency of the sales organization, as well as improved marketing.

*Analysis and organization of business processes*

During the course of the liberalization and globalization of the markets over the last few years, it has been observed that customers are behaving more individually and customer loyalty is decreasing. In global markets, the competitive differentiation of products and services alone is no longer a promising approach. Companies and organizations are aware of this change in the market situation and are deliberately aligning their value chains toward the customer. The sale of a product or of a service should represent not only a business transaction but also the beginning of a long-term customer relationship. Customer management aims to incorporate individual customer desires and customer behavior in the place of product-related argumentation lists and efforts.

*Decreasing customer loyalty*

Figure 8.2 characterizes the shift from the product focus to CRM (see also Sect. 8.4), and mentions the most important characteristics. Critical success factors for this change are the recognition of individual customer sales prospects, an increase in customer retention, and improvements in customer profitability.

	<b>Product Orientation</b>	<b>Customer Orientation</b>
<b>Target Market</b>	customer segments	customers with high customer value
<b>Channels</b>	monochannel	multichannel
<b>Communication</b>	one-way communication	interaction
<b>Time Horizon</b>	periodic campaigns	life cycle of the customer
<b>Information Systems</b>	function-oriented	integrated into the customer data warehouse
<b>Main Focus</b>	marketing and sales activities	increasing of customer equity
<b>Analysis</b>	statistical transaction evaluations	profile and behavior of customers

Fig. 8.2: Characteristics of the shift from the product perspective to the customer perspective

## 8.2 The Customer Equity Model by Blattberg et al.

The term customer value has many interpretations, because the value contributed by the customer in his various roles must be considered. In his decisions, the customer judges the intrinsic usefulness of continuing a business relationship or ending it.

### *Definition of customer equity*

The customer lifetime value or the customer capital, known as the customer equity, is the value of a customer or customer base in attempting to achieve the monetary and nonmonetary goals of the company. This customer equity is often characterized by three components: value equity, brand equity, and retention equity. The value equity is established through the value perception of the customer. The brand equity involves the subjective appraisal of the brand by the customer. The retention equity describes the success of customer retention programs.

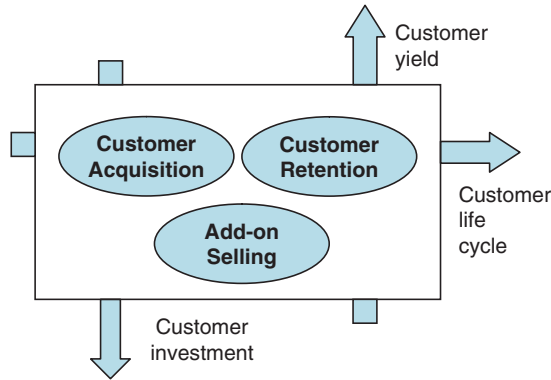


Fig. 8.3: Main components of the customer equity model

### *Approach proposed by Blattberg et al.*

Although there are a variety of methods for calculating customer equity, what follows is based on the work of Blattberg et al. This team of authors proposed a basic model that is shown in Fig. 8.3. In order to be able to compute the value of the customer life cycle, existing and future customer investments and customer returns must be considered. This particularly applies to the phases of customer acquisition, customer retention, and up and cross-selling (add-on selling). The customer value is calculated according to the approach by Blattberg et al. as the sum total of the acquisition equity, the customer retention equity, and the add-on selling equity which results from up and cross-selling activities. If the customer value per customer for a customer segment is calculated, then the customer lifetime value or the customer equity of this segment is obtained. Generally speaking, the customer retention equity and the add-on selling equity must be discounted, depending upon the number of comparative time periods. For the purpose of clarity, the general formula for the computation of the customer equity value (net present customer value) is waived here.

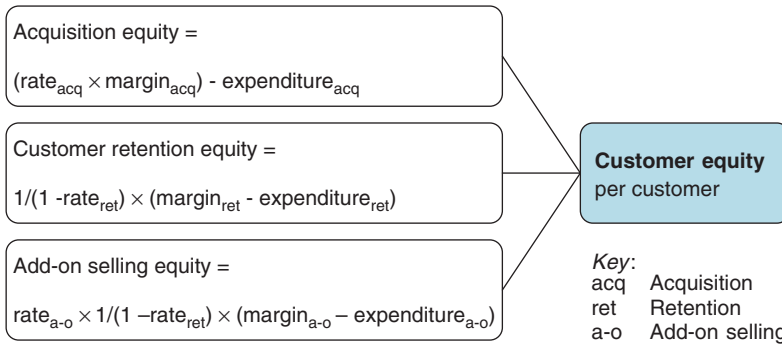


Fig. 8.4: Calculation of customer value (according to Blattberg et al.)

From Fig. 8.4, it is apparent that the acquisition equity results from the profit margin minus the expenditure transacted for the acquisition. In the process, the profit margin must be multiplied by the acquisition rate because not everyone in the target group will be gained as new customers. The acquisition rate expresses the percentage of those customers who are acquired as new customers, based on the size of the target group. With the expenditure, however, the total amount is included in the formula for the acquisition equity; in other words, the expenditure is not multiplied by the acquisition rate.

*Calculation of the acquisition equity*

In the computation of the customer retention equity, the customer retention rate expresses how many customers from the acquired customer base can be retained over the next time period. For example, a customer retention rate of 70% means that 30% of the customer base is lost in one year (or over a selected time period). If the assumption is made that this rate remains constant over time, then the duration of the relationship is calculated from the partial formula  $1/(1 - \text{Rate}_{\text{ret}})$ . In the case of a customer retention rate of 70%, a duration of 3.33 years is obtained (namely  $1/(1 - 0.70) = 1/0.3 = 3.33$ ). If this duration is known, then the total profit of the customer relationship for the core products and services of this customer can be computed.

*Formula for customer retention equity*

The third measurement, the add-on selling equity, is calculated by taking into account the margins and expenditures for the customer programs of the up- and cross-selling. At the same time, it is assumed that the duration of the effect of the up- and cross-selling is the same as that of the customer retention; in other words the same partial formula  $1/(1 - \text{Rate}_{\text{ret}})$  is used for the relationship duration as for the customer retention. However, the measurement of the add-on selling equity depends on how strongly the company performs in the activity of up- and cross-selling. For this reason, the add-on selling rate  $\text{Rate}_{\text{a-o}}$  must be incorporated into the up-selling.

*Add-on selling equity*

It is not only quantitative measurements that determine the customer value or customer equity, however. There are also qualitative measurements that must be considered when assessing the customer value. Suppose the marketing of

*Qualitative measurements*

an airline creates a customer club for frequent fliers. Such a concept is not implemented simply because a direct measurable increase in yield is expected with it; it is also implemented because the customer club will undoubtedly generate recommendations. Above all, if the relationship to the customer in the club intensifies and he receives courteous treatment, then the probability of a recommendation increases. Along with the recommendation potential, the lead customer potential will also have an influence on the computation of the customer value.

*Customer  
lifetime value*

A question remains: how are all of the measured values involved in the creation of the customer equity and the qualitative influencing variables collected over time and evaluated? Under normal conditions, the aim is for lifelong customer retention, with the customer value tracked over several years (customer lifetime value). Suitable information systems to achieve this must therefore be designed and constructed. A customer data warehouse—which provides the quantitative and qualitative measurements of customer development structured within a multidimensional database—is considered a promising approach. Such analysis and maintenance of the customer data warehouse is carried out in analytical CRM.

## 8.3 Analytical Customer Relationship Management

### 8.3.1 Rough Architecture of a Customer Data Warehouse

*Evaluation of  
valuable  
customers*

The change from product orientation to customer orientation is facilitated by information technologies and communication technologies. These technologies enable those involved in analytical CRM to become better acquainted with existing customers (through the use of a special database) and allow potential customers to be acquired more systematically. The most valuable customers, either existing or potential, should be recognized early and captured in a long-term customer relationship. With these customer groups defined, differentiated products can be fashioned and services for specific needs developed.

To begin with, the valuable customers must first be identified and quantified with regard to their profitability. This is achieved with the help of a well-structured and multidimensional database, the customer data warehouse. A customer data warehouse is an integrated database which aids the decision-making processes that occur in CRM.

*Establishing  
customer  
profiles*

In order to establish the customer profile, the following questions must be answered:

- Who is the customer?
- What are the needs of the customer?
- How do these requirements relate to the service?
- How does he prefer to communicate with the company?
- When would he like to be informed about product changes, etc.?

Additional questions related to customer behavior and customer loyalty must be answered in a second step:

*Analysis of customer behavior*

- How loyal is the customer to the company?
- How often and to what extent does he do business with the company?
- What additional value does the customer bring?
- How high is his customer value?
- How will his customer value develop in the future?

If the customers and their behavior are known, then the customers can be divided into groups. Such a division can be done according to profit potentials, capital outlays and acquisition costs, market risks, or other company-specific success factors. For instance, in a specific company, the key customers who have high requirements and yet generate more than half of the company’s profit may be evaluated. Another possible group comprises the customers with rising potential who have fewer differentiated requirements and only conditionally want to spend more money on additional services. If the expectations and the behavior of the top customers are known, it is also possible to draw conclusions about potential customers. A differentiated approach to looking at these customer groups enables the acquisition of customers with success potential.

*Segmenting of customers*

A customer data warehouse is multidimensional, time-related, and not alterable. Multidimensionality means that indicators such as customer value, turnover figures, profitability key numbers and other measures can be analyzed according to different analytical dimensions, such as customer segments, distribution areas, product groups, or branch networks. Time-related means that the evaluations relate to the past, the present, and also the future. The data values of a data warehouse can only be read, not changed; they are pulled periodically from the operational systems and made available in the database for analysis. Figure 8.5 shows the rough architecture of such a database: the heart of the customer data warehouse—the data cube—is fed by different data sources. Internal data sources

*Definition of a customer data warehouse*

*Rough architecture of a data cube*

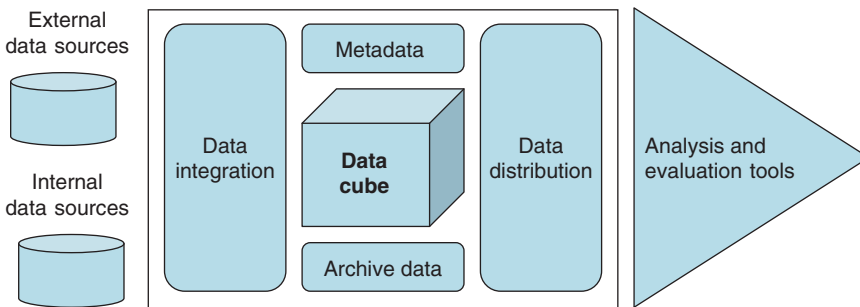


Fig. 8.5: Rough architecture of the customer data warehouse

include the operational information systems, such as enterprise resource planning, call centers, supply systems, help desks, and other things; external sources can include online databases, business reports and business analyses, or data from information brokers. These data must be converted into uniform formats covering specified periods (daily, weekly, or monthly) and deposited into the multidimensional database. In order to accomplish this data integration step, predefined descriptive data (metadata) are attached to both the data and the data formats used. Each time the database is periodically loaded, the data entered earlier are not lost; they are kept in comprehensive archives. In order to be able to analyze and evaluate the data cube according to different criteria, suitable tools are used for data distribution and data preparation.

### 8.3.2 Evaluation of a Multidimensional Data Cube

*Online transaction processing*

Operational databases and applications concentrate on a clearly defined function-oriented performance area. For business transactions, the aim is to make data available quickly and accurately for the completion of business. This kind of business activity is often referred to as online transaction processing (OLTP).

*Online analytical processing*

Since operational databases are updated daily, important data on which the user can base decisions are lost. Moreover, these databases were primarily intended to aid in the completion of business rather than for analysis and evaluation. This is why, for many years, other databases and applications aside from transaction-oriented databases have also been developed to help with data analysis and decision support. This is referred to as online analytical processing (OLAP).

The core element of OLAP is a data warehouse with a multidimensional data cube in which all facts relevant to the decision-making process, covering arbitrary evaluation parameter dimensions, are stored. Such a data cube can become quite extensive, since it contains decision-related variables for various points in time. For example, sales or customer measurements can be stored in a multidimensional database and evaluated quarterly according to sales region and products.

*Outline of dimensions*

Consider Fig. 8.6. In this example, three evaluation dimensions are of interest: service, region, and time. The term “dimension” describes the axes of the multidimensional cube. These dimensions are important since analyses and evaluations occur along these axes. The order of these dimensions is not important; each

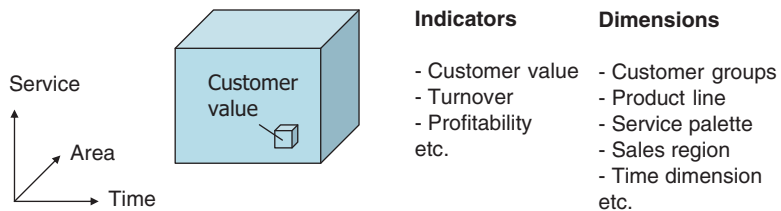


Fig. 8.6: Example of a three-dimensional data cube



user can and should be able to perform evaluations from various viewpoints. For example, a customer consultant prioritizes the service dimension, while an area representative might want to list customer value measurements according to his region.

A customer data warehouse supports the following operations on the data cube:

**Drill down.** This command allows a part of the cube to be evaluated in greater depth by increasing the detail presented for a particular dimensional region. For example, the annual perspective can be broken down into months, weeks, or even days, or a region may be analyzed in detail according to subregions or branches. Depending upon the granularity of the data cube, it should be possible to break the data down into individual customers, services, or daily perspectives.

*From the coarse to the detailed*

**Roll up.** This operation, the inverse of drilling down, allows for evaluation at higher levels of aggregation. Instead of one individual branch, whole areas are analyzed; instead of one individual customer, customer groups or even the entire customer line is of interest. Levels of aggregation are changed while investigating a data cube (i.e., if the data model is a mature one with fixed granularity and periodic updating, no further precautions are necessary in the customer data warehouse).

**Slicing.** Here, a certain slice of the data cube is selected and analyzed. For example, all services and areas within a certain year may be of interest. Conversely, a certain area can be recorded (by the person responsible for the area, for instance) along with a time perspective, service perspective, etc.

*Evaluation of part of the cube*

**Dicing.** In this operation, the order of the dimensions is changed. Instead of evaluating customer key numbers according to service, region, and time, customer values could be viewed according to time, region, and service. This operation corresponds to a reorganization of the data cube; the perspective required depends upon the user.

*Rotating the dimensions*

One requirement for an efficient customer data warehouse is a future-oriented data model for the data cube. Moreover, the desired facts or key indicators, their granularity, and the time between updates must be specified. It is also necessary to define meaningful dimensions, including aggregation levels.

### 8.3.3 Steps Involved in Outlining a Data Cube

In order to construct a customer data warehouse as a future-oriented basis for decisions, an outline of the data cube must be drawn up. From a logical point of view, this involves examining and specifying the indicators used in and the dimensions of the multidimensional data cube.

An indicator is a key number or key measurement used in decision support (see Sect. 4.3.6). Indicators can refer to quantitative as well as qualitative characteristics of the business activity. Apart from key financial measurements, market

*Establishment of indicators*

and distribution indicators, customer line and customer movement indicators, business process indicators, innovation potential indicators, and staff know-how indicators are all important. These indicators, along with the dimensions, form the basis of management decision support, internal and external reporting, as well as computer-aided performance measurement systems.

*Determining the dimensions*

The dimensions are the economically relevant formation and evaluation criteria, such as customer groups, service and product palettes, sales regions, or sales channels. As already discussed above, the dimension of time strictly belongs to customer data warehouses. The dimensions themselves can be substructured: the customer dimension can contain segments and subgroups; the time dimension can also cover—aside from yearly data—months, weeks, and days. A dimension thus describes the desired aggregation level used in the evaluation of the multi-dimensional cube.

*Part of a star schema*

Figure 8.7 shows part of a data model for a customer data warehouse. A data model consists of an indicator (or several indicators) presented in detail as data values. Besides the indicator (customer value in this case), the indicator table shows different identification keys, one per dimension. Each value of each identification key depicts the lowest level of the dimension hierarchy (under normal conditions, a dimension is a hierarchy of dimension levels; for example, the time dimension consists of the levels year, quarter, month, and day), which specifies the granularity of the evaluation. A dimension can express different branches of aggregation; for example, in the time dimension, one can attain the year level starting from days via a week perspective. Whether several branches of aggregation are established per dimension depends upon the user's needs. The individual branches of aggregation are generally arranged hierarchically.

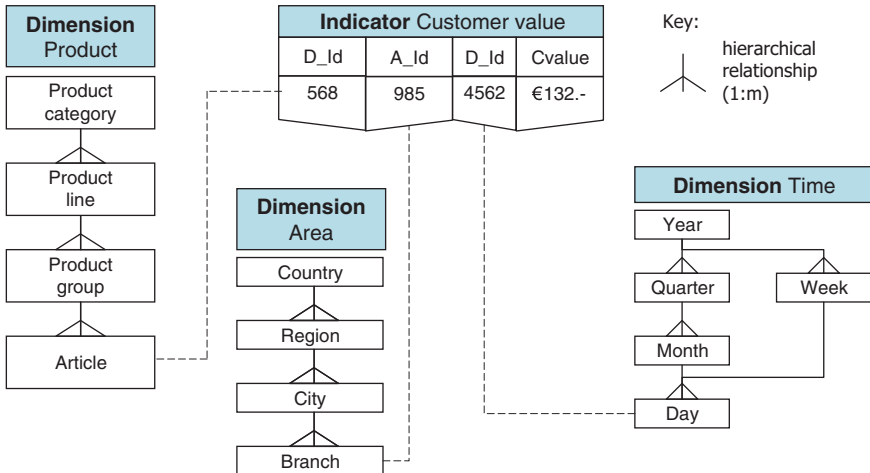


Fig. 8.7: Star schema for a customer data warehouse

### 8.3.4 Data Mining Procedure

Data mining means exploring a database or digging for valuable information in it. The term “mining” refers to the mining industry, where large quantities of rock are broken up in order to extract jewels or precious metals.

*What is data mining?*

More precisely, data mining is the use of algorithms to extract and represent patterns in data. Specific algorithms are needed for data mining in order to be able to analyze extensive volumes of data. Possible patterns relate to promising business constellations (e.g., in terms of customer behavior and customer relationship maintenance).

*Pattern recognition*

Two different problem areas can be addressed with data-mining procedures, as shown in Fig. 8.8. Starting from company data and market information that were purposefully collected in a customer data warehouse, analyses such as prognoses for relationship maintenance and the optimization of marketing activities can be generated. In terms of the analysis of the customer, his sales behavior, and his involvement in the customer relationship, the following procedures are emphasized:

*Data-mining procedures*

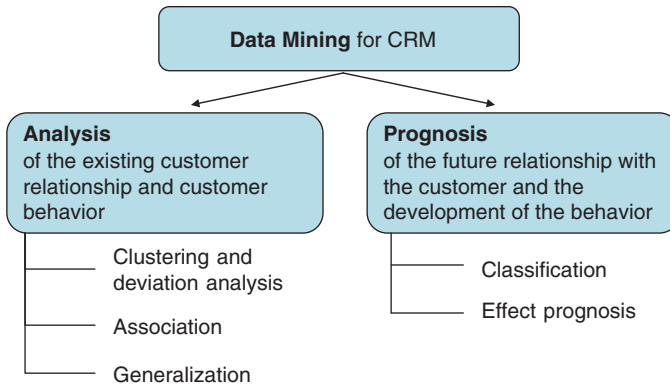


Fig. 8.8: Analysis and prognosis procedures for CRM

**Clustering and deviation analysis.** The goal of clustering is to group together customers with similar customer profiles and customer behavior. Deviation analysis aims to recognize changes in developmental and behavioral patterns and to find “strays” who cannot be assigned to any cluster. Clustering and deviation analysis allow the customer line to be evaluated with respect to different criteria and a better understanding of the behavior of customer groups.

*Similar customer profiles*

**Association.** Dependencies between the characteristics of individual customers are captured into association rules (in the form “if A and B then C”). Also included are shopping cart analyses, which evaluate products based on an evaluation of purchases (evaluation of sales slips or customer charge cards) that are commonly bought in combination. However, such an analysis says nothing about the placement of the products (i.e., whether product combinations are displayed

*Shopping cart analysis*

as close to one another physically as possible or far apart; both variants exhibit their advantages and disadvantages).

*Generalization  
and  
specialization*

**Generalization.** When a customer data cube is evaluated, interest often focuses on reports about aggregated data rather than detailed data. The abstraction of objects into object categories is called generalization (e.g., we can generalize the behavior of individual customers to the behavior of customer groups). The reverse direction—the analysis of an individual customer or a subgroup instead of a customer group—is called specialization. Generalization functions and specialization functions can therefore be applied to different aggregation levels.

If the customer, his relationship to the company and his behavior are analyzed, then future-oriented reports and prognoses can be drawn up. The following two procedures have gained importance:

*Allocation of  
customers into  
categories*

**Classification.** The allocation of customers into given categories based on the characteristics of the customers is called classification. A well-known example is risk examination at financial or insurance institutions, in which the customers are divided into high-risk and low-risk customers. Classification problems can be solved by decision trees, neural networks, or genetic algorithms: decision trees segment the volume of data based on certain characteristics; a detailed discussion of such decision trees is provided in Sect. 8.3.5. A neural networks is a form of computer-based processing that mimics the way in which nerve cells operate. It consists of a network of simple components arranged in layers, where each component is coupled to components from surrounding layers. As well as pattern recognition in data mining, neural networks are used for language analysis or for image processing. Genetic algorithms borrow the processing strategy associated with evolutionary theory in order to find the best possible solution to a problem. Starting with a (virtual) population, new populations are generated via mutation and crossbreeding rules, which are evaluated with the aid of a fitness function. After repeating heredity processes over a number of generations, it is hoped that a promising solution variant will emerge.

*Prognosis  
procedure*

**Effect prognosis.** Characteristic individual developments of the customer can be estimated using a prognosis procedure. For example, we may be interested in the order volume of a customer for the next report period, based on his present purchase behavior. Statistical procedures (e.g., regression analysis), neural networks, or genetic algorithms are used for this.

Decision trees obtained from such data-mining procedures and used for customer classification are described below.

### 8.3.5 Decision Trees for Customer Classification

*Purpose of  
decision trees*

Decision trees can be used to classify customers. Each decision tree consists of nodes and edges. There is a root node, as many inner nodes as desired, and a number of leaves (end nodes without subtrees). An edge always connects exactly

two nodes, which are on different yet neighboring levels of the tree (see Fig. 8.9). A binary decision tree occurs if the root node and all of the inner nodes refer to exactly two subtrees.

In a decision tree, characteristics from the customer line are given to the root node and the inner nodes, with the leaves representing the customer categories desired. Different calculation methods (algorithms) have been devised to select relevant characteristics and define the sequence in the nodes.

A small example is shown in Fig. 8.9. The data collected from 12 customers who bought different products (A, B, and C) should suffice as a small test. The customers are characterized by three characteristics: age, civil status, and income. Only the following age categories are of interest: younger than 30, between 30 and 50, and older than 50. The civil status characteristic can be either single or married. The third characteristic, income, is determined by the qualifiers low, middle, and high.

*Structure of a decision tree*

*Example of a decision tree*

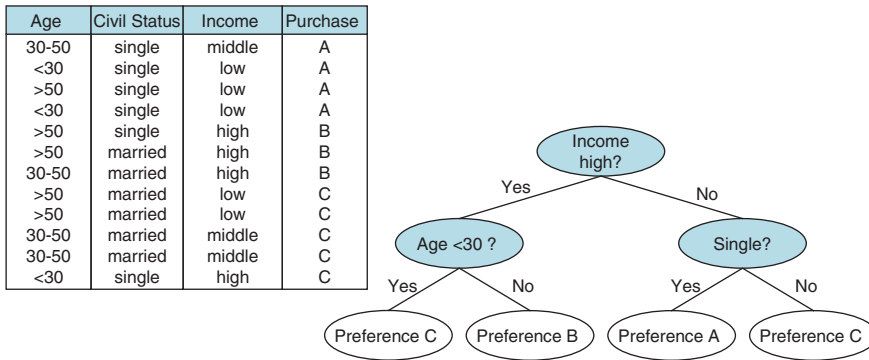


Fig. 8.9: Classification of customers with the aid of a decision tree

The customers should now be divided into the three categories A, B, and C, where the preferential product represents the category affiliation. An algorithm that produces decision trees generated the binary tree in Fig. 8.9, in which the formation of the nodes and edges is not shown in detail. The decision tree derived from this data collection sample gives information on the customer behavior. For example, if a customer has a high income, and if he is over 29 years old, then this customer prefers product B. This fact can also be expressed in the form of a rule: if a customer has a high income and is older than 29, then this customer prefers product B. In other words, this rule suggests that target customers who do not yet possess the three products A, B, and C and who have a preference for product B can be contacted. This opens up opportunities for the cross-selling and up-selling of products and services.

*Customer behavior*

Calculation methods for decision trees try to obtain an optimum arrangement for the decision criteria in the nodes. Moreover, these methods differ in terms of the selection of the stop criteria (i.e., in the definition of the depth of the tree or the number of leaves).

*Determination of stop criteria*

We have now considered the methods and techniques of analytical CRM, and so we turn our attention to procedures used in operational and collaborative CRM. Collaborative CRM occupies itself with the discussion and selection of suitable communication channels for customer communication.

## 8.4 Operational Customer Relationship Management

### 8.4.1 Customer Buying Cycle

*About the term customer buying cycle*

The term “customer buying cycle” refers to a process model that shows the consumer relationships between the company (provider) and the customer (consumer). This process model for the consumption of products and services is roughly sketched in Fig. 8.10. The customer process is represented by the outer ring and the company process by the inner ring. The customer process in the customer buying cycle is divided into the following four phases:

*Establishing contact*

**Stimulation.** In this phase (also often called the contact phase, awareness, or problem recognition), the interest of the customer is stimulated and contact with potential customers is established. Fashion trends and/or targeted advertising measures can stimulate the customer’s need for products and services.

*Evaluation of the offer*

**Evaluation (information and evaluation phase).** Here, the customer finds out about the advantages and disadvantages of the product or service. He perhaps also obtains offers from competitors and compares and evaluates them.

*Purchasing a product*

**Purchase.** In this phase (the purchase, order handling, and distribution phase), the customer provides an order for the purchase of a product or a service. Servicing is also paid for by the customer, before or after receipt of the product or service.

*Use phase*

**Use (follow-up phase, after-sales).** Here, the customer uses the product or service until he procures a new product or a replacement. Possible training and maintenance exercises are also included in this phase.

*Coordination of the processes*

The customer processes present in the customer buying cycle must be supported by the company through suitable marketing, purchasing, and after-sales service measures. This means that the company must coordinate its company process with the customer process. This is indicated graphically in Fig. 8.10: the contact and evaluation phase must be supported by suitable marketing measures.

The following subprocesses rank among the marketing tasks of the company:

**Market research.** Market information and customer information are collected and evaluated.

**Need analysis.** Specific customer needs and wishes are collected and assessed.

**Advertising.** The company itself, as well as individual products and services, are made known.

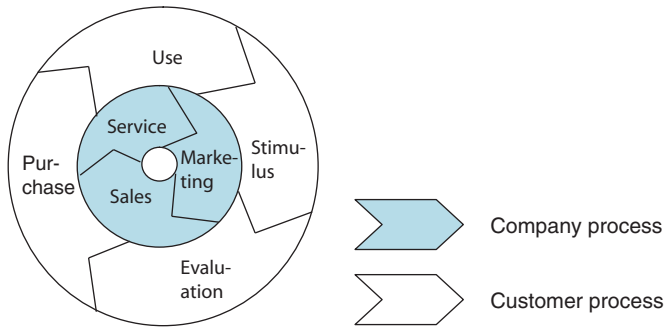


Fig. 8.10: Customer processes and company processes in the customer buying cycle

**Sales promotion.** Using specific programs and campaigns, purchasing incentives for certain customers and customer groups are created.

The company's sales process supports the customer buying cycle as follows:

**Product and price information.** Detailed information about products and services, as well as aspects of their use, is communicated through suitable channels (see Sect. 8.4.2 on multichannel management).

**Consultative support.** Customers are advised and/or invited to become reference customers.

**Offer generation.** The customer is in charge during the assembly of product and service parts and receives an offer.

**Order and purchase completion.** The order is accepted and the purchase order is released.

**Payment transactions.** Payment orders for product parts and services are released, and receipts of payment are supervised.

**Delivery and service provision.** Products and services are delivered through using the distribution networks.

The after-sales service phase includes the following subtasks:

**Installation.** Products are installed with the customer or services are provided.

**Training.** Customers are instructed and challenged with suitable training measures.

**Customer service.** After startup, customer inquiries are answered and potential maintenance work is carried out.

**Customer connection.** Customer communities are promoted and incentive systems for expanded product parts and services are developed.

*Goal of  
long-term  
customer  
connection*

Examining the customer buying cycle—from both the customer perspective and the company perspective—leads to an improved understanding of customer needs as well as a better chance of offering suitable solutions and products and attaining a long-term customer connection. Communication with the customer represents a special challenge, since a variety of contact and communication channels are usually used.

## Case Study eDVDSShop: Clickstream Analysis

In order to better evaluate the customers of the eDVDSShop, Anderson would like to carry out a so-called clickstream analysis. To do this, all of the inquiries from the Internet are stored. At the same time, an attempt is made to identify the inquirer with the help of different procedures. Each click of the user on a link is stored in the webshop's database. With the aid of this information, some interesting questions can be answered:

- How many of the visitors can be identified and are therefore registered with the eDVDSShop? These users are sorted into the customer category below. However, among the remaining visitors who are sorted into the user category, there can still be registered customers of the eDVDSShop who were not identified.
- How do the visits and orders of a customer relate to each other? Do customers come more frequently to a site without buying anything?
- How long does a customer stay on the web page? How many calls are made? Are there differences between the customer categories?
- Which products and categories receive the greatest attention? Does these correspond to the most popular products in the order?

Anderson speaks with eTorrent about the storage of the clickstream. Since eSarine is implemented in Java, the clickstream is easy to establish and store. The necessary mechanisms for the identification of the customer are also present in Java and already used in eSarine.

A customer is usually recognized with a cookie. A cookie is a file stored on the customer's hard drive during the first visit. Additional information about the user can be stored in the cookie. The customer can, however, look at and edit the cookie. This is why caution is imperative with plain text information—the user name for instance. eSarine stores the session ID in the cookie during the first visit in order to identify the customer. This number provides protection, since it is relatively secure during an attack on a customer. At the same time, an entry with the session ID as well as the user name is stored in the database. If the customer visits the shop again at a later time, the customer's web browser sends the cookie back to the web server. The old session ID can be selected, and using this the identity of the user is established by accessing the database.



However cookies are somewhat controversial, since they do limit user anonymity on the Internet. For this reason there are users who do not permit the storage of cookies.

After a few weeks, Anderson compiles a statistics report and is surprised by the large number of users who visit his site without registering or buying anything. They click on an average of 3.2 pages before they leave the eDVDSHOP. Anderson considers providing a special offer for new customers in order to induce them to make a purchase.

### 8.4.2 Multichannel Management

The term “multichannel management” has not yet become firmly established in the literature. While it is understood to mean the management of different channels, it is not always obvious whether it concerns distribution and/or contact channels. It is also unclear whether the term is to be used exclusively for the customer side or for the supplier side.

*Unclear term  
formation*

Here, we use the terms “multichannel management” or “collaborative eCustomer Relationship Management” to mean the management of contact channels used in parallel on the customer side. Distinguishing between contact channels and distribution channels is therefore a sensible approach, because distribution channels and communication channels exhibit different characteristics and are also mostly served by different information systems.

*Management of  
contact  
channels*

Different information and communication needs develop during the different phases of the customer buying cycle. If a customer arrives at the company, regardless of the contact channel and the request, then this is referred to as inbound communication. In outbound communication, however, the company is directed toward the customer using appropriate contact channels.

*Inbound  
communication*

Media are interaction platforms or technical solutions for the exchange of information. Examples of direct media are telephones, email, and the Internet. The customer is addressed directly and personally using direct media, in contrast to indirect media, which include newspapers, advertising spots or billboards.

*Direct and  
indirect media*

Figure 8.11 shows the various combinations of contact channels with direct and indirect media. The contact channel on the company side is not reduced to a choice of just one organizational unit. Rather a contact channel consists of different employee roles and employee abilities from front office processes as well as information and communication media:

*Variety of  
combinations*

**Personal contact.** Personal contact can be effective from the company’s perspective if, above all, employees are appropriately trained and promoted. However, the costs associated with this type of communication are generally very high and can be only justified for certain product types and services. Supporting personal contact through the use of electronic aids (configuration of products, variant evaluation and risk analysis, offer generation) can increase the efficiency.

*High costs  
associated with  
personal  
contact*

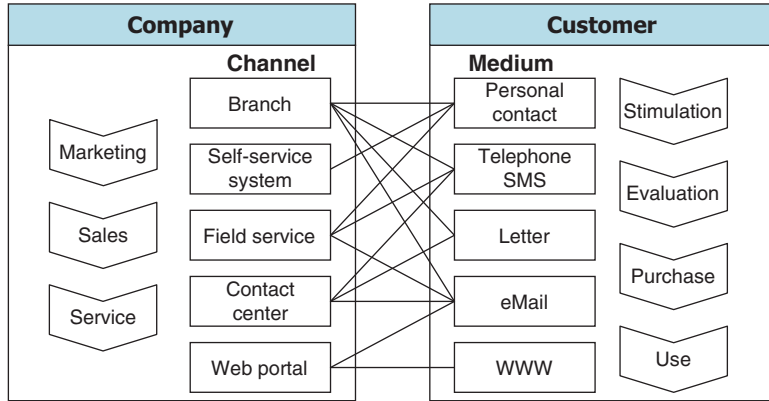


Fig. 8.11: Contact channel and contact medium

*Use of call and communication centers*

**Telephone.** Using the telephone is a promising approach if the employees are specially trained and prepared for telephone calls. In many companies a telephone call often needs to be rerouted several times until a suitable employee can respond to the customer's request, and so call or communication centers are increasingly being established in companies (see also Sect. 8.4.3). As well as using telephones in a traditional manner, there are also asynchronous connection possibilities associated with telephones. Thus, some companies sell special offers via SMS (short message service).

*Direct marketing with letters*

**Letter contact.** Even in the age of the Internet, conventional and appropriate letters can be dispersed to good effect through direct marketing to interested customer groups. This medium is generally expensive, and so it is worth using data mining to find out which customer characteristics promise success for which acquisition campaigns or sales campaigns beforehand.

*Establishing contact electronically*

**Email.** The advantages of email in relation to conventional correspondence derive from the rate of transmission and from the fact that the information is available electronically and can therefore be processed. There is also the ability to provide supplementary documents and graphics. However there is a danger that the customer will be supplied with too much material and become annoyed.

*Use of web portals*

**WWW.** Web portals have the advantages that they can anonymously provide information and possibly customer-specific offer calculations. Depending upon how the technology is used, expert opinions can also be obtained online for consultation purposes.

From among the various contact channels and media, the company must select and provide the combinations which largely correspond to customer preferences and justify the financial and personnel expenditure.

### 8.4.3 Inbound and Outbound Customer Processes

In inbound communication, the company receives incoming customer inquiries, assesses them, and (if necessary) forwards them to other company units for processing. These customer inquiries are often bundled by a contact or interaction center, since these organizational units are trained for customer dialog and are connected to the most important information systems in the company.

*About inbound communication*

As shown in Fig. 8.12, the following activities must be carried out during the acceptance of an inbound process:

**Accepting and identifying the inbound.** Inbounds can occur spontaneously or as a result of advertising measures. Among the inbounds are also inquiries or complaints from the customers. Depending on the medium used, the customer is identified and the customer database or customer data warehouse is consulted. During the initial contact with an interested party or new customer, the most important master data is collected and customer identification is performed. The input of each inbound is confirmed to the customer, perhaps with a comment about when the customer request can be settled.

*Acceptance procedure*

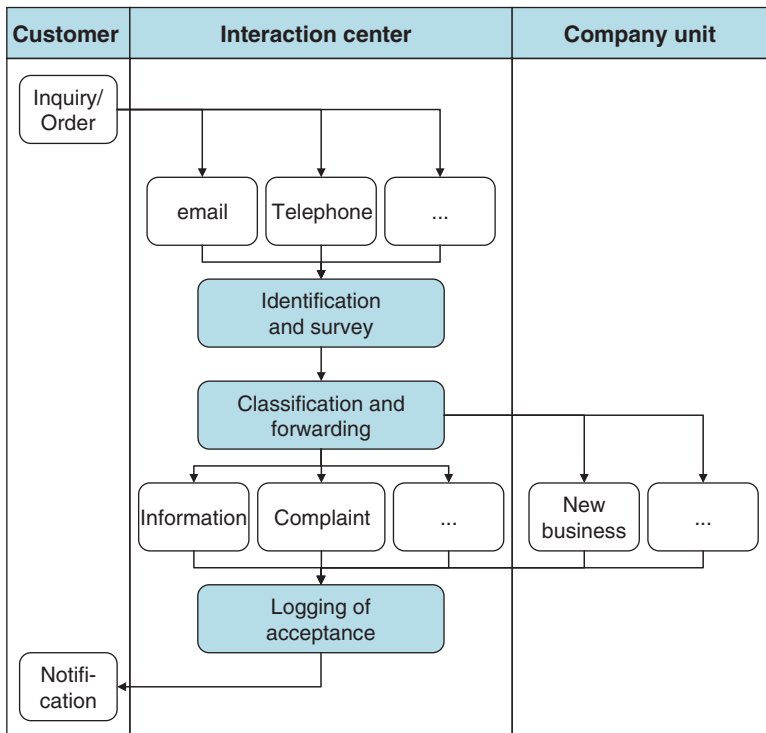


Fig. 8.12: Processing steps in inbound acceptance

*Processing categories of inbound communication*

**Classifying and processing the inbound.** The inbounds are classified and forwarded accordingly for processing. The following processing categories can thereby be differentiated:

- Providing information
- Requesting an offer
- Placing an order for new business
- Requesting a change to current business
- Complaint handling

Inbound classification is required if different staff qualifications and different processing steps (processes) are needed to handle the inbounds. After the allocation of the inbounds into the appropriate category the task people are oriented. Eventually individual customer requirements can be automated or processed directly by an employee of the communication center.

*Structure of a contact database*

**Logging activities.** The customer data warehouse or contact database is updated. In particular, the individual processing steps are logged in order to be able to send information on the current status at any time internally within the company or to the customer. When workflow management systems are employed for inbound completion, parallel subprocesses can be supervised and reconstructed at any time.

*Processing the outbounds*

The processing of outbounds (i.e., the provision and distribution of offers and special promotions from the company to customers) occurs in a similar fashion. The provision of content (content management, see Sect. 4.4.2) can be undertaken by special units of the company, with contact taking place mostly through the interaction center. The determination of suitable media in the case of outbounds is also important. Perhaps a mixture of media (and channels) must be employed.

*Monitoring success*

The success of a campaign or of outbound activities can be monitored with the aid of a customer data warehouse (see also Sect. 8.6 on controlling customer relationships). As well as extracting promising target groups from the customer line and contacting potential customers, returns and feedback are recorded in the customer data warehouse or in the contact database.

## 8.5 Use of CRM Systems

The information and communication systems of the company logically have an interface with the customer data warehouse and feed this periodically with up-to-date information. The interaction center not only has access to the customer data warehouse, but it also occasionally uses the systems for marketing, sales, and after-sales service. A target architecture for eCustomer Relationship Management is depicted in Fig. 8.13.

Used for the electronic support of marketing, sales, and service are computer-aided kiosk systems, electronic product catalogs, offer systems, sales systems, as well as help-desk systems and Web portals:

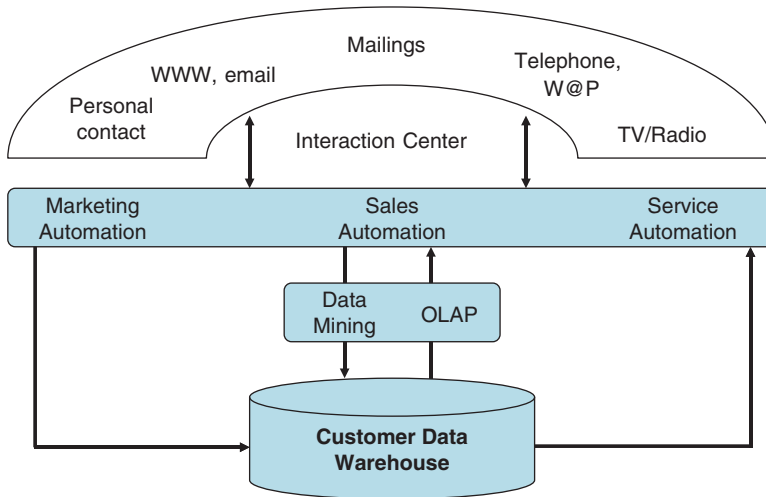


Fig. 8.13: Linking of the information systems via customer data warehouse

**Kiosk systems.** A kiosk system is an information system that is used at a place where products and services are sold (point of sale). Kiosk systems allow the customer to access multimedia information and animated content, mostly via a simple-to-operate touch screen. The customer can call up and study the desired presentations and purchase documents. Using built-in control functions, the search behavior of and other information about the users can be collected and evaluated.

*Use of point of sale*

**Electronic product catalogs.** Electronic product catalogs, as discussed in Sect. 3.4, can be consulted and browsed offline (e.g., via CD) or online (via the Internet). They may contain multimedia objects and appropriate animations. The advantage of online catalogs is that the information and quotations included in them can be updated. Depending upon the technical complexity of the electronic catalog, customers may be able to deposit a profile and enroll for special services in order to receive automatic updates.

*Updating product properties in online catalogs*

**Offer systems.** Offer systems augment electronic product catalogs. They facilitate the configuration of products and services and allow appropriate calculations to be carried out. If the offer system possesses an ordering system, then the customer can request his desired products without media disruption.

**Sales systems.** Offer systems are used by the customer, while computer-aided sales systems are primarily used by sales employees. They have functions for customer analysis, date and route planning, product configuration and price calculation, as well as for offer generation and order entry. Sales systems have also recently been installed on mobile equipment (see Chap. 9). In most case these

*Mobile use of sales systems*

devices can connect to the central information systems of the company using the conventional telephone network, a mobile radio network, or via the Internet.

*Complaint management*

**Help-desk systems.** Help-desk systems are used by the interaction center when problem messages and complaints need to be collected and processed. They are used in conjunction with hotlines and service numbers and allow for the provision of so-called problem tickets. This allows the time at which a customer reaches the communication center to be logged as well as the type of problem involved. Aided by extensive problem databases, customers can be helped and perhaps connected directly with product development and maintenance specialists. Periodic evaluations of these databases enable the quality of the products and services offered to be evaluated, and aid in the planning of changes and improvements.

*Use of web portals*

**Web portals.** Web portals offer extensive organizational possibilities between the company and those customers who have an Internet connection. Functions from web portals have also been used on mobile devices for some time (e.g., for remote diagnostics and for user and customer support).

## 8.6 Controlling Customer Relationship Management

*Performance measurement system*

The goal of a performance measurement system must be to show the revenue potential and the maintenance of the tangible and intangible assets of a company. As well as management, stakeholders are also interested in receiving information about how the value of the company is evolving and the how its assets are being used. This information should enable executive personnel to intervene before undesirable developments affect the financial results of the company.

*Cycle of CRM control*

Figure 8.14 shows the CRM control cycle. At the strategic level, and under the responsibility of a customer steering committee, the CRM strategy is established, along with goals and measures. At the tactical–analytical level, a specially arranged CRM core team develops customer portfolios and customer models for obtaining and increasing customer value, in cooperation with market studies and analytical CRM. The customer data warehouse forms the basis for this, and is fed by the contact database as well as by the operational information systems. At the operational level, relationship marketing, sales, customer service and support, and multichannel management are all responsible for realizing customer programs and customer campaigns. The feedback from the operational systems as well as evaluations of customer contact (often called customer touch points) from different contact channels gradually convert the customer data warehouse into a knowledge database.

*From customer value to intellectual capital*

All of the relevant information needed to, among other things, compute the customer value or the customer lifetime value, is stored in the customer data warehouse. The intellectual capital includes, above all, knowledge-related assets of the company. It forms the basis for the creation of value and is thereby a crucial factor in company success. Management has the task of developing knowledge of the customer base, relationship networks, customer processes, etc., further in

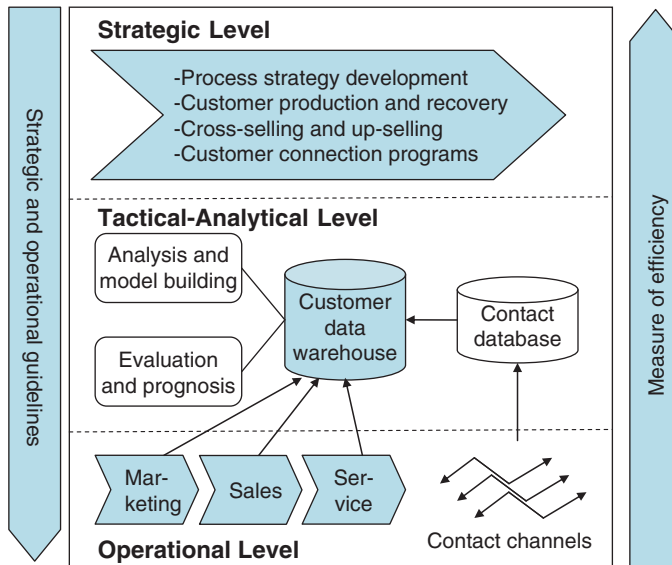


Fig. 8.14: Control cycle for customer relationship management

order to enhance the intellectual property of the company as well as to secure it for the long term using the control process outlined above.

## 8.7 Literary References

The Internet and electronic business relationships affect customer management to a considerable degree. Kotler et al. [Kot02] deal with these changes and describe a holistic marketing concept that can be applied to meet the challenges of electronic business. In the Harvard Business Review [Har02] on customer relationship management, a collection of papers describe relationship building strategies. A book by Buttle [But04] shows the roles played by customer data and information technology in enabling customer relationships to be implemented.

Approaches that can be used to increase customer orientation and to improve CRM have been widely discussed in the last few years in scientific circles and implemented in practice to some degree. Lately, the focus has shifted more and more towards customer value. Some works on this have been published: in English. Blattberg et al. [Bla01] developed a customer equity model that is oriented towards the customer life cycle and computing the acquisition equity, the customer connection equity, and the add-on equity from increased sales effort. Rust et al. [Rus00] regard the three components of value equity, brand equity and retention equity as being influential variables in the customer equity.

An array of textbooks and research work have recently been published that focus on the topics of data warehousing and data mining. Some of these works

*Literature on  
customer  
capital*

examine aspects of a customer data warehouse or the use of database technologies in marketing, sales, and customer management.

*Standard works  
on data  
warehouses*

Some standard works on data warehouse systems are available. An early work with clear concept formation was provided by Inmon [Inm96]. The work by Kimball et al. [Kim96], which describes all of the aspects of planning and operating a data warehouse system, is one of the more well known. Adamson and Venerable [Ada98] focus on discussing an outline of and the development of a data warehouse. Jarke et al. [Jar00] illustrate the state of research in this field, in addition to general methods and techniques.

*Literature on  
KDD process*

Adriaans and Zantige [Adr96] give an overview of data mining and the KDD process (Knowledge Discovery in Databases) with illustrative examples. Additional standard works on data mining come from Han and Kamber [Han01], Weiss and Indurkha [Wei98], as well as from Witten and Frank [Wit99]. Different procedures such as clustering, decision trees, association rules, neural networks, and genetic algorithms are described in these works, including a procedural model for the KDD process.

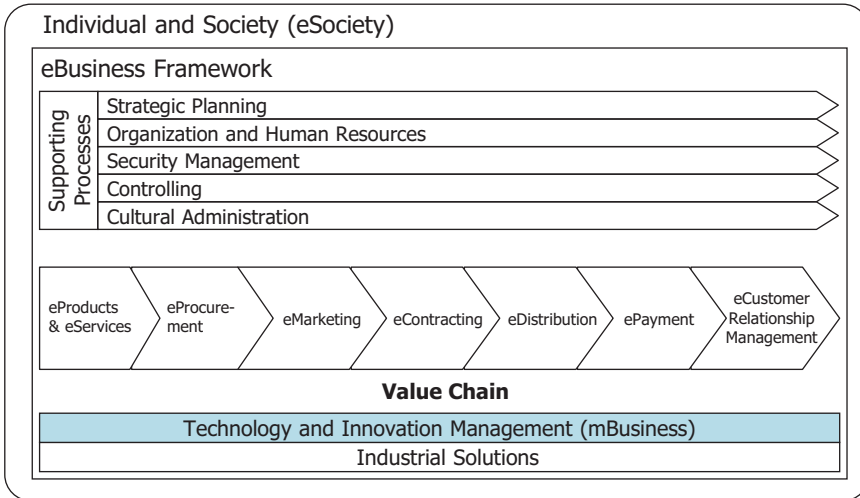
The use of data-mining algorithms for sales, distribution, and customer support is tackled in the works by Berry and Linoff [Ber97] and Berson and Smith [Ber99]. Kaushik [Kau07] has written a book about web analytics and provides a guide for implementing it step by step.

*On the  
management of  
intangible  
assets*

The management of intangible assets is increasingly presenting new challenges to companies. In this field, the work by Kaplan and Norton [Kap96b] on the balanced scorecard, which improves the steering of the functional chain towards company success, is well known. Edvinsson and Malone [Edv97] show in their work on intellectual capital the significance of customer capital, organization capital, and human capital. Küng et al. [KMW01] illustrate the basic principles of using information systems for performance measurement.



# 9 mBusiness



*The term mobile business or mBusiness covers all of the activities, processes, and applications that can be realized with mobile technologies. In mBusiness, the business relationships take place by means of mobile devices. mBusiness can be regarded as a subset of eBusiness in which the information is available independent of time and location. The chapter first describes the mobile devices required for mBusiness (Sect. 9.1), and then introduces mobile communications technologies (Sect. 9.2). This chapter mainly focuses on current mobile applications (Sect. 9.3). Additional literature are compiled in Sect. 9.4.*

## 9.1 Mobile Devices

Mobile business requires mobile devices for the fulfillment of services. Mobile devices range from portable computers, like notebooks, to cell phones or personal digital assistants (PDAs). The latter in particular have proven enormously popular. Over 80% of all Europeans possess a cell phone. Even PDAs have an ever-growing number of buyers. An interesting development in connection with this is the smartphone. These devices combine the features of a cell phone with the features of a PDA. It may be assumed that in the future the different product groups—cell phone and PDA—will merge into the smartphone product group.

*Mobile devices differ from stationary devices*

Considering the characteristics of mobile devices, the following differences from stationary computers can be established:

- Smaller display
- Slower processors
- Smaller main memory
- Inferior data input
- Smaller bandwidth during communication
- Low battery power

*Mobile devices continue to improve*

The disadvantages presented above refer to the mobile devices available today. Right now, all of the following issues are being intensely researched:

**Smaller display.** Different attempts are being made to resolve this problem. There are solutions for producing displays with flexible materials. This means that the display could be folded up and unfolded when required. In addition, there are experiments with glasses that project the display near to the front of the eye and thus produce large resolutions.

**Slower processor.** The development of computer power has made amazing progress over the last few years. Extensive improvements can be expected in this area in the future.

**Smaller main memory.** The main memory has increased enormously in the last few years. The first mobile devices had at most 1 MB of main memory. Now there are devices that possess more than 64 MB of integrated main memory and allow upgrades to 1 GB.

**Inferior data input.** Voice input and virtual keyboards can be regarded as interesting developments in this area. Experiments are being carried out with gloves that are designed to compute input data from the movements of the fingers.

**Smaller bandwidth during communication.** The bandwidth for mobile communication has already improved in the last few years. Further improvements are expected in the near future.

	Siemens S6D	Nokia 6210	Nokia 6230	Sony Ericsson P1i
Year of construction	1997	2000	2004	2007
Weight (in g)	190	114	97	124
Dimensions (in mm)	190 x 60 x 25	129.5 x 47.3 x 18.8	103 x 45 x 20.5	106 x 55 x 17
Network (GSM)	900	900, 1800	900, 1800, 1900	900, 1800, 1900
Display	text lines monochrome	96 x 60 pixel monochrome	128 x 128 pixel 65,536 colors	240 x 320 pixel 262,144 colors
Features		HSCD Internet access	300K Camera, Bluetooth	UMTS, 3,2M Camera

Fig. 9.1: Historical comparison of cell phone specifications

**Low battery power.** Research in this area over the last years has unfortunately not led to any great improvements. This issue is complicated by the fact that modern devices need more and more power. A breakthrough is not likely to occur here in the very near future.

The technical progress made in the area of mobile devices is illustrated by Fig. 9.1, which shows the specifications of four mobile telephones. Current devices are smaller, lighter, and obviously possess more functions than their predecessors. It can be assumed that this development will continue in the coming years.

## 9.2 Mobile Communication

The communication possibilities of mobile devices can be differentiated into large and small networks. Global networks can be used for communication with participants around the world, and local networks for communication with a few devices in the local vicinity. Two examples of global and local networks—GSM and Bluetooth, respectively—follow.

*Global networks vs. local networks*

### 9.2.1 The GSM Cell Phone Network

The Global System for Mobile Communication (GSM) is a network which was originally developed for mobile telephony. However, the GSM network now offers other services too.

GSM was developed by the Groupe Spécial Mobile, a division of the European Conference of Postal and Telecommunications Administrations (CEPT). It was originally planned as a European cell phone network, but it is now used in more than 100 countries worldwide. Development began in 1982. It was first used in some European countries in 1987 after the signing of a memorandum.

*History of GSM*

GSM is based on electromagnetic waves. The frequencies of these wavelengths are measured in Hertz (cycles per second), in memory of Heinrich Hertz, a pioneer of this technology. As soon as several transmitters are transmitting on the same frequency, these waves overlap and produce interference. This is why each service must be assigned a unique, specific frequency range. This allocation is

*Radio waves for data transmission*

regulated separately in each country. Although there are certain standards (like UKW wireless reception within the range 87–107 MHz), exceptions can occur, depending upon the country. Even the radiofrequency is not totally available in some Eastern European countries. The frequency ranges of 890–915 and of 935–960 MHz were reserved for GSM. Today it is referred to as the GSM 900 standard. Other frequency bands, for instance those in the ranges 1,710–1,785 and 1,805–1,880 MHz, known as GSM 1800, are also now used. A GSM provider divides the

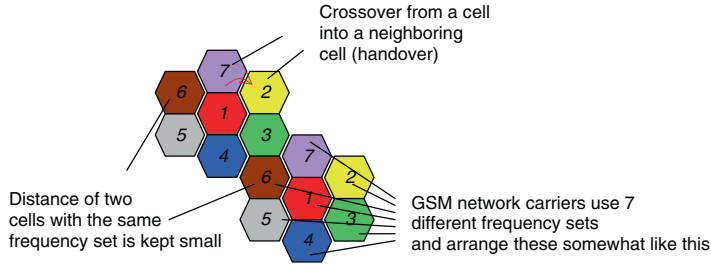


Fig. 9.2: Basic structure of a GSM network

region that it wishes to cover into similar-sized subregions called cells. Each cell is equipped with a base station. A mobile device communicates with the base station that offers the best signal strength. This is generally the nearest station. Figure 9.2 shows an idealized view of a GSM network. Each cell is represented by a hexagon. The different numbers represent different frequency sets. In reality, however, reflections can result from the presence of mountains and buildings for example, which means that the arrangement of the cells must be altered.

Since data must be transmitted in both directions in telephony, in contrast to the radio for example, GSM separates the frequencies into “to and from” call directions (uplink and downlink). In the GSM 900 network, the 890–915 MHz band is reserved for communications from the mobile device to the base station, and the 935–960 MHz band is reserved for communications from the base station to the mobile device. Each band is divided into 124 channels.

So that the neighboring cells do not overlap in the boundary areas, the existing channels are subdivided further. The network providers create frequency packages of the same size, each containing a subset of the channels, and allocate different frequency packages to the neighboring base stations. However, when communicating, the mobile device and the base station use only those channels which were allocated to the base station.

*GSM supports  
handover*

If a mobile user moves from one cell into a neighboring cell, the base station changes. This happens dynamically without the mobile user knowing. The mobile device independently scans the entire frequency range and checks the transmitter strength. If it finds a much stronger transmitting base station, then this station is selected. In the GSM standard this is referred to as a “handover.” In order efficiently coordinate the handover, data is exchanged periodically between the base station and the mobile device.

*A telephone for  
all networks*

The GSM network makes it possible to use external network providers. A mobile user can establish a connection over an external network provider without

registering. The resulting costs are accounted for through his network provider. This feature is called “roaming” in the GSM standard.

Besides wireless telephony, GSM also offers other services, for instance a short message service (SMS). Using the SMS, short messages can be sent from one mobile participant to another. SMS was originally a byproduct of GSM, but was integrated into the GSM standard as an additional service. It makes use of the coordination data exchanged between the base station and the mobile device. Some advantages result from this. A mobile device can receive SMS messages at any time, even while a discussion is taking place. In addition, the SMS service can easily be integrated into the existing infrastructure without creating additional bandwidth. The SMS service is extraordinarily popular.

*GSM provides other services as well as telephony*

Among the other important GSM services are High-Speed Circuit-Switched Data (HSCSD), the General Packet Radio Service (GPRS), and Enhanced Data Rate for GSM Evolution (EDGE). These allow a mobile device to connect with the Internet.

In order to safeguard communication in a GSM network, some security mechanisms were also established in the standard. Thus, a mobile device automatically authenticates itself with a GSM provider. Only afterwards can the user use the mobile device. One problem with this approach is the one-sided authentication. A mobile device does not know whether it is communicating with a genuine GSM provider. The transmission of coordination data and language data is coded into the GSM network in order to ensure the confidentiality of the data. Each mobile user possesses a so-called subscriber identity module (SIM) card. This card must be inserted into a mobile device. On it is a secret key which is needed for the authentication and coding of the data. The secret key cannot be picked out.

*On the security of GSM*

However, there have been some successful attacks on the GSM network in the last few years. For instance, it was found to be possible to copy the SIM card. In addition, the secret key can be established through a series of tests. Other attacks use the fact that the network provider does not authenticate itself with the mobile device. For this attack, a special device inserts itself into the communication between mobile device and base station. It simulates the base station for the mobile device, and simulates the mobile device for the base station. This allows the user of the device to listen in on the communication. However, this is at least encoded in the case of language data and coordination data, and the private key is not normally known to the aggressor; on the other hand, the most commonly used encoding algorithm possesses a weakness that allows the key to be calculated. Despite these attacks, the GSM network is still considered relatively secure.

*Attacks on the GSM network*

GSM is a successful communication network; however, successors like UMTS have already been installed in a number of countries.

### 9.2.2 Local Communication with Bluetooth

Using Bluetooth, devices can exchange data across a small spatial distance using electromagnetic waves. Bluetooth specifies both the technical communication infrastructure as well as application profiles for special applications.

*History of  
Bluetooth*

The development of Bluetooth began in 1994 under the sponsorship of Ericsson. The first standard was adopted in 1999. Many renowned companies that were united in the Bluetooth Special Interest Group (Bluetooth SIG) worked on this standard. The first devices were placed on the market in 2000. In the current version (1.1) of Bluetooth, data can be exchanged at a speed of  $1 \text{ Mbits}^{-1}$ . Bluetooth devices are divided into different classes. Devices of the first class can communicate at a distance of up to 100 m; devices of the second class at a distance of 20 m, and devices of the third class at a distance of 10 m.

*Bluetooth  
connects  
several devices*

Aside from the communication between two devices, Bluetooth also allows for the creation of short-term networks. Here a device can be connected to up to seven other devices. Like the GSM network presented above, communication takes place over electromagnetic waves. The range 2,400–2,483.5 MHz is used for Bluetooth. In many countries this range is openly available.

*Bluetooth  
defines profiles*

Bluetooth defines a set of profiles which developers can use to connect certain devices. Over 25 profiles have already been specified, as seen in Fig. 9.3. Among

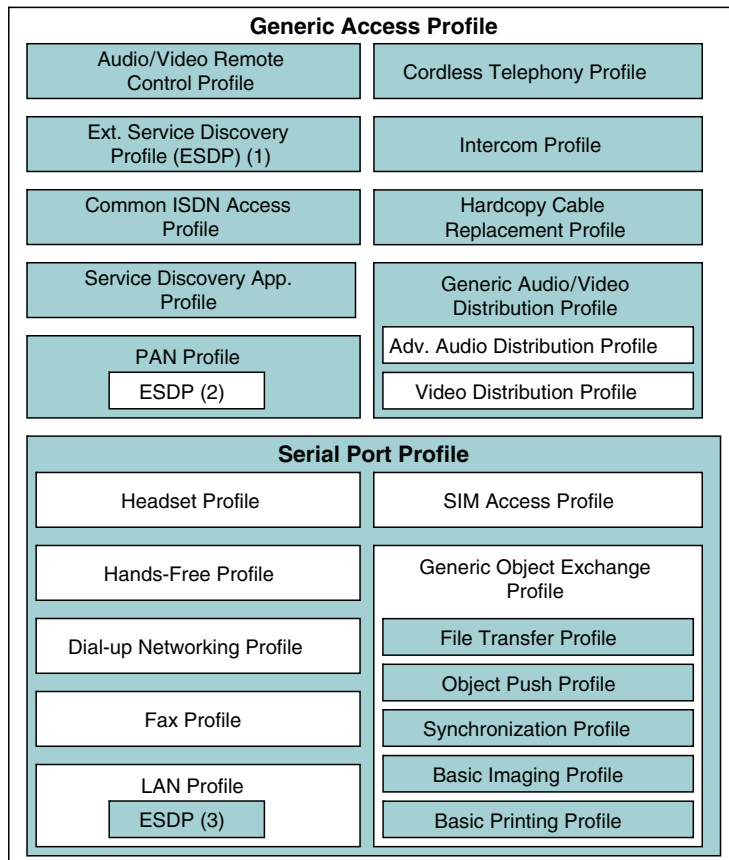


Fig. 9.3: Profile of version 1.1 of Bluetooth

the most well known are the Headset Profile for using a wireless headset with a mobile device, the Hardcopy Cable Replacement Profile for controlling a printer through a mobile device, and the Human Interface Device for communicating with a mobile device from input devices such as joysticks or keyboards. Since profiles are specified in great detail, and it is possible to connect two devices to one another without a software drive.

## 9.3 Mobile Applications

Since there is still an abundance of applications that were not developed for mobile devices, it is a substantial task to adapt these applications. Furthermore, mobile devices possess a few functions that are generally not available or useful on stationary devices, including the possibility of determining the current spatial position of the device. This is why new applications for mobile devices may not run so smoothly on stationary devices. However, when applications are adapted in this way, use is sometimes made of the newly available functions. Thus, some mPayment solutions make use of GSM network authentication.

### 9.3.1 Mobile Payment

Mobile payment or mPayment is regarded by many experts as the most important application of mobile devices.

*Mobile  
Payment as a  
key application*

mPayment makes payment possible with the aid of a mobile device. Two different approaches can be distinguished here:

1. The adaptation of existing ePayment solutions onto mobile devices
2. The development of new solutions specifically for mobile devices

For mobile devices which use the GSM service, the second solution is the more interesting because GSM network authentication can be used. The account can also be realized over the phone bill. The majority of mPayment solutions used today were developed for micropayment transactions. The same classifications as previously defined in Sect. 7.1 can be used for mPayment. Different roles can be defined in mPayment: the buyer, who wants to pay for a product with his mobile device, and the seller, who offers the product. Communication takes place over a telecommunications provider, and a financial institution has control over the payment process. Depending upon the mPayment solution, the roles can be molded and cast differently. In addition, the requirements are different for mPayment solutions. Apart from a secure transaction, the buyer also desires anonymity: beyond those directly involved in the transaction, as few parties as possible should be able to review the buyer's financial situation. The seller, however, would like to be sure of receiving the payment. Great competition has developed between

telecommunications providers and financial institutions, since it has proven attractive for a telecommunications provider to also take over the role of financial institution.

*mPayment  
market  
opportunities*

mPayment solutions based on mobile telephones promise good market opportunities:

- Existing cell phones can be used without any hardware changes and are widespread.
- The mPayment solutions presented are simple for the user to operate.
- Accounting can conveniently take place with the phone bill.
- The telecommunications providers have a great interest in the successful introduction of these solutions, since they promise to be an additional direct source of income. More customers could also be acquired this way.

*Standardization  
efforts*

So that the solutions presented become widespread, they should be like GSM roaming: usable everywhere. For this reason, a common standard is necessary. There are already preliminary approaches aimed at achieving this. In 2003 the Mobile Payment Services Association was established, which set the goal of developing a common standard for mPayment. Members of the association include Vodafone, T-Mobile, Orange, Telefónica Móviles, and others.

One important question is: to what extent do traditional financial institutions take part in this standard? Like the telecommunications providers, the creation of such a standard is of great importance to such institutions, as financial transactions represent their most important business. We can therefore assume that financial institutions and telecommunications providers will cooperate with a common mPayment standard.

Two different mPayment solutions that are already in use are briefly presented in the following sections.

### Payment Through a Call

*Payment  
services on  
telephone basis*

One of the simplest methods of paying with the cell phone is to call a special fee-based number. Part of the cost of the call is therefore passed to the service provider. There are a number of payment services that currently use this simple system:

**Dial-a-coke.** The mPayment solution Dial-a-Coke, from the Coca Cola Company in cooperation with the Marconi Company, was one of the first services of this kind. A customer buys a refreshment drink at a beverage dispenser and pays for it with his cell phone. The selected product is dispensed from the automat, with the payment made through the telephone bill.

**Selecta mPayment.** A system similar to Dial-a-Coke is offered by the vending machine producer Selecta. It is currently used in Switzerland and Austria at more than 500 automats. After the customer has sent an SMS message containing a



code indicated on the automat, he selects and retrieves the product. As with Dial-a-Coke, payment is made through the phone bill.

**Logos, ring tones, and others.** In the last few years, the sale of logos and ring tones for cell phones has developed into a billion dollar market. These services are almost always paid for through the phone bill as well. To order a Handy logo, a customer dials a given number or sends an SMS message. The logo is then sent to him and payment for the service is deducted through his phone bill.

**M-Pay from Vodafone**

The telecommunications company Vodafone developed the mPayment service M-Pay, which is already available to every Vodafone customer. M-Pay is a micropayment solution; only payments of less than ten Euros are permitted. M-Pay can be used without registering, and at present offers three different procedures for paying online (see Fig. 9.4):

**Internet.** In order to pay for a product on the Internet at an online shop that accepts M-Pay, the customer must enter his phone number into a form. Afterwards he receives an SMS message which contains a payment code. He must

*M-Pay can be used on the Internet*

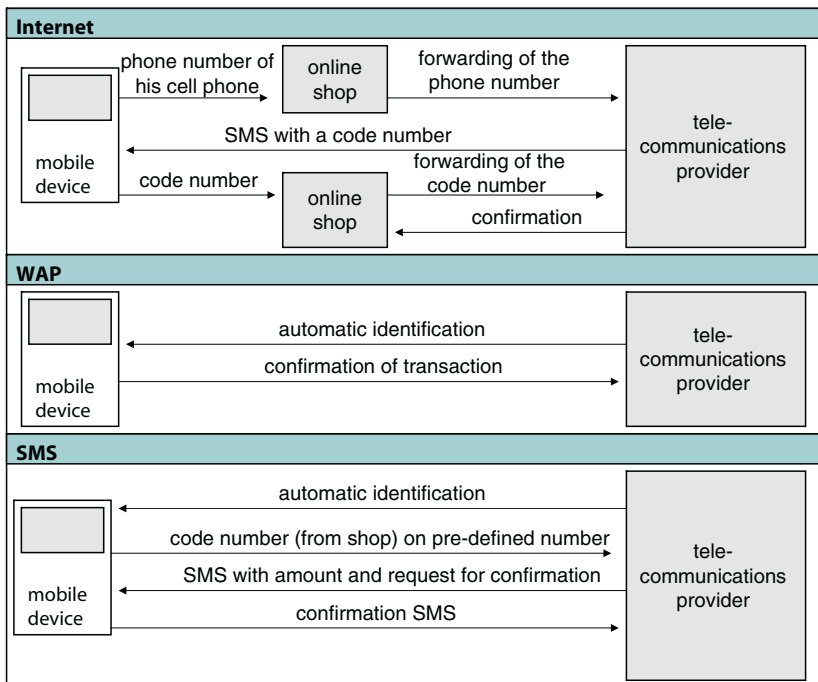


Fig. 9.4: The three M-Pay variants: Internet, WAP, and SMS

enter this into another form present on the web page of the online shop. The transaction is then finalized and the product can be delivered.

**WAP.** To order products over WAP sites (see Sect. 9.3.3), a simple click on an order symbol on the appropriate page is sufficient. The security-relevant information is transmitted automatically.

*Paying by SMS*

**SMS.** In order to allow customers to purchase products by SMS, an online shop can write a code number on a product. If the customer wants to acquire this product, he sends an SMS message containing the code number to a predefined number. Afterwards he receives a confirmation SMS message that he must answer. The transaction is then finalized.

### 9.3.2 Mobile Ticketing

*Purchasing tickets on mobile devices*

Another important application for mobile devices is mobile ticketing or mTicketing. The idea is to dispense electronic tickets that can be stored on mobile devices instead of paper tickets. Apart from passenger transportation, electronic tickets can also be used as admission tickets for cinemas or theaters.

The user buys his ticket online or through an automat. Either of the following two procedures are then followed:

1. The ticket is stored on a central server and a password is transmitted to the user. Such a ticket is called a virtual ticket. To check the ticket, the ticket collector requires a connection to this server.
2. The ticket is transmitted to the user's mobile device, where it can be checked without an online connection to a server. This type of ticket is called a PTD (personal trusted device) ticket.

*Smartcards vs. mobile ticketing*

It is also possible to obtain an electronic ticket that is stored not on a mobile device but on a smartcard. A number of solutions are available for these well-known electronic ticketing procedures. The advantage of mobile ticketing is that a separate smartcard is not needed. The ticket is stored on the mobile device, which should already be available (the market penetration of cell phones in Europe is over 80%, see Sect. 9.1). Another advantage is that tickets can be acquired online, which can lead to problems in electronic ticketing, since a reader-recorder is needed for smartcards.

*Advantages and disadvantages of mobile ticketing*

Mobile ticketing offers advantages for both customers as well as providers. Customers can buy an electronic ticket electronically in advance and store it on their mobile device. They no longer have to queue up at a sales counter for tickets, and so they save time. Providers save money because they can reduce the expenditure needed to supply tickets through automats or sales counters. In addition, electronic tickets can be combined with ePayment solutions, thus simplifying the entire monetary transaction.

*Problems with mTicketing*

However, mobile ticketing solutions still have problems, even today. On the provider side, the biggest problem is the fear of abuse. The customer can copy

an electronic ticket at will, particularly if it is stored on his mobile device. One solution, the above-mentioned smartcard, which is issued by the provider, can protect against illegal copying. Another problem for the provider is ticket control. A ticket collector must be able to determine the validity quickly and easily. Here a protocol for the transmission of the ticket to the ticket collector's validating system would be the most suitable. The solutions used today usually involve numbers or barcodes which must be entered laboriously into a validating system or which can produce difficulties when read. The electronic ticket can have disadvantages for the customer if his mobile device does not function perfectly; for instance when the battery is dead. In addition, he could unknowingly delete the ticket. Since a ticket can be copied at will, attacks upon the mobile devices of other customers in order to steal tickets could be encouraged.

### Plusdial

Since September 2001, the people of Helsinki have been able to acquire tickets for public transportation by cell phone. Over three million tickets have already been sold. The Helsinki City Transport Company (HKL) developed the solution together with the Finnish company Plusdial. The concept used is very simple to implement. A SMS message containing a particular code is sent to a defined number. A short time later the sender receives his ticket in the form of a specially encoded answer SMS message. The user does not have to register for the service. Accounting is done through the phone bill.

*mTicketing is already a reality in Helsinki*

### Telepay

There are also mobile ticketing solutions in some German cities. For instance, in the project Telepay, the Berlin Transport Services (BVG) together with the Belgian company Ertico tested the use of cell phones as a ticket carrier. Besides Berlin, the cities of Rome, Turku, and Paris are cooperating in this project supported by the European Union. In Berlin alone, during the test phase of the project in October 2002, more than 8,000 electronic tickets were sold. Travelers do not need advance booking or registration to use the service. However the service offered functions only with a telephone from the German telecommunications provider, ePlus. A traveler sends an SMS message (WAP access was also available, see Sect. 9.3.3) with a defined number to a given address. It is possible to acquire a one-way ticket or a day ticket. He subsequently receives his electronic ticket as an SMS message on his mobile device. The traveler pays for the ticket through his phone bill, where the received SMS message is charged at a premium SMS rate.

*Telepay performed a mobile ticketing test in Berlin*

The confirmation SMS message (the electronic ticket received) contains the following data:

- The purchase date of the ticket, and with it the date for which the ticket is valid. During the project it is only possible to acquire tickets for the immediate start of the trip.

- Type of ticket (i.e., one-way ticket or day ticket).
- To remind the traveler, the validity of the ticket is indicated in a field. For day tickets this is the 24 h following the purchase date; for one-way tickets it is the next 2 h.
- A password assigned by the system.
- The sender's number.
- The ticket's unique identification number.

The traveler shows the ticket on the mobile device to the ticket collector. The ticket collector can check the validity based on the date, the time, the password, the ticket ID, and the sender number; a precise but time-consuming approach. The obvious solution—to make the ticket machine-readable and to equip the ticket collector with a special reader—leads to problems because of the many different display types used in mobile devices.

### **Teltix**

*The Teltix  
solution  
requires  
customer  
registration*

Another mTicketing procedure named Teltix was tested in a pilot project by Osnabrück public utilities and Teltix Ltd. Here, the traveler calls a defined number (the so-called order number) in order to purchase a ticket. Afterwards he receives the ticket as an SMS message. Payment is not made through the phone bill as in the Telepay project; the customers must register for Teltix in advance and select a payment method (either a debit process or credit card). Osnabrück public utilities use the registration data for other statistics. The traveler must present the ticket to the ticket collector. The ticket collector compares certain fields of the ticket (time, password) in order to ascertain the validity.

### **M-Parking**

*Acquiring  
parking passes  
with  
mTicketing*

M-Parking is a parking pass solution developed by Siemens Business Services and Mobilcom Austria that has been used throughout Vienna since October 2003. In this solution, electronic parking passes can be acquired with a cell phone. At the same time, the user must register with the service provider and provide his payment information as well as his automobile license plate number. Afterwards, he can buy a parking pass that is valid for a certain amount of time by sending an SMS message with the required parking duration to a predefined address. After that he receives an SMS message with the parking pass number. The parking pass is paid with the registered payment method. A ticket collector checks the electronic parking pass by inquiring whether an electronic parking pass is available for the automobile number.

### **9.3.3 Mobile Web Sites**

*The web on a  
mobile device*

Another important application for mobile devices is the viewing of web sites on mobile devices. The Internet was developed for stationary devices and is static.

Upon requesting a web site, the web server sends the page independent of the client. So that the client can display the web page received, a browser must be installed. The browsers developed for mobile devices often cannot display the web site received correctly as they are too complex for such browsers. Another issue is the restricted nature of mobile devices, as has already been described. For this reason, some new specification languages were developed for mobile devices that are specifically tailored to their needs. Two of these languages, WML and cHTML, are introduced briefly below.

### Wireless Markup Language

The Wireless Markup Language (WML), version 1.0, was submitted by the WAP Forum as a standard in 1997. Important members of this forum include Nokia, Ericsson, Motorola, and others. WML is a language for describing mobile web sites and is based on XML. Version 2.0 of WML is now the most current. WML was developed for mobile devices for the reasons given in Sect. 9.1. WML does not allow as many options as HTML, which simplifies the development of WML browsers for mobile devices. An important advantage of WML is its site administration (see Fig. 9.5); a site is called a “card” in the WML language. In order to improve the low bandwidths associated with mobile devices, when an XML site is requested, a batch of other sites are retrieved at the same time (a so-called deck). The relatively long time taken to establish a connection is thus reduced because subsequent sites have already been downloaded to the device. Figure 9.5 shows that when a mobile device requests site 1, the WAP server sends the entire deck. Thus the mobile device also receives site 2 and site 3.

*WML as an independent page specification language for mobile devices*

Another important optimization of mobile devices is achieved with WML by merging special pictures into the WML page. While HTML supports the most diverse display formats (e.g., JPEG or PNG), the pictures to be displayed on a WML page must be available in the WML bitmap format (WBMP). This allows development to be simplified by WAP (see below) browsers, and it also means that WBMPs are relatively space-saving.

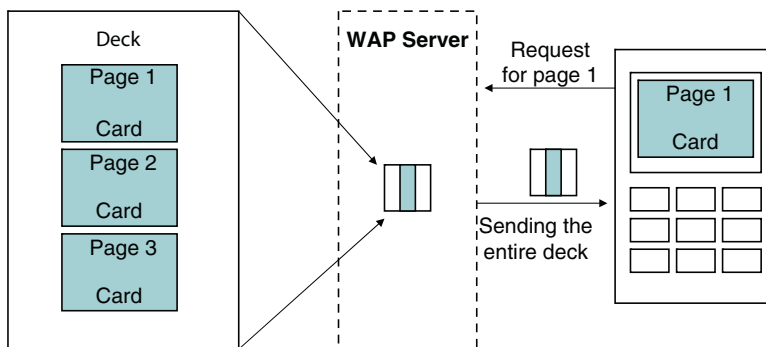


Fig. 9.5: Request from the mobile device along with the response

The finished WML sites are transferred from the server to the mobile device via the Wireless Access Protocol (WAP). This protocol is comparable to HTTP but is optimized for mobile devices. One difference between HTTP and WAP is that the sites are compressed before transmission.

*WML did not  
gain general  
market  
acceptance*

Although WML is now available on almost all new mobile telephones, it has not general acceptance. Only a few providers make WML sites available for users. There are several reasons for this:

**Bandwidth of the connection.** The bandwidth of connections in the GSM network is currently small (comparable to an analog modem).

**Expenditure required to produce WML sites.** Many providers already possess HTML sites that can be converted into WML sites, but only with difficulty. WML sites usually have to be created from scratch, which drives up both development costs and maintenance costs.

**Simplicity of WML sites.** Sites generated with WML are usually simple and basic in nature since the functionality of WML is limited; for example, the character font of a WML site cannot be changed.

## cHTML

*cHTML is a  
subset of  
HTML*

Compact HTML (cHTML) is a subset of HTML. While HTML has gradually become more and more complex over the years, cHTML makes only some of this complexity available. cHTML was developed by the largest worldwide telephone company, NTT DoCoMo, which introduced the first version in 1999. NTT DoCoMo developed this language in order to use it in their iMode service. iMode is popular in Japan, although not particularly prevalent in Europe. Only ePlus iMode is offered in Germany, and no service whatsoever is available in Switzerland.

cHTML pages are normal HTML pages that can also be viewed in a web browser on a stationary device. Some of HTML's tags are missing in cHTML, e.g., those for tables.

## Direct HTML Adaption

*Using HTML  
sites for mobile  
devices*

While WML and cHTML are useful for creating web sites that can be viewed on mobile devices, this approach usually doubles the expenditure involved in creating a web site, since HTML sites for stationary devices already exist. Therefore, another approach is to adapt "normal" HTML for use on mobile devices. The following solutions that take this approach are available at this time:

- The mobile device receives the HTML site and provides special tools for navigating it, such as a page zoom mechanism. This feature is available on some browsers developed for mobile devices.
- The HTML site itself is adapted for viewing on mobile devices. There are different ways to achieve this. One possibility comes from the World

Wide Web Consortium, which recommends developing special cascading stylesheet (CSS) files for mobile devices. Another possibility is based on the dynamic construction of HTML pages through XML documents using a converter. The converter modifies the HTML pages to make them suitable for viewing on mobile devices.

## Case Study eDVDShop: Use of Mobile Web Pages

Marcel Anderson has also recognized the fact that more and more of his customers possess a mobile device, in particular a cell phone. For this reason he considers opening up the eDVDShop to mobile devices. Therefore, the web pages of the shop need to be adapted for viewing on mobile devices. Marcel Anderson decides to perform HTML adaptation on the basis of different CSS files. Since the display of a mobile device is substantially smaller than that of a normal PC, the web page must also be made smaller.

In a first step, Anderson looks at the static objects on the web page. There are two menus, each with five entries, a category index, a search bar, and some smaller windows with descriptions of the most popular and newest products (similar to Fig. 9.6). Anderson decides to keep the menus and the search bar as the only static components for web pages viewed on mobile devices. The category index should be available through another entry in a menu. The remaining information is no longer displayed. Moreover, he changes the product presentation and adds a servlet that dynamically makes pictures smaller. In this way, Anderson saves display space and transmission bandwidth.

The World Wide Web Consortium introduced the media attribute for the inclusion of CSS files. The basic idea behind CSS is the separation of content and display. Most HTML sites provided today on the Internet already use CSS. Each element of an HTML file can be provided through CSS with special display attributes (e.g., boldface or width of a table row). The attributes can be defined in different places, but it is recommended that they should be outsourced to a separate CSS file. Such a CSS file is included in the HTML file using the command:

```
<link rel="stylesheet" type="text/css" href="layout.css">
```

The browser can load the associated CSS file (in the example layout.css) from the web server when it interprets the HTML page.

Since version 2 of CSS (CSS Level 2), CSS has supported the media attribute. Using this, the merged CSS file can be selected dynamically, depending upon the client. For example, when the following command is inserted into an HTML file:

```
<link rel="stylesheet" type="text/css" href="stationary.css"
media="screen">
```

```
<link rel="stylesheet" type="text/css" href="mobile.css"
media="handheld">
```

The Web browser loads the CSS file that it needs. A browser which is implemented on a stationary device loads the stationary.css file (media = screen); a browser which is implemented on a mobile device uses the mobile.css file (media = handheld). These definitions make it possible to adapt the web page using the CSS files. A CSS file can be generated for each supported media type (in CSS Level 2, more than 20 different media types are defined) that carries out the formatting of the display for the appropriate medium.

As specified above, Anderson generates a stationary.css file and a mobile.css file and merges both files into his HTML page. In this way, customers with a mobile device can now order products at the eDVDShop over their mobile devices.

## Personalization

*Web sites can be personalized*

As well as the above solutions, so-called personalized approaches are increasing in popularity. A personalized service uses information about the user in order to specially adapt the service to them. The user therefore hands a profile to the service; this profile can be made up of the most diverse parameters, such as:

- Identity of the user
- Current position of the user
- Specification of the device with which the service is to be used

Using the profile, the service can compute a personalized result. Both representation and content can be personalized. In principle, all kinds of services can be personalized, but it is particularly useful when displaying web pages on mobile devices. The following solutions based on personalization exist:

- The web server provides several smaller sites from the requested web site, which are then sorted based on the user's priorities so that the sites with the most important information to him are found first. In addition, elements of a particular web site are defined and then arranged according to frequency of use. For example, in an electronic shop the user can find products through either a directory listing or a search function. If, based on user statistics, it is recognized that he only uses the search function, then this can be prioritized over the directory listing. Figure 9.6 shows the different elements of a web page that can be rearranged or excluded to give a personalized solution.
- The mobile device communicates with a representative. This representative loads the entire HTML site and changes it so that it can be displayed on the mobile device.



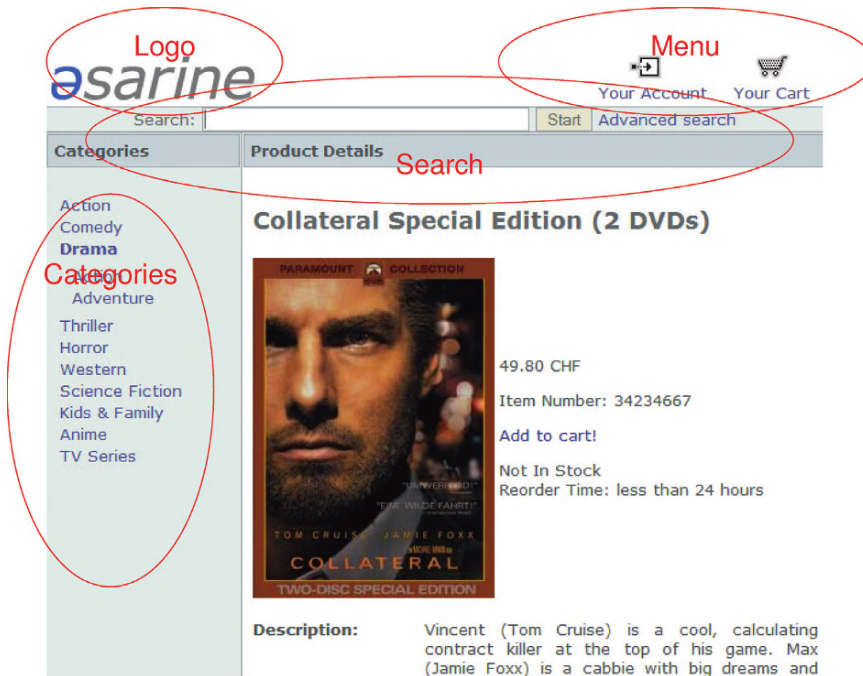


Fig. 9.6: Design elements of an eShop

### 9.3.4 Location-Dependent Services

As we have already mentioned previously, in certain cases a mobile device can establish its current location and make use of this in an application. Interesting applications can be provided through this feature. There are various positioning procedures:

*Techniques for determining position*

**GPS.** The Global Positioning System (GPS) was developed by the US Department of Defense. It is based on 24 satellites in various orbits about the Earth. A mobile device can compute the distance to a satellite. In addition, the time taken for a signal to be sent from the satellite to the mobile device is measured. After measuring this time for three satellites, it is then possible to calculate two possible positions for the mobile device, one of which is the true position. The use of four satellites is avoided, since the exact computation of the distance is a complex task in this case (each device would have to possess an atomic clock, since the smallest deviation in the time could lead to large inaccuracies). The advantage of GPS is its worldwide serviceability as well as its accuracy, since the calculated position is usually accurate to a few meters.

**GALILEO.** GALILEO is a European system similar to GPS that is currently being developed, but which promises even higher accuracy than GPS. It will

utilize 30 satellites (more than GPS). However, according to current plans, it will not be ready for use before 2013.

**GSM positioning.** The GSM network can also be used for positioning. All cell phones can determine their current positions with this service. The basic idea for this can be traced back to Ericsson, who baptized this system the Mobile Positioning System (MPS). With it, similar to GPS, the distances to three base stations are measured (using the signal travel times). As well as a mobile device requesting its current position, it is also possible to request the position of a mobile device in MPS (e.g., in order to determine the position of the thief in the case of a theft). However, such actions are disputed since they may breach data protection laws.

*Examples of  
location-  
dependent  
applications*

If a mobile device can establish its current position, then this information can also be used for new applications, such as:

- A car-based application that searches for the nearest gas station, service station, or supermarket.
- An electronic route planner or city plan which computes the fastest route to a destination from the current position.
- A tourist information system that sends information on the nearest places of interest to mobile devices.
- An information system in a recreational park or a museum that sends multimedia information to the nearest objects.
- If the mobile device possesses a digital camera, then as well as the time that a photo was taken, the location of the camera at the time can also be recorded. The JPEG (Joint Photographic Experts Group) standard already used on the majority of cameras contains the requisite fields for this. This makes it easier to search for particular photos, since the search can then be done according to both the time and location. For example, in order to obtain all of the photos from the last city celebration in Fribourg, the date of the city celebration could be entered as a search parameter as well as the location, Fribourg and its surroundings out to a distance of 1 km, as a second search parameter. However, the picture search engine would have to support this.
- A personal emergency call system (presented in more detail in Sect. 9.3.5).

### 9.3.5 Mobile Devices in the Medical Field

Mobile devices have also found many uses in the field of medicine. In the following, some of these applications are briefly presented.

### The Mobile Visit

There are mobile device applications that can aid the visit of a physician. These show the physician information on the course of the disease of interest. The physician is supported by the mobile device, as a checklist is generated for each patient depending upon the course of his disease. Conversely, the physician can enter new information on a patient directly into the mobile device, which is then transferred automatically to an information system.

### Personal Emergency Call Systems

In the last few years, personal emergency call systems have undergone tremendous development and there are currently a multitude of commercial products in this area. With a personal emergency call system, its owner can request speedy assistance in the case of an emergency. This is of interest for older people who do not want to leave their familiar surroundings (to live in a home for the elderly). The personal emergency call system is also suitable for other people, since anyone can have an accident. For this reason, the Japanese government decreed that, starting from the year 2007, all mobile telephones must be equipped with a GPS receiver. In the case of an emergency, the current position of the distressed person is sent, so that a response can be dispatched quickly.

*Personal emergency call systems can be integrated into cell phones*

Today's personal emergency call systems take the form of special systems (for instance wristwatches) or adapted mobile devices (for instance cell phones). All personal emergency call systems allow for a manual emergency call, which is usually made by pressing a key on the device. There are also devices that send an automatic emergency call. In addition, the normal physiological parameters of a person, like his heart rate or blood pressure, are monitored. When these parameters deviate from normal, an emergency call is automatically sent to a point of contact. This can be a professional emergency call center, but it may also be a relative or a neighbor. The telephone network, an SMS message, or something else can be used as the medium of communication.

## 9.4 Literary References

The area of mobile business can be considered a subset of eBusiness, as it has been in this work. Therefore, many of the books on eBusiness, like the book by King et al. [Kin02], contain a section on mBusiness. In the meantime, there is a great deal of literature that exclusively addresses mobile business. Books that deal with technical questions come from Mallick [Mal03] and Wackefield et al. [Wak07]. Books with an application-oriented background have been provided by Norman [Nor02] as well as Kalakota and Robinson [Kal01].

*mBusiness as part of eBusiness*

A good introduction to how the GSM network functions can be found in the book by Eberspächer et al. [Ebe01] or the work of Redl et al. [Red07]. The attack on the encoding function of the GSM standard is described by Biryukov et al. [Bir00]. Possible attacks on the GSM algorithm have been published in the dissertation of Barkan [Bar06]. Different groups are using his ideas to develop

*Literature on GSM*

software that can decrypt an encrypted GSM telephone call; one example is The Hacker's Choice (<http://wiki.thc.org/gsm>).

*Documents on  
Bluetooth*

The Bluetooth standard was defined by the Bluetooth Special Interest Group [Blu01]. Jakobsson and Wetzel [Jak01] deal with weak points in Bluetooth security in their paper.

Some simple mPayment systems based on a telephone call were presented in this chapter. The mPayment solution by Selecta is presented on their homepage [Sel08].

The Telepay project was presented in the section on mobile ticketing. The final report of this project [Ble03] describes the entire course of the project, from the motivation for it right up to the results achieved.

*Literature on  
WML,  
cHTML, and  
others*

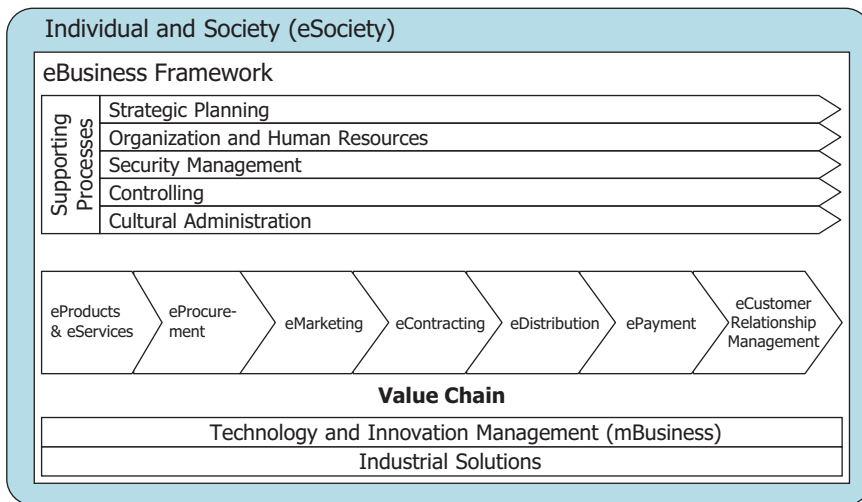
Presentations for WML developers can be found in the book by Tull [Tul02]. The specification for the cHTML language is provided by the Dutch telephone company KPN [KPN01]. An article by Ashely et al. compares the security of WAP and iMode [Ash01]. The standard for CSS is publicly available from the W3C [Bos04]. An article on the personalization of web pages by Billsus et al. [BBE<sup>+</sup>02] is available, as well as one by Freire [FKL01].

*Reports on  
GPS*

The GPS procedure used for positioning purposes appears in many works, such as the book by Kaplan [Kap96a]. GALILEO is presently under development. Some works and documentation on it can be found on the homepage of the European Space Agency (ESA), including a technical report on the current standing of the project [Eur08b]. An overview of GSM positioning is given in the article by Drane et al. [Dra98]. The article by Seybold and Stormer describes the injection of location-dependent data into photos using the applications presented [Sey03].

In our discussion of mobile solutions in the field of medicine, we mentioned the mobile visit. This is described in more detail in the article by Arnscheidt et al. [Arn02].

# 10 eSociety



*The effects upon individuals and society caused by the location and time independence of electronic markets are discussed in this chapter. Market changes and technological changes are primarily changing our approaches to work and organization (Sect. 10.1). According to Sect. 10.2, forms of cooperation develop between independent network partners in which core competencies are bundled (virtual organizations). This results in the formation of eTeams, which carry out their activities at mobile workstations. A knowledge worker in a multioption society is both employee and entrepreneur (Sect. 10.3). Section 10.4 shows that knowledge-intensive and virtual companies optimize intangible assets (intellectual capital). At the same time, it is necessary for knowledge workers such as those in eTeams to commit themselves to acting ethically (Sect. 10.5). Section 10.6 cites literature on the information and knowledge society.*

## 10.1 Change in the Working World

*Profound  
change in  
values*

Western industrialized countries are currently being subjected to a profound change in both societal and work values. Here, unemployment, uncertainty, and dissatisfaction are influential factors, even though demands and expectations of work and free time continue to rise. Work conditions that grant a high degree of independence and that better accommodate work and private lives are in demand. Appreciation and the possibility of structuring are important motivating factors, especially for employees with higher qualifications.

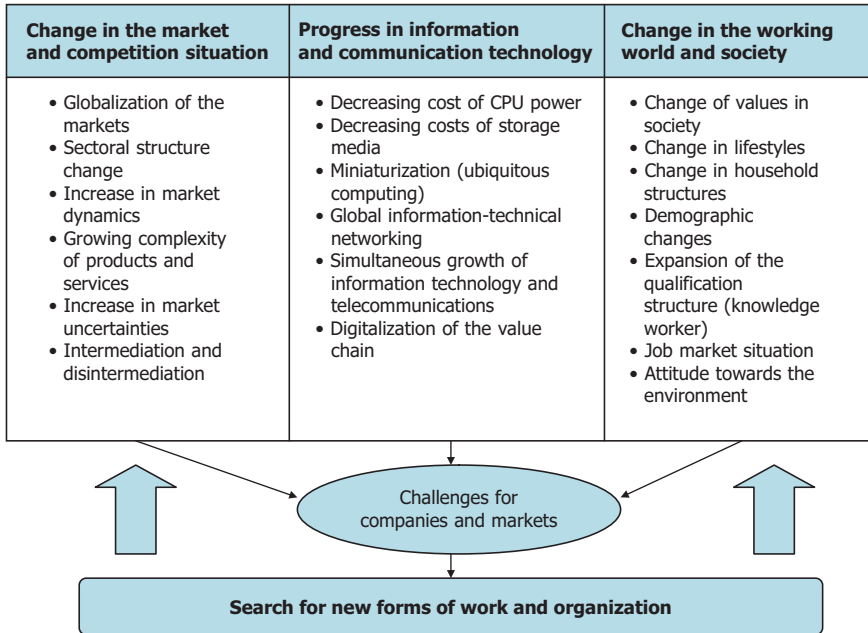


Fig. 10.1: Factors that are influencing changes occurring in the working world (according to Reichwald et al.)

Figure 10.1 shows three factors that are affecting the way in which we work:

*Globalization  
of the market  
and  
competition  
relationships*

**Market changes.** The globalization of the market and competition relationships has resulted in a globalization of the ways in which we work and our work contacts. Work now involves cooperation across great spatial distances and different time zones. Linguistic and cultural barriers must be overcome. Apart from globalization, sectoral structure change is also taking place, as was pointed out in Fig. 1.6 in the introductory chapter. The long-term shift in worker density from agriculture (primary sector) to the production sector (secondary sector) and then to services and to the information society (tertiary sector) has changed our activities and the working world. Despite occasional fluctuations, occupations in the information sector clearly dominate in industrialized countries; all

of the activities relating to information production, information processing, and information distribution fall within this employment sector.

**Technological progress.** The decreasing cost of computer processing power and storage media as well as the simultaneous rise in services has resulted in the wide availability of information and communication infrastructures. Computer technology and telecommunications have grown together and digitalized vast areas of the economy. Computer functions and network functions have now been miniaturized and disappear into the surfaces of buildings and objects. Ubiquitous computing makes it possible to transform everyday objects into smart (intelligent) devices by means of sensor technology and microprocessors (also see Chap. 9).

*Information technology is becoming invisible*

**Social change.** Lifestyles and household structures change as values evolve. For instance, the number of employed single parents as well as single households is constantly rising. For this reason, companies and organizations must consider the habits and needs of their employees. Societies have developed more and more into multioption societies, where each individual is simultaneously working in several areas. The individual offers his abilities to different companies (employee) and is also active as an entrepreneur (employer).

*Change in values mold lifestyle and work reforms*

Spatial and temporal constraints of the business processes in terms of economics and policies are gradually dissolving with the adoption of information and communications technologies. This creates dangers and risks, and requires organizational innovation and social adjustments.

## Case Study eDVDShop: Setting Up New Ways to Sell

A friend of Marcel Anderson works on a volunteer basis for a small film club. He asks Anderson if he would like to compress and sell the results of the annual conference on DVD. Anderson consents. In a first step, he reads up on so-called DVD authoring in order to be able to create his own DVD. He acquires an authoring application and creates a DVD for the film club. On it are movie shorts that were filmed by members and presented at the conference. Anderson includes the DVD in his sales catalog. He arranges with the film club to pass on 50.

After a few weeks Anderson again generates a statistics report on the current sales. He notices that the film club DVD sold very well. He receives praise from some of the customers for the design of the DVD, which makes him very proud since this was his first self-produced DVD. The film club is also very pleased with the sales. Through word of mouth, members of the club recommend the DVD to acquaintances and friends. Eventually, the profit made from the DVD is sufficient to allow Anderson to temporarily employ a multimedia specialist to produce the next DVD for the film club.

## 10.2 Changing Organizational and Work Structures

### 10.2.1 Virtual Organizations

*Apparent reality* The word “virtual” means “to appear real.” In other words, something that is apparently present despite missing measurable characteristics—the impression of a virtual object exceeds its own powers in a manner of speaking.

*Examples of virtual phenomena* An example of a virtual phenomenon, taken from computer science, is the virtual memory. Blocks of information from the internal memory are stored and outsourced for a short time to create what appears to be larger storage capacity. In the economy, virtual money, also known as cybercash, represents a separate currency (such as digital money). In virtual banking, physical bank machines are no longer needed for banking transactions; services are instead provided through electronic means. Correspondingly, a store in cyberspace is consulted and used for purchases in virtual shopping.

*What is a virtual company?* A virtual company has the potential of a traditional organization without having a comparable institutional framework. Such a company works as an “as if organization.” Virtual companies go beyond the actual in terms of their potential. They dissolve internal and external company borders. It is no longer clear to customers which companies or partial companies are involved in product development and product marketing. Such companies optimize their creation of value and try to stir up high customer use.

*Time-limited partnerships* Virtual organizations contract time-limited network-like partnerships. The cooperating partners (companies, institutions, specialist teams, individuals) make their core competencies available based on a common business interest and a culture of trust.

*Characteristics of virtual organizations* The characteristics of virtual organizations include:

- Voluntary cooperation between several independent network partners
- Consistent bundling of core competencies
- Control over a common business goal
- Consistent use of information and communications technologies

These characteristics differ somewhat from those of conventional alliances, as shown by Fig. 10.2.

*Demarcation of virtual companies* For instance, strategic alliances involve cooperation for an indefinite time period, and with this comes a limited flexibility in terms of the interchange of the partners. Fractal organizations are, however, self-organizing and are not temporary cooperation networks; there is no contracted bundling of competencies with a third party in a fractal organization. In outsourcing, a long-term connection with a selected partner exists in order to be able to outsource integral components of the company.



	Objective	Constituent Characteristics	Demarcation for the Virtual Organization
<b>Strategic Alliance (Joint Venture)</b>	Economic cooperation to generate advantages in time, cost and know-how	<ul style="list-style-type: none"> <li>• Long-term cooperation with mutual participation</li> <li>• Use of the entire value chain</li> </ul>	<ul style="list-style-type: none"> <li>• Cooperation with a few partners conceived on a long-term basis</li> <li>• Mutual financial participation</li> </ul>
<b>Fractal Organization</b>	Similar structures for improving efficiency	<ul style="list-style-type: none"> <li>• Similar organizational units</li> <li>• Self-organization</li> <li>• Internal company</li> </ul>	<ul style="list-style-type: none"> <li>• No temporary cooperation network</li> <li>• No competency bundling with a third party</li> </ul>
<b>Outsourcing</b>	Outsourcing and assignment of particular tasks to a third party	<ul style="list-style-type: none"> <li>• Concentration on own core competencies</li> <li>• Contractual, not cultural connection</li> <li>• Assignment of individual creation of value sections</li> </ul>	<ul style="list-style-type: none"> <li>• Long-term design</li> <li>• Contractual connection, usually with a single partner</li> <li>• External outsourcing of integral components</li> </ul>

Fig. 10.2: Comparison of related forms of alliance (according to Wüthrich et al.)

### 10.2.2 Work Organization in eTeams

Consider the tasks and obligations of traditional companies; in general, they bind dependent manpower into long-term contracts, labor-divided task management takes place in hierarchically structured organizations, and this is coordinated through planning, assignment, and control. However, with the emergence of the Internet, companies are looking for suitable organization structures and external network variants. The creation of b-webs (Sect. 2.3) and the emergence of virtual organizations support this development. As well as changed organizational structures, teleworking and mobile working are growing in prominence.

The opportunities and risks associated with forms of telecooperation have been studied on several occasions. It was established that work productivity greatly increases and employee potential is better developed in companies with teleworking potential. Increased creative freedom and motivation were most important to employees who selected a form of teleworking. However, the parties involved also saw shortcomings. For instance, the uncoupling of the team as well as business processes often went hand-in-hand with reduced developmental and career possibilities. It is interesting that forms of teleworking should provoke strong rejections, especially from company management. Resistance often develops in the middle management because it seems to lose controllability and criticizes unequal treatment of employees.

With the emergence of the Internet and suitable means of communication, teleworking and above all mobile working have gained in significance. Some companies bring together suitable employees virtually, independent of location and time zone, for a challenging task or for an important project.

In this sense, an eTeam is a group of geographically distributed individuals who apply themselves to a common task and use information and communication systems. They use electronic means to plan and coordinate their tasks as well

*Business webs displace conventional organization forms*

*Opportunities and risks of teleworking*

*Mobile forms of work*

*Characterizing eTeams*

	Description of empirically derived advantages of eTeams	Advantages in keywords
<b>Area of responsibility</b>	Electronically networked teams recognize the dimensions of the task and their freedom of activity better than conventional teams.	understanding one's own area of responsibility
<b>Blocking</b>	Since everyone can express themselves in asynchronous computer meetings, on the one hand fewer ideas are forgotten, and on the other hand more new ideas are generated.	less blocking
<b>Coordination</b>	Electronically networked teams are organized and coordinated. For a substantial part of the work, time and/or location dependence are irrelevant, which simplifies the coordination.	optimal coordination
<b>Criticism</b>	In synchronous meetings, differences are discussed rather hesitantly out of politeness. In asynchronous meetings these are clearly formulated.	sharper criticism
<b>Performance</b>	Electronic networking makes additional cooperation possible and motivates the individual team member to better performance.	stimulation of performance
<b>Memory</b>	Synchronous and asynchronous computer meetings can be stored. Individual passages can be studied again.	better memory

Fig. 10.3: Cooperation in eTeams (according to Hodel)

as to create the desired services. The members of the eTeam can have different locations and time zones. They organize themselves through both synchronous and asynchronous electronic forms of cooperation.

*Motivation in eTeams*

Figure 10.3 shows some results from a survey of eTeams. It should be noted that the participants of the eTeam are generally well motivated. They want to probe the possibilities and boundaries of these forms of cooperation. They overcome first-time production difficulties and conflict situations. For these reasons, most investigations of eTeams tend to cast them in a positive light compared to experiences from other, more conventional, forms of work.

*Synchronous and asynchronous activities side-by-side*

It is interesting that eTeams select both synchronous and asynchronous forms of cooperation. They initially clarify the individual parts of the assignment together, and provide an account of the complexity and degree of difficulty involved in achieving a goal. Task coordination is assigned and individual results or partial results are made available to all of the members in a common electronic archive. This promotes transparency and allows for improvements in quality, since all of the team members can see all of the documents and work data at any time (central memory).

*Advantages of virtual team meetings*

In virtual meetings and discussions within eTeams, it has been found that individual team members block less, although in general they have a tendency to express blunter statements and opinions. It is desirable that this positive assessment of the cooperation of eTeams should continue in the future.

### 10.3 The Knowledge Worker in a Knowledge Society

An information and knowledge society achieves its creation of value primarily by designing, processing, and relaying information (digital products and services) or knowledge (intelligent products and knowledge services). Products and services enriched by intelligence increase availability and security. For instance, the software of an elevator automatically analyzes the maintenance mode and recognizes existing defects early on. Explicit knowledge can be digitalized, stored, and relayed. Implicit knowledge (often known as tacit knowledge) is more difficult to identify and communicate. It includes mental models about reality as well as know-how.

*Explicit and implicit knowledge*

Knowledge management requires a guidance concept in order to systematically collect the knowledge in a company through suitable methods and techniques (knowledge identification, knowledge acquisition), to process it (knowledge development, knowledge evaluation), to relay it, and to use it. Knowledge management guarantees that both the internal knowledge and the external knowledge of an organization are developed and made available for future use. The internal knowledge of a company concerns technical details, innovative procedures, best practices, know-how, decision-making processes, and other things. External knowledge relates to market behavior, development of competitors, competitive advantages, customer development, etc.

*Structure of knowledge management*

Expert systems are suitable tools for knowledge management. An expert system is a software system that stores knowledge about an application area and, acting on this knowledge base, submits proposals for a solution (Fig. 10.4).

*Application-oriented expert systems*

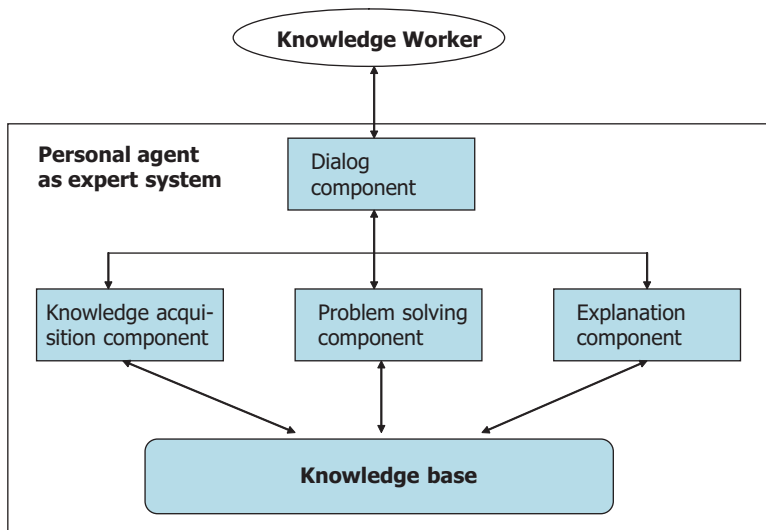


Fig. 10.4: The knowledge worker resorting to expert systems

The knowledge base includes facts (case data) and rules. In the simplest case, the component of knowledge acquisition exists through the recording of the data. These can be analyzed and linked together by human experts, perhaps aided by suitable procedures (machine learning, data mining). Based on new or expanded facts and rules, the actual problem-solving component (inference machine) generates previously unknown knowledge. Similarly, the software system can justify its function and make suggestions to a human expert (explanation component).

Expert systems are able to bundle knowledge from limited application areas and introduce it into company processes in a problem-oriented way. These can be supplemented by business intelligence methods and techniques (OLAP, online analytical processing; data mining). This succeeds, along with computer-aided tools, in extending and partly improving essential service areas of the company. With the aid of these systems, the employees develop more and more into knowledge workers. As a result, the following key factors are emphasized:

*What is a  
knowledge  
worker?*

- Tasks involve a smaller degree of routine and programming activity
- The degree of abstraction and the ability to abstract in complex projects
- The possibility of using and ability to use information systems and knowledge banks
- A large degree of independence and a high degree of responsibility

*Inclusion of all  
stakeholders*

All of the employees in the company, and in the best cases all of the stakeholders (including customers and suppliers), are potential users of knowledge management. They frequently evaluate the knowledge offered and are involved in the acquisition of knowledge assets. Just as important are information policies and training in the use of knowledge-based systems, as well as a readiness to enrich the knowledge base through personal know-how and knowledge.

## 10.4 Measuring the Success of Intellectual Capital

*Meaning of  
invisible assets*

With knowledge-intensive and virtual companies, the market value, unlike the balanceable real value, is a poorly balanceable value with intangible assets. Although these values cannot be concretized well by material or financial goods, they do represent critical success positions of the company. This relates to economic advantages such as know-how, brand, location, or customer potential, which are not physical in nature.

Virtual companies generate returns from knowledge work, customer base, or appropriate services. The company success is thus based more on intangible than on tangible assets. As a result, the following factors must be considered:

*Coding of  
knowledge*

- Virtual companies or organizations increase their creation of value through the coding of knowledge, the effective use of relationships, and brand profiling (among other things). Competitive advantages and relevant unique selling points are primarily obtained through intangible assets.

- The development costs for knowledge-intensive services are generally high. However, in the case of documented knowledge, the manufacturing and duplication costs are small. Development and manufacturing costs alone are therefore not a sufficient basis for value considerations. Additional factors such as customer access over networks, market penetration obtained with software, branding, and service quality also play a role.
- Ascertainable ownership rights barely exist for the human resources of a company. An employee with implicit and personal knowledge is not a company possession. A knowledge worker makes himself independent by making his expert knowledge available to different institutions, or perhaps places orders for subtasks (multioption society).

*Customer and market use increase*

*Strengthening the individual*

All of the stakeholders of the company are interested in receiving information about the value development of the company and the use of intangible assets. Using this information, the individuals responsible for doing so must intervene and steer the company in a more profitable direction before any undesirable developments affect key financial performance indicators.

Figure 10.5 lists some success potentials for intellectual capital. Intangible assets consist of the human capital and the structural capital (customer capital, organization capital). Structural capital is the remaining value of the company after the employees have gone home.

*Intellectual capital is human capital plus structural capital*

		Areas for measuring success
<b>Intangible assets</b>	<b>Intellectual capital</b>	<ul style="list-style-type: none"> <li>• Professional competence and know-how</li> <li>• Knowledge of methods</li> <li>• Social competence</li> <li>• Patents and licenses</li> <li>• Unique selling points</li> </ul>
	<b>Human capital</b>	<ul style="list-style-type: none"> <li>• Leadership abilities</li> <li>• Collaboration abilities</li> <li>• Qualification level</li> <li>• Level of training</li> <li>• Level of motivation</li> </ul>
	<b>Customer capital</b>	<ul style="list-style-type: none"> <li>• Customer base</li> <li>• Core competencies of the customer</li> <li>• Level of innovation</li> <li>• Customer value</li> <li>• Customer potential</li> </ul>
	<b>Organization capital</b>	<ul style="list-style-type: none"> <li>• Process quality</li> <li>• Infrastructure</li> <li>• Location advantages</li> <li>• Stakeholder satisfaction</li> <li>• Branding of products and services</li> </ul>

Fig. 10.5: The cornerstone of intellectual capital

Knowledge-oriented companies invest as much know-how and expert knowledge as profitably possible into information systems, databases, or data warehouses. The customer data warehouse (Chap. 8) along with the customer base, customer value, and customer potential comprise the cornerstone of the intellectual and structural capital. For this reason, this information base must be specially maintained and updated.

The intellectual capital includes all of the knowledge-related property shares of the company. They are the basis of the knowledge-based creation of value and thus a crucial success factor in company success. The management has the task of further developing knowledge of the customer base, relationship networks, and customer processes to enhance the intellectual property of the company, and to secure this in an information system as structural capital.

## 10.5 Ethical Maxim for eTeams

*Kant's  
categorical  
imperative*

The term “ethics” refers to the basic principles that limit the personal actions of individuals or groups of individuals in order to promote the well-being of the community. For instance, Immanuel Kant required ethical norms that are not derived from experience but (a priori) demand general validity with every experience and that are binding for all men. A reasonable action with respect to the general law does not therefore need to be morally good. According to Kant it is only then when the inner consenting wants appear, are they expressed in attitude. Thus Kant's categorical imperative reads: “only act in accordance with a maxim if you would like to see it used as a general law.”

*Basic model  
for the ethics*

Figure 10.6 shows a basic ethical model in an information and knowledge society. Commerce with information systems cannot be arbitrary; it must be regulated by legal requirements (a policy framework; see the outermost ring in the figure). Furthermore, social behavioral norms (the middle ring) can limit trading. Finally, the individuals themselves conform to imposed ethical principles (the innermost ring). One such behavioral norm is “Net etiquette,” which concerns the behavior of the participants communicating using the Internet. It requires that documents are published on the Web under the correct name, and that unwanted commercial advertisements (spam) are dispensed with. There are five dimensions of ethical trading in an information and knowledge society according to Laudon and Laudon:

*Get the express  
permission of  
those involved*

**Right to information.** To achieve a functional economy, companies, organizations, and individuals all need information. However, the private sphere of citizens must also remain protected at all times. Personal data should only be used for business purposes, and those involved must give their consent. The relaying of any personal data worth protecting is therefore largely prohibited (see the Data Protection Act). As a consequence, the collection of customer-related data on web sites when eShops are used or during marketing activities can only take place with the express permission of those involved. The customers must be informed of how the data is to be used, and how long it will be used for.

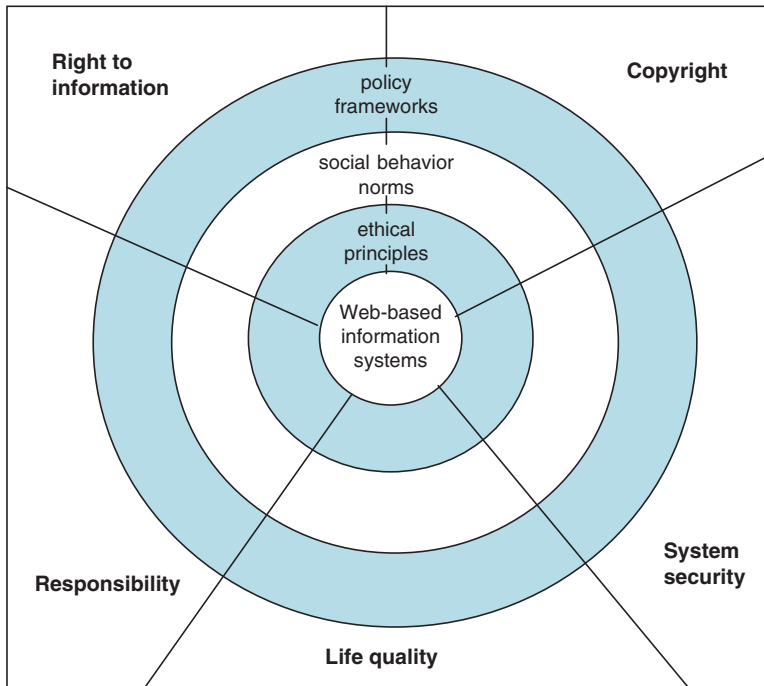


Fig. 10.6: The five dimensions of ethical trading (according to Laudon and Laudon)

**Copyright.** Copyright protection is a special challenge in the case of digital goods (see Sect. 6.5). Digital products differ from paper documents, books, reports, or photographs due to the fact that they can be quickly and easily copied and distributed. As well as digital watermarks, cryptographic procedures and digital signatures are employed to limit the theft of digital goods and their fraudulent use.

*Ensure the copyright*

**Responsibility.** Both institutions and individuals must take responsibility. Employees must sign an agreement upon employment that they respect the rules posted in relation to software use (licensing) and software transference, and about not reusing labeled digital products for private purposes.

**System security.** The availability and security of Web-based information systems must be ensured and supervised. Most data protection laws concern not only data protection (protection of the data from abuse), but also data security (protection of the data from loss or falsification). Thus, the owner of collections of personal data is obligated to provide information on the data being stored (i.e., at any time, companies must reveal what data are being stored which people). An excuse of a defective computer system is not acceptable according to data protection laws.

*Data protection and data security*

*Protecting the  
private sphere  
of citizens*

**Quality of life.** An ability to reach anyone at any time and in any place in the digital age should not lead to a deterioration in the quality of life. It should be possible for the individual to drop his connection to cyberspace at any time and to maintain his private sphere. Recording all of the activities of each individual in digital memory (information trace in cyberspace) is an extremely problematic approach and should be rejected.

A broader ethic can be developed from systematic thinking, which plays an important role in economics-related computer science, as an alternative to the ethic of individualism. According to this ethic, the behavior of a person, a group of people, or an institution is considered good if it results in an improvement of the higher system.

*Ethic maxim  
for knowledge  
workers and  
eTeams*

Work time and workplace flexibility is feasible within autonomous teams or eTeams. Networked communication systems support communities in a useful manner if they promote access to the information as well as regulate self-determination and the right to a voice. The ethical maxim for eTeams reads (according to Hodel; amended): “knowledge workers and eTeams, supported by information systems, organize themselves into genuine communities when they respect integrity, holism, and the individual and provide outstanding services.”

## 10.6 Literary References

*Literature on  
telecooperation*

A work on the changes associated with distributed forms of work and organizations was written by Reichwald et al. [Rei98]. The authors illustrate the most important components of telecooperation and deal with the necessary guidance questions in greater detail. They describe problems and aspects of use at the service level, at the level of the overall organization, as well as at the level of the market and society.

*Virtual  
companies*

The work by Wüthrich et al. [WPF97] describes the potential of virtual organizations and virtual marketplaces. In addition, six case studies are discussed, along with their success potentials. A decision-making aid for management rounds the work off.

*Works on  
knowledge  
management*

The book by Frappaolo [Fra06] covers the key area of knowledge management using case studies from well-known companies. The work by Ichijo and Nonaka [Ich06] deals with ideas about knowledge creation and management from different companies.

*Multioption  
society*

In his book about multioption societies [Gro94], Gross provides a basic understanding of the dynamics of modern companies, aligning them to simultaneously available trading options, which are mostly coupled to peoples’ desires for more. Gross analyzes this development by pointing out impetuses (driving forces), simulation worlds, and boundaries.

*Interface  
culture*

A book by Johnson [Joh97] about the interface culture describes how new technologies have changed creativity and communication. The author covers a range of topics, from bitmapping to the visualization of digital samples to digital agents. The cultural model suggested by Johnson connects technology with creative use.



The work by Edvinsson and Malone [Edv97] points out how a company, along with the financial aspects, can also get a grip on those of the intellectual capital. This intellectual capital includes financial key indicators, indicators for process management, innovation, the customer base, and human resources.

The author team of Laudon and Laudon [Lau02] provide a chapter on ethics in computer science in their work on information management. Here, the dimensions of ethical trading in an information company are pointed out and illustrated using concrete examples. A work on computer ethics has also been provided by Johnson [Joh01]. In this, the author points out that ethical questions associated with the use of information and communication technologies must be addressed, as well as the effects that appropriate behavioral norms have on the company. The dissertation by Hodel [Hod98] describes different studies of eTeams and condenses these experiences into an ethical maxim.

# Glossary

## **Aggregator**

The aggregator type of business web is a digital supermarket which offers products and services from several manufacturers.

## **Agora**

The agora type of business web is an electronic marketplace where buyers and sellers openly negotiate over goods and services offered and specify individual prices.

## **Alliance**

Alliances are business webs that are loosely joined, self-organized partner networks that aim to make their know-how available and to participate together in the solution.

## **Analytical CRM**

Analytical customer relationship management deals with the care and evaluation of the customer data warehouse. Customers are combined into customer categories, behavior models of customers are obtained, or customer valuations are made.

## **Asymmetric coding**

See coding.

## **Auction**

Electronic auctions are dynamic price formation processes achieved with the aid of the Internet. They are held in order to flexibly specify prices during the meeting of supply and demand.

## **Authentication**

Authentication examines the authenticity of the participants involved in an electronic market with digital signatures.

## **Banner**

Banners are advertising messages superimposed onto web pages which lead to further information when clicked upon.

**Bluetooth**

Bluetooth is a transmission technology based on shortwave radio frequencies that does not require a cable connection.

**Browser**

A browser is a software program for presenting the contents of a web page.

**Business process**

A business process means a series of activities that contribute to the company's success. The individual activities can be carried out by hand or by machine.

**Business web**

Business webs or b-webs are networks for the production and marketing of electronic products and services. Such forms of cooperation vary from open marketplaces (agora type) over tightly organized hierarchical networks (aggregator, distributor, integrator) to self-organized and loosely joined communities (alliance type).

**Call center**

The call center is the direct point of contact for the telephone processing of customer requests.

**Certificate**

A certificate is a type of electronic identification in accordance with ISO Standard X.509 that is required when digital signatures are used.

**Certification site**

See public key infrastructure.

**Chat**

A chat is an electronic conversation on the Internet that is conducted by two or more users in real time.

**Coding**

Coding or cryptography corresponds to procedures that can code and decode texts and documents with the aid of symmetric or asymmetric pairs of keys. In the case of asymmetric coding there is a public key and a private key.

**Collaborative CRM**

Collaborative customer relationship management or multichannel management combines all of the tasks used for the selection and operation of media and contact channels for customers and customer groups.

**Communication center**

A communication center is a central coordination site that handles all incoming customer requests (inbound), independent of the respective medium or customer contact channel.

**Community**

A community, in the context of this book, means an Internet-based community generated by chats, portals, or customer relationship programs.

**Cookie**

When a visit is made to a web site, a cookie is a file that is stored on the hard drive of the visitor that is used for registration purposes.

**CRM**

Acronym for customer relationship management.

**Customer buying cycle**

Each purchase process can be divided into four phases: stimulation/motivation, evaluation, purchase, and after-sales service. The after-sale phase is particularly important for promoting long-term relationships between a company and its customers.

**Customer data warehouse**

A customer data warehouse is an integrated collection of data on customers that enables analysis and decision support.

**Customer equity**

The customer equity of an individual customer or of a customer group is the sum of the acquisition equity, the retention equity, and the add-on selling equity that results from up- and cross-selling activities.

**Customer lifetime value**

See customer value.

**Customer relationship management**

Customer relationship management involves strategic, tactical–analytic, and operational organization of the customer relationships and customer processes.

**Customer value**

The customer value is the discounted profit that a customer produces in the course of a average customer relationship.

**CyberCoin**

CyberCoin is an electronic payment procedure developed by the CyberCash Company in which the customer opens an electronic credit account (CyberWallet) with a bank.

**Data mining**

Data mining means digging or mining for valuable information in databases or in the customer data warehouse. Algorithms are used in order to extract and represent previously unknown patterns in the data.

**Data warehouse**

A data warehouse is a database system for decision support that permits different analytical operations (drill down, drill up) on the multidimensional data cube.

**Database system**

A database system consists of a storage component and an administrative component. Data and relationships are stored with the storage component, and different functions for the maintenance of the data are made available with the administrative component.

**Desktop purchasing system**

Products and services can be bought via the Internet with a desktop purchasing system. Such systems include catalogs, and they provide support for payment and delivery.

**Digital signature**

The digital signature is a procedure that reveals the authenticity of an electronic document or contract and the authenticity of the sender.

**Direct marketing**

Direct marketing refers to all of the communication measures that make it possible to purposefully address and directly contact the customer.

**Discussion forum**

In a discussion forum (often called a newsgroup), the participants are invited to comment on certain topics.

**Disintermediation**

Disintermediation means the direct access of customers to the services of a provider via electronic communications networks, bypassing middlemen.

**Distribution**

In electronic distribution or online distribution, the distribution of digital goods and services takes place over the Internet.

**Distributor**

A distributor type of business web is a distribution network that transfers material and nonmaterial products and services from the provider to the user.

**Domain**

The domain name is the Internet address of a particular server. Domain names are used to pinpoint web sites globally.

**eBook**

An eBook or electronic book is a portable electronic device that allows access to digital libraries and knowledge banks, and has software functions for information retrieval.

**eCash**

eCash is an electronic payment system developed by DigiCash that allows micro-payments and represents the digital counterpart to small banknotes and coins.

**eHealth**

With eHealth (or electronic health), the electronic process flow for patient care is optimized, quality and security are increased, and availability to medical information is improved.

**Electronic business**

Electronic business or eBusiness means the initiation, agreement, and completion of electronic business processes that generate value over the Internet.

**Electronic commerce**

Electronic commerce or eCommerce is a subsection of eBusiness that involves the business-to-business (B2B) and business-to-consumer (B2C) service exchange relationships.

**Electronic government**

Electronic government or eGovernment refers to the administration-to-administration (A2A), administration-to-business (A2B), and administration-to-citizen (A2C) communication and exchange relationships.

**Electronic software distribution**

Electronic software distribution (ESD) means a distribution architecture for software programs that regulates the legal rights of suppliers, dealers, and collectors.

**ESD**

Acronym for electronic software distribution.

**eShop**

An eShop, often called a webshop or an online shop, is a Web-based software system that provides goods and services, generates offers, receives orders, and handles deliveries and payment arrangements.

**eVoting**

Electronic votes and elections are carried out using secure Internet-based procedures which guarantee that each voter has exactly one vote.

**Extensible Markup Language**

The markup language XML (Extensible Markup Language) describes semistructured data hierarchically.

**File transfer protocol**

The file transfer protocol (FTP) is a packet-oriented data communication method based on the Internet protocol (TCP/IP).

**Firewall**

A firewall is a shield that prevents unauthorized access to web servers and information systems.

**FTP**

Acronym for file transfer protocol.

**Geldkarte/money card**

See money card.

**Global system for mobile communications**

The global system for mobile communications (GSM) is the most successful global mobile telephone network.

**GSM**

Acronym for global system for mobile communications.

**HTML**

Acronym for hypertext markup language.

**Hyperlink**

A hyperlink is a link from one web site to another which is automatically activated when clicked in the Internet browser.

**Hypertext Markup Language**

HyperText Markup Language (HTML) is a markup language based on tags that is used to write and create web pages.

**Infomediary**

See intermediary.

**Integrator**

The integrator type of business web is a value chain that commissions products and services from different manufacturers and controls the value integration.

**Intermediary**

Intermediaries or infomediaries are third-party providers in the electronic market who independently take on and provide tasks in the value chain.

**Intermediation**

The term intermediation refers to the separation of value chains in electronic markets.

**Internet economics**

Internet economics is concerned with electronic markets and examines cause and effect connections in digital exchange relationships.

**Mass customization**

Mass customization is the individualization of the mass market, which is supported in electronic markets by software agents.

**mBusiness**

mBusiness or mobile business is electronic business conducted with the aid of mobile devices and communication networks in order to allow such business to be conducted independent of time and location.

**Money card**

A type of smartcard known as a money card makes it possible to store money in the form of digital monetary units and to use this on the Internet in order to handle payments.

**Newsgroup**

See discussion forum.

**Operational CRM**

Operational customer relationship management is concerned with the operational processes of marketing, sales, and after-sales services. It is supported by appropriate information and workflow management systems.

**Outsourcing**

Outsourcing is the allocation of services to specialized providers.

**PGP**

Acronym for pretty good privacy.

**PKI**

Acronym for public key infrastructure.

**Portal**

In a portal, products and services are offered across companies, as value chains are vertically integrated.



**Pretty good privacy**

Pretty good privacy (PGP) is a cryptographic procedure for coding and marking the authenticity of electronic documents or files.

**Procurement process**

An electronic procurement process supports the selection of suppliers, contract negotiation, and the completion of purchase activities with the aid of electronic catalogs.

**Prosumer**

A prosumer participates in the electronic market as both a producer (manufacturer) and a consumer (customer, user).

**Provider**

A provider is a company which offers other Internet services besides eMail.

**Public key infrastructure**

Public key infrastructure (PKI) is the creation and operation of certification sites (trust centers) that issue certificates and certify the assignment of public keys to real people.

**Pull**

In the pull principle, Internet users can decide which web sites they would like to visit and what information they would like to procure.

**Push**

In the push principle, information or advertising messages from different sources are arranged according to topic and sent to the Internet user by the provider.

**SCOR**

Acronym for supply chain operations reference.

**Search engine**

A search engine is a software program that takes a search term as input and outputs a list of web sites relevant to that particular search term.

**Secure electronic transaction**

Several credit card and software suppliers have developed a secure electronic transaction payment system that handles payments with the help of certificates.

**Secure sockets layer**

Secure sockets layer (SSL) is a cryptographic protocol used for secure communication over the Internet.

**SET**

Acronym for secure electronic transaction.

**SSL**

Acronym for secure sockets layer.

**Supply chain management**

Supply chain management combines the planning of and control over the flow of material and information along the entire value chain.

**Supply chain operations reference**

Supply chain operations reference (SCOR) refers to a reference model for supply chains based on the processing steps of planning, procurement, production, and supply.

**Trust center**

See public key infrastructure.

**Ubiquity**

Ubiquity means equal rights for all of the participants of an electronic market, independent of language barriers, time zones, or geographic distance.

**Virtual community**

See community.

**Virtual organization**

In virtual organizations, limited partnerships are contracted with companies, organizations, or people in order to bundle together core competencies in the electronic market.

**Web site**

A web site, in the context of this book, is the Internet presence for a company or organization and their products.

**Workflow management system**

A workflow management system is an active software system for controlling the workflow between particular sites. Such a system works according to the guidelines of a flow specification.

**XML**

Acronym for Extensible Markup Language.

# Bibliography

- [Ada98] Adamson, C. and Venerable, M. *Data Warehouse Design Solutions*. Wiley, New York, 1998.
- [Adr96] Adriaans, P. and Zantinge, D. *Data Mining*. Addison-Wesley, New York, 1996.
- [Arn02] Arnscheidt, K., Brüchert, L., Puhl, H., and Walter, M. Mobile documentation with integrated PDAs—A real world example. In *Proceedings of Mobile Computing in Medicine (MoCoMed)*, Heidelberg, 11 April 2002.
- [Ash01] Ashley, P., Hinton, H., and Vandenwauver, M. Wired versus wireless security: The Internet, WAP and iMode for eCommerce. In *Proceedings of the 17th Annual Computer Security Applications Conference (ACSAC)*. IEEE Computer Society, Washington, 2001.
- [Bar00] Baron, J.P., Shaw, M.J., and Bailey, A.D. Electronic catalogs in the Web-based business-to-business procurement process. In Shaw, M., Blanning, R., Strader, T., and Whinston, A., editors, *Handbook on Electronic Commerce*, pp. 385–410. Springer, Berlin, 2000.
- [Bar02] Bartel, M., Boyer, J., Fox, B., LaMacchia, B., and Simon, E. XML-Signature Syntax and Processing. <http://www.w3.org/TR/xmlsig-core/>, 2002 (last checked: March 2008).
- [Bar06] Barkan, E.P. *Cryptoanalysis of Cyphers and Protocols*. Ph.D. Thesis, Technion, Israel Institute of Technology, Haifa, 2006.
- [BBE<sup>+</sup>02] Billsus, D., Brunk, C., Evans, C., Gladish, B., and Pazzani, M.J. Adaptive interfaces for ubiquitous Web access. *Communications of the ACM*, 45(5):34–38, 2002.
- [Ber97] Berry, M.J.A. and Linoff, G. *Data Mining Techniques for Marketing, Sales, and Customer Support*. Wiley, New York, 1997.
- [Ber99] Berson, A. and Smith, S. *Building Data Mining Applications for CRM*. McGraw Hill, New York, 1999.
- [Bir00] Biryukov, A., Shamir, A., and Wagner, D. Real time cryptanalysis of A5/1 on a PC. In *Proceedings of the CRYPTO Conference*. Springer, Berlin, 2000.

- [Bir02] Birkhofer, B. Profit models—Sources of income and proceeds in innovative distribution channels of electronic commerce (in German). In Schögel, M., Tomczak, T., and Belz, C., editors, *Roadmap to eBusiness—How Companies Successfully Use the Internet*, pp. 430–452. Thexis, St. Gallen, 2002.
- [Bla01] Blattberg, R.C., Getz, G., and Thomas, J.S. *Customer Equity—Building and Managing Relationships as Valuable Assets*. Harvard Business School, Boston, 2001.
- [Ble03] Blervaque, V. Telepay Project: Final Report. Technical report, Ertico, Brussels, 2003.
- [Blu01] Bluetooth SIG. Specification of the Bluetooth System—Wireless Connections Made Easy. Technical report, Bluetooth Special Interest Group, Bellevue, 2001.
- [Bos04] Bos, B., Celik, T., Hickson, I., and Wium Lie, H. Cascading Style Sheets, Level 2, Revision 1. Technical report, World Wide Web Consortium (W3C), 2004.
- [Bro07] Brousseau, E. and Curien, N., editors. *Internet and Digital Economics—Principles, Methods and Applications*. Cambridge University Press, Cambridge, 2007.
- [But04] Buttle, F. *Customer Relationship Management—Concept and Tools*. Elsevier Butterworth–Heinemann, Oxford, 2004.
- [Cam05] Campell, D. *E-Commerce and the Law of Digital Signatures*. Oxford University Press, Oxford, 2005.
- [Cha82] Chaum, D. Blind signatures for untraceable payments. In Chaum, D., Rivest, R.L., and Sherman, A.T., editors, *Advances in Cryptology CRYPTO’82*, pp. 199–203. Plenum, New York, 1982.
- [Cha90] Chaum, D. Online cash checks. In *Advances in Cryptology EUROCRYPT’89, Lecture Notes in Computer Science*, pp. 288–293. Springer, Berlin, 1990.
- [Cha06] Chaffey, D., Ellis-Chadwick, F., Johnston, K., and Mayer, R. *Internet Marketing—Strategy, Implementation and Practice*. Prentice-Hall, Englewood Cliffs, NJ, 2006.
- [Cho01] Chopra, S. and Meindl, P. *Supply Chain Management—Strategy, Planning, and Operation*. Prentice-Hall, Englewood Cliffs, NJ, 2001.
- [Cro98] Cronin, M.J., editor. *Banking and Finance on the Internet*. Wiley, New York, 1998.

- [Dau00] Daun, B. and Scheller, M. *Success with Electronic Business—Design, Architecture and Technology of Electronic Business Systems*. Addison-Wesley, New York, 2000.
- [Dol00] Dolmetsch, R. *eProcurement—Saving Options for Purchase (in German)*. Addison-Wesley, New York, 2000.
- [Dra98] Drane, C., Macnaughtan, M., and Scott, C. Positioning GSM telephones. *IEEE Communications*, 36(4):46–54, 1998.
- [Ebe01] Eberspächer, J., Vögel, H., and Bettstetter, C. *GSM, Global System for Mobile Communication*. Teubner, Stuttgart, 2001.
- [Edv97] Edvinsson, L. and Malone, M.S. *Intellectual Capital—Realizing Your Company's True Value by Finding Its Hidden Brainpower*. Harper-Collins, New York, 1997.
- [EUR08a] EURO Cash Card GmbH. Geldkarte Homepage. <http://www.geldkarte.de>, 2008 (last checked: February 2008).
- [Eur08b] European Commission. The Galileo Project—Galileo Design Consolidation. Technical report, European Space Agency (ESA), Paris, 2008.
- [Fer03] Ferguson, N. and Schneier, B. *Practical Cryptography*. Wiley, New York, 2003.
- [Fir08] Firstgate Internet AG. Firstgate Homepage. <http://www.firstgate.de>, 2008 (last checked: February 2008).
- [FKL01] Freire, J., Kumar, B., and Lieuwen, D.F. Webviews: Accessing personalized Web content and services. In *Proceedings of WWW10*, Hong Kong, pp. 576–586, 1–5 May 2001.
- [Fra06] Frappaolo, C. *Knowledge Management*. Capstone, Dover, 2006.
- [Fre96] Freier, A.O., Karlton, P., and Kocher, P.C. The SSL Protocol—Version 3.0. <http://wp.netscape.com/eng/ssl3/draft302.txt>, 1996 (last checked: March 2008).
- [Fro08] Frog, P. Allopass Homepage. <http://www.allopass.com>, 2008 (last checked: February 2008).
- [Geb03] Gebauer, J., Shaw, M.J., and Zhao, K. The Efficacy of mobile e-Procurement: A pilot study. In *Proceedings of the 36th Hawaii International Conference on System Sciences (HICSS)*, Hilton Waikoloa Village, 6–9 Jan. 2003.
- [Grä99] Gräf, H. *Online-Marketing—End User Management in Electronic Markets (in German)*. Deutscher Universitäts, Wiesbaden, 1999.

- [Gra05] Graber, A. *Internet Pricing—Economic Approaches to Transport Services and Infrastructure*. Peter Lang, New York, 2005.
- [Gro94] Gross, P. *The Multi-Option Society (in German)*. Suhrkamp, Frankfurt am Main, 1994.
- [Gro07] Grover, V. and Saeed, K. The impact of product, market, and relationship characteristics on interorganizational system integration in manufacturer–supplier dyads. *Journal of Management Information Systems*, 23(4):185–216, 2007.
- [Han01] Han, J. and Kamber, M. *Data Mining—Concepts and Techniques*. Morgan Kaufmann, San Francisco, 2001.
- [Han03] Handfield, R.B. and Nichols, E.L. *Supply Chain Redesign: Transforming Supply Chains into Integrated Value Systems*. Financial Times, Upper Saddle River, 2003.
- [Har02] Harvard Business Review. *Harvard Business Review on Customer Relationship Management*. Harvard Business School, Boston, 2002.
- [Hod98] Hodel, T.B. *IT-Ethical Maxims for the Usage in Computer Network Systems (in German)*. Galda + Wilch, Berlin, 1998.
- [Hou04] Hougaard, S. and Bjerre, M. *Strategic Relationship Marketing*. Springer, Berlin, 2004.
- [Hug06] Hugos, M. *Essentials of Supply Chain Management*. Wiley, New York, 2006.
- [Ich06] Ichijo, K. and Nonaka, I. *Knowledge Creation and Management—New Challenges for Managers*. Oxford University Press, Oxford, 2006.
- [Inm96] Inmon, W.H. *Building the Data Warehouse*. Wiley, New York, 1996.
- [Jak01] Jakobsson, M. and Wetzel, S. Security weaknesses in Bluetooth. In *Proceedings of the Cryptographer’s Track at the RSA Conference (CT-RSA 2001), LNCS 2020*. Springer, Berlin, 2001.
- [Jar00] Jarke, M., Lenzerini, M., Vassiliou, Y., and Vassiliadis, P. *Fundamentals of Data Warehouses*. Springer, Berlin, 2000.
- [Joh97] Johnson, S. *Interface Culture—How Technology Transforms the Way We Create and Communicate*. HarperEdge, New York, 1997.
- [Joh01] Johnson, D.G. *Computer Ethics*. Prentice-Hall, Englewood Cliffs, 2001.
- [Kal01] Kalakota, R. and Robinson, M. *M-Business: The Race to Mobility*. McGraw Hill, New York, 2001.

- [Kap96a] Kaplan, E., editor. *Understanding GPS: Principles & Applications (Artech House Mobile Communications)*. Artech House, Norwood, 1996.
- [Kap96b] Kaplan, R.S. and Norton, D.P. *Balanced Scorecard—Translating Strategy into Action*. Harvard Business School, Boston, 1996.
- [Kat07] Katz, J. and Lindell, Y. *Introduction to Modern Cryptography*. Chapman & Hall, London, 2007.
- [Kau07] Kaushik, A. *Web Analytics—An Hour a Day*. Wiley, New York, 2007.
- [Kim96] Kimball, R., Reeves, L., Ross, M., and Thornthwaite, W. *The Data Warehouse Lifecycle Toolkit*. Wiley, New York, 1996.
- [Kin02] King, D., Lee, J., Warkentin, M., and Chung, H.M. *Electronic Commerce 2002—A Managerial Perspective*. Prentice-Hall, Englewood Cliffs, 2002.
- [KMW01] Küng, P., Meier, A., and Wettstein, T. Performance measurement systems must be engineered. *Communications of the Association for Information Systems*, 7(3), 2001.
- [Kot02] Kotler, P., Dipak, C.J., and Maesincee, S. *Marketing Moves—A New Approach to Profits, Growth, and Renewal*. Harvard Business School, Boston, 2002.
- [Kot06] Kotler, P. and Keller, K.L. *Marketing Management*. Prentice-Hall, Englewood Cliffs, 2006.
- [Kou03] Kou, W., editor. *Payment Technologies for eCommerce*. Springer, Berlin, 2003.
- [KPN01] KPN Mobile The Netherlands B.V. HTML for Mobile Reference Guide. Technical report, KPN, The Hague, 2001.
- [Kun03] Kuner, C. *European Data Privacy Law and Online Business*. Oxford University Press, Oxford, 2003.
- [Lau02] Laudon, K.C. and Laudon, J.P. *Management Information Systems*. Prentice-Hall, Englewood Cliffs, 2002.
- [Law02] Lawrence, B., Jennings, D.F., and Reynolds, B.E. *E-Distribution*. South-Western College, Cincinnati, 2002.
- [Mal03] Mallick, M. *Mobile and Wireless Design Essentials*. Wiley, New York, 2003.
- [Mei07] Meier, A. and Werro, N. A fuzzy classification model for online customers. *Informatica Journal*, 31(2):174–182, 2007.

- [Nor02] Norman S. *M-Commerce—Technologies, Services, and Business Models*. Wiley, New York, 2002.
- [Pay08] PayPal Company. PayPal Homepage. <http://www.paypal.com>, 2008 (last checked: February 2008).
- [Pin99] Pine, B.J. and Davis, S. *Mass Customization—The New Frontier in Business Competition*. Harvard Business School, Boston, 1999.
- [Por01] Porter, M. Strategy and the Internet. *Harvard Business Review*, 79(3):63–78, 2001.
- [Qia99] Qiao, L. and Nahrstedt, K. Noninvertible watermarking methods for MPEG encoded audio. In *Proceedings of the SPIE Conference on Electronic Imaging, Security and Watermarking of Multimedia Contents*, San Jose, pp. 194–202, 24–29 Jan. 1999.
- [Red07] Redl, S., Weber, K., and Oliphant, M. *An Introduction to GSM*. Artech House, Norwood, 2007.
- [Rei98] Reichwald, R., Möslin, K., Sachenbacher, H., Engelberger, H., and Oldenburg, S. *Telecooperation—Distributed Work and Organisational Forms (in German)*. Springer, Berlin, 1998.
- [Ron96] Rivest, R.L. and Shamir, A. PayWord and MicroMint: Two simple micropayment schemes. In *Security Protocols Workshop*, Cambridge, pp. 69–87, 10–12 April 1996.
- [Ron97] Rivest, R.L. Electronic lottery tickets as micropayments. In Hirschfeld, R., editor, *Financial Cryptography*, pp. 307–314. Springer, Berlin, 1997.
- [Run00] Runge, A. *The Role of Electronic Contracting for Electronic Business (in German)*. Gabler, Wiesbaden, 2000.
- [Rus00] Rust, R.T., Zeithaml, V.A., and Lemon, K.N. *Driving Customer Equity—How Customer Lifetime Value Is Reshaping Corporate Strategy*. The Free Press, New York, 2000.
- [Saa94] Saarinen, T. and Vepsäläinen, A.P.J. Procurement strategies for information systems. *Journal of Management Information Systems*, 11(2):187–208, 1994.
- [Sal02] Salouer, G. and Spence, A.M. *Creating and Capturing Value—Perspectives and Cases on Electronic Commerce*. Wiley, New York, 2002.
- [SCC08] Supply-Chain Council. Supply-Chain Operations Reference Model—Overview of SCOR Version 8.0. <http://www.supply-chain.org/galleries/public-gallery/SCOR800overviewBooklet2.pdf>, 2008 (last checked: February 2008).



- [Sch97] Schoenmakers, B. Basic security of the eCash(TM) payment system. In Preneel, B. and Rijmen, V., editors, *Lecture Notes in Computer Science*, volume 1528, pp.338–352. Springer, Berlin, 1997.
- [Sch02] Schubert, P., Wölfe, R., and Dettling, W., editors. *Procurement for eBusiness—How to Optimize Electronic Processes for Purchase and Sale (in German)*. Hanser, München, 2002.
- [Sch07] Schneider, G.P. *Electronic Commerce*. Thomson Course Technology, Boston, 2007.
- [Sco07] Scoott, D.M. *The New Rules of Marketing and PR—How to Use News Releases, Blogs, Podcasting, Viral Marketing and Online Media to Reach Buyers Directly*. Wiley, New York, 2007.
- [Sel03] Sellers, L.K., Walker, J.K., and Zoghi, B. *Connecting Resources: A Primer for the Electronics Distribution Industry*. Custom Publishing, Needham Heights, 2003.
- [Sel08] Selecta. Selecta Mobile Phone Payment Technology. <http://www.selecta.com/news/food-vending-service/mobile-phone-payment-technology-at-selecta.html>, 2008. (last checked: March 2008).
- [SET97a] SET Consortium. SET Secure Electronic Transaction Specification—Book 1: Business Description. [http://ccc.cs.lakeheadu.ca/set/set\\_bk1.pdf](http://ccc.cs.lakeheadu.ca/set/set_bk1.pdf), 1997 (last checked: March 2008).
- [SET97b] SET Consortium. SET Secure Electronic Transaction Specification—Book 2: Programmers Guide. [http://ccc.cs.lakeheadu.ca/set/set\\_bk2.pdf](http://ccc.cs.lakeheadu.ca/set/set_bk2.pdf), 1997 (last checked: March 2008).
- [SET97c] SET Consortium. SET Secure Electronic Transaction Specification—Book 3: Formal Protocol Definition. [http://ccc.cs.lakeheadu.ca/set/set\\_bk3.pdf](http://ccc.cs.lakeheadu.ca/set/set_bk3.pdf), 1997 (last checked: March 2008).
- [Sey03] Seybold, C. and Stormer, H. Mobile devices injecting spatial information into photographs enabling the world photo album. In *Proceedings of the Advances in Mobile Multimedia Conference (MoMM)*, Jakarta, 15–17 Sept. 2003.
- [Sha99] Shapiro, C. and Varian, H.R. *Information Rules—A Strategic Guide to the Network Economy*. Harvard Business School, Boston, 1999.
- [Sha00] Shaw, M., Blanning, R., Strader, T., and Whinston, A., editors. *Handbook on Electronic Commerce*. Springer, Berlin, 2000.
- [Sto06] Stormer, H. Exploring solutions for a mobile Web. In *Proceedings of the 3rd IEEE International Workshop on Mobile Commerce and Wireless Services (WMCS)*, San Francisco, 26 June 2006.

- [Tap00] Tapscott, D., Ticoll, D., and Lowy, A. *Digital Capital—Harnessing the Power of Business Webs*. Harvard Business School, Boston, 2000.
- [Tap01] Tapscott, D. Rethinking strategy in a networked world (or why Michael Porter is wrong about the Internet). *Strategy + Business*, 24:1–8, 2001.
- [Tel08] Telekurs Multipay AG. CashCard Homepage. <http://www.cashcard.ch>, 2008 (last checked: February 2008).
- [Tim99] Timmers, P. *Electronic Commerce—Strategies and Models for Business-to-Business Trading*. Wiley, New York, 1999.
- [Tse03] Tseng, M.M. and Piller, F. *The Customer Centric Enterprise—Advances in Mass Customization and Personalization*, Kindle Edition. Springer, Berlin, 2003.
- [Tul02] Tull, C. *WAP 2.0 Development*. Que, Sebastopol, 2002.
- [Tur04] Turban, E., King, D., Lee, J., and Viehland, D. *Electronic Commerce 2004—A Managerial Perspective*. Prentice-Hall, Englewood Cliffs, 2004.
- [Tur06] Turban, E., King, D., Lee, J., and Viehland, D. *Electronic Commerce 2006—A Managerial Perspective*. Pearson Education, Trenton, 2006.
- [Vac04] Vacca, J.R. *Public Key Infrastructure—Building Trusted Applications and Web Services*. Auerbach, New York, 2004.
- [Wak07] Wakefield, T., McNally, D., Bowler, D., and Mayne, A. *Introduction to Mobile Communications: Technology, Services, Markets*. Auerbach, New York, 2007.
- [Wam06] Wamba, S.F., Lefebvre, L.A., and Lefebvre, E. Enabling intelligent B-to-B eCommerce supply chain management using RFID and the EPC network: A case study in the retail industry. In *Proceedings of the 8th International Conference on Electronic Commerce*, Fredericton, 14–16 Aug. 2006.
- [Wei98] Weiss, S. and Indurkha, N. *Predictive Data Mining*. Morgan Kaufmann, San Francisco, 1998.
- [Wer01] Werthner, H. and Bichler, M.B., editors. *Lectures in E-Commerce*. Springer, Berlin, 2001.
- [Wit99] Witten, I. and Frank, E. *Data Mining*. Morgan Kaufmann, San Francisco, 1999.
- [WPF97] Wüthrich, H.A., Philipp, A.F., and Frentz, M.H. *Advantage by Virtualization—Learning from Pioneer Companies (in German)*. Gabler, Wiesbaden, 1997.

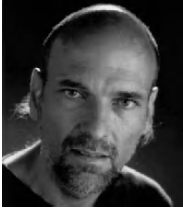
- [WSFM04] Werro, N., Stormer, H., Frauchiger, D., and Meier, A. eSarine—a Struts-based webshop for small and medium-sized enterprises. In *Proceedings of the Workshop Information Systems in E-Business and E-Government (EMISA)*, Luxembourg, Oct. 2004.
- [Zen06] Zeng, W., Yu, H., and Lin, C.-Y. *Multimedia Security Technologies for Digital Rights Management*. Academic, Orlando, 2006.
- [Zer00] Zerdick, A., Picot, A., Schrape, K., Artopé, A., Goldhammer, K., Lange, U., Vierkant, E., López-Escobar, E., and Silverstone, R. *E-conomics: Strategies for the Digital Marketplace*. Springer, Berlin, 2000.

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