



# Introduction to E-Commerce

Combining Business and Information Technology

Martin Kütz

MARTIN KÜTZ

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# **INTRODUCTION TO E-COMMERCE**

COMBINING BUSINESS AND  
INFORMATION TECHNOLOGY

Introduction to E-Commerce: Combining Business and Information Technology

1<sup>st</sup> edition

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# TABLE OF ABBREVIATIONS

3GPP	3 <sup>rd</sup> Generation Partnership Project
AES	Advanced Encryption Standard
AI	Application Identifier
ANSI	American National Standards Institute
API	Application Programming Interface
APICS	American Production and Inventory Control Society
ASP	Application Service Providing
ATM	Automated Teller Machine
B2B	Business to Business
B2C	Business to Customer/Consumer
BGB	Bürgerliches Gesetzbuch (German Civil Law)
BIC	Bank Identifier Code
BME	Bundesverband Materialwirtschaft, Einkauf und Logistik (Association Materials Management, Purchasing and Logistics)
BMP	Windows Bitmap
BOB	Box of Bits
BPR	Business Process Re-engineering
BSI	Bundesamt für Sicherheit in der Informationsverarbeitung (German Federal Office for Information Security)
C2C	Customer to Customer
C2G	Citizen to Government
CA	Certification Authority
CAx	Computer Aided "x"
CDA	Content Delivery Application
CDMA	Code Division Multiple Access
CERN	Conseil Européen pour la Recherche Nucléaire

CLV	Customer Lifetime Value
CMA	Content Management Application
CMS	Content Management System
C.O.D.	Cash on Delivery
CORBA	Common Object Request Broker Architecture
CPA	Cost per Action
CPC	Cost per Click
CPS	Certification Practice Standard
CPx	Cost per "x"
CRL	Certification Revocation List
CRM	Customer Relationship Management
CRV	Customer Referral Value
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
CSP	Cloud Service Provider
cXML	commerce XML
DENIC	DE Network Information Centre (DE = .de: top level domain)
DES	Data Encryption Standard
DoD	Department of Defence
DTD	Document Type Definition
EAI	Enterprise Architecture Integration
EAN	European Article Number
EDGE	Enhanced Data Rate for GSM Evolution
EDI	Electronic Data Interchange
EE	Enterprise Edition
EFF	Electronic Frontier Foundation
e.g.	exempli gratia



EHI	EuroHandelsInstitut (EuroTradeInstitute)
EMOTA	European E-Commerce and Mail Order Trade Association
ERP	Enterprise Resource Planning
etc.	et cetera
ETSI	European Telecommunications Standards Institute
eWoM	electronic World of Mouth
FAQ	Frequently Asked Questions
FDDI	Fiber Distributed Data Interface
FTP	File Transfer Protocol
G2B	Government to Business
G2C	Government to Citizen
G2E	Government to Employees
G2G	Government to Government
GIF	Graphics Interchange Format
GPRS	General Packet Radio Service
GRC	Governance, Risk and Compliance
GSM	Global System for Mobile Communications
GTIN	Global Trade Item Number
HSCSD	High Speed Circuit Switched Data
HSDPA	High Speed Downlink Packet Access
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
IaaS	Infrastructure as a Service
IANA	Internet Assigned Numbers Authority
IBM	International Business Machines
ICANN	Internet Corporation for Assigned Names and Numbers

ICC	Integrated Circuit Card
ICT	Information and Communication Technology
IDC	International Data Corporation
IDEA	International Data Encryption Algorithm
i.e.	id est
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electrotechnical Engineers
IETF	Internet Engineering Task Force
IIS	(Microsoft) Internet Information Services
IMAP	Internet Message Access Protocol
IMT	International Mobile Telecommunications
IP	Internet Protocol
IPng	Internet Protocol next generation
ISBN	International Standard Book Number
ISM	Information Security Management
ISO	International Standards Organization
ISSN	International Standard Series Number
IT	Information Technology
ITIL	IT Infrastructure Library
JDBC	Java Database Connectivity
JNI	Java Native Interface
JVM	Java Virtual Machine
KPI	Key Performance Indicator
LDAP	Lightweight Directory Access Protocol
MAB	Multi-Author Blog
MD	Message Digest

MPM	Manufacturing Process Management
MRO	Maintenance, Repair, Operations
MRP	Material Requirements Planning
NGO	Non-Governmental Organization
NIST	National Institute of Standards and Technology
OCI	Open Catalogue Interface
ODBC	Open Database Connectivity
OECD	Organization for Economic Co-operation and Development
OMG	Object Management Group
ORB	Object Request Broker
OSI	Open Systems Interconnection
P3P	Platform for Privacy Preferences
PaaS	Platform as a Service
PCI	Payment Card Industry
PDA	Personal Digital Assistant
PDF	Portable Document Format
PDM	Product Data Management
PKCS	Public Key Cryptography Standard
PKI	Public Key Infrastructure
PLM	Product Lifecycle Management
PMBOK	Project Management Body of Knowledge
POP3	Post Office Protocol Version 3
POS	Point of Sale
PPM	Product and Portfolio Management
RA	Registration Authority
RFC	Request for Comment

RFID	Radio Frequency Identification
RFM	Recency, Frequency, Monetary
RFx	Request for "x"
ROI	Return on Investment
RSA	Rivest, Shamir and Adleman
RSS	Rich Site Summary
SaaS	Software as a Service
SAP	Systeme, Anwendungen und Produkte (Systems, Applications and Products) = name of a big German software firm
SCC	Supply Chain Council
SCM	Supply Chain Management
SCOR	Supply Chain Operations Reference
SCRM	Social Media CRM

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SE	Software Engineering
SE	Standard Edition
SEO	Search Engine Optimization
SET	Secure Electronic Transaction
SHA	Secure Hash Algorithm
SIIA	Software & Information Industry Association
SIM	Subscriber Identity Module
SLA	Service Level Agreement
SMS	Short Message Service
SMTP	Simple Mail Transfer Protocol
SNS	Social Networking Site
SOAP	Simple Object Access Protocol
SQL	Structured Query Language
SRM	Supplier Relationship Management
SSO	Single Sign On
StGB	Strafgesetzbuch (German Criminal Law)
TCP	Transmission Control Protocol
TKG	Telekommunikationsgesetz (German Telecommunication Act)
TMG	Telemediengesetz (German Tele Media Act)
TÜV	Technischer Überwachungsverein (Technical Control Association)
UCS	Universal Coded Character Set
UDI	Universal Document Identifier
UMTS	Universal Mobile Telephone System
UPS	Uninterruptable Power Supply
URI	Unified Resource Identifier
URL	Uniform Resource Locator

USA	United States of America
VIP	Vertical Information Portal
W3C	World Wide Web Consortium
WCC	Web Content Controlling
WCPM	Web Content Performance Management
WLAN	Wireless Local Area Network
WPM	Web Performance Management
WSDL	Web Services Description Language
WUC	Web User Controlling
WUPM	Web User Performance Management
WWW	World Wide Web
XHTML	Extended HTML
XML	Extended Markup Language
XMPP	Extensible Messaging and Presence Protocol

# 1 BASICS AND DEFINITIONS

## Learning objectives

In this chapter you will learn,

- how the term “E-Commerce” has been defined,
- how the Internet has enabled this type of business,
- what are typical categories of making business digitally,
- what are the advantages as well as the disadvantages of digital business,
- which technical and economical challenges have to be mastered when doing business electronically.

## Recommended pre-reading

- Mohapatra 2013, chapter 1.
- Turban et al 2015, chapter 1.

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## 1.1 THE TERM “E-COMMERCE”

### 1.1.1 THE WIKIPEDIA CONTENT

Of course, we looked up the term “E-Commerce” and other related terms in the popular encyclopaedia Wikipedia. The outcome of our research as of October 25, 2015, is documented in the subsequent lines.

#### **E-Commerce**

“Electronic commerce, commonly written as E-Commerce, is the trading in products or services using computer networks, such as the Internet. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web for at least one part of the transaction’s life cycle, although it may also use other technologies such as E-Mail.

E-Commerce businesses may employ some or all of the following:

- Online shopping websites for retail sales direct to consumers,
- Providing or participating in online marketplaces, which process third-party business-to-consumer or consumer-to-consumer sales,
- Business-to-business buying and selling,
- Gathering and using demographic data through Web contacts and social media,
- Business-to-business electronic data interchange,
- Marketing to prospective and established customers by E-Mail or fax (for example, with newsletters),
- Engaging in pretail for launching new products and services.

Petail (also referred to as pre-retail, or pre-commerce) is a sub-category of E-Commerce and online retail for introducing new products, services, and brands to market by pre-launching online, sometimes as reservations in limited quantity before release, realization, or commercial availability. Petail includes pre-sale commerce, pre-order retailers, incubation marketplaces, and crowdfunding communities.” (Wikipedia 2015)



## **E-Business**

“Electronic business, or E-Business, is the application of information and communication technologies (ICT) in support of all the activities of business. Commerce constitutes the exchange of products and services between businesses, groups and individuals and can be seen as one of the essential activities of any business. Electronic commerce focuses on the use of ICT to enable the external activities and relationships of the business with individuals, groups and other businesses or E-Business refers to business with help of Internet i.e. doing business with the help of Internet network. The term <E-Business> was coined by IBM’s marketing and Internet team in 1996.” (Wikipedia 2015)

Comparing E-Commerce and E-Business we come to the subsequent conclusion:

E-Business is a more general term than E-Commerce. However, in this book we will only use the term “E-Commerce”, because every business transaction finally is involved in selling or buying of products or services. And the term “E-Commerce” obviously is more widespread than the term “E-Business”.

## **Digital economy**

“Digital economy refers to an economy that is (substantially) based on computing technologies. The digital economy is also sometimes called the Internet Economy, the New Economy, or Web Economy. Increasingly, the “digital economy” is intertwined with the traditional economy making a clear delineation harder.” (Wikipedia 2015)

We will not use the term “digital economy” further on in this book, because business is business be it traditional or digital. And boundaries are moving every day due to technical development. However, we will repeatedly use the term “digital” or “digitalized” to indicate that subjects or activities are based on ICT.

### **1.1.2 PRELIMINARY DEFINITION**

Some authors write extremely enthusiastically like this: E-Commerce enables the comprehensive digital execution of business processes between suppliers and their customers via global public and private networks.

However, this definition rises some questions:

- What does “comprehensive” mean? Does it mean the total process? Is everything digitalized?
- What about transportation and delivery of real goods? Obviously here are some limits for digitalization, though sooner or later 3-D-printing may change a lot...
- Why should businesses be run electronically? Is enablement a value in itself? Or do we digitalize businesses because we can reduce costs, accelerate processes and increase profit?

This definition, though given in many E-Commerce books, is too much marketing-minded and not helpful to understand the advantages (and disadvantages) of “digitalized” business reasonably.

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### 1.1.3 FINAL DEFINITION

To come to a final definition of E-Commerce let us start with some constituent attributes of E-Commerce:

- Digitalization of business:
  - This means a comprehensive usage of ICT (Information & Communication Technology) not only within a business organization (as it has been done during the last decades by traditional (internal) information systems), but now through a more and more seamless linking and cooperation of information and communication systems of all involved business partners.
  - The comprehensive usage of ICT has been enabled by some technologies and technical standards, which have been accepted globally (see chapter 2 of this book).
- Focus on business processes:
  - We support business processes, of course, as we did it for the last decades, but now the total processes, running through several organizations and crossing their boundaries, are supported.
  - We automate business processes not longer only within organizations, as it was “the” traditional objective of ICT, but now the automation is related to the total process, running through all involved organizations, and not only to the sub-process within the own organization.
  - We increase the speed of business processes. Additional potentials can be realized with the coupling of processes between different organizations.
  - We increase the economic efficiency of business processes, again through coupling of business processes at the boundaries of the business partners.
- Usage of a global network:
  - Internet plays a dominant role and has become a universal technical infrastructure. Thus it builds a global virtual place where every organization and person being interested in making business can come together without geographical and time restrictions.
  - Global networks allow the exchange of information without any restrictions in time and independently from any geographical distances.
  - We “know” (means: assume) that the Internet is always up and running (7·24h).

- New potentials and opportunities for cooperation:
  - More or less independent persons and/or organizations work together.
  - Business actors can come together whenever they want it or whenever there is a need.

These considerations lead to our final definition (Turban et al 2015, p. 7):

E-Commerce is the exchange of goods and services between (usually) independent organizations and/or persons supported by a comprehensive usage of powerful ICT systems and a globally standardized network infrastructure.

For this purpose the business partners have to couple their business processes and their ICT systems. These systems have to work together temporarily and seamlessly and have to share, exchange and process data during the whole business process and across the boundaries of the cooperating organizations.

Data security and data privacy as well as the compliance with laws and other policies and procedures have, of course, to be guaranteed.

#### 1.1.4 E-COMMERCE WITH THE "5-C-MODEL"

Another approach to define and explain, what E-Commerce is, comes from the so-called 5-C-model (Zwass 2014). It defines E-Commerce by five activity domains whose denominations start with the letter "C":

##### **Commerce**

- In the electronic marketplaces there is a matching of customers and suppliers, an establishing of the transaction terms, and the facilitation of exchange transactions.
- With the broad move to the Web-enabled enterprise systems with relatively uniform capabilities as compared to the legacy systems, a universal supply-chain linkage has been created.

##### **Collaboration**


- The Web is a vast nexus, or network, of relationships among firms and individuals.
- More or less formal collaborations are created or emerge on the Web to bring together individuals engaged in knowledge work in a manner that limits the constraints of space, time, national boundaries, and organizational affiliation.

## Communication

- As an interactive medium, the Web has given rise to a multiplicity of media products.
- This universal medium has become a forum for self-expression (as in blogs) and self-presentation (as, for an example, in Polyvore: [www.polyvore.com](http://www.polyvore.com)).
- The rapidly growing M-Commerce (see below) enables connectivity in context, with location-sensitive products and advertising.
- In the communications domain, the Web also serves as a distribution channel for digital products.

## Connection


- Common software development platforms, many of them in the open-source domain, enable a wide spectrum of firms to avail themselves of the benefits of the already developed software, which is, moreover, compatible with that of their trading and collaborating partners.
- The Internet, as a network of networks that is easy to join and out of which it is relatively easy to carve out virtual private networks, is the universal telecommunications network, now widely expanding in the mobile domain.



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## Computation

- Internet infrastructure enables large-scale sharing of computational and storage resources, thus leading to the implementation of the decades-old idea of utility computing.

### 1.1.5 ADDITIONAL TERMS

#### **M-Commerce (Mobile Commerce)**

M-Commerce (Mohapatra 2013, pp. 81–82) is commonly understood as the usage of mobile devices for business purposes, especially mobile phones and PDA's (Personal Digital Assistants).

Main features of M-Commerce are:

- Location independence of (mobile) customers,
- High availability of services through well established mobile phone networks,
- Increasing computing power of mobile devices,
- Interactivity of mobile devices (voice and data transfer),
- Security (when using mobile phone networks),
- Localization of customers through cell structure,
- Accessibility of customers,
- Potential of personalized services/offers.

#### **E-Procurement (Electronic Procurement)**

In general, E-Procurement (Chakravarty 2014, p. 115) is the automation of an organization's procurement processes using Web-based applications. It enables widely dispersed customers and suppliers to interact and execute purchase transactions. Each step in the procurement process is captured electronically, and all transaction data is routed automatically, reducing time and cost of procurement. Properly deployed, E-Procurement can deliver tremendous value to enterprises in different ways.

In a narrower sense E-Procurement is seen as the ordering of MRO goods (MRO = Maintenance/Repair/Operations) on the basis of Web-based application systems directly by the demand carrier to reduce process costs in the area of so-called C-articles (C-articles represent a small portion of the total financial procurement volume, but cause a significant portion of the procurement costs).

Every sales process at the same time is a procurement process or a buying process – from the point of view of the (potential) customer. Sales processes are driven by the supplier. Procurement processes are driven by the customer. However the exchange of goods or services has to be managed. Thus we will consider E-Procurement as a specific view onto E-Commerce.

### **E-Government (Electronic Government)**

The big encyclopaedia Wikipedia says (search as of October 26, 2015) (Xu 2014, pp. 102–105):

“E-Government (short for electronic government, also known as e-gov, Internet government, digital government, online government, or connected government) consists of the digital interactions between citizens and their government (C2G), between governments and government agencies (G2G), between government and citizens (G2C), between government and employees (G2E), and between government and businesses/commerce (G2B).

This digital interaction includes all levels of government (city, state/province, national, and international), governance, information and communication technology (ICT), and business process re-engineering (BPR).”

### **E-Administration (Electronic Administration)**

“E-administration refers to those mechanisms which convert the paper processes in a traditional office into electronic processes, with the goal to create a paperless office. Its objective is to get total transparency and accountability within any organization.” (Wikipedia 2015)

### **E-Democracy (Electronic Democracy)**

“E-Democracy incorporates 21st-century information and communications technology to promote democracy. That means a form of government in which all adult citizens are presumed to be eligible to participate equally in the proposal, development, and creation of laws.” (Wikipedia 2015)

## **1.1.6 ROLE OF INTERNET**

In the early years, E-Commerce was considered to be an aid to the business. In the meantime it has become more or less a business enabler (Mohapatra 2013, pp. 10–12).

Between 1998 and 2000, a substantial number of businesses in the United States and Western Europe developed rudimentary websites. In the dot-com era, E-Commerce came to include activities more precisely termed “Web commerce” – the purchase of goods and services over the World Wide Web, usually with secure connections with E-Shopping carts and with electronic payment services such as credit card payment authorizations.

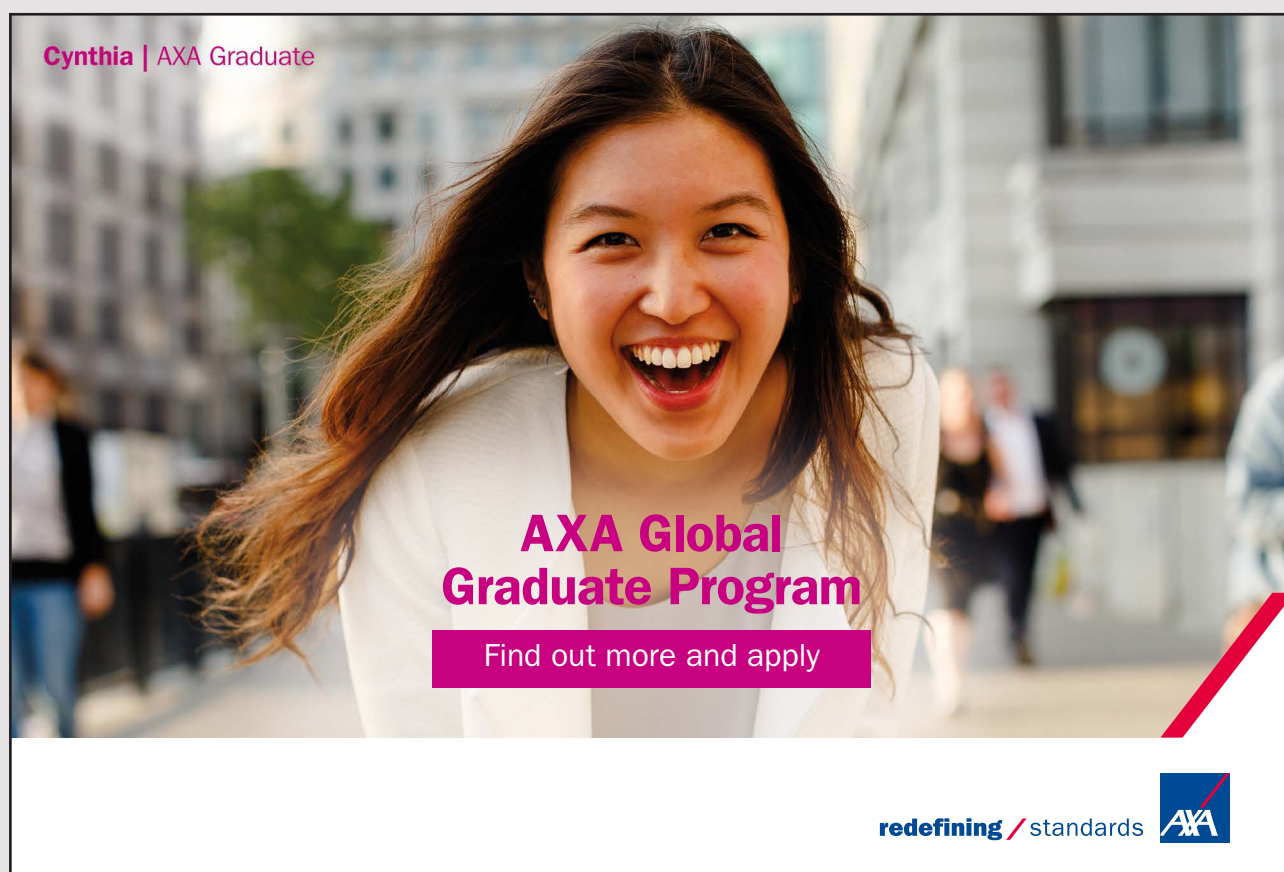
The emergence of E-Commerce also significantly lowered barriers to entry in the selling of many types of goods; many small home-based proprietors are able to use the Internet to sell goods. Established suppliers had to close their shops and to change their business model to an E-Commerce model to stay profitable and in the business (e.g. travel agencies).

Often, small suppliers use online auction sites such as eBay or sell via large corporate websites, to ensure that they are seen and visited by potential customers.

## 1.2 BUSINESS MODELS RELATED TO E-COMMERCE

### 1.2.1 INTERNET BASED BUSINESS


In this chapter we list some typical business activities, which are based on the Internet. E-Commerce actors cooperate with those firms and use them as specific service providers.



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**Access provider**

The access provider ensures (technical) access to the Internet. We should have in mind, that somebody has to pay the access provider so that we can get access to the Internet. Who pays? We or somebody else? In many (most?) areas of the world it is a totally privatized business, though sometimes in the political arena the access to the Internet is declared as a modern human right. Obviously there is a similarity to telephone network(s). However, it (normally) works in this privatized form.

Traditional business models, which are somehow similar to the business of an access provider, are operators of a technical infrastructure, e.g. telephone networks, car highways, or railways.

**Search engine**

Search engines are the most used software in the Internet. They are the starting step for many Internet-based activities, not only but, of course, also if somebody is looking for a business opportunity. Again we must ask: Who pays? The one, who wants to find something or someone? Or the one, who wants to be found?

A traditional and similar business model is given by the so-called “yellow pages”, where firms are listed and grouped according to branches and locations.

**Online shop**

An online shop is a website, where you can buy products or services, e.g. books or office supplies.

Traditional and similar business models are direct mail selling (no shop facility, offering of goods via a printed catalogue, ordering by letters or telephone calls) and factory outlets (producer has own shop facility, does not sell his products via merchants).

**Content provider**

Content providers offer content, a completely digital good, e.g. information, news, documents, music. A specific variant of a content provider is the information broker, who is a trader of information.

Again the following question has to be put: Who pays? The one, who wants to have access to an information? The one, who wants to provide an information?

Traditional business models in this area are newspaper publishers, magazine publishers, radio and television broadcasting services or publishing companies.

**Portal**

A portal is a website, which provides a set of services to the user so that he/she sometimes thinks that he/she is using a single but very complex software system. Portals are often used in big organizations to control the access of employees to the different ICT systems; each employee gets a specific menu of “his”/“her” applications. Also content providers use portals, though in the narrow sense that they only deliver content and no application systems.

**Online marketplace/electronic mall**

An online marketplace is a website, where suppliers and potential customers can come together like on a real marketplace in a small town. An E-Mall is a set of online shops, which can be found on one website.

Examples of traditional and similar business models are shopping centers, omnibus orders (One person is customer of the shop and buys for a group of people), marketplaces and buying associations.

**Virtual community**

A virtual community is a platform for communication and exchange of experience. It is similar to a virtual club or association. We always should ask: Who is the owner? Who is the person or organization behind the platform? Who pays? The members or the visitors? The community operator?

**Information broker**

An information broker collects, aggregates and provides information, e.g. information with respect to products, prices, availabilities or market data, economical data, technical information.

Here we have to ask: Can we trust the information? Is it neutral or just a product placement? Who pays? The visitor? Some providers? Financed through advertisements?

Traditional and similar business models are magazines running tests of computers, cars, consumer goods, restaurants.

**Transaction broker**

A transaction broker is a person or an organization to execute sales transactions. Sometimes those brokers are used to hide the real customer to the supplier. A transaction broker is an agent who is an expert in a specific area and can take over parts of a business.

A similar traditional business model is the free salesman.

### Online service provider/cloud service provider (CSP)

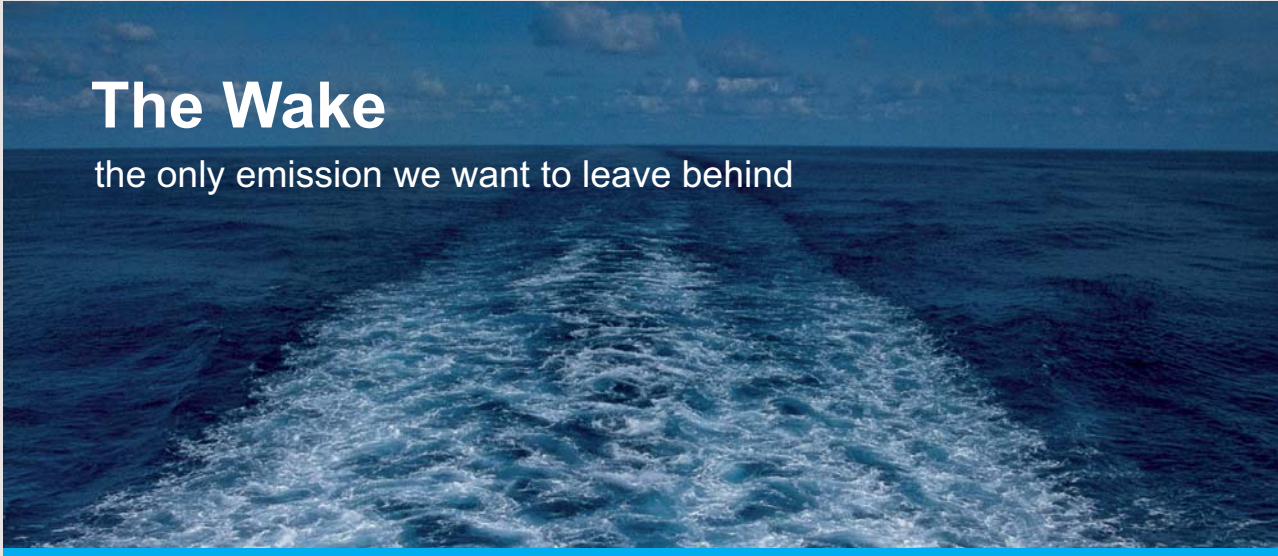
An online service provider provides services, which can be run electronically, e.g. application software services or ICT infrastructure services like storage or backup services. If this organization uses so-called cloud technologies it is called a cloud service provider (ten Hompel et al 2015; Marks & Lozano 2010).

The questions, which we have to put, are: Who pays? The service user? If not, who is the customer?

This list describes a great variety of Internet-based business models. However, it will not be a complete compilation because with new and innovative technologies new business ideas will come up and lead to new and additional offerings.

### 1.2.2 ADVANTAGES AND DISADVANTAGES

E-Commerce has a lot of advantages. But as we know it from every area of our life, there is “no free lunch”. Of course, E-Commerce has some disadvantages (see tables 1 and 2).




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<b>Advantages</b>	
<b>...for the customer</b>	<b>...for the provider</b>
<ul style="list-style-type: none"> <li>• Flexible shopping hours (7-24h)</li> <li>• No waiting queues (if net is available and software appropriately designed)</li> <li>• Shopping at home (we don't have to leave our apartment, refuel our car or buy a subway ticket, look for a parking place, etc.)</li> <li>• Individual needs can be covered (if customization is offered)</li> <li>• Global offers, more competition, pressure on prices</li> </ul>	<ul style="list-style-type: none"> <li>• Better customer service can be offered</li> <li>• Fast communication with customer</li> <li>• New customer potential through global visibility</li> <li>• No (traditional) intermediaries, who take away margins</li> </ul>

**Table 1:** Advantages of E-Commerce

<b>Disadvantages</b>	
<b>...for the customer</b>	<b>... for the provider</b>
<ul style="list-style-type: none"> <li>• Security risks:                             <ul style="list-style-type: none"> <li>○ Data theft (e.g. stealing account or credit card numbers)</li> <li>○ Identity theft (acting under our name or user identity)</li> <li>○ Abuse (e.g. third person orders goods with our identity, gets them delivered and we have to pay for it)</li> </ul> </li> <li>• Crime:                             <ul style="list-style-type: none"> <li>○ Bogus firm (firm does not really exist)</li> <li>○ Fraud (e.g. order is confirmed, invoice has to be paid, but goods are never delivered)</li> </ul> </li> <li>• Uncertain legal status (if something goes wrong, can we accuse the provider?)</li> </ul>	<ul style="list-style-type: none"> <li>• Higher logistics cost (goods have to be sent to the customer's location)</li> <li>• Anonymity of customers (how to make targeted advertisements?)</li> </ul>

**Table 2:** Disadvantages of E-Commerce

### 1.2.3 BUSINESS NET TYPES

A more abstract categorization of digital businesses has been given 2001 by Tapscott (Meier & Stormer 2008, pp. 34–46). He discussed the following business net types:

**Business Web Agora**

- Objective: To run a marketplace for goods and values.
- Attributes: Market information available, negotiation processes established, dynamic pricing through negotiations between market participants.
- Role of the customer: Market participant.
- Benefits: Negotiable products and services.
- Examples: eBay, auctions.yahoo.

**Business Web Aggregator**

- Objective: To run a digital super market.
- Attributes: Presentation of a great variety of products, fixed prices and no negotiation between supplier and customer, simple fulfilment from the customer's point of view.
- Role of the customer: Customer.
- Benefits: Convenient selection and fulfilment from the customer's point of view.
- Examples: etrade, amazon.

**Business Web Integrator**

- Objective: To establish an optimized value creation chain.
- Attributes: Systematic supplier selection, process optimization for the total value chain, product integration along the value chain.
- Role of the customer: Value driver.
- Benefits: Creation and delivery of customer-specific products.
- Examples: Cisco, Dell.

**Business Web Alliance**

- Objective: To establish a self-organizing value creation space.
- Attributes: Innovation in products and processes, trust building between different actors, abstinence of hierarchical supervision.
- Role of the customer: Contributor.
- Benefits: Creative and collaborative solutions.
- Examples: Linux, music.download.

**Business Web distributor**

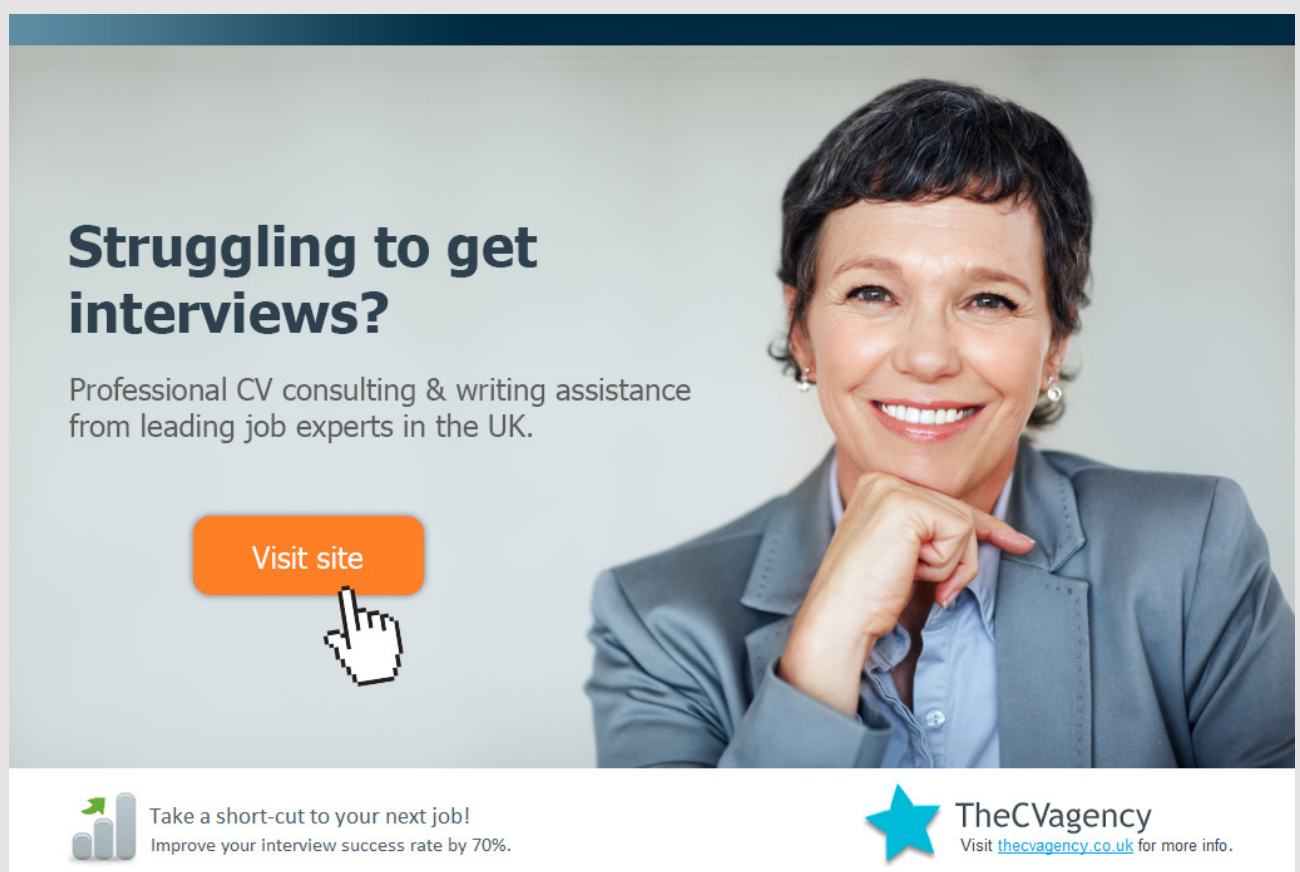
- Objective: Exchange of information, goods and services.
- Attributes: Net optimization, unlimited usage, logistics processes.
- Role of the customer: Recipient.
- Benefits: In-time delivery.
- Examples: UPS, AT&T, Telekom.

### 1.2.4 WEB 2.0

Web 2.0 (Chen & Vargo 2014) describes World Wide Web sites that emphasize user-generated content, usability, and interoperability. Although Web 2.0 suggests a new version of the World Wide Web, it does not refer to an update of any technical specification, but rather to cumulative changes in the way Web pages are made and used.

Characteristic application types of Web 2.0 are

- **Blogs:** A blog (a truncation of the expression weblog) is a discussion or informational site published on the World Wide Web and consisting of discrete entries (“posts”) typically displayed in reverse chronological order (the most recent post appears first). We normally see “multi-author blogs” (MABs) with posts written by large numbers of authors and professionally edited. MABs from newspapers, other media outlets, universities, think tanks, advocacy groups and similar institutions account for an increasing quantity of blog traffic. The rise of Twitter and other “micro-blogging” systems helps integrate MABs and single-author blogs into societal news streams.




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- **Social networking services:** A social networking service (also social networking site or SNS) is a platform to build social networks or social relations among people who share similar interests, activities, backgrounds or real-life connections. A SNS consists of a representation of each user (often a profile), his or her social links, and a variety of additional services such as career services. SNS's are Web-based services that allow individuals to create a public profile, create a list of users with whom to share connections, and view and cross the connections within the system. Most SNS's provide means for users to interact over the Internet, such as E-Mail and instant messaging. SNS's incorporate new information and communication tools such as mobile connectivity, photo/video/sharing and blogging.
- **Online communities:** An online community is a virtual community whose members interact with each other primarily via the Internet. Those who wish to be a part of an online community usually have to become a member via a specific site and necessarily need an Internet connection. An online community can act as an information system where members can post, comment on discussions, give advice or collaborate. Commonly, people communicate through SNS's, chat rooms, forums, E-Mail lists and discussion boards. People may also join online communities through video games, blogs and virtual worlds.
- **Forums/Bulletin boards:** An Internet forum, or message board, is an online discussion site where people can hold conversations in the form of posted messages. They differ from chat rooms in that messages are often longer than one line of text, and are at least temporarily archived. Also, depending on the access level of a user or the forum set-up, a posted message might need to be approved by a moderator before it becomes visible.
- **Content aggregators:** An aggregator is a website or computer software that aggregates a specific type of information from multiple online sources.

If business wants to benefit from Web 2.0 then it has to proceed in a specific way which in many aspects differs from the traditional Web based business. The differences and conformities between the Web 1.0 ("old") and the Web 2.0 world ("new") are listed in table 3.

Area	Old (Web 1.0)	New (Web 2.0)
Business philosophy	IT enabled relationship marketing	IT enabled relationship marketing
Technology base	Web 1.0 technology (static pages, file system, communication via E-Mail separated from website)	Web 2.0 technology/ Social technology (user-generated content, usability, interoperability)
Digital part of business processes	Transaction based: one-to-one interaction	Interaction based: dynamic, many-to-many interaction
Interaction place	Defined channels: E-Mail, phone calls, websites, stores, etc.	Dynamic customer-driven touch-points realized in social media
Segmentation of users and participants	Traditional demographics	Dynamic, flexible and temporary segmentation if at all
Broadcast message flow	Push-based, inside-out	Pull-based, outside-in
Control	Firms and established organizations	Social customers
Design/analysis scope	Internal focus: one (part of an) organization	Value chain through total organization or group of organizations
Data store	360° customer transaction data	All interactions or conversations across all touch points; user contributed contents
Data analysis	Subject-oriented analysis	Network analysis
Metrics	Transaction based: Customer life-time value (CLV), share of market, RFM analysis measures (RFM = Recency, Frequency, Monetary)	Interaction based: Customer referral value (CRV), share of voice, size and engagement of communities, sentiment
Viral marketing (information is spread like a virus)	Not possible	Can easily develop a viral marketing campaign
Crowd sourcing	Not possible	Integral part of SCRM strategy (SCRM = social media CRM)
Customer loyalty	Static, repeated patronage	Dynamic, eWoM (electronic Word of Mouth), advocacy

**Table 3:** Comparison of Web 1.0 and Web 2.0



In the Web-2.0-world the traditional goods-dominant logic is replaced by a service-dominant logic. Its premises are:

- Service is the fundamental basis of exchange.
- Indirect exchange masks the fundamental basis of exchange.
- Operant resources are the fundamental source of competitive advantage.
- Goods are a distribution mechanism for service provision.
- All economies are service economies.
- The customer is always a co-creator of value.
- The enterprise cannot value, but only offers value propositions.
- A service-centred view is inherently customer-oriented and relational.
- All social and economic actors are resource integrators.
- Value is always uniquely defined by the beneficiary.



The advertisement features a dark blue background with the 'FACTCARDS' logo in white and light blue. Below the logo, a question asks if the reader is working in academia, research, or science and if they have thought about working and moving to the Netherlands. Five colorful cards represent different categories: 'Arriving' (yellow, 33), 'Living' (green, 50), 'Studying' (red, 51), 'Working' (orange, 101), and 'Research' (purple, 50). A light blue button at the bottom right says 'VISIT FACTCARDS.NL'.

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If an enterprise wants to be successful in the Web-2.0-world it has to move from a goods focus to a service focus. How can this be managed? The following rules may help:

- Do not produce goods but assist customers in their own value-creation processes.
- Value is not created and sold but value is co-created with customers and other value-creation partners.
- Do not consider customers as isolated entities, but in the context of their own networks.
- Resources are not primarily tangible such as natural resources but usually intangible such as knowledge and skills.
- Shift from thinking of customers as targets to thinking of customers as resources.
- Shift from making efficiency primary to increasing efficiency through effectiveness.

Obviously there is a strong focus on the customer and customer satisfaction as it should be in every business. But what is really new? Is there finally a significant difference between traditional business, Web 1.0 business and Web 2.0 business? We are not sure.

## **1.3 TECHNICAL AND ECONOMIC CHALLENGES**

### **1.3.1 TECHNICAL CHALLENGES**

ICT systems have to work properly not only within the boundaries of the own organization but also in combination with ICT systems of other organizations. Interfaces between the involved systems have to be defined and documented properly. But: How heterogeneous are the involved ICT systems allowed to be? Is our IT infrastructure fit for E-Commerce? How do we have to change or extend our application systems for E-Commerce?

In the digital business ICT systems are mission critical assets. How do we have to protect an ICT system so that it is not possible to destroy it, damage it or manipulate it? Are our ICT systems secure? Are unauthorized persons able to get access to our systems? Are payment procedures secure enough? Can we protect the personal data of involved people, especially customer data?

Finally we have to realize, that E-Commerce depends on people. Are the people of our IT organization qualified enough? Can we provide the necessary and significantly high technical support?

### 1.3.2 ECONOMIC CHALLENGES

E-Commerce is not only a matter of technology. It is primarily, because it is commerce, a matter of management and organization. The following questions have to be answered:

- Are our business processes standardized enough – at least harmonized among the participants?
- Who is allowed to participate? Are all participants trustworthy? Who makes the decision which person or organization is allowed to participate?
- How much E-Commerce do we need to keep competitive? How do we have to change our business model?
- What is going to happen after opening a new (electronic) sales channel? Will traditional sales channels suffer from it?
- How can we measure the success of our E-Commerce activities? Will costs be compensated through revenues? Will we make profit?
- How do we have to develop our relationship with customers, suppliers and other business partners to be able to realize the advantages of E-Commerce for our organization and avoid the disadvantages? How do we have to develop and change our business relationships?
- How do we have to redesign our business processes? How do the roles of our employees change? Are our employees qualified for these new roles?

## 1.4 EXERCISES

### 1.4.1 QUESTIONS FOR YOUR SELF-STUDY

Q1.01: Where do you use the opportunities of E-Commerce actually in your daily life?

Q1.02: Which companies do you know which are doing E-Commerce?

Q1.03: Consider the Internet-based businesses, which we have listed above. Are they really new business categories?

Q1.04: Find additional advantages and disadvantages of digital businesses.

Q1.05: Consider the above-mentioned technical and economic challenges of E-Commerce. Try to find answers to the various questions, which we have listed.

Q1.06: What is E-Commerce? How does it differentiate from traditional business models?

Q1.07: What are different business models available for E-Commerce?

Q1.08: How can customers benefit from E-Commerce?

### 1.4.2 PREPARATION FOR FINAL EXAMINATION

T1.01: We have discussed about E-Commerce, E-Business and E-Procurement. Is there any relationship between these three terms? What is the difference between E-Commerce and E-Business? What is the difference between E-Commerce and E-Procurement?

T1.02: E-Commerce is so successful, because we have the Internet. Do you agree to that statement? Why? What would happen, if tomorrow morning the Internet had been shut down? What would happen, if tomorrow we would only have traditional telephone lines?

T1.03: Please define the term “M-Commerce”.

T1.04 E-Commerce has advantages as well as disadvantages. Give one example for the customer’s perspective. Give one example for the supplier’s perspective.

### 1.4.3 HOMEWORK

Apply the E-Commerce elements to the administration of your university. Who are the customers? What is delivered? What are the potentials? What are the advantages or disadvantages? Which parts have already been digitalized? What would you recommend to the top management of the university to do next?



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## 2 FRAMEWORKS AND ARCHITECTURES

### Learning objectives

In this chapter you will learn,

- what are the main actors and stakeholders in the area of E-Commerce,
- how the fundamental sales process and his 7+1 process steps work,
- what are the technological elements, which are characteristic for E-Commerce and have enabled the big success of E-Commerce.

### Recommended pre-reading

- Mohapatra 2013, chapter 2.

### 2.1 ACTORS AND STAKEHOLDERS

E-Commerce is driven by different groups of actors and stakeholders.

First we have persons, abbreviated by “C”, where “C” stands for (potential) consumers or citizens, according to the specific context, which is to be considered.

Secondly we have business organizations, abbreviated by “B”, where “B” stands for producers and suppliers, trade organisations or merchants, banks, insurance companies or other financial service providers, logistics & transportation firms or forwarding agencies and last but not least several intermediaries (making business with and on the Internet; see chapter 1 of this book).

Thirdly we have governmental authorities, abbreviated by “G” or “A”, where “A” stands for administration and “G” stands for Government. This category includes local authorities, e.g. on town level or on county level, national authorities, e.g. on state level or on federation level (United states of...), and international authorities like European Union, United Nations, etc.

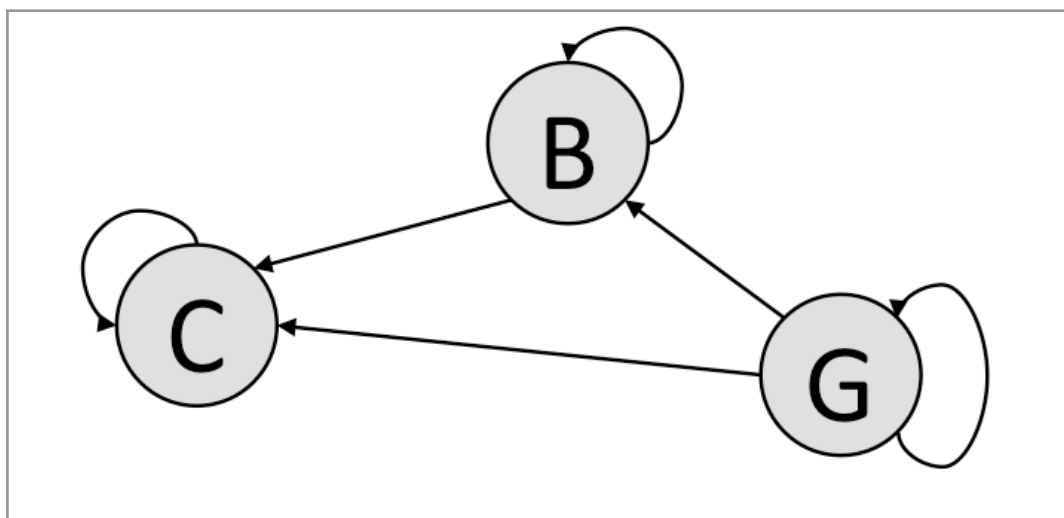
We also see political parties, lobby organizations, press and media, non-governmental organizations (NGO's) like Greenpeace, Red Cross or Olympic committee, churches and other religious organizations, sports and other associations. There is no specific abbreviation for this group of stakeholders.

According to the specific nature of the interacting partners we talk about “X2Y business” where X and Y belong to the above-mentioned categories. We only talk about X2Y business if there is an interchange of goods or services and money. The supplier provides goods or services, the customer, be it a consumer or another business, has to forward an appropriate amount of money to the supplier. This is done on the base of a contract (be it a written or an oral contract).

There are typically mentioned relationships (see figure 1):

- C2C: “Consumer to Consumer”, considered as a part of B2C business here,
- B2C: “Business to Consumer” (see chapter 3 of this book),
- B2B: “Business to Business” (see chapter 4 of this book),
- G2C: “Government to Citizen”, part of E-Government (not considered in this book),
- G2B: “Government to Business”, part of E-Government (not considered in this book),
- G2G: “Government to Government”, part of E-Government (not considered in this book).

If you are interested in E-Government, see Rodríguez-Bolívar 2014 and Boughzala et al 2015.



**Figure 1:** Business Relationships (B = Business; C = Customer/Citizen; G = Government)

However this is a somehow artificial pattern. Doing business can be mainly considered via two questions:

- **Who is the initiator or driver of the business transaction?** If it is the supplier, then this is under the focus of E-Commerce. If it is the customer, then this is under the focus of E-Procurement.
- **What is the nature of the transaction?** If it is a temporary/one time transaction, then this will be considered under the term “B2C business”. If it is a permanent/an ongoing cooperation, then this will be considered under the term “B2B business”.

## 2.2 FUNDAMENTAL SALES PROCESS

As we are discussing E-Commerce we have to know in detail what is going on in E-Commerce transactions. Thus we have to consider the basic or fundamental sales process. This process describes the general pattern of making business in delivering goods or providing services and getting payments for this. Here we can differentiate as we generally and due to Porter's value chain do it in process management between the primary or kernel process and a secondary or supporting process (Baan 2014, p. 113).

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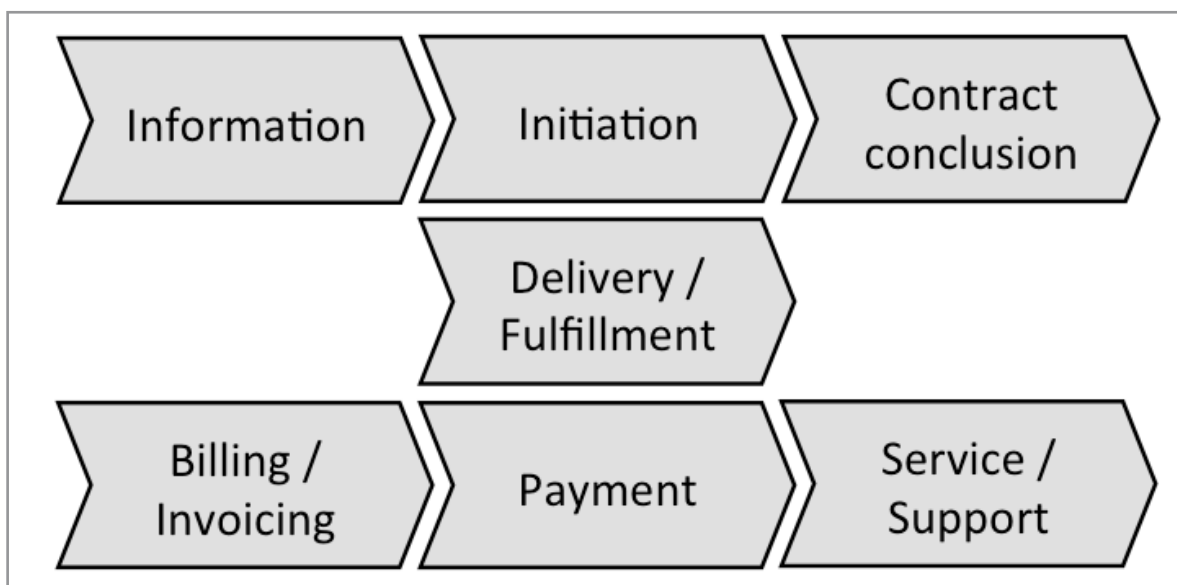
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### 1.2.1 PRIMARY PROCESS



**Figure 2:** The primary process

In general we will denominate the provider of goods or services as the **supplier** and the receiver of goods or services as the **customer**. Sometimes third parties are involved, e.g. shipping agents, which are denominated specifically.

The steps and sub-steps of the primary process, including the responsible party (see figure 2), are:

- Information step:
  - Search for products and services: by the customer,
  - Search for potential suppliers: by the customer,
  - Search for potential customers: by the supplier,
  - Communicate an offering: by the supplier,
  - Communicate a need: by the customer,
  
- Initiation step:
  - Get into contact: either by the customer or by the supplier,
  - Request for delivery or service: by the customer,
  - Offer for delivery or service: by the supplier,
  - Assess supplier: by the customer,
  - Assess customer: by the supplier,



- Contract conclusion step:
  - Negotiate offer: by supplier and customer,
  - Negotiate contract: by supplier and customer,
  - Place order: by the customer,
  - Confirm order: by the supplier,
  
- Delivery/fulfilment step:
  - Proceeding for physical goods:
    - Pack goods: by the supplier,
    - Load goods: by the supplier,
    - Ship goods: by the shipping agent,
    - Unload goods: by the shipping agent,
    - Unpack goods: by the customer or the shipping agent or a specific service provider,
    - Assemble complex equipment at the customer's site: by the shipping agent or a specific service provider,
    - Accept delivery: by the customer,
    - Approve contract fulfilment to authorize billing: by the customer,
  
  - Proceeding for physical services:
    - Build and maintain service fulfilment capability: by the supplier,
    - Come together physically because customer must be an active part in service delivery: by the supplier and the customer,
    - Define service levels: by the supplier, possibly after a negotiation with the customer,
    - Add service level agreement to contract: by the supplier,
    - Accept service fulfilment: by the customer,
    - Approve contract fulfilment to authorize billing: by the customer,
  
  - Proceeding for digital goods:
    - Send goods to the customer via the net or provide for download: by the supplier,
    - Protect goods against unauthorized access (see chapter 6 of this book): by the supplier,
    - Accept delivery or confirm successful download: by the customer,
    - Approve contract fulfilment to authorize billing: by the customer,

- Proceeding for digital services:
  - Provide service via the net: by the supplier,
  - Define service levels: by the supplier, possibly after a negotiation with the customer,
  - Add service level agreement to contract: by the supplier,
  - Initiate service provision: by the customer,
  - Accept service fulfilment: by the customer,
  - Approve contract fulfilment to authorize billing: by the customer,
- Proceeding for information:
  - Like digital goods,
- Billing/invoicing step:
  - Generate invoice: by the supplier,
  - Generate attachments to invoice (e.g. protocol of service fulfilment, protocol of final customer's approval, certificates, etc.): by the supplier,
  - Forward invoice to customer (via the Web or via postal services): by the supplier,

(Note: This step is sometimes conducted by the customer – totally or partially.)



"I studied English for 16 years but...  
...I finally learned to speak it in just six lessons"

Jane, Chinese architect

ENGLISH OUT THERE

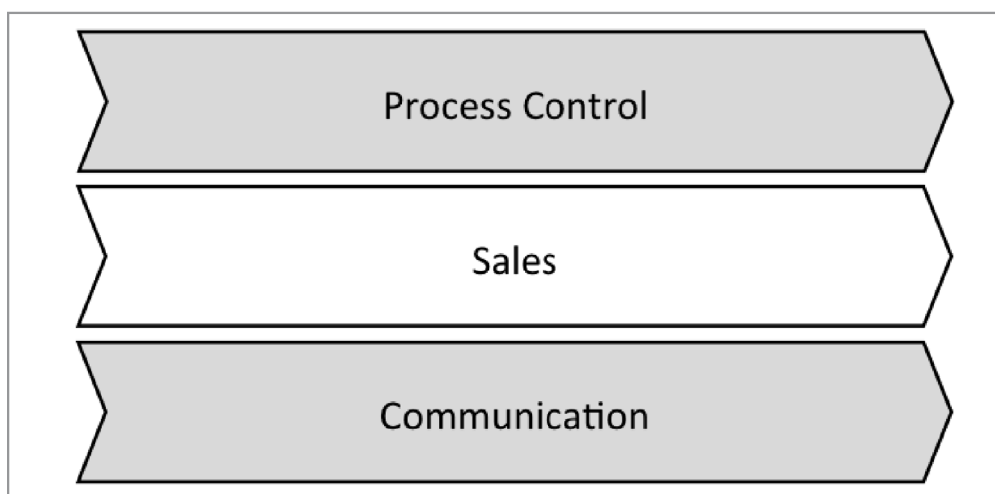
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- Payment step:
  - Get money from the customer (see chapter 7 of this book): by the supplier or a financial services provider,
- Service/support step:
  - Provide additional information for the customer (e.g. user manual, technical documentation, etc.): by the supplier,
  - Conduct customer support (e.g. recommendation for usage, FAQ, etc.): by the supplier,
  - Manage complaints: by the supplier,
  - Repair: by the supplier or a specific service provider,
  - Manage returns (if repair is necessary, a wrong product has been delivered or customer wants to “roll back” the business): by the supplier in cooperation with the customer,
  - Conduct maintenance (may be part of the product or may be a separate service offered by the supplier): by the supplier or a specific service provider.

### 2.2.2 SECONDARY PROCESS

The secondary process (see figure 3) can be sub-divided into

- Internal process control,
- Communication to the customer:
  - Tracking & tracing: by the supplier or the shipping agent,
  - Inform about order processing status: by the supplier,
  - Announce delivery time: by the supplier or the shipping agent.



**Figure 3:** The secondary process

### 2.3 TECHNOLOGICAL ELEMENTS

In this chapter we will discuss subjects IT people are talking about. Technology is a major enabler of E-Commerce as we consider it here. Globally accepted technological standards have been and still are a prerequisite and a driver of global electronic business. Here we will follow a technology model with four layers (see figure 4). This model (Merz 2002, p. 36) is not satisfactory from a scientific point of view, but it gives a heuristic and pragmatic orientation. The subsequent short descriptions are mostly taken from Wikipedia.

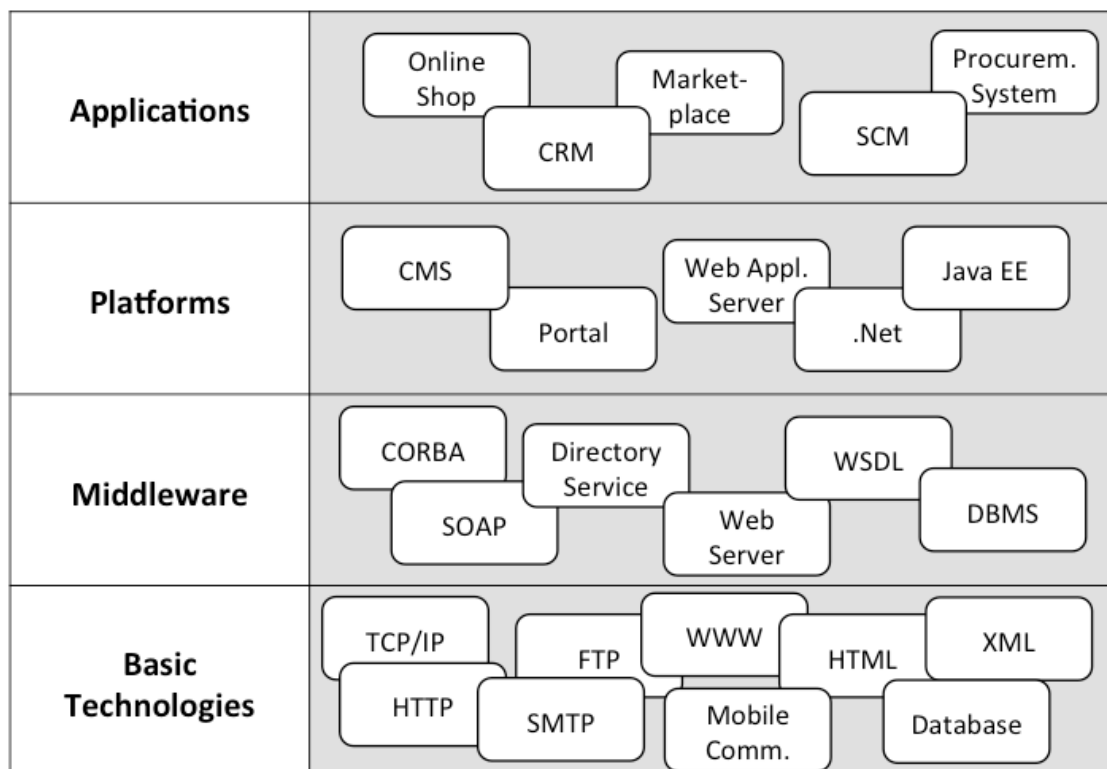


Figure 4: Technologies for E-Commerce

#### 2.3.1 BASIC TECHNOLOGIES

##### TCP/IP

TCP/IP (Mohapatra 2013, pp. 28–35) is an abbreviation and stands for **Transmission Control Protocol/Internet Protocol**. This twin protocol describes the transportation of data in the Internet and was introduced in 1978 by the USA-DoD (Department of Defence) as a standard for heterogeneous networks.

TCP/IP is part of the following 4-layer protocol:

**Layer 1: Local network/network access**

This layer corresponds to the first layer (physical layer) and the second layer (data link) of the ISO/OSI seven layer model (ISO = International Standards Organization, OSI = Open Systems Interconnection).

Available technologies are:

- **FDDI** (Fiber Distributed Data Interface), which has a ring structure, provides a transmission rate up to 100 MBit/sec and is defined in the ANSI standards X3T9.5, X3.139 and X39.5 (ANSI = American National Standards Institute),
- **Token Ring**, which also has a ring structure, in which the token-possession grants the possessor permission to transmit on the medium, is an advancement of FDDI and is defined by the standard IEEE 802.5 (IEEE = Institute of Electrical and Electronics Engineers),
- **Ethernet**, which has the widest propagation now, actually is the primary technology and provides transmission rates up to 10 Gigabit/sec (Access is carried out via CSMA/CD = Carrier Sense Multiple Access/Collision Detection; technology is based on standard IEEE 802.3).

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## Layer 2: Internet (IP)

This is the address layer, corresponding to the third layer (network layer) in the ISO/OSI seven layer model. The layer is independent from the physical transportation medium. Within IP each destination has a unique address, globally administered by IANA (IANA = Internet Assigned Numbers Authority).

- **IPv4** (Internet Protocol version 4) is the fourth version of the Internet Protocol (IP). It is one of the core protocols of standards-based internetworking methods in the Internet, and the first version was deployed in 1981. IPv4 is described in the IETF publication RFC 791 (September 1981; RFC = Request for Comment; IETF = Internet Engineering Task Force), replacing an earlier definition (RFC 760, January 1980).

IPv4 is a connectionless protocol for use on packet-switched networks. No permanent physical link between participants of the network is necessary. It operates on a best effort delivery model, in that it does not guarantee delivery, nor does it assure proper sequencing or avoidance of duplicate delivery.

IPv4 has a length of 4 Bytes respectively 32 bits. Usually each byte is presented as a decimal figure between 0 and 255: nnn.mmm.ppp.sss. The address 192.168.178.25 in binary form is

11000000.10101000.10110010.00011001

- **IPv6** (Internet Protocol version 6) is the most recent version of the Internet Protocol (IP), the communications protocol that provides an identification and location system for computers on networks and routes traffic across the Internet. IPv6 was developed by IETF to deal with the long-anticipated problem of IPv4 address exhaustion.

IPv6 uses a 128-bit address, allowing  $2^{128}$  addresses, or more than  $7.9 \times 10^{28}$  times as many as IPv4. The main advantage of IPv6 over IPv4 is its larger address space. The two protocols are not designed to be interoperable, complicating the transition from IPv4 to IPv6. However, several IPv6 transition mechanisms have been devised to permit communication between IPv4 and IPv6 hosts.

IPv6 addresses are represented as eight groups of four hexadecimal digits (16 digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F) with the groups being separated by colons: XX XX:XXXX:XXXX:XXXX:XXXX:XXXX:XXXX:XXXX, for example 2001:0DB8:0000:0042:0000:8A2E:0370:7334.

The number 8A2E means  $8 \cdot 16^3 + A(=10) \cdot 16^2 + 2 \cdot 16^1 + E(=14) \cdot 16^0$ .

The IETF adopted the IPng (IP next generation) model on 25 July 1994, with the formation of several IPng working groups. By 1996, a series of RFCs was released defining Internet Protocol version 6 (IPv6), starting with RFC 1883 and ending with RFC 2460.

It is widely expected that the Internet will use IPv4 alongside IPv6 for the foreseeable future. Direct communication between the IPv4 and IPv6 network protocols is not possible; therefore, intermediary trans-protocol systems are needed as a communication conduit between IPv4 and IPv6 whether on a single device or among network nodes.

### **Layer 3: Host-to-Host (TCP)**

TCP (Transmission Control Protocol) is a connection-oriented protocol for providing reliable data transport service between two computers (hosts) over Internet. It accepts data from a data stream, divides it into chunks, and adds a TCP header creating a TCP segment. The TCP segment is then encapsulated into an Internet Protocol (IP) datagram, and exchanged with peers. TCP is “the” transportation medium for WWW (World Wide Web). It corresponds to the fourth layer (transport layer) of the ISO/OSI seven-layer model.

### **Layer 4: Process/Application**

This layer corresponds to some layers of the ISO/OSI seven layer model: session layer (5), presentation layer (6) and application layer (7).

It includes several protocols, which will be discussed subsequently.

### **HTTP (Hypertext Transfer Protocol)**

HTTP functions as a request-response protocol in the client-server computing model. A Web browser, for example, may be the client and an application running on a computer hosting a website may be the server. The client submits an HTTP request message to the server. The server, which provides resources such as HTML files and other content, or performs other functions on behalf of the client, returns a response message to the client. The response contains completion status information about the request and may also contain requested content in its message body.

HTTP is a stateless protocol. A stateless protocol does not require the HTTP server to retain information or status about each user for the duration of multiple requests. However, some Web applications implement states or server side sessions using for instance HTTP cookies or hidden variables within Web forms.

HTTP is documented in RFC 2616 (= HTTP/1.1).

### **FTP (File Transfer Protocol)**

FTP is a standard network protocol used to transfer computer files from one host to another host over a TCP-based network, such as the Internet. FTP is built on a client-server architecture and uses separate control and data connections between the client and the server. FTP is documented in RFC 959 (1985).

### **SMTP (Simple Mail Transfer Protocol)**

SMTP is an Internet standard for electronic mail transmission. First defined by RFC 821 in 1982, it was last updated in 2008 with the Extended SMTP additions by RFC 5321, which is the protocol in widespread use today.



The advertisement features a background image of a person running on a path during a sunrise or sunset. The GaiTeye logo is in the top left, with the tagline 'Challenge the way we run'. The main text reads 'EXPERIENCE THE POWER OF FULL ENGAGEMENT...'. Below this, a dotted line leads to the text 'RUN FASTER. RUN LONGER.. RUN EASIER...'. On the right, there are technical diagrams of a foot and a hand cursor pointing to a yellow button that says 'READ MORE & PRE-ORDER TODAY' with the website 'WWW.GAITEYE.COM'.

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Although electronic mail servers and other mail transfer agents use SMTP to send and receive mail messages, user-level client mail applications typically use SMTP only for sending messages to a mail server for relaying. For receiving messages, client applications usually use either POP3 or IMAP (POP3 = Post Office Protocol Version 3, IMAP = Internet Message Access Protocol).

Although proprietary systems (such as Microsoft Exchange and IBM Notes) and webmail systems (such as Outlook.com, Gmail and Yahoo! Mail) use their own non-standard protocols to access mail box accounts on their own mail servers, all use SMTP when sending or receiving email from outside their own systems.

### **WWW (World Wide Web)**

WWW is an open source information space where documents and other Web resources are identified by URLs (URL = Uniform Resource Locator), interlinked by hypertext links, and can be accessed via the Internet. It has become known simply as “the Web”. WWW is the primary tool billions of people use to interact on the Internet.

The World Wide Web was invented by the English scientist Tim Berners-Lee in 1989. He wrote the first Web browser in 1990 while he was employed at CERN (CERN = Conseil Européen pour la Recherche Nucléaire) in Switzerland.

Berners-Lee’s breakthrough was to marry hypertext to the Internet. In his book “Weaving The Web”, he explains that he had repeatedly suggested that a marriage between the two technologies was possible to members of both technical communities, but when no one took up his invitation, he finally assumed the project himself. In the process, he developed three essential technologies:

- a system of globally unique identifiers for resources on the Web and elsewhere, the universal document identifier (UDI), later known as uniform resource locator (URL) and uniform resource identifier (URI),
- the publishing language HyperText Markup Language (HTML),
- the Hypertext Transfer Protocol (HTTP).

Web pages are primarily text documents formatted and annotated with Hypertext Markup Language (HTML). In addition to formatted text, Web pages may contain images, video, and software components that are rendered in the user's Web browser as coherent pages of multimedia content. Embedded hyperlinks permit users to navigate between Web pages. Multiple Web pages with a common theme, a common domain name, or both, may be called a website. Website content can largely be provided by the publisher, or interactively where users contribute content or the content depends upon the user or their actions. Websites may be mostly informative, primarily for entertainment, or largely for commercial purposes. WWW is documented in RFC 1738 (1994) and WWW is administered by W3C (W3C = World Wide Web Consortium).

## **Mobile Communication**

### **GSM/EDGE**

GSM (Global System for Mobile Communications, originally Groupe Spécial Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second-generation (2G) digital cellular networks used by mobile phones. It is the de facto global standard for mobile communications with over 90% market share, and is available in over 219 countries and territories.

In 1998 the 3rd Generation Partnership Project (3GPP) was founded. It led to the extensions:

- High Speed Circuit Switched Data (HSCSD): up to 115 kbit/sec,
- General Packet Radio Service (GPRS): up to 53,6 kbit/sec,
- Enhanced Data Rates for GSM Evolution (EDGE): up to 220 kbit/sec download/ up to 110 kbit/sec upload.

EDGE is a digital mobile phone technology that allows improved data transmission rates as a backward-compatible extension of GSM. Through the introduction of sophisticated methods of coding and transmitting data, EDGE delivers higher bit-rates per radio channel, resulting in a threefold increase in capacity and performance compared with an ordinary GSM/GPRS connection. EDGE can be used for any packet switched application, such as an Internet connection, and thus creates the basis for M-Commerce.

### **UMTS**

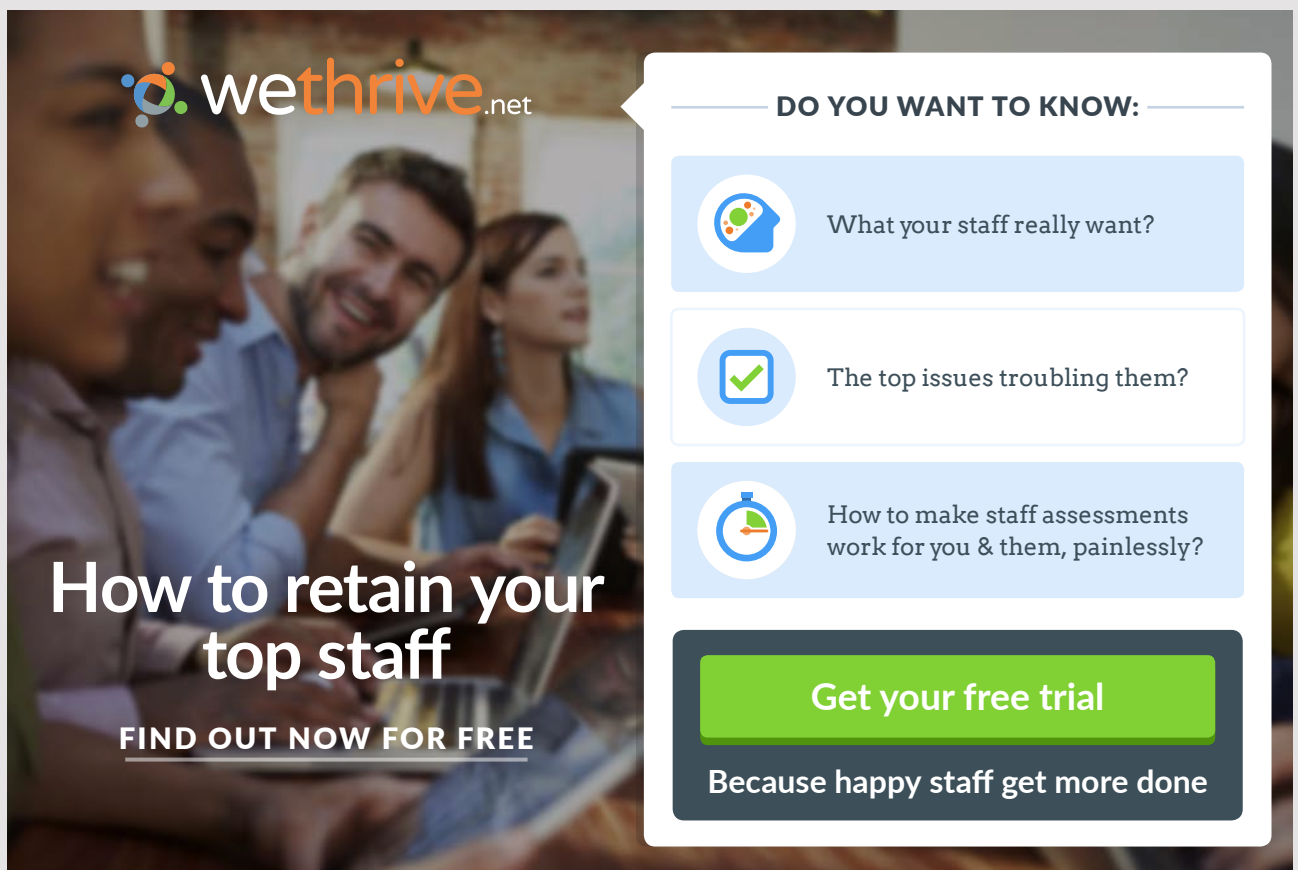
UMTS (Universal Mobile Telephone System) was developed in the 3rd Generation Partnership Project (3GPP). It is a mobile cellular system for networks based on the GSM standard and provides transmission rates up to 384 kbit/sec, with HSDPA up to 14,4 Mbit/sec.

High Speed Downlink Packet Access (HSDPA) is an enhanced 3G (third-generation) mobile communications protocol in the High-Speed Packet Access (HSPA) family, also dubbed 3.5G, 3G+, or Turbo 3G, which allows networks based on Universal Mobile Telecommunications System (UMTS) to have higher data speeds and capacity. HSDPA has been introduced with 3GPP Release 5, which also accompanies an improvement on the uplink providing a new bearer of 384 kbit/s. Even higher speeds of up to 337.5 Mbit/s are possible with Release 11 of the 3GPP standards.

UMTS (unlike EDGE) requires new base stations and new frequency allocations. This leads to high investment efforts with pay back periods up to 10 years.

### HTML (Hypertext Markup Language)

HTML 5 is a markup language (Mohapatra 2013, pp. 36–38) used for structuring and presenting content on the World Wide Web. It was finalized, and published, on 28 October 2014 by the World Wide Web Consortium (W3C). This is the fifth revision of the HTML standard. The previous version, HTML 4, was standardized in 1997. Its core aims are to improve the language with support for the latest multimedia while keeping it easily readable by humans and consistently understood by computers and devices (Web browsers, parsers, etc.).



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A Web browser can read HTML files and compose them into visible or audible Web pages. The browser does not display the HTML tags, but uses them to interpret the content of the page. HTML describes the structure of a website semantically along with cues for presentation. It is not a programming language.

HTML elements form the building blocks of all websites. HTML allows images and objects to be embedded and can be used to create interactive forms. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. It can embed scripts written in languages such as JavaScript, which affect the behaviour of HTML Web pages.

HTML documents can be delivered by the same means as any other computer file. However, they are most often delivered either by HTTP from a Web server or by E-Mail.

There are a lot of specific HTML-editors available (Open Source, Freeware, Commercial software).

### **XML (Extended Markup Language)**

XML is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. It was developed by W3C; the complete standard is available at [www.w3.org/TR/1998/REC-xml-19980210](http://www.w3.org/TR/1998/REC-xml-19980210).

The design goals of XML emphasize simplicity, generality, and usability over the Internet. It is a textual data format with strong support via Unicode for different human languages (Unicode is a computing industry standard for the consistent encoding, representation, and handling of text expressed in most of the world's writing systems. Developed in conjunction with the Universal Coded Character Set (UCS) standard and published as The Unicode Standard, the latest version of Unicode contains a repertoire of more than 128,000 characters covering 135 modern and historic scripts, as well as multiple symbol sets.) Although the design of XML focuses on documents, it is widely used for the representation of arbitrary data structures, e.g. in Web services. The advantage of XML is that the data structure of a document is documented within the document. However, there is a "price" for this generality: The size of XML documents, compared to EDIFACT documents, is much greater.

As of 2009, hundreds of document formats using XML syntax have been developed, including RSS (Rich Site Summary; a family of standard Web feed formats to publish frequently updated information: blog entries, news headlines, audio, video), Atom (Atom Syndication Format; used for Web feeds; or: Atom Publishing Protocol for creating and updating Web resources.), SOAP (Simple Object Access Protocol; protocol specification for exchanging structured information in the implementation of Web services in computer networks), and XHTML (Extensible HyperText Markup Language; mirrors or extends versions of HTML).

XML-based formats have become the default for many office-productivity tools, including Microsoft Office (Office Open XML), OpenOffice.org and LibreOffice (OpenDocument), and Apple's iWork. XML has also been employed as the base language for communication protocols, such as XMPP (Extensible Messaging and Presence Protocol). Applications for the Microsoft .NET framework use XML files for configuration. Apple has developed an implementation of a registry based on XML.

### **XML database**

An XML database is a data persistence (a data structure that always preserves the previous version of itself when it is modified) software system that allows data to be stored in XML format. These data can then be queried, exported and serialized into the desired format. XML databases are usually associated with document-oriented databases.

Two categories of XML databases are available:

- **XML enabled data bases:** These may either map XML to traditional database structures (such as a relational database), accepting XML as input and rendering XML as output, or more recently support native XML types within the traditional database. This term implies that the database processes the XML itself (as opposed to relying on middleware).
- **Native XML data bases:** The internal model of such databases depends on XML and uses XML documents as the fundamental unit of storage, which are, however, not necessarily stored in the form of text files.

### **2.3.2 MIDDLEWARE**

Middleware consists of technologies building the link between hardware and application software. The boundaries between middleware and hardware as well as between middleware and application software are changing over time due to the technological development. Middleware normally is a category of general and not application specific software. In general there is a trend to replace hardware functionality by middleware thus allowing the usage of highly standardized hardware components which can be provided at low cost.

### **CORBA (Common Object Request Broker Architecture)**

CORBA is a standard defined by the Object Management Group (OMG) designed to facilitate the communication of (software) systems that are deployed on diverse platforms. CORBA enables collaboration between systems on different operating systems, programming languages, and computing hardware. The CORBA specification dictates there shall be an ORB (Object Request Broker) through which an application would interact with other objects.

Java Native Interface (JNI) is an alternative to CORBA. It is a programming framework that enables Java code running in a Java Virtual Machine (JVM) to call and be called by native applications (programs specific to a hardware and operating system platform) and libraries written in other languages such as C, C++ and assembly. However, there is a significant disadvantage: An application that relies on JNI loses the platform portability Java offers.

### **Database systems**

In a business environment we often use a relational database system, which is optimally suited to store and process structured data as we find it in typical business transactions.



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Typical examples for structured data are:

- Address data,
- Orders,
- Shipping documents,
- Invoices,
- Tax declarations.

Together with the growing usage of unstructured data (text documents, graphical information, multi media data) new types of databases become relevant for business purposes: NoSQL databases (Not only SQL) and XML databases.

### **Directory services**

We need directory services for the following purposes:

- Address lists,
- User management: A common usage of a directory service is to provide a “single sign on” where one password for a user is shared between many services, such as applying a company login code to Web pages (so that staff log in only once to company computers, and then are automatically logged into the company intranet),
- Authentication.

There are two standards widespread used:

- **LDAP** (Lightweight Directory Access Protocol) is an open, vendor-neutral, industry standard application protocol for accessing and maintaining distributed directory information services over an Internet Protocol (IP) network. LDAP is documented in RFC 4510 and RFC 4511. It has become the de-facto-standard in industry for authentication, authorization as well as user and address management. LDAP is based on a subset of the standards contained within the X.500 standard. Because of this relationship, LDAP is sometimes called X.500-lite.
- **X.500** is a series of computer networking standards covering electronic directory services. These directory services were developed in order to support the requirements of X.400 electronic mail exchange and name lookup. However, X.500 is too complex to support on desktops and over the Internet, so LDAP was created to provide this service ‘for the rest of us’.

## **Webserver**

A Webserver is a virtual computer (a piece of software), which helps to deliver Web content that can be accessed through the Internet.

Well-known products are:

- Apache HTTP Server,
- Microsoft Internet Information Services (IIS).

## **WSDL (Web Services Description Language)**

The actual version is WSDL 2.0 (2007). WSDL has been developed by W3C (World Wide Web Consortium).

WSDL is an XML-based interface definition language that is used for describing the functionality offered by a Web service. WSDL describes services as collections of network endpoints, or ports. The abstract definitions of ports and messages are separated from their concrete use or instance, allowing the reuse of these definitions. WSDL is often used in combination with SOAP and an XML Schema to provide Web services over the Internet.

## **SOAP (Simple Object Access Protocol)**

SOAP is a protocol specification for exchanging structured information in the implementation of Web services in computer networks. It uses XML Information Set for its message format, and relies on other application layer protocols, most notably HTTP or SMTP, for message negotiation and transmission.

### **2.3.3 PLATFORMS/Frameworks**

#### **Portal**

A portal is a central entry and navigation point to provide access to a virtual area (of applications or services) and to deliver additional information to the user. It works as an interface between user and system(s). Often portals are seen as the platform for an E-Commerce-strategy.



There are two categories of portals:

- Web portal
  - A horizontal portal is used as a platform to several companies in the same economic sector or to the same type of manufacturers or distributors.
  - A vertical portal (also known as a “vortal”) is a specialized entry point to a specific market or industry niche, subject area, or interest. Some vertical portals are known as “vertical information portals” (VIPs).
- Enterprise portal
  - provides a secure unified access point, often in the form of a Web-based user interface,
  - is a framework for integrating information, people and processes across organizational boundaries,
  - is designed to aggregate and personalize information through application-specific portlets (Portlets are pluggable user interface software components that are managed and displayed in a Web or enterprise portal.).

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Technical elements of a portal are:

- Use of Web-servers und Web-browsers on the basis of HTTP and HTML,
- Integration of “business objects”, e.g. JavaBeans (In computing, based on the Java Platform, JavaBeans are classes that encapsulate many objects into a single object (the bean).) or ActiveX components (ActiveX is a deprecated software framework created by Microsoft for content downloaded from a network, particularly in the context of the World Wide Web.),
- Access to data via ODBC or JDBC (Open/Java Database Connectivity).

### **Content Management System (CMS)**

A CMS is application software that allows publishing, editing and modifying content, organizing, deleting as well as maintenance from a central interface.

Main areas of functionality are:

- Content management application (CMA) is the front-end user interface that allows a user, even with limited expertise, to add, modify and remove content from a Website without the intervention of a Webmaster.
- Content delivery application (CDA) compiles that information and updates the Website.

Requirements to a CMS are:

- Role specific access rights and navigation,
- Usage of different data sources,
- Integration of content,
- Caching of content (to avoid data base access),
- Generation of meta-information (e.g. Site Maps),
- Functionality for administration,
- Personalization:
  - Explicit: configuration by user or administrator,
  - Implicit: configuration by interference with user activities,
- Multi-language ability,
- Cross-media-publishing capability.

## Web Application Server

A Web application server is a piece of software, which provides the run-time environment for the server part of a client server application (For Web applications the Web browser is the client part of the application).

Requirements to a Web application server are:

- Encapsulation of data sources,
- Interfaces to other services,
- Scalability,
- Monitoring- & management functions,
- Software lifecycle management.

## Java EE (Java Platform, Enterprise Edition)

Java EE provides an API (Application programming interface) and run-time environment for developing and running enterprise software, including network and Web services, and other large-scale, multi-tiered, scalable, reliable, and secure network applications. It extends the Java Platform, Standard Edition (Java SE), providing an API for object-relational mapping, distributed and multi-tier architectures, and Web services. Software for Java EE is primarily developed in the Java programming language.

Java EE Open Source Servers are Apache Geronimo, JBoss Application Server or GlassFish. Commercial Servers are IBM WebSphere, Oracle Application Server or SAP Netweaver Application Server.

## .NET (Dot-net)

.Net is a proprietary platform, provided by Microsoft. It is a competitor to Java EE.

### 2.3.4 TYPICAL APPLICATIONS

As a basis for subsequent considerations we will draft a general software architecture for the E-Commerce area (see figure 5).

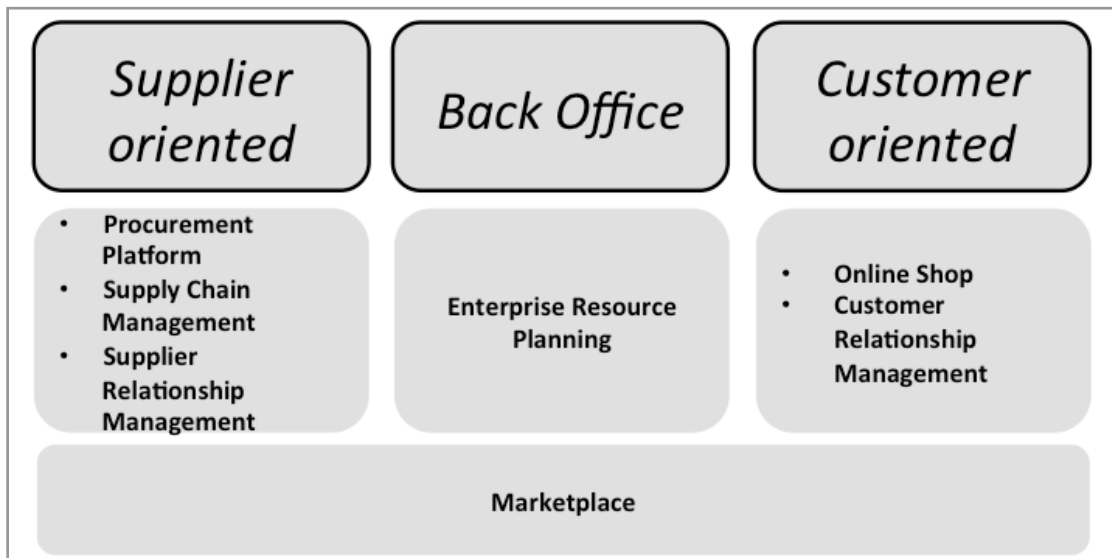



Figure 5: Software architecture

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These application systems will be discussed in more detail in chapters 3 and 4 of this book:

- Procurement platform: chapter 3,
- Supply chain management: chapter 4,
- Supplier relationship management: chapter 4,
- Enterprise resource planning: chapter 4,
- Online shop: chapter 3,
- Customer relationship management: chapter 3,
- Marketplace: chapter 4.

In this architecture three elements have interfaces between supplier and customer:

- Procurement platform (driven by customer): 1 customer,  $n$  suppliers ( $n > 1$ ),
- Online shop (driven by supplier): 1 supplier,  $m$  customers ( $m > 1$ ),
- Marketplace (driven by third party):  $n$  suppliers,  $m$  customers ( $n > 1, m > 1$ ; third party may be a supplier).

## 2.4 EXERCISES

### 2.4.1 QUESTIONS FOR YOUR SELF-STUDY

Q2.01: Compare the fundamental sales process as it has been shown here to your daily life and the “traditional” sales process. What is different? What is new? What is missing?

Q2.02: How much should a business manager know about technical subjects? What is “need to know”? What is “nice to know”?

### 2.4.2 PREPARATION FOR FINAL EXAMINATION

T2.01: Please list the seven plus one steps of the fundamental selling/purchasing process.

T2.02: There are three basic types of software systems in the E-Business: Online Shop/Marketplace/Procurement Platform. Characterize them by the number of suppliers and customers.

T2.03: A basic technology of E-Business is abbreviated by TCP/IP. What does this mean? What are the two functions, which are covered by this technology?

T2.04: Explain the two abbreviations B2C and B2B. Do you think it could make sense to define a business type C2C? Why?

### 2.4.3 HOMEWORK

It is often stated, that E-Commerce will lead to fully digital economics. Find a realistic view onto this topic. Which parts of the business can be digitalized? Which cannot?

## 3 B2C BUSINESS

### Learning objectives

In this chapter you will learn,

- that the fundamental sales process has a lot of variants due to a great variety of needs of the involved parties,
- that there are three challenges in realising B2C business, namely the pricing challenge, the fulfilment challenge and the payment challenge,
- that digital business creates new opportunities to learn more about your customers.

### Recommended pre-reading

- Mohapatra 2013, chapter 4.

### 3.1 THE PROCESS MODEL AND ITS VARIANTS

In the B2C business (see Xu 2014, pp. 77–96; B2C = Business to Customer) normally the selling partner is a business organization, but this is not a Must. Normally the buying partner is a single person, but this also is not a Must. So B2C is a synonym for the selling process considered from the point of view of the supplier.

#### 3.1.1 BUYING VIA INTERNET

First let us naively consider what is going on if we buy something via the Internet. The process starts, when the customer generates an order via an online shop. The order is processed in the backend ERP system(s) as a sales order and all ordered products and components are verified. If products are available in the quantity, which the customer has ordered, products can be delivered to the customer's location, and at that point of time, which is convenient for the customer.

After that verification the processing of the order continues in preparing that order for packing and shipping and also preparing it for billing. The customer gets an acknowledgement of his order. Customer and order data are available via a portal solution to all stakeholders.

But is E-Commerce really so simple? A series of questions arises:

- How did the customer find the “right” online shop?
- Is the order legally binding?
- Is the customer allowed to change his order ex post?
- How is the consignment processed through the provider?

- Do processes differ between producers and traders?
  - Does the trader have the ordered goods in his warehouse or does he himself send a corresponding order to the producer?
  - What happens if the ordered goods and services cannot be delivered?
  - How are the goods provided?
  - Can the customer pick up the ordered goods by himself?
  - Where can the customer pick up the ordered goods?
  - How is it ensured that the customer or a representative of the customer is on site when goods are delivered?
  - How does the customer have to pay?
  - What is going on in the case of a customer complaint?
  - What is going on in the case that the customer does not accept the delivered goods and that a return shipment has to be initiated?

### 3.1.2 VARIANTS OF THE PROCESS

Obviously is the Internet based selling process more complex than it looks like at the first impression. Thus we will discuss the process steps in more detail.

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### Information step

How does the process start? The first variant is, that the customer becomes active. Even here we have to differentiate because the starting point may be different:

- Product/service is clear, the supplier has already been selected,
- Product/service is clear; the supplier has not yet been selected,
- Product/service has to be determined.

The customer may enter the process via search engines, marketplaces/multi-shops, communities, rating platforms or known providers respectively their websites or online shops. Within those entry paths some questions arise:

- Who pays the information provider, if the process is started via online communities, rating platforms or search engines? Normally the customer does not pay for those services.
- Who is owner of the information sources? Rating platforms for product and price comparison are often operated and owned by publishing companies. Online communities are many a time established and administered by providers or lobby organizations.
- Who benefits?
- And finally: How does the payer, if it is not the customer, restrict or filter the information, which is forwarded to the customer?

The result of this step will be, that

- the customer identifies relevant products/services,
- the customer identifies relevant providers,
- the customer conducts a pre-selection or
- the customer makes his final decision.

The second variant of the information step is, that the supplier initiates it. Here we can differentiate, whether the customer is already known to the supplier or not. If the customer is already known then the process may be initiated via a specific contact or a general information (relationship management) or a specific offering (1:1-marketing/personalization). If the customer is not yet known to the supplier then he will try to call the customer's attention via supplier communities/marketplaces/multi-shops, via online communities, via banner advertising or via "adwords" (intelligent small ads). Advertisements are placed in search engines or websites of public interest. Sometimes sports and other associations take advertisements to fund their website or organization.



If the supplier wants to appeal to the customer specifically then he should have appropriate customer profiles. Those profiles are a valuable asset and contain information about properties/preferences/behaviours. This information may either be provided by the customer voluntarily or extracted from former behaviour of the customer (automatically) through analysing his visits, communication and transactions.

This generation of customer profiles can be done by each single supplier or by an aggregation of data collected by several suppliers. The latter can be an independent business. However, legal restrictions with respect to data privacy have to be followed.

There are several approaches or tools to collect customer data.

**Cookies** are tokens or short packets of data passed between communicating programs, where the data is typically not meaningful to the recipient program. The contents are opaque and not usually interpreted until the recipient passes the cookie data back to the sender or perhaps another program at a later time. Cookies allow detailed access statistics. However, the user must be able to switch cookies off (due to definition of IETF).

Profiles are explicitly provided by the customer. Profiles can also be deduced from the customer's behaviour (see chapter 8 of this book):


- Duration and course of session,
- Transaction data,
- Hits (HTTP access),
- Page Impressions,
- Click Streams,
- AdClicks,
- Content of shopping baskets,
- Dispatched queries.

Profile information is aggregated in data warehouses and analysed with methods from OLAP (Online Analytical Processing) and data mining.

E-Commerce is based on technology. This technology allows a 1:1-marketing which means that marketing activities can be focused on one specific customer. With the help of data processing capabilities potential customers can be identified through combination of:

- Given profile data whether they are provided directly by the customer or deduced from data, which have been provided by the customer in different environments,
- Credit-worthiness information (from banks or financial service providers),
- Address data (from online communities or electronic telephone directories),
- Demographic data (age, sex, marital status, profession; from online communities or existing profiles),
- Geographic data (size and location of place of residence, type of flat or house),
- Positive/negative attributes (e.g. from former transactions or from profile data).


**Recommendation Engines** are software systems, which analyse what the customer has purchased or checked. From this behaviour they make conclusions what the customer could be interested in when he visits the online shop for the next time. Good recommendation engines are learning systems. The longer they monitor the customer the better do they predict the customer's wishes and interests.



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Another approach to systematically build customer profiles is to run a CRM system (Customer Relationship Management). Here a supplier puts together all information about his customers and manages the resulting customer profiles. Also online communities can be a place where customers allow deep insights into their thinking, their preferences and their aversions. A lot of suppliers have established such online communities where customers can become a member, get privileged information, and can place their comments and judgements. Sometimes those communities take a fee for the membership thus establishing an aura of exclusivity.

The active identification and evaluation of customers has a downside: There is not only a positive but also a negative selection. Organizations establish specific rules like: You charge them higher fees because you don't want them – make them know they're not welcome. Or: Unprofitable customers will pay an additional price in terms of service. You answer the cash cows first. Examples of these strategies can be easily found in banks, insurances or mail order firms.

At the end of this step there is or should be a result:

- The customer has been identified.
- The customer request has been identified.
- A decision has been made, whether the customer will be served or not.
- It has been checked, that the requested product/service can be delivered.

In both variants of the information step product information is needed and has to be presented to the (potential) customer. If standardized products and services are offered then product information will be given via an online catalogue. This catalogue contains:

- Technical specifications of each product,
- Configuration and variants,
- Prices/rebates/payment conditions,
- Delivery conditions.

Because online shops offer products of different suppliers, there should be a common product data model in the industry. Indeed there are some general data models available.

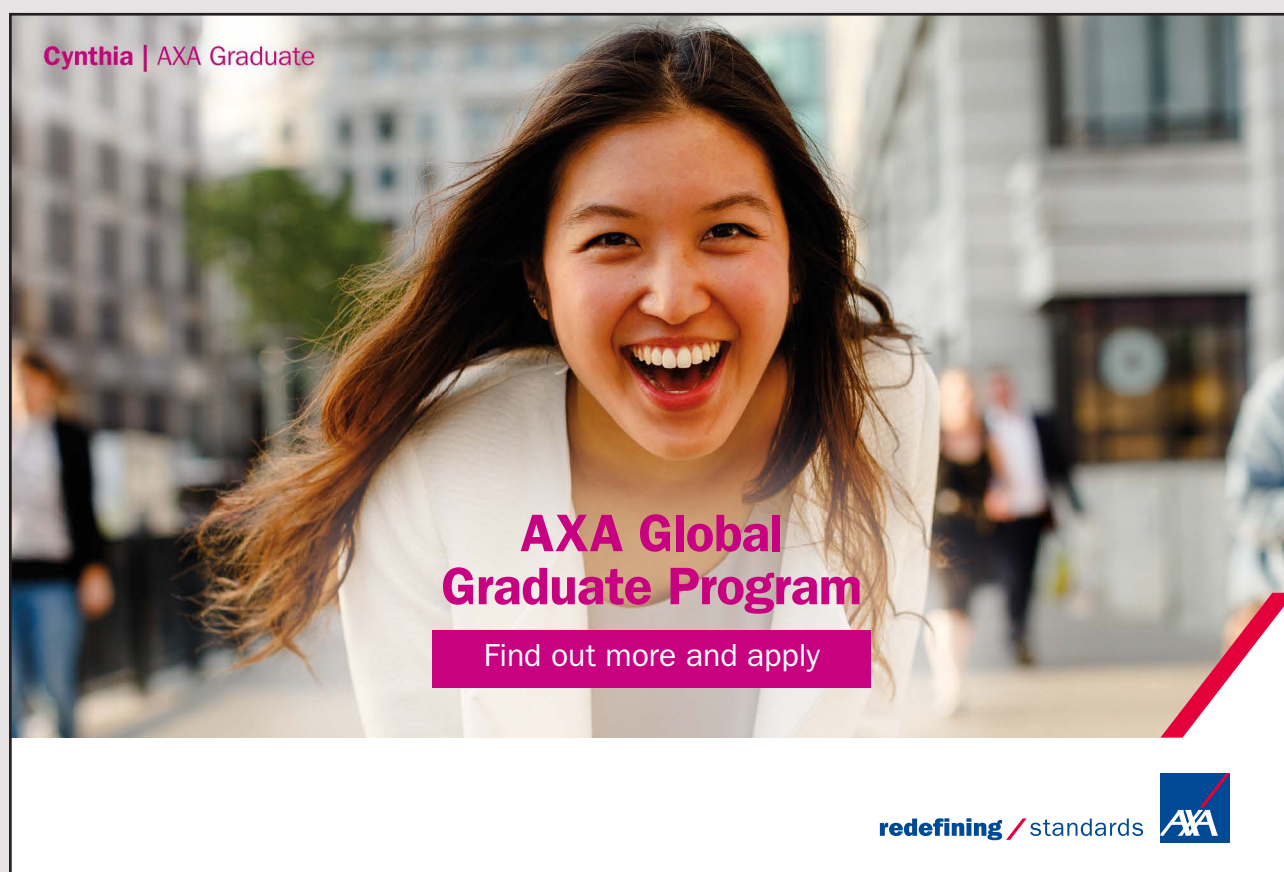
In German speaking economies dominates the so-called **BMEcat** (the BME catalogue; BME = Bundesverband Materialwirtschaft, Einkauf und Logistik e.V. (Germany); in English: Association Materials Management, Purchasing and Logistics). The actual version (2015) is BMEcat 2005. BMEcat provides a basis for a simple adoption of catalogue data from many different formats and particularly provides the requirements to promote the Internet goods traffic among companies in Germany. BMEcat can be used in a multi-language environment as well as in a multi-supplier environment. The XML-based standard BMEcat has successfully been realized in a multiplicity of projects. Many companies are using BMEcat today and exchange their product catalogues in the established standard BMEcat.

In BMEcat product data are documented with the following data element groups:

- Identification (article number, EAN, ...),
- Description (short/long, provider specific information, ...),
- Category (ERP material group, ...),
- Classification,
- Properties (weight, colour, ...),
- Order information (unit, minimal order size, ...),
- Prices (list price, rebates, ...),
- Logistics information (delivery period, packaging unit, ...),
- Additional information (pictures, PDF files, ...),
- References to other products,
- Special identifiers (exceptional offer, phase-out model, ...).

There are also a lot of commercial activities in the product data management. OCI (Open Catalogue Interface) is a product of SAP AG (a successful German software enterprise). OCI allows access from SAP systems to provider catalogues.


Another commercial offering is **cXML (commerce XML)**, which was initiated by Ariba, a provider of procurement systems, which is well established in the USA. cXML is based on XML and provides formal XML schemas for standard business transactions, allowing programs to modify and validate documents without prior knowledge of their form. cXML is a protocol that is published for free on the Internet along with its DTD. It is open to all for their use without restrictions apart from publications of modifications and naming that new protocol. Essentially, everyone is free to use cXML with any and all modifications as long as they don't publish their own standard and call it "cXML". cXML supports the punch-out method, which is a specific method of the interaction between a supplier's Web storefront and a customer's procurement application. With this method the customer leaves ("punches out") his company's system and goes to the supplier's Web-based catalogue to locate and add items to his shopping cart, while his application transparently maintains connection with the website and gathers pertinent information.



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A specific and very fundamental issue in presenting products in an E-Commerce area is the product identification key. The **Global Trade Item Number (GTIN)** is an identifier for trade items developed by **GS1** (a neutral, not-for-profit, international organization that develops and maintains standards for supply and demand chains across multiple sectors; comprising among others of the former EAN International and Uniform Code Council). Such identifiers are used to look up product information in a database (often by entering the number through a bar code scanner pointed at an actual product), which may belong to a retailer, manufacturer, collector, researcher, or other entity. The uniqueness and universality of the identifier is useful in establishing which product in one database corresponds to which product in another database, especially across organizational boundaries.

**GTIN** is contained in GS 1–128, an application standard within the Code 128 barcode. It identifies data with Application Identifiers (AI) and is a universal identification system in logistics. GTIN has 13 digits:

- Country prefix = 3 digits,
- Company identifier = 4–6 digits,
- Company specific article number = 5–3 digits,
- Check digit.

**ISBN** (International Standard Book Number) and **ISSN** (International Standard Serial Number), which every student should know well, are included in GTIN.

The potential of actual technologies allows a powerful monitoring and analysis of user data in the Internet. Data privacy thus has become an issue. With **P3P (Platform for Privacy Preferences)** a protocol is available allowing websites to declare their intended use of information they collect about Web browser users. P3P was developed by the W3C and officially recommended on April 16, 2002. P3P-Profiles are stored on Web servers in XML files.

If the surfer has a P3P agent, he can define, how the Web is allowed to handle his data. Usage is free for all providers and users. The protocol works in three steps: Proposal – Acceptance – Agreement, where the agreement is recommended by the provider. The negotiation of data privacy rules is done automatically by a “user agent”. A P3P agent is integrated in common browsers. However, the end user cannot check the action of the Web server and has to trust in them.

### **Initiation step**

When customer and supplier at the end of the information step know that they want to conduct a business transaction together, then they initiate it according to the specific nature of the goods to be sold respectively bought.

If standardized products without individual offers are sold then an **electronic shopping cart** is provided. The customer picks up interesting products or services and puts them into his shopping cart. He removes products or services, which are not interesting for him. The financial volume is always transparent so that he knows at any time how much he would have to pay if he would decide to buy the actual content of his shopping cart. The customer is able to order or abort every time.

If goods or services have to be personalized then this is done via requests and offers. The online shop has to provide an appropriate functionality to run this dialogue between supplier and customer.

### **Contract conclusion step**

At the end, both, the supplier as well as the customer, have to “sign” a contract. Initially all relevant data have to be put together. The customer has to be identified and his name and contact data have to be documented. Then invoicing address, delivery address and payment data must be selected. If the customer has previously bought from the supplier then these data may be available in the supplier’s customer database or CRM system. However the customer must be able to change or extend these data with every order. Then specific order data like preferred delivery time and notification method have to be registered. Of course, the shopping cart content is fixed with defining the order.

The request of the customer to buy something from the supplier must be answered by the supplier. He will run a **solvency check** either based on his own customer profile data or (sometimes) by sending a request to a specific financial information service provider. At the end he accepts or refuses the order and sends a confirmation note to the customer. Normally the customer expects that this is conducted within seconds or even parts of seconds but effort and duration of such checks may depend on the ordered goods and the financial volume of the order.

A severe problem for many online shops are the so-called **junk orders**, where people order things just for fun and never plan to accept delivery and pay for the delivered goods. Suppliers will try to find out whether there is a risk of junk ordering by checking the previous behaviour of the customer. In the case of digital goods the process may be designed such that the digital good can be downloaded to the customer's client, but not used until a specific key is provided to the customer. This key will be sent to the user when the supplier is sure that the customer has paid or will pay.

### Delivery/fulfilment step

If real goods have been sold, then the contract between supplier and customer is followed by the compilation of the ordered goods. If goods are not in stock of the online shop they have to be ordered at the producer and either they can be taken from the producer's warehouse or they have to be produced. When the ordered goods are available they must be consigned, packed and forwarded to **transportation**. Now the delivery can be made directly to the customer's address or to a station, e.g. an authorized retail shop in the customer's neighbourhood or to another home address if we are in an omnibus buying where an "agent" orders for his friends, colleagues or neighbours.

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At the end of the shipment the package with the ordered goods has to be physically given to the customer. Because the customer is not always at home or in his office, the **delivery time** must be coordinated. When this time has come the shipping company will be on site and transfer the goods to the customer. The customer then will confirm the delivery and that he has taken over the goods into his responsibility.

Sometimes the delivery will not be possible. It may be that the customer is not on site whether he has forgotten the delivery time or had to change his schedule short term and was not able to inform the shipping agent. It may be that the acceptance is refused, e.g. because of transport damages or the delivery had been initiated by a junk order.

Depending to the nature of the ordered goods an installation or assembly will be necessary at the customer's site. If complex (technical) equipment is delivered an instruction of the customer's representative has to be conducted. Finally old equipment has to be removed and packaging material has to be disposed.

The process step is finished with a confirmation of the delivery by the customer.

If services have been ordered the process has to be modified. The reason is that the customer is an active part of service production. The service production equipment must be provided and be shipped to the location of service delivery/service production. Also the time of service delivery must be determined. The process step finishes again with a confirmation of the service delivery.

If digital goods have been ordered they may be either documents or rights to use something. Documents will often be delivered due to the push principle; the ordered documents is sent to the customer. If a right has been sold then the delivery mostly is conducted due to the pull principle; the customer has to download software or a key or whatever he needs to realize the benefits of his purchase. The transfer of the digital good to the customer is closed with a proof of delivery. In the case of digital products the delivery process can be completely digitalized and processed with the Internet.

Finally also in this variant the process step is finished with a confirmation of delivery by the customer. This may be integrated into the proof of delivery.

### **Billing/invoicing step**

After the confirmation of delivery the billing and invoicing step can be started.

If the customer had to pay before delivery then it may happen that the invoice has to be corrected and a credit note (if the value of the delivered goods was lower than the value of the originally ordered goods) or debit note (if the value of the delivered goods was higher than the value of the originally ordered goods) must be created. Customers do not like additional charges. So the customer relationship management has to think of appropriate charging strategies.

If the customer has not paid before delivery, then the ideal situation is the identity of delivery and order. If there is a deviation from order an adjusted invoice has to be created. Here we also have the problem of the customer's acceptance in case of higher invoice amounts.

The supplier should carefully consider the process and optimize it so that the expected invoice total is exceeded only in very few cases.

Billing seems to be simple but of course it is not. **Tax regulations** have to be followed. It also turns out that costs of paper invoices are alarmingly high (paper, envelopes, stamps, processing cost). Also the run time of invoice letters at postal services may be an issue. If the customer gets the invoice one day later he will also pay one day later. If the supplier wants to create electronic invoices he has to be sure that the lawfulness of electronic invoice is given and he has to follow corresponding law requirements for (electronic) invoices.

The receipt of payment depends on the agreed payment method (see chapter 7 of this book). If the payment is done after delivery and not in combination with delivery then there may be a delay of payment and the supplier has to initiate a corresponding **dunning process** to get his money. First he will send friendly reminders to the customer, later-on dunning letters. If the customer does not just yet pay then it comes to a lawsuit. After the lawsuit a compulsory execution will be initiated to get the money from the customer with the help of governmental authorities.

If the supplier wants to have no trouble with the payments he could change to **factoring**. Here he will sell the debt claims to a third party and this third party will take over the cashing. The supplier will get a (major) part of the claimed amount immediately and does not have to wait for weeks or months. This improves his solvency.

Finally there is a very good advice for getting your money from your customers: Tell your customer that you have an effective cashing process – and be consequent in running that process.

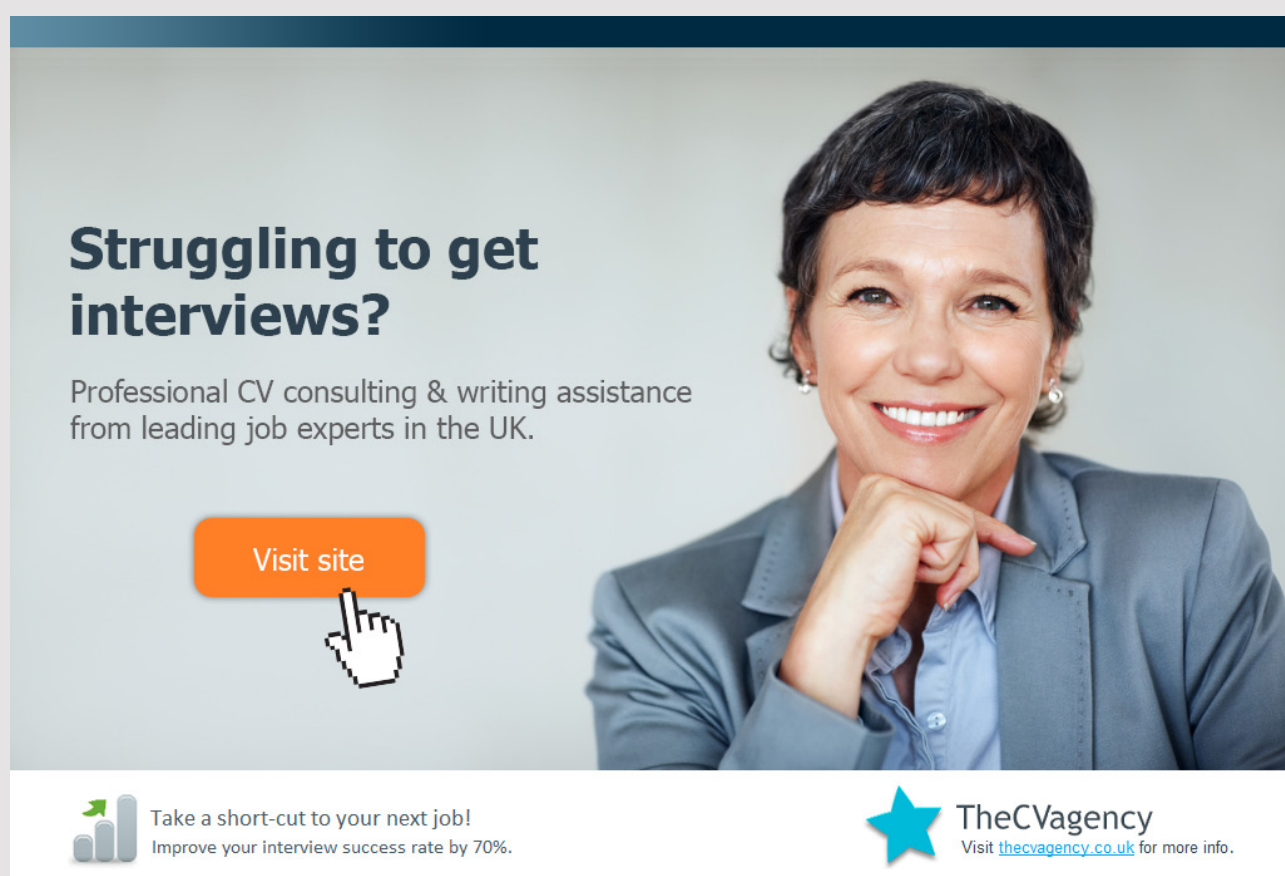
Sometimes the customer will get money back from you (credit voucher). According to the selected payment method this can result in a money transfer to the customer's bank account, a cash payment to the customer or a back posting on the customer's credit card account.

### Service/support step

To be successful in E-Commerce does not only depend on interesting products, low prices and fast delivery. To generate a high customer satisfaction presumes a professional service and support. There must be an effective **complaints management**. Supplementary and replacement deliveries, including return consignments, must be in place and run smoothly if needed.

The customer expects appropriate assembly support and installation help, of course a good documentation, e.g. user manuals, FAQ options. If a repair of a delivered component is necessary picking up and sending back of the component to the supplier should be as easy as possible for the customer. It may be that an on-site repair is the best alternative.

Return orders should be avoided, because it always leads to an expenditure of time for the customer and also a financial effort of the customer. The customer is strongly involved in the execution.




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E-Commerce allows checking the **customer's satisfaction** with each specific transaction. This can be done but there is the risk that the customer feels stalked by the supplier. Some enterprises exercise an approach where specific transactions initiate an assessment of the supplier in general.

Of course each supplier should keep in contact with his customers and each transaction should create information for the customer relationship management. Clubs, forums or so-called customer advisory boards can help to improve customer relationships. However this will only work successfully if customer's are considered as real partners. If the customers have the impression that those clubs, forums or boards are not a platform for a serious dialogue between supplier and customers then the effect of such platforms may be worse than having no such platforms.

Customer relationship means communication with the customer. In the E-Commerce world a great variety of communication channels is available:

- Letters,
- E-Mails,
- Telephone calls,
- Electronic chat rooms.

The challenges for the supplier are availability of those channels and acceptable response times.

### **Communication/tracking & tracing step**

Customer and supplier want to monitor the order processing status. This presumes a seamless and automated data capture during the total workflow, e.g. by scanners or RFID technology (RFID = Radio Frequency identification). RFID is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information.

Prerequisites for this seamless tracking and tracing are the interconnectedness of all actors, e.g. sub-contractors, the harmonization of data structures and communication protocols and the identification of goods to be conveyed.

### 3.1.3 E-PROCUREMENT

E-Procurement is a synonym for the selling process considered from the point of view of the customer. It is similar to B2C, but now the buying organization is the driver. This organization is the only customer and is looking for many suppliers. Thus a procurement platform if we talk about IT systems is somehow an inverse of an online shop.

## 3.2 THE PRICING CHALLENGE

### 3.2.1 PRICING STRATEGIES

The first pricing strategy (see Chen 2014) is that the supplier sets the prices for his products. The customer makes a “take-it-or-leave-it” decision. In the E-Commerce world this leads to lower prices and price dispersion. The problem for the supplier is, that it is easy to reduce prices but it is extremely hard to increase prices.

The second pricing strategy is the auction. Here we have a horizontal competition among customers. The customer who offers the highest amount of money gets the product. However, there is a difference to real-life auction if we are in the digital world. There are different end of auction rules, hard ending times and late minute bidding. The disadvantage for the customer is that Internet auctions run without physical inspection of goods. Thus the reputation of the supplier is a fundamental prerequisite for the trust of the customer in such transactions.

The third pricing strategy is the individual negotiation between customer and supplier.

### 3.2.2 REASONS OF PRICE DISPERSION

In the economic theory there is the law of one price. That means that in an ideal market with identical and total information for every participant demand and supply lead to a unique price for a specific product. But does this work in real markets? Obviously not, which can easily be found out by everybody of us. And it is also true for markets in the Internet. What are the reasons for such price dispersions?

First of all suppliers are not interested in ideal markets with total transparency and full information for everybody. And they try to create the impression as if they would offer a unique product or service as well as keeping competitors on distance. The objective of the first approach is that the (potential) customer stops his search process because he thinks that he has already found the best offer. The objective of the second approach is to exclude competitors from the competition, so that they are not able to offer something adequately to the customer.

Further supplier strategies can be found easily:

- Frustrate customers in searching so that they stop their search process earlier.
- Pull customers to products with low prices so that they think that the favourable prices are representative for the whole program of offered products.
- Give discounts only for selected products, which shall have the same result as pulling customers to the low price corner.
- Run short-term promotions, which are unpredictable for competitors.
- Prohibit comparability of prices by including or excluding delivery costs.
- Prohibit comparability of prices by giving different guarantees to the customer.
- Give discounts only for specific delivery options of a product, which shall have the same result as pulling customers to the low price corner.
- Focus on brand loyalty and supplier reputation in advertising.
- Avoid competition between different channels by offering different product variants in different sales channels.
- Let the customers think that they already have the complete information.



The advertisement features a dark background with the 'FACTCARDS' logo in white and blue. Below the logo, a question asks if the reader is working in academia, research, or science and if they have thought about working and moving to the Netherlands. Five colorful cards represent different categories: 'Arriving' (yellow, 33), 'Living' (green, 50), 'Studying' (red, 51), 'Working' (orange, 101), and 'Research' (purple, 50). A light blue button at the bottom right says 'VISIT FACTCARDS.NL'. To the right of the graphic, text explains that the website offers career information in the Netherlands, organized by category and accessible on both mobile and desktop.

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The information is ordered in the categories arriving, living, studying, working and research in the Netherlands and it is freely and easily accessible from your smartphone or desktop.

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### 3.3 THE FULFILMENT CHALLENGE

#### 3.1.1 DELIVERING REAL GOODS

Real goods cannot be forwarded electronically to the customer. Forwarding agencies and trucking companies are needed. Is this an own function or should it be transferred to a third party (outsourcing)? Does it make sense to think about delivery with drones? For example in areas with very low density of population? How much is short-term delivery a competitive advantage?

In international transportation trans-shipping (plane/train/ship/truck) is an issue. Also piracy and theft have to be mastered. A lot of tax and customs requirements have to be observed. And finally the export to a foreign country may raise the problem of **dual use goods**. Dual use goods are products and technologies normally used for civilian purposes but which may have military applications.

The next question where the supplier has to find an answer is whether the customer is at home to take over delivered products? Was an alternative delivery point defined in the order? Can the supplier deliver to a neighbour? Does the customer want this? Can the supplier trust in the neighbour? How can the delivery be proved if the neighbour signs? What can the supplier do if the customer declares that he never got the shipment?

And finally should the supplier do everything to avoid transportation damages. What are the packaging requirements? Who takes the risk of transportation damages? And does customer pay for transportation?

#### 3.3.2 DELIVERING DIGITAL GOODS

Digital goods can be copied without any damage of the original copy. Thus the “master copy” must be protected against unauthorized usage.

As an example let us consider the electronic distribution of software according to the model of SIIA (Software & Information Industry Association; see Meier & Stormer 2008).

The process runs as follows:

- The software supplier provides a software product.
- With specific packer software the product is registered at a clearing organization, a unique product identification number due to a global numbering standard is generated and the software is transferred to a BOB (Box of Bits) in coded form. The BOB is a specific digital warehouse.

- The online customer selects the requested software, downloads it from the BOB via the online shop of a merchant, pays for the software and gets a digital key and a license from the clearing organization.
- The clearing organization registers the software products, administers keys and its distribution and is a gateway for the money transfer from customer to bank, too.
- The online merchant has a contract with the software supplier, can order products from the BOB and offers consulting and services to his customers.

### 3.4 THE PAYMENT CHALLENGE

See chapter 7 of this book.

### 3.5 B2C-BUSINESS AND CRM

CRM (Customer Relationship Management) aims at tracking and analysis of all interactions of the firm with the customers to optimize sales volume, customer effectiveness, customer satisfaction and customer loyalty. It integrates all customer-oriented processes and considers the customer as a strategic asset (A regular customer is the most profitable customer).

Process owner of the CRM processes is the supplier. In CRM there is no focus on single transactions but on customer activities in general.

Typical CRM-Processes are:

- Process customer requests,
- Inform customer,
- Solve problems of customer,
- Conduct repair and service,
- Manage complaints:
  - Pre-complaint consideration set (complaint cause, dissatisfaction),
  - E-complaint decision (complainers versus non-complainers),
  - Profiling e-complaint senders (personality, demographics, culture),
  - E-complaint channels (channel choice, publicity),
  - E-complaint message (attitude orientation, language intensity),
  - E-complaint receivers (employees, observers),
  - Internal e-complaint management systems (IT, human elements),
  - E-complaint response message (speed, tone, content),
  - E-complaint feedback utility evaluations (perceptions, outcomes),
- Run customer loyalty improvement programs.



## 3.6 B2C SOFTWARE SYSTEMS

### 3.6.1 ONLINE SHOP

An online shop is characterized by one supplier and n customers. Process and software are under the control of the supplier.

Subsystems or components of an online shop are:

- Shop system in a narrower sense:
  - Sign-on function,
  - Presentation of goods and services,
  - Ordering function,
  - Payment function,
  - Delivery function,
  - Search engine,
- Editing functionality (see CMS),
- Banner management (small advertisements),
- Recommendation engine,
- Call centre integration,



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- Tax system,
- Development system,
- Data management (product catalogue, customers, transactions, documents, banner pool)
- Interfaces:
  - Payment gateway,
  - Data exchange with business partners (e.g. suppliers, forwarding agencies, payment service providers),
  - ERP-System (accounting, materials management),
  - Data warehouse.

There are organizations, which certify online shops and award quality seals. Examples of such organizations are:

- EHI (EuroHandelsInstitut): owned by EHI Retail Institute e. V.; provide quality seal “EHI trusted Online-Shop”,
- Trusted Shops: founded 1999; assessment system for Online Shops; Business Partner of European E-Commerce and Mail Order Trade Association (EMOTA), an association of European mail order associations; present in 9 European countries,
- TÜV Saarland (Germany), a German technical services corporation.

### 3.6.2 PROCUREMENT PLATFORM

A procurement platform is a computerized system designed to manage the procurement process. Procurement platforms are often included in an enterprise resource planning (ERP) or accounting software product.

A typical procurement platform includes purchase requisitions, purchase orders, goods receipts, and invoice processing. In addition to these core requirements, most systems include an array of reporting tools. Built-in approval processes, controls, and funds management tools are usually standard in the larger products.

A procurement platform is characterized by  $n$  suppliers and one customer. Process and software are under control of the customer.

Objectives of a procurement system are:

- Reduction of prices through centralization (quantity rebates),
- Minimization of procurement costs (mainly in the area of C-products/MRO = Maintenance, Repair and Operations),
- Minimization of warehousing costs (just-in-time delivery).

Functions of a procurement platform are:

- Indent management,
- E-Tendering,
- E-Auctioning,
- Vendor management,
- Catalogue management,
- Purchase order integration,
- Order status,
- Ship notice,
- E-Invoicing,
- E-Payment,
- Contract management.

### **3.6.3 CUSTOMER RELATIONSHIP MANAGEMENT (CRM)**

Customer relationship management (CRM) is an approach to manage a company's interaction with current and future customers (Menzel & Reiners 2014). The CRM approach tries to analyse data about customers' history with a company, in order to improve business relationships with customers, specifically focusing on retaining customers, in order to drive sales growth. One important aspect of the CRM approach is that a CRM system compiles information from a range of different channels, including a company's website, telephone, E-Mail, live chat, marketing materials, social media, and more. Through the CRM approach and the systems used to facilitate CRM, businesses learn more about their target audiences and how to best cater to their needs.

A CRM system usually provides the following functionality:

- External interfaces:
  - Web channel,
  - Interaction channel,
  - Partner channel management,
- Marketing:
  - Marketing resource management,
  - Segmentation & list management,
  - Campaign management,
  - Real time offer management,
  - Lead management,

- Sales:
  - Sales planning & forecasting,
  - Sales performance management,
  - Territory management,
  - Accounts & contacts,
  - Opportunity management,
  - Quotation & order management,
  - Pricing & contracts,
  - Incentive & commission management,
  - Time & travel,
  
- Service:
  - Service order management,
  - Service contract management,
  - Complaints & returns,
  - In-house repair,
  - Case management,
  - Installed base management,
  - Warranty management,
  - Resource planning,

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- Internal interfaces:
  - Trade promotion management,
  - Business communication management.

## **3.7 EXERCISES**

### **3.7.1 QUESTIONS FOR YOUR SELF-STUDY**

Q3.01: How can we get to the point where the consumer wants to buy something from us?

Q3.02: How should we make the business, so that the customer is satisfied, and we as a supplier are satisfied as well?

Q3.03: You are a producer of a specific product, which you deliver in various packaging sizes and different trade units. What are the consequences for the identification of the product, e.g. to determine your sales quantities?

Q3.04: Think that you run an online shop. How can you make sure that the customer, just placing an order, is a real customer, will accept the delivery and then pay the invoice?

Q3.05: Think that you sell digital goods. How can you ensure that the customer does not disclaim the delivery of a digital good?

### **3.7.2 PREPARATION FOR FINAL EXAMINATION**

T3.01: If you are the owner of an online shop, you can decide whether your customers have to pay before delivery or after delivery. Both variants have advantages and disadvantages for you. Assume that you can select only one of both methods. Which one would you select? Why?

### **3.7.3 HOMEWORK**

Consider the key success factors of B2C. Is it only IT? What is most important?

# 4 B2B BUSINESS

## Learning objectives

In this chapter you will learn,

- how we define B2B business,
- what are the commonalities of B2C and B2B business,
- what are the differences between B2C and B2B business,
- how electronic business can be supported by application software packages.

## Recommended pre-reading

- Chakravarty 2014, chapter 4.

## 4.1 THE PROCESS MODEL AND ITS VARIANTS

### 4.1.1 DEFINITION OF B2B

B2B stands for “Business to Business”. In general: Business interaction between different organizations is considered. B2B E-Commerce is simply defined as E-Commerce between companies (Xu 2014, pp. 119–130). Business processes cross the boundaries of the participating organizations. B2B also includes business interactions between sub-organizations of (big) organizations. Big enterprises are often organized as a group of different autonomous legal entities. There is no clear limit between “inner world” and “outer world”.

Somehow B2B is a synonym for integration and coupling of business processes. What does this mean for the responsible management?

Business processes cross boundaries of organizations. Thus the process ownership must be clearly defined and assigned. It also should be clear, who are the owners of different sub-processes and how they have to coordinate their work. The overall process owner may be a process committee consisting of all sub-process owners. If there is a process committee then decision rules must be defined and agreed on by all involved organizations.

There must also be integration and consistency of the underlying business rules. These business rules must be consistent between the participating organizations and they must be agreed on in all participating organizations. Often there is one participating organization, which dominates all other participants, e.g. if B2B commerce is established within a group of firms.

**Business rules** cover:

- Decision rules for process management,
- Rules for exception handling,
- A comprehensive data model including input requirements and output descriptions,
- Rules for the operation of interfaces,
- Policies for the usage of information systems,
- Areas of responsibilities and accountabilities,
- Reporting lines.

Key success factors to the seamless business integration are organizations and human beings. The following questions must be answered clearly:

- Who is responsible? Who is accountable?
- Where are the boundaries of management areas?
- What about the principal-agent relationship? Who is the principal? Who are the agents?
- Do agents do what is best for the principal?
- Do agents share their information with the principal?
- How can the principal ensure that the agents operate as he expects them to do?



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How can ICT support B2B business? This is done by the subsequently described technologies:

- **EAI (Enterprise Application Integration)** is a sub-area of the B2B integration. It considers the coupling of databases and/or ERP systems and is mainly focused on technical issues.
- **Portals** are the user interface for an access to different application systems. So the suite of different application systems behind the portal looks like one integrated application system to the user. In this area the management of access rights is a challenging task.
- **ASP (Application Service Providing)** provides software for users, who are not mandatorily members of the same organization. With the emerging cloud technologies ASP is more or less absorbed by SAAS = Software as a service, where application services are technically based on cloud technology. The application may be provided by one of the participants of the B2B structure, but a third party may also provide it. ASP is a specific variant of outsourcing.
- **Hubs** are central points where output from various senders is collected and then distributed to the receivers. A hub takes messages/documents/data files. It converts and transforms formats and forwards messages/documents/data files to receivers. Hubs may be operated by one of the participants (normally the most powerful participant), but also by a third party.
- **Cloud Computing** is the synonym for up-to-date technologies to use IT systems without possessing them or having them installed in the own facilities (Marks & Lozano 2010). The philosophy is: You actually do not have your own power plant. Why should you tomorrow still have your own IT infrastructure? The access to these systems is possible via the Internet. The systems are virtual and you can use them but you do not know where the server or database is physically installed.

There are three categories of cloud services available:

- **SaaS** = Software as a Service,
- **Paas** = Platform as a Service,
- **IaaS** = Infrastructure as a Service.

Of course, cloud technologies can be used in-house, which would be somehow similar to the internal usage of Internet technologies, the so-called intranet. In many cases cloud services will be provided by a third party, the CSP (Cloud Service Provider).



### 4.1.2 DIFFERENCES BETWEEN B2B AND B2C

The primary aspects of B2C business are:

- The fundamental pattern is the one-time cooperation with a focus on the single transaction.
- Each transaction has to be executed as if business partners have never cooperated in the past and will never come together again in the future.
- Both business partners have to find out whether they want to conduct this transaction (negotiation). Both business partners have to see that they will benefit from this transaction (win-win situation).
- Prices have to be allocated for each transaction specifically (See chapter 3 of this book: pricing challenge).
- The appropriate payment method has to be selected (See chapter 7 of this book: Electronic payment)

The primary aspects of B2B business are:

- The fundamental pattern is the on-going cooperation. Business partners have agreed to cooperate for some time. Business partners have concluded a (written) contract.
- Large data quantities are exchanged along the value creation chain; there is an information process coming along with the business process.
- Different partners with specific objectives have to be coordinated.
- All members work together to reach common objectives.
- Negotiation is in most cases completely done in the initiation phase of the B2B cooperation; there is one decision to cooperate for many transactions or a long period of time.
- Price allocation is in most cases completely done in the initiation phase of the B2B cooperation; it is normally not done in each single transaction.
- Payment is in most cases done beside the B2B cooperation via traditional payment channels; often payments are not done for each single transaction but for a set of transactions, e.g. on a monthly basis.

B2B stands for a specific type of cooperation. In most cases cooperation is agreed between different autonomous firms or other organizations. However, “B” may even be a single human being if the type of relationship is “B2B”.

### 4.1.3 STRONG B2B RELATIONSHIP

Now we consider a specific example of B2B integration where both partners are strongly interconnected. The example is the cooperation of a supplier and a merchant. They have to work like a single and homogeneous organization. What are their **fields of cooperation**?

- **Common strategic planning:** Matching of the merchant's sales plan and the supplier's production plan.
- Supplier gets sales data from merchant: Monitoring of sales data at POS (point of sale; at rack in shop).
- Optionally **daily sales data:** tomorrow real-time (see the big data issue); objective is just-in-time delivery and just-in-time production to avoid warehousing and capital lockup.
- **Common forecasts:** update of cooperative planning; planning departments of business partners have to collaborate closely.

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- Automatic initiation of orders: orders are generated by IT systems; no human interaction necessary; rules for order generation have to be defined in advance by involved management.
- Sometimes supplier gets responsible for total **logistics chain** until filling up storage racks: The merchant is just owner of the shop facilities and lets storage racks to suppliers; people, who work in the shops, are employees of the suppliers or specialized third party organizations (merchandising firms).

There are a lot of **advantages for the supplier**:

- Supplier gets precise sales data: Development/change in time; due to geographic distribution,
- Improved production management,
- Improved marketing and advertisement: reduction or even avoidance of return shipments.

On the other side there are also a lot of **advantages for the merchant**:

- Reduction of warehousing costs,
- Saving of personnel costs: rack management done by supplier or specific service firms (paid by the supplier),
- Transfer of logistics risks to supplier,
- Reduction or even avoidance of out-of-stock situations,
- Renting of storage space to the suppliers: Business model of merchant changes; merchant earns money with letting of rack space not longer with sales activities; sales risk is transferred to the supplier.

In most cases the merchant is the dominating partner in that B2B relationship. The balance of power has changed. In former times the merchant had to ask whether he was allowed to sell the supplier's products. Now the supplier has to ask whether he is allowed to sell his products in the merchant's facilities.

There are several **consequences for IT organizations**:

- Intensified exchange of data: planning data, product and price data, monitoring of logistics activities, monitoring of sales activities, monitoring of rack productivity,
- Shared access to product master data: synchronization of data models, common article identification, supplier has to think in selling units not only in production or delivery units,
- Integrated logistics management: production, delivery to merchant's facility, in-shop logistics, rack management.

Also functions are shifted between the business partners. We see a strong integration of planning functions. The logistics chain of the supplier is extended. However, this may be transferred to a third party, e.g. a forwarding agency. The supplier now is responsible for rack management and rack productivity and has to manage the storage racks as micro-warehouses. And finally he gets his invoices from the merchant.

#### **4.1.4 SUPPLY CHAIN MANAGEMENT**

Supply Chain Management (SCM) is considered as the strong interlinking and coordination of all activities, which are related to procurement, manufacturing and transportation of products. The supply chain connects suppliers, manufacturing shops, distribution centres, shipping companies, merchants and customers through processes like procurement, warehouse management, distribution and delivery, to provide goods and services to the customer. It is characteristic for supply chains that they coordinate several value chain stages.

SCM is considered a dynamic and ever-changing process that requires the coordination of all activities among all partners of the supply chain in order to satisfy the final customer and maximize total supply chain profitability. Process drivers are often manufacturers who want to improve and optimize the cooperation with their pre-suppliers.

Due to the increasing relevance of supply chains a framework SCOR (Supply Chain Operations Management) has been established by the Supply Chain Council (SCC), now part of APICS (American Production and Inventory Control Society), as the cross-industry de facto standard strategy, performance management, and process improvement diagnostic tool for supply chain management.

The SCOR framework covers several processes (Minguela-Rata 2014), which are presented in tables 4 to 11.

Customer Relationship Management	
Strategic processes	Operational processes
<ul style="list-style-type: none"> <li>• Review corporate and marketing strategy</li> <li>• Identify criteria for categorizing customers</li> <li>• Provide guidelines for the degree of differentiation in the product/service agreement</li> <li>• Develop framework of metrics</li> <li>• Develop guidelines for sharing process improvement benefits with customers</li> </ul>	<ul style="list-style-type: none"> <li>• Differentiate customers</li> <li>• Prepare the account/segment management team</li> <li>• Review the accounts internally</li> <li>• Identify opportunities with the accounts</li> <li>• Develop the product/service agreement</li> <li>• Measure performance and generate profitability reports</li> </ul>

**Table 4:** SCOR Customer Relationship Management

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<b>Customer Service Management</b>	
<b>Strategic processes</b>	<b>Operational processes</b>
<ul style="list-style-type: none"> <li>• Develop customer service strategy</li> <li>• Develop response procedures</li> <li>• Develop infrastructure for implementing response procedures</li> <li>• Develop framework of metrics</li> </ul>	<ul style="list-style-type: none"> <li>• Recognize events</li> <li>• Evaluate situation and alternatives</li> <li>• Implement solution</li> <li>• Monitor and report</li> </ul>

**Table 5:** SCOR Customer Service Management

<b>Demand Management</b>	
<b>Strategic processes</b>	<b>Operational processes</b>
<ul style="list-style-type: none"> <li>• Determine demand management goals and strategy</li> <li>• Determine forecasting strategies</li> <li>• Plan information flow</li> <li>• Determine synchronization procedures</li> <li>• Develop contingency management system</li> <li>• Develop framework of metrics</li> </ul>	<ul style="list-style-type: none"> <li>• Collect data/information</li> <li>• Forecast</li> <li>• Synchronize</li> <li>• Reduce variability and increase flexibility</li> <li>• Measure performance</li> </ul>

**Table 6:** SCOR Demand Management

<b>Order Fulfilment</b>	
<b>Strategic processes</b>	<b>Operational processes</b>
<ul style="list-style-type: none"> <li>• Review marketing strategy, supply chain structure and customer service goals</li> <li>• Define requirements for order fulfilment</li> <li>• Evaluate logistics network</li> <li>• Define plan for order fulfilment</li> <li>• Develop framework of metrics</li> </ul>	<ul style="list-style-type: none"> <li>• Generate and communicate order</li> <li>• Enter order</li> <li>• Process order</li> <li>• Handle documentation</li> <li>• Fill order</li> <li>• Deliver order</li> <li>• Perform post-delivery activities and measure performance</li> </ul>

**Table 7:** SCOR Order Fulfilment

<b>Manufacturing Flow Management</b>	
<b>Strategic processes</b>	<b>Operational processes</b>
<ul style="list-style-type: none"> <li>• Review manufacturing, sourcing, marketing and logistics strategies</li> <li>• Determine degree of manufacturing flexibility requirements</li> <li>• Determine push/pull boundaries</li> <li>• Identify manufacturing constraints and determine capabilities</li> <li>• Develop framework of metrics</li> </ul>	<ul style="list-style-type: none"> <li>• Determine routing and velocity through manufacturing</li> <li>• Manufacturing and materials planning</li> <li>• Execute capacity and demand</li> <li>• Measure performance</li> </ul>

**Table 8:** SCOR Manufacturing Flow Management

<b>Supplier Relationship Management</b>	
<b>Strategic processes</b>	<b>Operational processes</b>
<ul style="list-style-type: none"> <li>• Review corporate, marketing, manufacturing and sourcing strategies</li> <li>• Identify criteria for categorizing suppliers</li> <li>• Provide guidelines for the degree of customization in the product/service agreement</li> <li>• Develop framework of metrics</li> <li>• Develop guidelines for sharing process improvement benefits with suppliers</li> </ul>	<ul style="list-style-type: none"> <li>• Differentiate suppliers</li> <li>• Prepare the supplier/segment management team</li> <li>• Review the supplier/supplier segment internally</li> <li>• Identify opportunities with the suppliers</li> <li>• Develop the product/service agreement and communication plan</li> <li>• Implement the product/service agreement</li> <li>• Measure performance and generate supplier cost/profitability reports</li> </ul>

**Table 9:** SCOR Supplier Relationship Management

Product Development and Commercialization	
Strategic processes	Operational processes
<ul style="list-style-type: none"> <li>• Review corporate, marketing, manufacturing and sourcing strategies</li> <li>• Develop idea generation and screening processes</li> <li>• Establish guidelines for cross-functional product development team membership</li> <li>• Identify product rollout issues and constraints</li> <li>• Establish new product project guidelines</li> <li>• Develop framework of metrics</li> </ul>	<ul style="list-style-type: none"> <li>• Define new products and assess fit</li> <li>• Establish cross-functional product development team</li> <li>• Formalize new product development project</li> <li>• Design and build prototypes</li> <li>• Make/Buy decision</li> <li>• Determine channels</li> <li>• Product rollout</li> <li>• Measure process performance</li> </ul>

**Table 10:** SCOR Product Development and Commercialization

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Returns Management	
Strategic processes	Operational processes
<ul style="list-style-type: none"> <li>• Determine returns management goals and strategy</li> <li>• Develop avoidance, gatekeeping and disposition guidelines</li> <li>• Develop returns network and flow options</li> <li>• Develop credit rules</li> <li>• Develop secondary markets</li> <li>• Develop framework of metrics</li> </ul>	<ul style="list-style-type: none"> <li>• Receive return request</li> <li>• Determine routing</li> <li>• Receive returns</li> <li>• Select disposition</li> <li>• Credit consumer/supplier</li> <li>• Analyse returns and measure performance</li> </ul>

**Table 11:** SCOR Returns Management

The SCOR has developed a specific business process model (element of the supply chain), which consists of 5 stages and focuses on the supply chain issues:

- **Plan:** market forecast, procurement forecast, procurement alternatives, manufacturing alternatives, delivery alternatives, supply-chain alternatives,
- **Source:** materials staging request, delivery of parts, materials order, materials delivery,
- **Make:** manufacturing order, product delivery,
- **Deliver:** customer order, delivery of customer order,
- **Return:** return/receive products from customer.

A lot of information has to be shared among the supply chain members:

- Inventory levels,
- Sales data,
- Order status for tracking/tracing,
- Sales forecasts upstream to suppliers,
- Production/Delivery schedule,
- Order information sharing.

## 4.2 B2B SOFTWARE SYSTEMS

### 4.2.1 ENTERPRISE RESOURCE PLANNING (ERP)

ERP (Ganesh et al 2014) is a category of business-management software – typically a suite of integrated applications – that an organization can use to collect, store, manage and interpret data from many business activities, including:

- Product planning,
- Manufacturing or service delivery,
- Marketing and sales,
- Inventory management,
- Shipping and payment.

ERP provides an integrated view of core business processes, often in real-time, using common databases maintained by a database management system. ERP systems track business resources – cash, raw materials, production capacity – and the status of business commitments: orders, purchase orders, and payroll. The applications that make up the system share data across various departments (manufacturing, purchasing, sales, accounting, etc.) that provide the data. ERP facilitates information flow between all business functions, and manages connections to outside stakeholders.

ERP systems provide the following functionality:

- **Financial accounting:** general ledger, fixed asset, accounts payables (vouchering, matching, payment), accounts receivables (cash application, collections), cash management, financial consolidation,
- **Management accounting:** budgeting, costing, cost management, activity based costing,
- **Human resources:** recruiting, training, rostering, payroll, benefits, diversity management, retirement, separation,
- **Manufacturing:** engineering, bill of materials, work orders, scheduling, capacity, workflow management, quality control, manufacturing process, manufacturing projects, manufacturing flow, product life cycle management,
- **Order processing:** order to cash, order entry, credit checking, pricing, available to promise, inventory, shipping, sales analysis and reporting, sales commissioning,
- **Supply chain management:** supply chain planning, supplier scheduling, product configurator, order to cash, purchasing, inventory, claim processing, warehousing (receiving, put-away, picking, packing),
- **Project management:** project planning, resource planning, project costing, work breakdown structure, billing, time and expense, performance units, activity management,
- **Customer relationship management:** sales and marketing, commissions, service, customer contact, call centre support,

- **Data services:** Various “self-service” interfaces for customers, suppliers and/or employees, product lifecycle management (PLM),
- **Systems engineering (SE):** product and portfolio management (PPM), product design (CAx), manufacturing process management (MPM), product data management (PDM).

#### 4.2.2 SUPPLY CHAIN MANAGEMENT (SCM)

SCM (Chakravarty 2014 and Kurbel 2013) is the management of the flow of goods and services. It includes the movement and storage of raw materials, work-in-process inventory, and finished goods from the point of origin to the point of consumption. Interconnected or interlinked networks, channels and node businesses are involved in the provision of products and services required by end customers in a supply chain. Supply chain management has been defined as the “design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally.”



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Supply chain management is a cross-functional approach that includes managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end consumer. As organizations strive to focus on core competencies and become more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other firms that can perform the activities better or more cost effectively. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing managerial control of daily logistics operations. Less control and more supply chain partners lead to the creation of the concept of supply chain management. The purpose of supply chain management is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and the velocity of inventory movement.

SCM systems usually provide the following functionality:

- **Demand & supply planning:** demands planning & forecasting, safety stock planning, supply network planning, distribution planning, service parts planning,
- **Procurement:** strategic sourcing, purchase order processing, invoicing,
- **Manufacturing:** production planning & detailed scheduling, manufacturing visibility & execution & collaboration, MRP based detailed scheduling,
- **Warehousing:** inbound processing & receipt confirmation, outbound processing, cross Docking, warehouse & storage, physical inventory,
- **Order fulfilment:** sales order processing, billing, service parts order fulfilment,
- **Transportation:** freight management, planning & dispatching, rating & billing & settlement, driver & asset management, network collaboration,
- **Real world awareness:** supply chain event management, auto ID/RFID and sensor integration,
- **Supply chain visibility:** strategic supply chain design, supply chain analytics, supply chain risk management, sales & operations planning,
- **Supply network collaboration:** supplier collaboration, customer collaboration, outsourced manufacturing.

#### 4.2.3 SUPPLIER RELATIONSHIP MANAGEMENT (SRM)

SRM is defined as the management of the relations between an organization and its suppliers. The objective is to link all suppliers to the organization, to support the procurement management for the total procurement process. SRM uses methods and approaches of CRM but now from the customer's point of view. SRM is a sub-area of SCM.

An SRM system contains information about all sources of supply and all procurement information like deliverable products, possible risks, terms and conditions or quality. SRM can be considered as an advancement of E-Procurement. Added value is generated through bundling of all information about procurement and resources and providing it to the total organization.

SRM systems usually provide the following functionality:

- **Purchasing governance:** global spend analysis, category management, compliance management,
- **Sourcing:** central sourcing hub, RFx/auctioning, bid evaluation & awarding,
- **Contract management:** legal contract repository, contract authoring, contract negotiation, contract execution, contract monitoring,
- **Collaborative procurement:** self-service procurement, services procurement, direct/plan-driven procurement, catalogue content management,
- **Supplier collaboration:** Web-based supplier interaction, direct document exchange, supplier network,
- **Supply base management:** supplier identification & on-boarding, supplier development & performance management, supplier portfolio management.

#### 4.2.4 MARKETPLACE

A (digital) marketplace is a piece of software with comprehensive E-Commerce functionality. It can be characterized by  $m$  suppliers and  $n$  customers ( $m > 1$ ,  $n > 1$ ). Process and software are under control of the marketplace owner. It uses portal technologies and enables the cooperation of different suppliers and different customers. Providing and demanding organizations act autonomously. It is possible, that members are at the same time providing and demanding organizations.

Marketplaces can be differentiated due to:

- Type of product or service,
- Type of transactions,
- Functions.

Due to the **type of product or service** we consider:

- **Tradable quantities:** Transaction costs must be low according to tradable quantity.
- **Specificity:** A specific product with a low application potential has low market liquidity.
- **Complexity of products:** Complex products are not appropriate for electronic trade.
- **Price components:** material, service, production, transport, profit margin.
- **Consequences for the consumer:** contract business, spot business.
- **Value creation:** A-Products (Goods needed for the production), C-Products (MRO = Maintenance/Repair/Operations).

Due to the **type of transaction** we consider:

- **Market liquidity:** number of transactions per time unit,
- **Stage of transaction:** due to process model,
- **Meaning of transaction:** due to industry, due to product,
- **Duration of a transaction:** with adjustment, without adjustment,
- **Stability of a contractual relationship:** long term (changes, postponements), short term,

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- **Transaction costs:** incidental costs (...up to 50% of total costs): searching, signing of a Contract, currency hedging, insurances; external transaction costs: by involved third parties, e.g. credit card company; internal transaction costs (...savings potential supposed to be up to 80%): customer, supplier,
- **Profit margin:** if profit margins are high, Provider will get around marketplaces; if profit margins are low, Market already has high transparency; do we need a marketplace?
- **Market model:** number of participants – automation does only make sense, if the number of participants is high,
- **Degree of concentration:** on the customer side, on the supplier side,
- **Degree of globalization:** distribution and allocation of power, structure of market volume: value of transaction (high/low), number of transactions (high/low),
- **Transparency of market:** complementary markets: support functions (Transportation, Insurances), adjacent markets: Extension of value creation chain, similar market structures.

Main **functions** of a (digital) marketplace are:

- Data management (master data, transaction data, catalogue),
- Pricing (market, calling for bids, tender offer, auction, negotiations, power shopping: Consumers build a group),
- Buying (E-Sourcing, E-Procurement, workflow),
- Sales (ordering, order management),
- Stock exchange,
- Transport,
- Invoicing,
- Payment,
- Additionally: All functions which can be offered centrally for various market actors,
- Interfaces (Provider, customer, forwarding and shipping agency, other service providers, e.g. insurance firms).

### eCo Framework

There is a framework for electronic marketplaces. It has been developed between 1994 and 1999 by CommerceNet, an American industry association. Updates have been released with respect to CORBA, Java and XML. This framework has 7 layers:

- **Network:** aggregation of different marketplaces, is a kind of registry,
- **Market:** different actors, sorted by industries,

- **Business:** definition of a firm, can have different roles, can ask for different products or services, can offer different products or services,
- **Service:** specific services which can be offered (e.g. download a catalogue, send an order, delivery status), interaction of different companies,
- **Interaction:** communication between business partners, e.g. ordering, order confirmation, exception reporting,
- **Document:** complete document for specific transactions, consists of different data elements,
- **Data element:** basic elements, are defined according to specific patterns.

Challenges to successfully run marketplaces are high complexity of processes (e.g. negotiation processes, abortion of processes, iterations/loops) as well as economic efficiency. The efficiency challenge is demonstrated by the subsequent example:

- **Investments & depreciations:** If the investment volume is 10 Mio. EUR and depreciation is 2 Mio. EUR p.a. then with 10.000 transactions p.a. each transaction has to take 200 EUR of depreciation.
- **Operating costs:** If personnel costs of 30 employees are 1,5 Mio. EUR p.a. then with 10.000 transactions p.a. each transaction has to take 150 EUR of personnel costs. If other material costs are 100% of personnel costs then with 10.000 transactions p.a. each transaction has to take 150 EUR of other material costs.
- **Access costs for participants:** Not included here.
- **Profit margin of marketplace operator:** If 20% of the average of the employed capital are 5 Mio. EUR then with 10.000 transactions p.a. each transaction has to take 100 EUR of profit margin.
- **Conclusion:** When transaction costs are limited to 1% of transaction value, then each transaction must have an average value of 60.000 EUR. With 10.000 transactions p.a. the market must have an annual volume of 600 Mio. EUR.

Operators and initiators of (digital) marketplaces can be:

- **Third party operators**, which must be able to cover the capital needs and must have specific industry knowhow and experience,
- **Consortium of suppliers**, which may induce legal issues through implementing a syndicate,
- **Consortium of customers**, which may induce legal problems through implementing a syndicate,
- **Mixed consortium**,
- **Single supplier**, which is just an online shop,
- **Single customer**, which is just a procurement platform.



We see several (digital) marketplaces. However, most of them obviously are not successful. Many of them collapse or shift to some kind of software company. Others shift to online shops or procurement platforms. Why are we not able to find a great variety of genuine (digital) marketplaces? Why do marketplaces fail? Here are several reasons for failure:

- Technology is much more complex than expected by founders.
- Costs of IT infrastructure are under-estimated (may change with cloud computing).
- Project takes longer than expected and increases capital need.
- Complexity of business processes is under-valued by management.
- There is no sound background due to missing standards.
- Personnel efforts are significantly higher than expected.
- Marketplace is economically not attractive for potential suppliers or customers.
- Fees are not cost-effective.
- The business does not need an intermediate organization because partners come together directly using the Internet technology.
- Specific business does not need a marketplace because of highly complex products or services.

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- The level of market liquidity is too low (that means: the number of transactions per time unit).
- There is a ruinous competition between different marketplaces.
- Sales and marketing efforts are too high.
- The management does not have enough experience in the specific industry.

#### **4.2.5 SPECIFIC SOLUTIONS AND SERVICES**

The B2B environment has led to many different and creative solutions.

Due to the increasing needs for logistics transportation, warehousing and distribution are offered, sometimes by organizations, which originally were not logistics experts, e.g. Procter & Gamble. Application service providers offer deployment, hosting and management of packaged software from a central facility, e.g. Oracle and Linkshare. Outsourcing of functions in the process of E-Commerce such as Web-hosting, security, and customer care solutions are offered by outsourcing providers such as eShare, NetSales, iXL Enterprises and Universal Access.

Auction solutions software for the operation and maintenance of real-time auctions in the Internet is provided, e.g. by Moai Technologies and OpenSite Technologies. Content management software for the facilitation of website content management and delivery is delivered, e.g. by Interwoven or ProcureNet. Web-based commerce enablers like CommerceOne offer a browser-based, XML enabled purchasing automation software.

### **4.3 EXERCISES**

#### **4.3.1 QUESTIONS FOR YOUR SELF-STUDY**

Q4.01: Describe the difference between B2B and B2C business.

Q4.02: Consider that you were a book-on-demand company. How could a B2B relationship to a big (electronic) bookshop look like? What is the process? What are the business rules?

Q4.03: We have described the advantages of the involved parties for a strong B2B relationship. What are the disadvantages for the involved parties?

Q4.04: Find information about marketplaces. What are they offering? How long have they been in the market? Why are they successful?

### **4.3.2 PREPARATION FOR FINAL EXAMINATION**

T4.01: What does the abbreviation EDIFACT mean?

T4.02: Consider a B2B relation between a producer of goods and a merchant. What are the specific advantages for both parties? Give two examples for both parties.

T4.03: Which consequences does a B2B relation have for the involved IT systems?

### **4.3.3 HOMEWORK**

Supply chains cross boundaries of organizations. What are the consequences for the management of supply chains?

Is Amazon a real marketplace? Is Alibaba? What do both organizations have in common? What are the differences?

## 5 IMPACT OF E-COMMERCE

### Learning Objectives

In this chapter you will learn,

- that ICT can have a lot of consequences in the area of ethics and morale,
- that E-Commerce has positive as well as negative impacts on human beings and society,
- that E-Commerce changes the economic world significantly.

### Recommended pre-reading

- Martínez-López 2014, chapters 2 and 3.

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## 5.1 ETHICS, MORALE & TECHNOLOGY

**Ethics** (sometimes known as moral philosophy) is a branch of philosophy that involves systematizing, defending and recommending concepts of right and wrong conduct, often addressing disputes of moral diversity. Philosophical ethics investigates what is the best way for humans to live, and what kinds of actions are right or wrong in particular circumstances. (Wikipedia 2015)

**Morality** (from the Latin *moralitas* “manner, character, proper behaviour”) is the differentiation of intentions, decisions, and actions between those that are “good” (or right) and those that are “bad” (or wrong). Morality can be a body of standards or principles derived from a code of conduct from a particular philosophy, religion, culture, etc., or it can be derived from a standard that a person believes should be universal. (Wikipedia 2015)

The development of **Information and Communication Technology (ICT)** is breath taking. We see a doubling of computer power every 18 months. Business processes and business activities are increasingly based on ICT systems or even completely taken over by ICT systems. The **firm without any employee** seems to be a realizable vision. What does this mean for employment?

Costs for data storage are still decreasing. Databases with detailed **profiles of human beings** are built and used at acceptable costs. How much can the customer be manipulated?

We see an on-going progress in the area of data analysis. Human beings can be considered from different perspectives and they also will be assessed and valued (only economically?). The behaviour of human beings can be forecasted. What about the **freewill of customers**?

Significant progress is also made in the area of networks and data communication. Data can be transferred and analysed all over the world. Do we see the **end of privacy**?

### Questions:

- Are we allowed to do everything we are able to do (See Immanuel Kant: Act beyond that dictum which you would like to be actual law.)?
- All, which is thought, will be done – sooner or later (See the Swiss author Friedrich Dürrenmatt: The physicists). How can we protect ourselves?
- In which society do we want to live – ethics-driven, technology-driven, economics-driven?
- What is the right balance between ethics, technology and economics?

## 5.2 ETHICAL ASPECTS OF ICT

### 5.2.1 INFORMATION RIGHTS & INFORMATION DUTIES

Stakeholders of information management are single persons as well as organizations.

**Privacy protection** must have a high priority in E-Commerce. The bases are the human rights and constitutions of states. For example we will find Article 10 clause 1 in the German constitution: “Privacy of correspondence, posts and telecommunication is invulnerable.” However, clause 2 of the same constitution says: “Restrictions are only allowed on the basis of a law.” Further on the German constitution says in article 13 clause 1: “The sanctities of a home is invulnerable.”

There are a lot of privacy concerns around E-Marketing, because technology has become so powerful, see for example data mining and data usage, platforms like Facebook or the advantages in the area of biometrics.

Several questions have to be asked:

- Under which circumstances may it be allowed to invade someone’s private sphere?
- How is the private sphere defined? Where are the boundaries? Due to content? In time?
- How can/must one protect his/her private sphere?
- Must we force him/her to better protect his/her private sphere?

We find some interesting approaches to the definition and protection of the private sphere and the exposure to information. So has Steven Levy (Levy 1984) defined six basic rules:

- The access to computers and all systems, which can help you to learn more about this world, should be unlimited and complete. Practical experience should always be preferred.
- All information should be free.
- Mistrust authority – stimulate decentralization.
- Hackers should be judged according to their hacking activities only and not according to apparent criteria like certificates, age, race or social position.
- With computers you can make art and create beauty.
- Computers can turn your life for the better.

Mr. Wau Holland (Co-founder of the German chaos computer club) has added two rules to this:

- Do not trash the data of other people.
- Use public data, protect private data.

In the USA EFF, the **Electronic Frontier Foundation** was founded in 1990. Their main slogan is: Defending your rights in the digital world. EFF fights for freedom primarily in the courts, bringing and defending lawsuits even when that means taking on the US government or large corporations. By mobilizing more than 61,000 concerned citizens through their Action Centre, EFF beats back bad legislation. In addition to advising policymakers, EFF educates the press and the public.

### 5.2.2 PROPRIETARY RIGHTS AND DUTIES

The German constitution says in article 14 clause 2: “Ownership obligates. Its application has to serve the public welfare.” What does this mean for intellectual properties? Which obligations does the owner have? And how can he protect his information assets? This is a very important issue for everybody of us, because the major security concerns in the Internet are global bank theft, data theft and social network data breaches.



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**Questions:**

- How can we ensure that the salesman sells only that which he owns or which he is authorized to sell?
- Where are the boundaries between theft and copy?
- How can we distinguish between legal and illegal trade? When is a transaction a deal and when is it not?

**5.2.3 ACCOUNTABILITY AND CHECK**

There is or should at least be a responsibility and a liability for damages.

**Questions:**

- Who is responsible for damages caused by a machine, which is controlled by software?
- Who is liable if data of human beings are stolen?
- How can you guard your organization against damages caused by breakdowns of ITC systems?
- Who is responsible if wrong or reputation-damaging information is distributed via Internet?
- How can you make a person responsible if he/she does not live in your country?

**Objectives:**

- Protect data and systems.
- Protect the rights of individuals.
- Guarantee the security of the society.
- Protect institutions.
- Protect values.

**5.3 OVERALL IMPACTS OF E-COMMERCE**

Questions with respect to the impact of ICT are:

- How does ICT change the world?
- What are the effects of bad software quality and bad data quality?
- How has the range of influence of ICT changed by the Internet?
- How much can we trust our ICT systems?
- Do we have to change our minds due to the powerful ICT?
- Can (global and digital) markets govern themselves? What must be governed by laws and international regulations?
- How does ICT influence support concentration of power and shift of power?



- How does ICT erode the monopoly of force of the states?
- How does ICT change social structures? Which social groups are preferred, which are discriminated?
- How does ICT influence social life and social behaviour?
- How does ICT in the end influence the evolution of the human race?
- What are the effects of ICT onto mental and physical health?
- Who is encouraged in organizations by ICT: owner, management or employees?
- Does ICT create jobs? Or does it finally eliminate jobs?

The subsequent sub-chapters are based on Proeger & Heil 2015.

### 5.3.1 MACROECONOMIC IMPACTS

Let us first consider the **size of E-Commerce**. E-Commerce has increased considerably in the developed world in the last 20 years. B2B transactions continue to be the dominant form of E-Commerce across the world. In 2009, B2B E-Commerce sales were 3.1 trillion USD or 32% of all B2B transactions in the USA (US Census 2011).

B2C E-Commerce in the US accounted for 298 billion USD or only 2.8% of all B2C purchases in 2009. Retail sales account for about half of the B2C figure, with the rest coming from services. Global B2C E-Commerce spending was estimated to be 708 billion USD in 2010 (IDC 2011). Since 2001 the growth in E-Commerce among developed nations has been dramatic. The USA witnessed a four-fold increase in E-Commerce sales. E-Commerce markets in Australia and South Korea both increased more than seven-fold (OECD 2011).

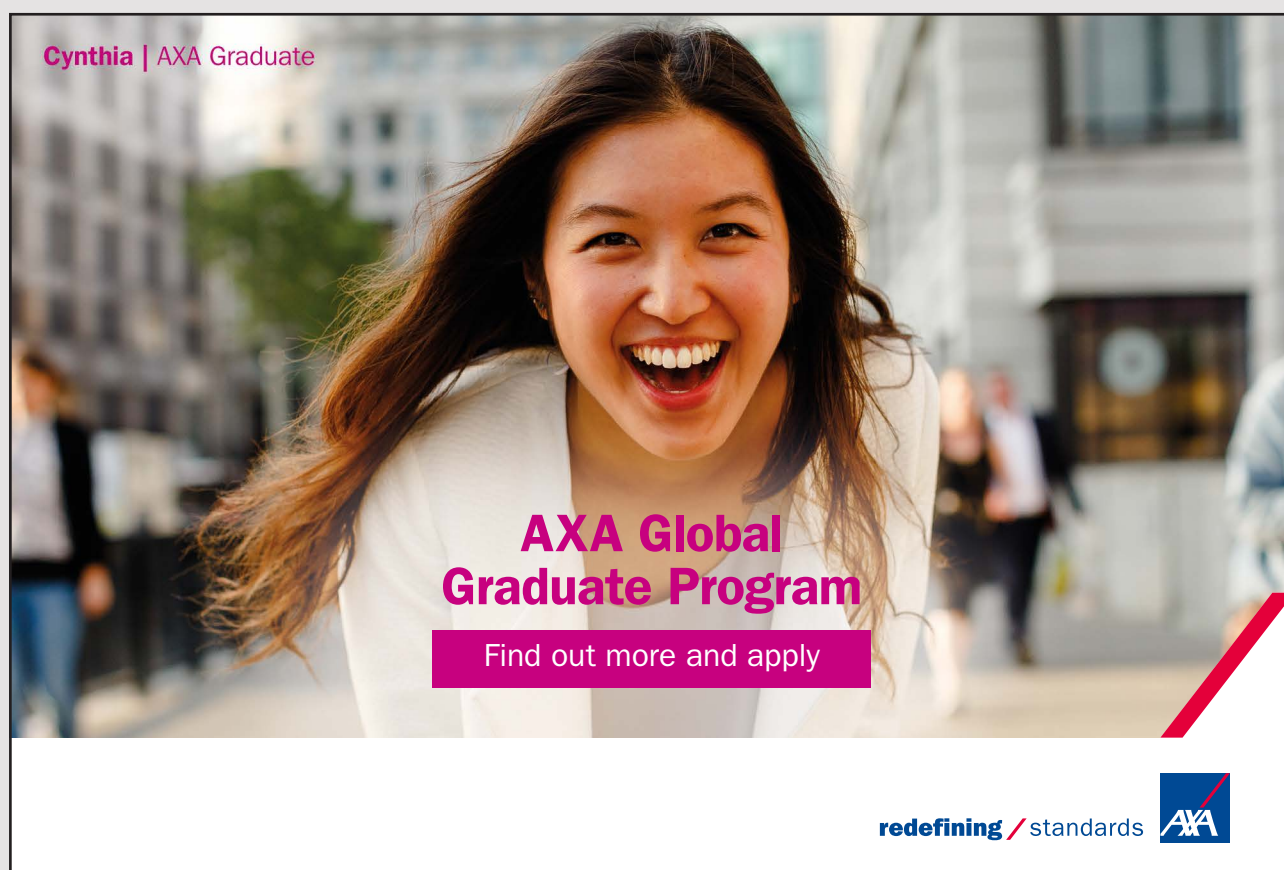
Developing nations have yet to witness considerable gains from E-Commerce. E-Commerce is increasing in importance and cannot be ignored by strategists. First-mover advantages may be available in developing countries.

Digitalization has increased **productivity** and caused economic **growth**. E-Commerce affects economies by increasing productivity (through additional capital formation) and may spur **innovations** in processes that will further increase productivity over the long term. Investments in ICT have clearly increased economic growth in many developed countries. The evidence is mixed in developing nations. While adopting ICT by itself may not confer lasting competitive advantage, failure to do so will surely put an organization at a disadvantage.

Also **international trade** is changed enormously by E-Commerce. E-Commerce improves opportunities for increased specialization, which increase the gains from international trade. A lack of infrastructure, poorly trained workforces, and regulatory obstacles may reduce any potential gains from trade for developing nations. Firms could find international trade more profitable with E-Commerce. Trading opportunities in developing nations may not prove profitable in the short-run.

E-Commerce also impacts **monetary policy**. Overall, E-Commerce is expected to increase competition and reduce search and transaction cost. The net effect will be lower prices. In the long run, these lower prices will represent a onetime change in the price level. In the aggregate, firms will face increased pressure to lower prices, but individual industries may avoid price reductions through product differentiation and increased customization.


The costs associated with inflation, namely **menu costs** (the cost of physically changing prices) could be dramatically reduced with E-Commerce. Nevertheless, price rigidities will likely remain a fact of business even with greater adoption of E-Commerce. Firms can more readily change prices in the wake of inflation and other price shocks. However, E-Commerce does not eliminate all costs associated with price changes



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E-Payments and E-Money present future challenges for policymakers who may find normal **monetary policy** tools less effective with the proliferation of E-Payments and E-Money. Practically speaking, E-Commerce has had little effect on monetary policy to date. Suppliers must consider whether to adopt E-Payment systems for online and offline sales to avoid falling behind rivals.

E-Commerce reduces geographical constraints and increases **interstate and international transactions**. Governments who fear these transactions will reduce **sales tax revenue**. Revenue losses are small to date, but policymakers are increasingly exploring options to tax these transactions. Firms conducting interstate or international transactions will likely face increased pressure to collect sales tax revenue on behalf of their customer's governments.

### 5.3.2 MICROECONOMIC IMPACTS

#### Threat of entry

E-Commerce may increase **economies of scale** in industries where fixed costs are unchanged, but variable costs are reduced. Thus minimum efficient scale increases and the threat of entry falls. E-Commerce may, at the same time, decrease economies of scale in industries where E-Commerce reduces fixed costs. Thus minimum efficient scale decreases and the threat of entry rises. E-Commerce may increase **economies of scope and aggregation**, particularly in information goods. The threat of entry decreases because rivals must enter with a bundle of goods.

E-Commerce may increase the importance of **network externalities** enjoyed by incumbents. The threat from entrants on competing networks is reduced. E-Commerce may encourage subsidization of one side of a platform market. Entry barriers in the subsidized side of the platform fall. E-Commerce encourages the proliferation of two-sided (platform) markets, which may be subject to "lock in" of complementary goods. Application barriers to entry may arise from such **vertical restraints**.

E-Commerce enables **ICT outsourcing**, converting fixed, sunk cost into variable cost. The threat from entrants increases as the importance of sunk costs declines.

E-Commerce decreases the importance of physical location in prime real estate. Entry barriers fall. E-Commerce B2B **vertical hubs** may be owned and controlled by large incumbents. B2B vertical hubs may be able to dominate supply and distribution channels, effectively limiting opportunities for new rivals.

E-Commerce decreases the importance of face-to-face trained sales force. Entry barriers fall. E-Commerce and outsourcing decrease the importance of **physical nearness to skilled labour**. Entry barriers fall. Early entry into E-Commerce confers initial but not necessarily lasting advantages to incumbents. Entry barriers decrease over time.

### **Power of suppliers**

E-Commerce may increase the number of suppliers and facilitate greater **transparency** of product prices and cost structures. Thus suppliers could see reduced power over industry. Suppliers (incumbents) may maintain control over B2B vertical hubs. Thus suppliers could see increased power over industry.

E-Commerce reduces **transaction costs** between supplier and industry. Thus suppliers lose ability to extract rents from industry, as firms can more easily contract with competing suppliers. E-Commerce and vertical supply chain integration tightens bonds between supplier and customer. Supplier loses bargaining power due to the hold-up problem.

E-Commerce reduces **switching costs** through the brokerage effect. Lower switching costs of customers reduce supplier power. Suppliers may make significant investments in vertical supply chain integration. Higher switching costs of customers increase supplier power

E-Commerce can increase vertical disintegration through **outsourcing**. Reduced incentives for suppliers to enter downstream markets lower supplier power.

### **Power of customers**

E-Commerce spurs **disintermediation** in industries such as travel agency service and brokerages. Intermediaries' power (and even existence) is threatened. E-Commerce spurs **re-intermediation** through B2B vertical hubs. Intermediaries' power is strengthened.

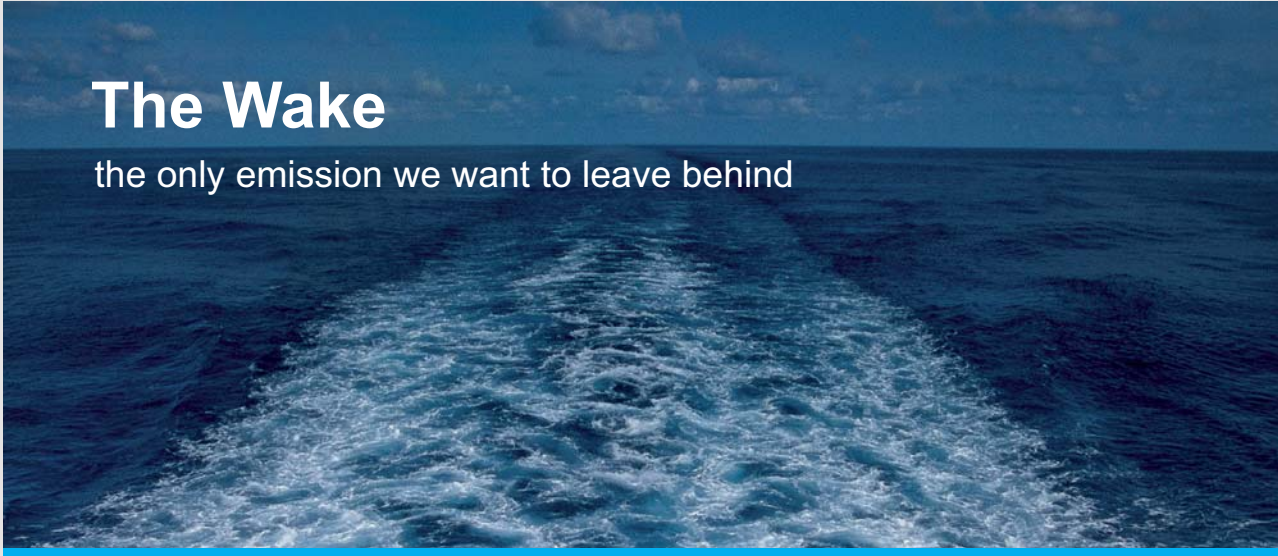
**Information and search costs** are reduced with E-Commerce, and branding may become less important. Product differentiation through branding decreases, and customer power increases. E-Commerce allows new forms of product differentiation, such as online ratings supplied by past customers. **Product differentiation** increases, and customer power decreases. E-Commerce allows firms to offer greater customization of products and services, such as computers sold to order. Product differentiation increases, and customer power decreases. Informational problems such as adverse selection E-Commerce allows firms to offer greater customization of products and services, such as computers sold to order. Product differentiation increases, and customer power decreases.

E-Commerce enables gathering information about customers and **resonance marketing**. Suppliers can improve their ability to extract value from customers. Customers might be able to aggregate demand (Groupon, LivingSocial, etc.). Customer power increases, resulting in lower prices and higher quality.

### Threat of substitutes

E-Commerce enables consumers to more quickly identify and purchase **substitutes** for a firm's products. The power of any one supplier decreases. Increasingly informed customers can easily find firms offering unique products filling gaps in the marketplace. Firms selling unique products can extend **market share**.

E-Commerce reduces search costs and therefore decreases switching costs for consumers in markets where they are willing to search for alternatives. Supplier power declines, and price levels and dispersion fall. E-Commerce allows firms to reduce the **efficacy of search engines** (through sponsored search) and to obfuscate prices and products. The customer's ability to compare prices and products falls, allowing firms to raise profits.



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### **Rivalry among competitors**

ICT, electronic market exchanges, and E-Commerce vertical hubs may enhance the market share of the largest incumbents. Where significant differences exist between firms, the impact of E-Commerce on market share will likely be greater. E-Commerce-enabled outsourcing and reduced capital requirements for entry may make market structure more competitive. Incumbent suppliers lose power and market share. In the wake of E-Commerce innovations, firms may attempt to capture a significant portion of the market share through **aggressive pricing strategies**, particularly for goods with very low marginal costs (e.g., information goods). Competitive rivalry among suppliers in the industry heats up, and supplier power in general decreases

Firms may join a coalition of competing firms selling less close substitutes in a B2C exchange. The coalition can attract more customers to its site than any one company could, and supplier power increases. E-Commerce lowers variable cost relative to fixed cost, making overcapacity problems relatively greater. Overcapacity in industry leads to cutthroat pricing; competition among suppliers increases and prices fall.

### **E-Commerce and non-profit organizations**

Non-profit organizations attempt to adopt E-Commerce practices from the for-profit sector, such as using terms like “checkout” when soliciting donations online. The commercialization of the donation process leads philanthropists to decline to contribute to the non-profit. Non-profits adopt ICT as a symbolic resource. The non-profit establishes legitimacy and improves its reputation among donors and accountability organizations.

## **5.4 SPECIFIC IMPACTS OF E-COMMERCE**

Now let us consider some specific impacts of E-Commerce, which all have a bright side but a shady side as well.

### **5.4.1 ATOMIZATION**

The units, which make sense economically, become smaller – due to the increasing data processing capabilities.

Examples are:

- Letting of shelf space in the retail business with sales dependent prices,
- Demand driven pricing in retail business, transportation business or gas stations,
- Tracking & Tracing in the transportation business,
- Road charges.

### 5.4.2 COMMODITIZATION

Complex, explanation needing and expensive goods and services become widespread available and easily applicable. Standardization and simplification will be profitable if sales management can enter mass markets via the Web.

Commoditization is well known but is accelerated through the Web. Coverage and transparency in the market increase. However, atomization and strong competition may lead to individualized and personalized products, which are aggregated from commodity goods and services.

By the way: There is a significant externalization effect if you book your tickets via the Web. The travel agency can reduce staff because now you are doing their job!

### 5.4.3 CONFIDENCE

Business partners are anonymous and do not know each other. They have to carry on efforts to build trust. This must be done on the background of the high speed of E-Commerce.

#### Fundamentals

Business transactions are only then conducted if all involved partners trust each other that the customer gets the contracted goods or services and the supplier gets the contracted revenues. Confidence is necessary because the accomplishment and the financial equivalent cannot be conducted completely simultaneously. As long as the transaction is running always one partner has a temporary advantage or disadvantage.

Traditionally transactions with high values are protected with the help of custodians or notaries.

**Confidence in traditional businesses** is generated as follows:

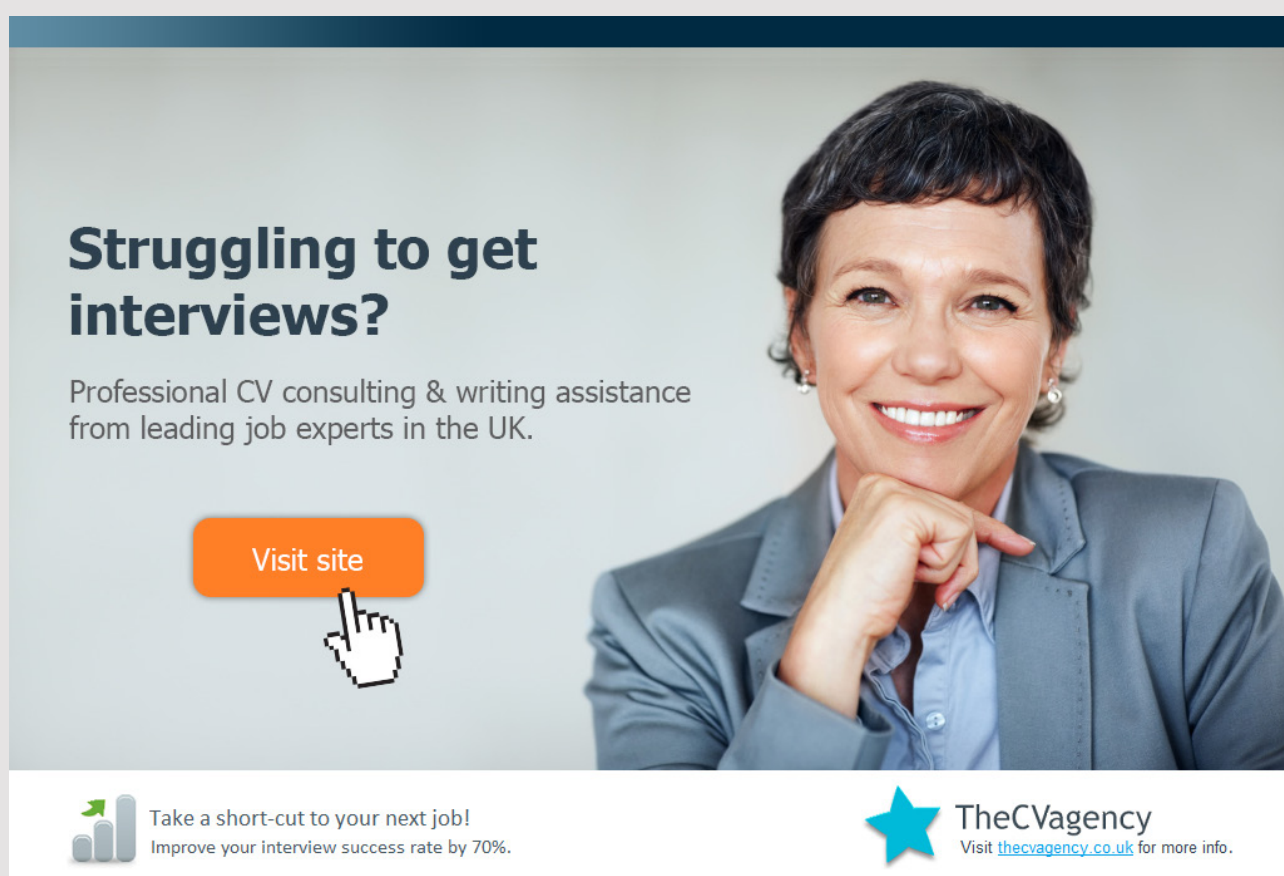
- The business partners know each other independently from the actual transaction. Possibly they have already conducted common business transactions successfully.
- The business partners catch up on each other's seriousness at a third party.
- The business partners involve one or more trustable agents who shall ensure that the contract is successfully signed and the business conducted.
- The business partners make all activities transparent to the other business partner(s).
- However, there will always be a residual risk.

Correspondingly **confidence in E-Commerce** is generated as follows:

- The business partners know each other independently from the actual transaction. The Internet is just the platform to run a transaction.
- The business partners catch up on each other's seriousness at a third party, may be via the Web.
- The business partners involve one or more trustable agents who shall ensure that the contract is successfully signed and the business conducted, may be a specific Web platform (see ebay or Alibaba).
- The business partners make all activities transparent to the other business partner(s), of course with the help of the Web.
- However, there will always be a residual risk.

There are some specific **questions** to be answered:


- Are the involved agents trustworthy? E.g. the Web broker, logistics partner, bank?
- Can we be sure that non-involved third parties cannot find out anything on our transaction?
- Can we be sure that non-involved third parties are not able to interfere our transaction?
- Can we be sure that the addressee receives all exchanged data as they have been submitted by the sender?




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#### 5.4.4 COST STRUCTURES

If a “digital” infrastructure is up and running marginal costs become very low. The production of a software package is a very good example of this effect. Access costs, transaction costs and switching costs are reduced dramatically (see electronic catalogues).

In the **traditional economy** we (normally) have low allocation costs and high transaction costs. The following example demonstrates it: Let the infrastructure costs be 1.000 currency units, and marginal costs of a single transaction be 10 currency units. If the result of a transaction is sold at a price of 15 currency units and a quantity of 1.000 is delivered, then total costs are 11.000 currency units and sales revenues are 15.000 currency units.

In the **digital economy** we (normally and vice versa) have high allocation costs and low transaction costs. Now let the infrastructure costs be 10.000 currency units, the costs of a single transaction be 1 currency unit. Then with a price of 15 currency units and a delivered quantity of 1.000 total costs and sales revenues are again 11.000 resp. 15.000 currency units.

What happens if the quantity is doubled? In the traditional economy sales go up to 30.000 currency units and costs increase to 21.000 currency units. In the digital economy sales go up to 30.000 currency units, too. But costs increase to 12.000 currency units only. What happens if selling goes down by 50%? In the traditional economy sales go down to 7.500 currency units and costs decrease to 6.000 currency units. In the digital economy sales go down to 7.500 currency units, too. But costs only go down to 10.500 currency units.

Where is the break-even-point? In the traditional economy we have  $15 \cdot x = 1.000 + 10 \cdot x$  and this equation leads to  $x = 200$ . In the digital economy we have  $15 \cdot x = 10.000 + 1 \cdot x$  and this equation leads to  $x = 715$ .

How do we have to interpret these results? What does this mean for the entrepreneur/ shareholder? The effect is not a new one: A reduction of variable/direct costs often leads to an increase of fixed/indirect costs. But in the electronic business this is exponentiated... If prices and profit margins are low the supplier has to sell high volumes in short times to generate profit. Profit expectations are high, but the risks are high, too.

### 5.4.5 DISINTERMEDIATION/RE-INTERMEDIATION

In the digital economy value chains become shorter. This is already known in traditional businesses, but radicalness and speed of change have increased. See the disappearance of intermediary trade/wholesale trade and retail sale. Suppliers sell directly to the consumer. For digital goods the physical manufacturing is transferred to the consumer: I print my books at home. Traditional intermediaries are eliminated. See the music business as another good example for this effect.

However, at the same time the high volume of offerings and the high number of customers in the Web leads to the establishment of new intermediaries, e.g. electronic marketplaces (B2B und C2C) where demand and offerings are bundled. Value chains become longer (again) to benefit from synergies with respect to specialization. The reason for this paradox changes is that minimizing of transaction costs with ICT is realized and this may sometimes lead to a disintermediation, but sometimes vice versa to a re-intermediation.

### 5.4.6 ECONOMY OF ATTENTION

Providers of a specific service can often be found in direct neighbourhood (see car dealers, farmer's market), because here it is easier for them to get the attention of potential customers. But if the market size increases every participant has to increase his marketing and advertising efforts to be noticed by potential customers. However, activities to get attention from potential customers will show an effect only if there are potential customers on the marketplace.

This leads to the finding, that the really narrow good is the attention of the potential customer, nothing else. Subsequently it must be the objective of the supplier to get the attention of his potential customers. With this background we see a changed role perception: The customer offers his attention and is "paid" by the supplier with content (see commercial television). The supplier can sell his product or service if he first buys the attention of his potential customer.

Examples of attention driven business models are:


- Subscription,
- Performance,
- Consulting and other intelligent services,
- Membership,
- Conferences and trainings,
- Customer service,
- By-product,
- Advertisement,
- Sponsors.

Categories of attention driven businesses are:

- Free offerings shall cause the customer to buy another product or service, which must be paid and also finances the costs of the provided teaser.
- The free services leads to connected services, which must be paid.
- The “free” service is paid by a third party.

The free service in the Web is often combined with a good or service, which cannot be delivered via the Web.

Within the information flood of the Internet the single supplier has to increase his marketing efforts and thus finally his marketing costs to get attention. So-called “teasers” are given away free of charge. This shall generate the willingness to purchase other goods or services. Also **freemium models** are installed by many providers of digital goods. A basic product is given away free of charge. But the customer has to pay for premium functionality. So some software tools are given away. But if the user wants to export or import files or just to print some content he has to buy an additional and specific software module, which is not included in the basic package...



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### 5.4.7 EMPLOYMENT

Does E-Commerce really create jobs as it is stated quite often? Let us consider what really goes on.

If the customer uses his free money to buy additional goods or services then he generates an additional demand. As long as this additional demand leads to a need of human workload the freed manpower can be allocated in new jobs. But... E-Commerce speeds up the price decrease. How long does it take until the free workload is allocated in new jobs?

However, there is a second question: Can the free manpower be allocated 1:1 in other jobs? Or do the new jobs need other skills and a higher qualification? Are the job-seeking people qualified enough? Can they be qualified?

Conclusion: There is a big social and political issue. But this cannot be solved by company owners. Because nobody can ask them not to make profit. It is a macroeconomic and political challenge. However, also business people as well as computer scientists have a social responsibility.

### 5.4.8 EXTERNALITIES

Let us start with a definition: Externalities are side effects of business transactions from which the parties involved in the transaction do not suffer but also do not have an advantage. However, third parties may suffer or benefit from those side effects.

Examples of externalities are:

- Environment pollution of a manufacturing facility, from which the people around will suffer.
- Parking area of a shopping centre, which can be used for markets or sport events or just as a playground when the shopping centre is closed.

Negative Externalities lead (hopefully) to legal consequences. Positive Externalities often generate new businesses.

Internet examples of externalities are:

- Coverage raises advertising.
- Virtual Communities are attractive for focussed advertising.
- Initiation of “clubs”: economic advantages of membership (Who benefits?), appeal to human vanities (exclusivity).

### 5.4.9 GLOBALIZATION

Technical standardization (see TCP/IP, HTTP, SMTP, HTML, XML) creates a global platform, which allows the cooperation of an infinite number of partners all over the world. Global coverage leads to global markets. Suppliers can and must produce in lowest cost locations. Jobs are transferred to low cost areas.

### 5.4.10 INFORMATION DENSITY

Data can be exchanged electronically. Media breaches can be eliminated. This leads to an information flood. Thus efforts to find the relevant information may increase or must be compensated by intelligent search agents. Information and knowledge management becomes more and more important.

### 5.4.11 INTELLECTUAL PROPERTIES

Intellectual properties are traditionally protected by patents, copyright and trade marks; this includes the economic application. There are ambivalent effects of the Web: Coverage and distribution speed increase, but digitalized results can be copied and manipulated arbitrarily.

Alternative ideologies are discussed:

- Protection of ownership through appropriate technical procedures, e.g. databases, certificates,
- Free use as cultural assets; commercial compensation through follow-up business.

However, there is a problem. Who funds the efforts to create intellectual properties? And who is the customer of the intellectual property? The one, who pays for an intellectual property, will claim that only he is allowed to use it. This is an old and not at all an Internet specific problem.

And last but not least: How can we ensure that an intellectual achievement is assigned to the creator for a sufficient long time (copyright)? We have to state the basic problem of intellectual properties in the Web is that anonymity of users leads to intellectual theft (plagiarism).

### 5.4.12 LEVELLING EFFECTS

We have similar and cost efficient, sometimes even free, access to the electronic market(s) for all participants. Also small organizations have access to services (e.g. software), which outside the Web only big organizations were able to afford.

Physical restrictions lose impact.

### 5.4.13 ENCOURAGEMENT OF INTERNATIONAL COOPERATION

The significance of company size changes. We see advantages for very big and very small firms, probably disadvantages for medium-sized businesses. Consequently the company sizes are changing. There is a clear trend to very big and very small companies. Will this be the death of the medium-sized business?

### 5.4.14 PRICING

Digital markets increase transparency: Who offers what at which price? Suppliers and customers have ideally the same degree of information (symmetric). Arbitrage profits go down, perfect competition balance seem possible.

#### Questions:

- When does the super market effect start: Transparency decreases through over-offering?
- What is the benefit of the lowest price if it is ex manufacturing plant and if the plant is 20.000 km away?
- Which methods do suppliers invent to reduce transparency (see configurable products)?
- What is the “price” of decreasing prices?

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Let us try to answer the last question. As a consumer you have a specific need for products and services. Through E-Commerce you can buy this “package” cheaper. Therefore the supplier has to reduce his prices. Thus he has to reduce costs. As a consequence he forces his suppliers to reduce their prices and costs. All producers need people to do the work. Finally also the suppliers of human work have to reduce their prices. Sooner or later we have to talk about salary reductions and unemployment...

#### **5.4.15 TRANSPARENCY AND COOPETITION**

Coverage and speed of the Internet lead to better comparability of offers, harder competition and price pressure among suppliers and thus to lower costs on the customer side (which would be an advantage for the customers, if the personal income would not be reduced...). Transparency leads to price and profit reductions on the supplier side. Inflation is slowed down.

Electronic business stimulates/requests virtual organizations, which are cooperations of autonomous legal entities who work together on the background of a common business understanding... From a customer’s point of view this looks like one homogeneous firm. This is already well known in traditional businesses, e.g. syndicates in underground construction. Competitors work together temporarily. This is described with the term **coopetition**.

#### **Business models:**

- Prime contractor: manages initiation and execution,
- Broker: manages only the initiation.

#### **Criteria:**

- Cooperation of autonomous companies,
- Partners holding their economic and legal autonomy,
- Optimal combination and use of resources,
- Open for everybody if he/she can contribute to the objectives,
- Closure after achievement of objectives (project management),
- Horizontal and vertical cooperation,
- No hierarchical structures, no one authorized to give instructions,
- High level of confidence among all members.

Examples can be found in the publishing sector, construction industry, software industry, and consulting.

The Internet allows building groups, which can work on their objectives independently from the geographical distribution of members. We see a trend towards **open-source-initiatives**: elimination of commercial relationships and replacement by personal communication and free of charge experience exchange. Does a new countertrade economy come up? But where do those actors get their money from to finance their daily life?

#### **5.4.16 VOLATILITY**

##### **Hollywood economics**

Digital goods must be completely ready when they enter the markets (see movies) and convince the customers. A supplier must be able to fund 3 to 4 flops with a blockbuster.

##### **Temporary monopolies**

Profit in E-Commerce will actually be possible in a monopoly situation (The winner takes it all) because of extreme competition and price pressure. Firms are forced to become monopolists: markets have to be occupied fast. Competition has to be avoided because it is ruinous for all participants. Monopolies will (normally) not stay forever because there are no essential entry barriers to the markets. Thus temporary monopolies will come up and will be replaced by subsequent temporary monopolies. Suppliers are forced to deliver unique products or services, thus they are forced to innovate.

## **5.5 EXERCISES**

### **5.5.1 QUESTIONS FOR YOUR SELF-STUDY**

Q5.01: Are the statements on specific impacts of E-Commerce true? If yes, what are the prerequisites? If no, what are the reasons?

Q5.02: Show examples for disintermediation and examples for re-intermediation.

Q5.03: Do you agree with the macroeconomic impacts described here? Is the list of the described impacts complete or can you identify other impacts?

Q5.04: Do you agree with the microeconomic impacts described here? Is the list of the described impacts complete or can you identify other impacts?



### 5.5.2 PREPARATION FOR FINAL EXAMINATION

T5.01: Does E-Commerce increase or decrease price levels? What are the reasons for your answer?

T5.02: Why do we have temporary monopolies? Why is their duration limited?

T5.03: Explain the term “hollywood economics”.

T5.04: Explain the term “externality” and give two examples of this impact.

### 5.5.3 HOMEWORK

How could E-University look like? Which effects would it have for all stakeholders? Who are the stakeholders? Do we still need traditional lectures?

In many cases the user of an electronic system does not have to pay a fee for the usage. Is he/she really the customer? Is the service really “free”? What is his/her role in the business “game”?

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# 6 SECURITY & COMPLIANCE MANAGEMENT

## Learning objectives

In this chapter you will learn,

- what are the basic elements of risk management,
- what we understand by compliance management,
- what are the basic elements of information security management,
- what technology can do to make E-Commerce secure,
- what are the most important legal aspects of E-Commerce.

## Recommended pre-reading

- Kimwele 2014.

## 6.1 FOUNDATIONS OF RISK MANAGEMENT

### 6.1.1 THREATS OF ICT SYSTEMS

ICT systems and the information, stored in these systems, can be attacked by software viruses, hackers or espionage. People (own employees, external people) can damage our ICT systems and destroy or damage information stored in these systems.

Also faults can lead to a damage or destruction of ICT systems or information stored in these systems. Typical faults are software bugs built in during first time development or maintenance of software, may it be our own software or may it be software packages from outside software suppliers, remote maintenance, where external organizations have access to our systems or information stored in these systems, spurious actions in operations, system administration or usage of systems.

### 6.1.2 THREATS CATALOGUE OF BSI

BSI (Bundesamt für Sicherheit in der Informationsverarbeitung; Federal Office for Information Security), a national German Authority, which has a high reputation, also internationally, has developed the “IT Grundschutz” catalogues. The complete documentation is available in the Internet at [www.bsi.bund.de/grundschutz](http://www.bsi.bund.de/grundschutz) (as well in German as in English).

BSI has published a comprehensive list of threats for ICT (see table 12).

<ul style="list-style-type: none"> <li>• Fire</li> <li>• Unfavourable climatic conditions</li> <li>• Water</li> <li>• Pollution, dust, corrosion</li> <li>• Natural or environmental disasters</li> <li>• Major events in the environment</li> <li>• Failure or disruption of power supply, communication networks, mains supply (power, telephone, cooling, heating or ventilation, water and sewage, supply of fire-fighting water, gas, alarm and control systems (e.g. for burglary, fire, housekeeping control engineering), intercoms)</li> <li>• Failure or disruption of service providers</li> <li>• Interfering Radiation (In Germany, regulations in this subject area are stated in the Act for the Electromagnetic Compatibility of Resources)</li> <li>• Intercepting of compromising emissions or information/espionage</li> <li>• Eavesdropping</li> <li>• Theft or loss of devices, storage media and documents</li> <li>• Bad planning or lack of adaption</li> <li>• Disclosure of sensitive information</li> <li>• Information or products from an unreliable source</li> </ul>	<ul style="list-style-type: none"> <li>• Manipulation of hardware or software or information</li> <li>• Unauthorized access to ICT systems</li> <li>• Destruction of devices or storage media</li> <li>• Failure or malfunction of devices or systems</li> <li>• Lack of resources</li> <li>• Software vulnerabilities or errors</li> <li>• Violation of laws or regulations</li> <li>• Unauthorized/incorrect use or administration of devices and systems</li> <li>• Abuse of authorizations</li> <li>• Absence of personnel</li> <li>• Attack</li> <li>• Coercion, extortion or corruption</li> <li>• Identity theft</li> <li>• Reputation of actions</li> <li>• Abuse of personal data</li> <li>• Malicious software</li> <li>• Denial of service</li> <li>• Sabotage</li> <li>• Social engineering</li> <li>• Replaying messages</li> <li>• Unauthorized entry to premises</li> <li>• Data loss</li> <li>• Loss of integrity of sensitive information</li> </ul>
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**Table 12:** BSI threats catalogue

Each organization should build and maintain a list of specific threats. This list should be updated periodically. The discussion of threats is a major management issue.

### 6.1.3 DEFINITION OF RISK

We start with a definition:

A risk is the extent of loss, which may happen if a threat occurs.

Due to the British Information Security Breaches Survey 2015 the average cost of the worst single breach suffered by organizations surveyed has gone up sharply for all sizes of business. For companies employing over 500 people, the ‘starting point’ for breach costs – which includes elements such as business disruption, lost sales, recovery of assets, and fines & compensation – now commences at £1.46 million, up from £600,000 the previous year. The higher-end of the average range also more than doubles and is recorded as now costing £3.14 million (from £1.15 in 2014).

#### 6.1.4 MEASUREMENT OF RISKS

##### Single risk

The standard approach (Ackermann 2013, p. 14) is, that the risk value is expressed by the product of the probability of occurrence and the expected amount of loss. The amount of loss is considered as a random variable. Thus it would be “more” correct to define the risk value as the expectation value of the random variable “amount of loss” with its underlying probability distribution.

The challenge of this definition is, that we have to find out the probability distribution of the amount of loss. Thus it is a good practice not to work with specific figures but just to list the identified risks and categorize them e.g. by low/medium/high.



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...I finally learned to speak it in just six lessons”  
Jane, Chinese architect

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## **Risk portfolio**

A very naïve approach to value the total volume of risks of a management object (e.g. a total organization or a portfolio of specific objects or a specific E-Commerce system) is the number of identified risks. Many people think, that such an approach is too simple but it is much better to work with such a very simple list and to discuss about the risk situation than to ignore the risks.

A more “sophisticated” approach to value the total volume of risks is to build the sum of expectation values of the identified single risks. This assumes that the risks in the sense of probability theory are totally independent from each other, which obviously is not correct. However, otherwise we would have to have a model of the interdependencies between the different risks.

There are further methods to calculate the total value of a risk portfolio but they all need a lot of mathematics and probability theory (Ackermann 2013).

### **6.1.5 RISK ANALYSIS**

A risk analysis according to ISO/IEC 27001 (IEC = International Electro-technical Commission, ISO = International Organization for Standardization) has to run through the following steps:

- Inventory of information assets,
- Determination of protection requirements,
- Identification and assignments of threats (e.g. supported by the BSI threats catalogue),
- Identification and assignment of weaknesses,
- Determination of potential extent of loss,
- Determination of probabilities of loss occurring,
- Determination of risks,
- Decision on acceptance of risk,
- Selection of safeguards,
- Documentation of residual risks,
- Documented approval of management.

### 6.1.6 BASIC RISK MANAGEMENT STRATEGIES

We see a lot of threats, which could lead to a damage or destruction of ICT systems. Management has to deal with it. Though the variety of threats and corresponding risks is extremely large there are only four basic risk management strategies:

- **Avoidance of threats**, which means that you are able to completely eliminate the threat of your management object. Normally you will not be able to completely avoid a threat.
- **Reduction of threats**, which means that you lower the risk resulting from that threat. In most cases you will be able to reduce the potential amount of loss. Whether you can change the probabilities of occurrence can only be answered if the specific situation is known.
- **Transfer of risks** to a third party, e.g. insurance. This means that the third party will take over and pay the amount of loss if the risk occurs. You will have to pay a fee for that.
- **Acceptance of threats**, which is selected when you do not have any chance to change the situation.

### 6.1.7 BASIC RISK MANAGEMENT TASKS

Obviously it is not sufficient to know the risks. Management has to actively work on it. This does not only include the application of the risk management strategies listed above. They also have to be prepared for the situation when a risk occurs. This leads to the following elementary management tasks:

- Avoid, reduce or accept threats. Transfer risks, if this is the best strategy.
- Know what must be done when a risk occurs.

The latter leads to **business continuity management**, which has to supplement risk management.

### 6.1.8 BUSINESS CONTINUITY MANAGEMENT

The main question is: How good is business prepared to get back to work if some parts of the organization break down?

Main processes are:

- Prepare for emergency situation (provide documentation, train people, run emergency exercises),
- Initiate and build up emergency organization (alert management, disaster management team),
- Run emergency organization/processes (if a disaster occurs),
- Re-install regular organization/processes,
- Get back to regular organization/processes,
- Stop and break down emergency organization/processes.

Business continuity management includes **ICT continuity management**, of course. But it is much more than preparing the ICT systems for continual operation. Business may break down, even if no ICT system is damaged or out of operation (e.g. due to disease of employees). In many cases risks occur which lead to a breakdown of ICT systems as well as other business resources, e.g. fire in an office building.

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## 6.2 COMPLIANCE MANAGEMENT

We start with the definition of compliance:

In general, compliance means conforming to a rule, such as a specification, policy, standard or law. Regulatory compliance describes the goal that organizations aspire to achieve in their efforts to ensure that they are aware of and take steps to comply with relevant laws and regulations.

Due to the increasing number of regulations and need for operational transparency, organizations are increasingly adopting the use of consolidated and harmonized sets of compliance controls. This approach is used to ensure that all necessary governance requirements can be met without the unnecessary duplication of effort and activity from resources.

### 6.2.1 RELEVANCE OF COMPLIANCE MANAGEMENT

The reason for the high attention of management towards compliance (management) is, that if any part of an organization is not compliant then there is a significant risk for that organization. Missing compliance can lead to punishment through governmental authorities and a loss of reputation in the business world.

### 6.2.2 INTEGRATION INTO GRC MANAGEMENT

Governance, Risk and Compliance (GRC) are three pillars that work together for the purpose of assuring that an organization meets its objectives....

**Governance** is the combination of processes established and executed by the board of directors that are reflected in the organization's structure and how it is managed and led towards achieving given objectives.

**Risk** management is predicting and managing risks that could hinder the organization to achieve its objectives.

**Compliance** with the company's policies and procedures, laws and regulations, strong and efficient governance is considered to be a key factor to an organization's success.



## 6.3 INFORMATION SECURITY MANAGEMENT (ISM)

Let us start with the definition of security:

Security is a status where a person, a resource or a process is protected against a threat or its negative consequences. Information security means the security of our information assets.

### 6.3.1 PROTECTION GOALS

With respect to information there are several common protection goals:

- **Authenticity:** Realness/credibility of an object/subject, which is verifiable,
- **Integrity:** Data cannot be manipulated unnoticed and without proper authorization,
- **Confidentiality:** Information retrieval not possible without proper authorisation,
- **Availability:** Authenticated and authorized subjects will not be restricted in their rights without proper authorization,
- **Obligation:** A transaction is binding if the executing subject is not able to disclaim the transaction afterwards,
- **Authorization:** Power and right to conduct an activity.

Information security management is not only an issue for the ICT department. It must be considered by all management areas and management levels.

### 6.3.2 OBJECTIVES OF ISM

The overall objective of information security management is to protect the information assets of the organization due to the above mentioned protection goals. This leads to specific ISM objectives:

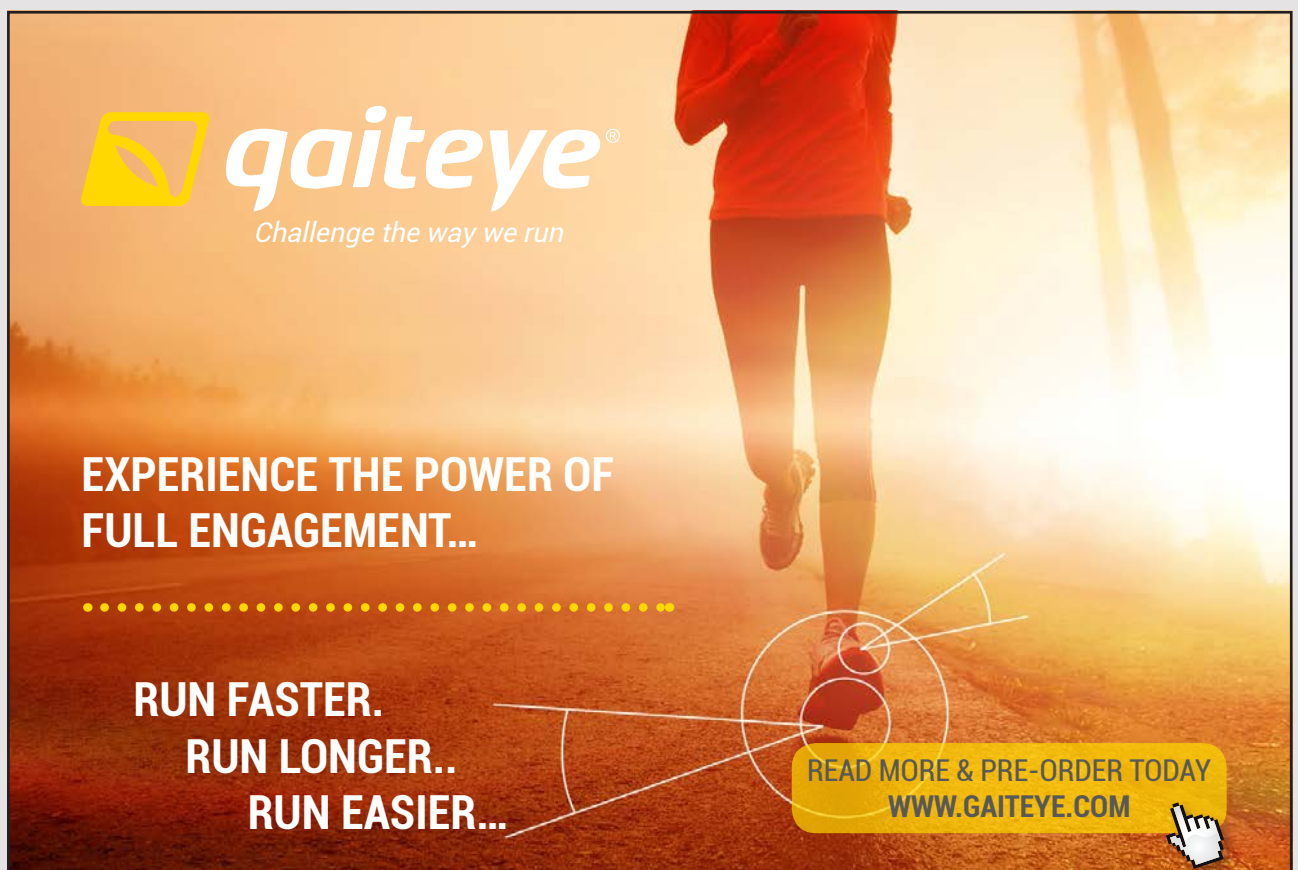
- Fulfil organizational duties: give precise, binding and complete orders to your people; select people carefully with respect to duties and responsibilities; check what your people do in the daily operation; inform your people about laws, rules and instructions they have to follow.
- Build an efficient and transparent organization.
- Build a professional security, continuity and risk management.
- Increase efficiency with general and unified rules and methods.
- Reduce time consumption and costs with security and security audits integrated into business processes.
- Run a continual improvement process to minimize risks and maximize economic efficiency.

- Have a good reputation at customers, shareholders, authorities and the public.
- Parry liability claims and plead the organization in criminal procedures.
- Be integrated into the corporate security management system.

### 6.3.3 THE ISM PROCESS

The information security management process has four major steps, which are subsequently described:

- **Initialize:**
  - Understand information security requirements,
  - Build information security policy to define overall security objectives,
  - Establish information security representative and organization,
- **Analyse and develop** information security strategy:
  - Determine protection needs,
  - Analyse threats,
  - Analyse risks,
  - Deduce information security requirements.



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- **Plan and implement:**
  - Define, what has to be regulated,
  - Define, how it should be regulated (comprehensively or detailed),
  - Prepare information security concepts,
  - Define policies and guidelines,
  - Prepare for implementation projects,
  - Run initial trainings,
  
- **Operation and monitoring:**
  - Administer activities and manage documentation,
  - Run trainings and increase security awareness,
  - Identify key performance indicators,
  - Conduct audits/assessments.

#### 6.3.4 ISM ACTIONS

Information security management includes a great variety of activities, which can be categorized due to the focus of the different activities.

##### **Organization:**

- Establish access profiles.
- Provide and file task descriptions for IT administrators and information security representatives.
- Conduct administration of keys.
- Run evacuation and emergency exercises.

##### **Technique:**

- IT security: Implement and operate firewalls, virus scanner, spam filter, encryption software.
- Facility management: Install access control system, door locks, fire detection system, burglar alarm system, emergency power generator, uninterruptable power supply (UPS).
- Safety of buildings: Install fences, observation cameras.

##### **People:**

- Conduct a professional recruiting and include security aspects.
- Do a proper placement of employees (duties of employees).
- Ensure a careful adjustment to the job.
- Establish a continuous supervision: rising of awareness, training.
- Conduct a professional separation of employees.

### 6.3.5 ISM DOCUMENTS

A professional information security management will lead to several documents:

- Information Security Process Framework,
- Information Security Declaration:
  - Requirements to information security, continuity and risk management with respect to risk capacity, risk propensity und aspired security level: corporate principles, corporate objectives, requirements of stakeholders, requirements through laws, regulations and standards,
  - Description of ISM process with continual improvement process, organization and responsibilities,
  - Responsibility of top management,
  - Integrated, transparent and auditable process model: information security principles, processes and organization, technical resources, employees and external experts, life cycle, communication, training, motivation, raising of awareness, surveys,
  - Commitment of employees,
  - Penalties,
- Information security concepts (e.g. job safety, human resources, facility management, IT security),
- Subject oriented concepts (e.g. virus protection, network, E-Mail or IT processes),
- Policies/guidelines:
  - End user policy incl. password policy and Internet policy,
  - Communication policy incl. communication with external parties and E-Mail policy,
  - Access authorization for buildings and rooms (incl. request and authorization process),
  - Firewall policy,
  - Backup policy incl. off site storage of backup data,
  - Access authorization for IT systems and networks (incl. request and authorization process),
  - Access protection of data (incl. request and authorization process),
  - Encryption policy,
  - Emergency plan (incl. alerting, emergency operation, transformation to regular operation),
  - Configuration of security related facilities,
  - Fire protection,
  - Sourcing policy.

## 6.4 TECHNOLOGY

Important technologies for ISM are data encryption and smart cards.

### 6.4.1 DATA ENCRYPTION

#### Steganography

Objective is to hide the existence of a message. Specific applications of this technology are the transfer of messages or digital watermarking.

Examples of steganographic methods are special terms and phrases in text documents, sympathetic ink or hiding of information in image files through setting of single pixels.

A major problem with steganography is the vulnerability to changes of data, e.g. compression. Information saving data compression formats are GIF and BMP.

#### Symmetric encryption

The communication protocol runs as follows: A and B define a common secret key. Then A encrypts the message and sends the message to B. B receives and decrypts the message through applying the key.

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Established methods are:

- DES = Data Encryption Standard,
- AES = Advanced Encryption Standard,
- IDEA = International Data Encryption Algorithm (Patents by Ascom AG, Switzerland).

The central problem with symmetric encryption is the secure exchange of the key between A and B.

### **Asymmetric encryption**

The communication protocol runs as follows: A and B generate a pair of keys (each of them consisting of a public key and a private key. Both public keys are published and accessible by any third party. If now A wants to send a message to B, A encrypts his message with the public key of B and sends the message to B. B receives the message from A and decrypts it with his private key.

The actually used method is the RSA method (RSA = Ronald Rivest, Adi Shamir, Leonhard Adleman) named after the three gentlemen who published this method in 1978. Obviously 10 years earlier this method had already been developed by the British secret service.

There are two weaknesses. The first: The public key must be authentic. This can or must be ensured by appropriate organizational elements. The second: Asymmetric encryption could be knocked out if the attacker placed his key as the public key of another person or organization. So the sender would think that he uses the public key of his addressee. He encrypts the message and the attacker could decrypt it with his own private key.

### **Hash function**

Hash functions are considered to be one step towards an electronic signature. By using specific algorithms a hash function generates a document specific hash value. That is a high-value number assigned to the actual document. If the document is modified later on it gets another hash value. However, because the hash function concentrates the document in one single number though it is a very big number, there is a residual probability, that the hash value of the changed document is identical to the hash value of the document before the modification or manipulation. There is also a residual probability that two different documents get an identical hash value.

But these residual probabilities are very low, if the length of the hash value is great enough (The hash function must be collision resistant). The SHA-1 (Secure Hash Algorithm) generates 160 bit hash values. Since 2007 the NIST recommends the use of one of the SHA-2 methods, which generate hash values of 256, 384, or 512 bits. An alternative hash function is MD5 (Message Digest) with a hash value of 128 bits. However, this method is not longer recommended, because it is relatively easy to find different messages having the same hash value.

### **Electronic signature**

There are some requirements for an electronic signature, which have their origin in traditional signatures, of course. First it has to proof the identity of the signer doubtlessly. The signature shall be applied once only and valid only in connection with the original document. The signed document must not be changed afterwards; a change must be visible. The signature must not be rejected. The signer must not deny that he has signed the document.

However, there are some advantages of the electronic signature against the traditional signature. The content of the document can be kept secret. The document can be better protected against later manipulation through the use of hash functions. The validity of the signature can be limited in time with time stamps. And finally signatures can be stored at a trustworthy organization so that the signer can be identified reliably.

The communication protocol runs as follows: The signer of a document creates a pair of keys and stores the public key in a public database. He encrypts the document with his private key and sends the document to the receiver. The receiver gets the public key from the public database and decrypts the documents (he “verifies” the signature).

The reader should be aware of the fact that the mathematical algorithms for electronic signatures are the same as for asymmetric encryption. But they are used in a different way.

The German law on electronic signatures differentiates between three levels of electronic signatures:

- **Basic electronic signature:** The signature is added to the document and is used to authenticate it. The provider of the signature is not liable for correctness and completeness of certificate data. An injured party has to prove that there is damage.

- **Advanced electronic signature:** This signature is only assigned to the owner of the signature key. It facilitates the identification of the owner of the signature key. The advanced electronic signature is generated by means, which are under full control of the owner of the signature key. It must be tied to the document in a way so that a later change of the document is recognized.
- **Qualified electronic signature:** This signature is based on a qualified certificate, which is valid at the time of generation of the signature. It has been generated with a so-called secure signature generation unit. The certificate assigns a signature check key to a specific person and confirms his/her identity. The certificate only is a qualified certificate if it has been provided by an accredited trust centre, has been electronically and qualified signed and contains some specific information, which is defined in the law. To store signature keys and to generate qualified electronic signatures secure signature generation units have to be used. The used technical components have to be accredited by specific German authorities.



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How do those technologies work together, if you want to send a message to your partner? First you have to sign the message. Secondly you apply a hash function to the signed document so that the receiver can check, whether the document he has got is the one you have sent. And thirdly you encrypt the signed and hashed document so that no third party can read the document.

### **Public Key Infrastructure (PKI)**

A PKI is built and operated for a secure generation, distribution, certification, storage/archiving and deletion of (encryption) keys.

The most important term is the certificate. This is a digital confirmation that a public signature key is assigned to a specific person or organization. There is a world wide standard for certificates: X.509v3. Thus a PKI is an infrastructure to generate and manage certificates. There is a business standard for PKI. It is PKCS (Public Key Cryptography Standard), which is provided of the company RSA who are the owners of the RSA encryption method.

Elements of a PKI are:

- CA (Certification Authority): Publication and call-back of certificates,
- RA (Registration Authority): links key and person,
- CPS (Certification Practice Standard): rules for issuing and managing of certificates,
- CRL (Certification Revocation List): list of blocked keys,
- Directory of issued certificates.

However, there are some problems and challenges in building and operating a PKI. First significant costs occur and several organizational issues have to be solved. Secondly a cooperation of different PKI's is a real challenge. But how can two communication partners verify their certificates if they do not operate within the same CA?

### **6.4.2 SMART CARDS**

A smart card, chip card, or integrated circuit card (ICC) is any pocket-sized card with embedded integrated circuits. Usually smart cards are made of plastic. The application focus is the proof of identity.

Smart cards can provide identification, authentication, data storage and application processing. They may provide strong security authentication for single sign-on (SSO) within large organizations.

Smart cards contain a tamper-resistant security system (for example a secure cryptoprocessor and a secure file system) and provide security services (e.g., protects in-memory information). They communicate with external services via card-reading devices, such as ticket readers, ATMs, DIP readers (to “dip” the card into a chip-enabled reader), etc.

A second card type is the contactless smart card, in which the card communicates with and is powered by the reader through RFID (at data rates of 106–848 kbit/s). These cards require only proximity to an antenna to communicate. Like smart cards with contacts, contactless cards do not have an internal power source. Instead, they use an inductor to capture some of the incident radio-frequency interrogation signal, rectify it, and use it to power the card’s electronics.

Dimensions of smart cards are similar to those of credit cards. ID-1 of the ISO/IEC 7810 standard defines cards as nominally 85.60 by 53.98 millimeters (3.370 in × 2.125 in). Another popular size is ID-000, which is nominally 25 by 15 millimeters (0.984 in × 0.591 in) (commonly used in SIM cards). Both are 0.76 millimeters (0.030 in) thick.

### **PCI Data Security Standard (Payment Card Industry)**

**Mandatory regulations** for the applying firms are:

- Installation and periodic updates of a firewall to protect data,
- No use of pre-given values for system passwords and other security parameters,
- Protection of stored credit card data, card and transaction data shall not be stored needlessly, e.g. complete credit card number or card number check digit,
- Encrypted transfer of cardholder data and other sensitive data in open networks,
- Use and periodic update of anti virus software,
- Development and use of secure systems and applications,
- Restriction of access to cardholder data to pure business reasons,
- Assignment of a unique identification code to each person who has access to the computer system,
- Restriction of physical access to cardholder data,
- Monitoring and documentation of all accesses to network resources and cardholder data,
- Periodic checks and assignments of the security systems and processes,
- Providing a company guideline for information security and ensuring, that it is practiced by employees and business partners.

The steps of the **certification process** for merchants are:

- Registration of merchant at credit card organization,
- Self assessment with respect to the compliance with the PCI rules and standards (questionnaire),
- Security scan (external security inspection conducting attacks to the systems of the merchant),
- Security audit (inspection of the merchant facilities and assessment on-site of the compliance with security rules and standards).

Certifying organizations have to be accredited. A list of accredited organizations is available at [www.pcisecuritystandards.org](http://www.pcisecuritystandards.org). Registration is free. However, the costs of inspections are several thousands of EUR.

### **SET (Secure Electronic Transaction)**

SET is a credit card based online payment system developed by Visa and Microsoft, supported by MasterCard, IBM, Netscape und CyberCash. The first official version was launched in May 1997. SET aims at enabling a secure electronic payment. It is an expensive system and has low acceptance in the markets.

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**Requirements:**

- Ensure confidentiality of order and payment information,
- Ensure integrity of transferred data,
- Authentication whether card holder is true owner of credit card account,
- Authentication whether customer communicates with an authentic merchant,
- Use of a secure protocol, which is independent from the security services of the communication protocols.

**Process:**

- Ordering/purchase request:
  - Customer sends an initial message (initiate request),
  - Request is answered by the supplier through sending a signed answer and also the certificate of the supplier and the certification of the supplier's bank (initiate response),
  - Customer checks both certificates and the supplier's signature at the certification office,
  - Customer creates the order and the order to pay and creates from both messages a dual signature,
  - The order to pay is additionally encrypted with the public key of the supplier's bank so that the supplier is not able to read it,
  - Finally all messages are sent to the supplier together with the certificate of the customer,
- Acceptance of the order to pay (payment authorization):
  - The supplier sends a request to his bank,
  - This request is signed and encrypted by the supplier. Certificates of supplier and customer as well as customer's order to pay are added,
  - The bank of the supplier checks all certificates and sends a corresponding request to the customer's bank via the bank's network,
  - The answer is signed by the supplier's bank and encrypted with the public key of the supplier,
  - Furthermore a so-called "capture token" is created for the subsequent clearance. This is encrypted with the public key of the supplier's bank and can only be read by this bank later on,
  - The encrypted answer and capture token are transferred to the supplier. He checks the certificates and the answer of the customer's bank, stores the capture token and delivers the goods or services to the customer,

- Clearance (payment capture):
  - The supplier sends the capture request to his bank complemented with his certificates and the payment amount,
  - This request is checked by the supplier's bank and a corresponding message is sent to the customer's bank (clearing request),
  - Subsequently a signed and encrypted acknowledgement is forwarded to the supplier (capture response), who can store it for his purposes.

## 6.5 LEGAL ASPECTS OF E-COMMERCE

The following considerations are made on the background of the situation in Germany resp. in European Union. Many questions will be the same or similar in other legal environments. However, some issues may be considered differently in other legal environments.

### 6.5.1 RELEVANT LAWS

In the European Union an E-Commerce-recommendation (Recommendation 2000/31/EG; ECRL) has been provided as of 08.06.2000. This had to be transferred to national laws in the European Union.

In Germany there are several other laws being relevant for E-Commerce:

- Telecommunications Act (Telekommunikationsgesetz (TKG)),
- Telemedia Act (Telemediengesetz (TMG)),
- Data privacy laws (on federal and state level),
- Signature law (with a Signature Act, a Signature Policy and a Signature By-Law),
- Administrative procedures laws (e.g. notification reform act, Formal requirements adjustment act, justice communications act),
- Antitrust and public procurement laws (with contracting rules and a law against restraints on competition).

In general there is the question which national law has to be applied when making E-Commerce. Basically there is a free selection of the law system, which is chosen as the basis for contracts. However, there is one exception (in Germany): Contracts with consumers. The protection of the consumer's state of residence cannot be revoked.

In the European Union the freedom to offer professional services in other countries (of the union) is protected by law.

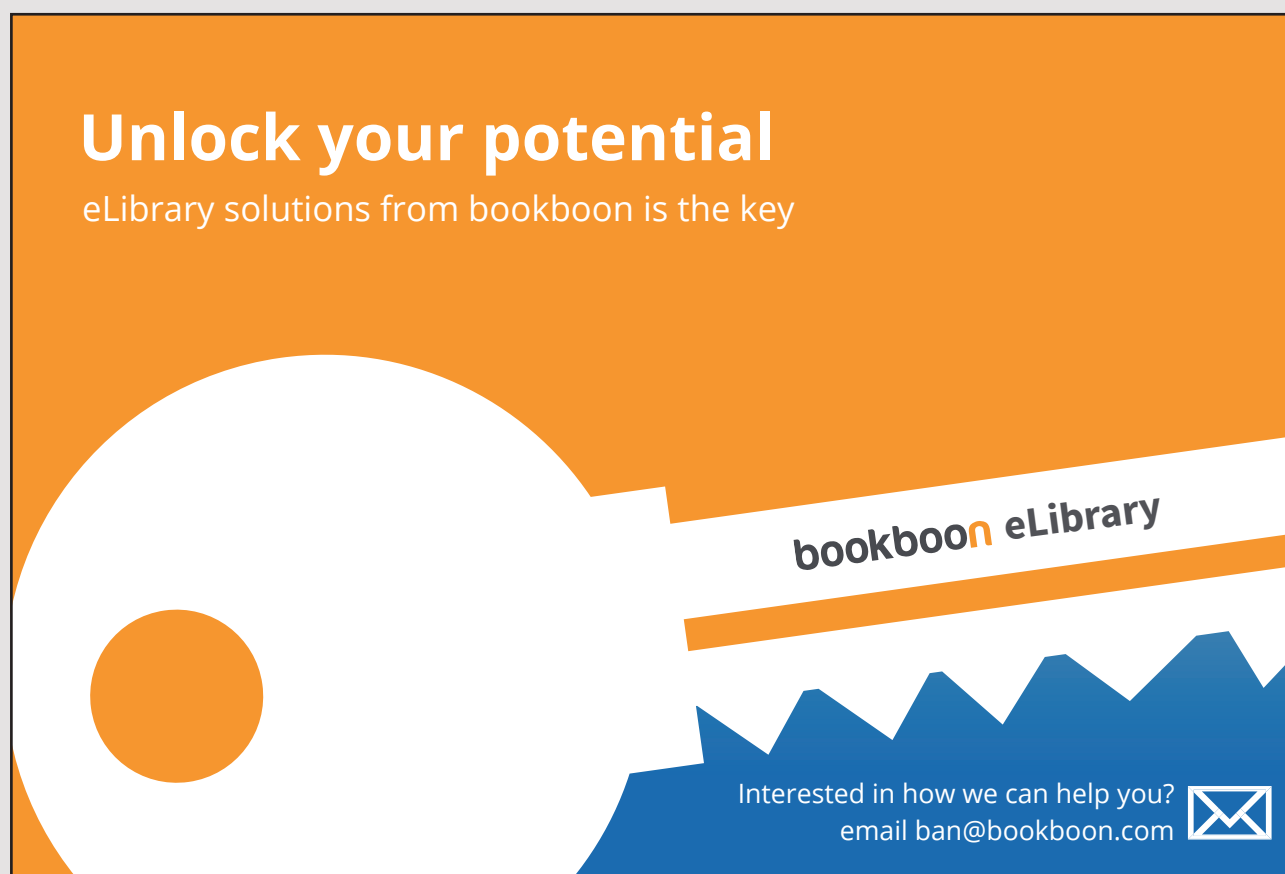
## 6.5.2 DOMAIN RIGHT

Domains are assigned via ICANN (Internet Corporation for Assigned Names and Numbers) and subsidiaries.

The domain **.eu** was started in 2005. In the beginning it was only available for owners of registered trademarks. The assignment follows the first-come-first-serve-principle. Strong formal procedures have been established.


The highest reconciliation instance is the Czech court of arbitration. An applicant is not only obliged to present his own judicial position but also has to expose that the opposite party does not have a reasonable interest in the considered domain or has registered it in bad faith (Bad faith is assumed if the domain has not been used for at least 2 years). No dispute action is accepted (if a third party claims a stronger interest in the considered domain).

The domain **.de** has been assigned since 1996 through DENIC e.G., the German chapter of ICANN.

The advertisement features a large white key shape on an orange background. The key's shaft is a white banner with the text 'bookboon eLibrary' in black and orange. The key's head is a white circle with an orange circle inside. Below the key, a blue jagged line represents a mountain range. In the bottom right corner, there is a white envelope icon next to the text 'Interested in how we can help you? email ban@bookboon.com'.

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Only civil law settlements are accepted. There is no trademark verification at registration. Dispute actions are not possible. The domain assignment is fixed for at least one year (to avoid domain grabbing).

### **6.5.3 IDENTIFICATION OF PROVIDER/IMPRESSUM**

In Germany there is a clear legal obligation for all (!) providers of websites (organizations as well as individuals) to identify themselves in a specific way. The obliged elements of provider identification are:

- Complete name and address (no P.O.Box allowed),
- Telephone number,
- E-Mail address,
- Inspecting authority if business needs a state licence,
- Value added tax identification number (if given),
- Business identification number, if given,
- Commercial register number, if provider runs a registered business,
- Similarly for registered cooperatives and registered associations.

For organizations the top representatives must be reported. There are specific obligations for specific businesses.

### **6.5.4 LIABILITY FOR DISTURBANCE**

A disrupter is a person or organization being involved in causing damage (see BGB § 1004; BGB = German Civil Code). His specific contribution is not relevant. Accountability is assumed even if you let a third party cause damage though you would have been able to prohibit it. This accountability is always given even if you are not aware of an illegal activity.

However, auditing duties have to be reasonable. Preventive auditing is requested but not clear. In 2016 pure conveyance of information has been allowed by the German Telemedia Act, if just the technical capability is provided, e.g. WLAN services in a public area are provided.

### **6.5.5 CRIMINAL LAW**

Due to German criminal law (StGB § 9) an action has been conducted where the actor did it or where he wanted to do it or where the result of his action occurred or was expected by him to occur.

What does this mean? If somebody provides racist content in German via a server running in a foreign country then the German prosecutor and German police have to become active because of the German language they assume that the actor wanted to address his ideologies to a German audience and wanted to have an effect in Germany.

### **6.5.6 RIGHTS OF EMPLOYEES**

In Germany the employer is the owner of his Web and mail system. An employee is not allowed to use it for private reasons if there is not an explicit permission of the organization.

If the private use is permitted then the employer is considered to be a professional telecommunication services provider. He is not longer allowed to check mails because the privacy of correspondence, posts and telecommunications dominates the employer's right to check the activities of his employees. Therefore the explicit prohibition of private use of any system of the organization is strongly recommended.

## **6.6 EXERCISES**

### **6.6.1 QUESTIONS FOR YOUR SELF-STUDY**

Q6.01: Why is the access provider not able to guarantee successful access to any computer attached to the Internet?

Q6.02: Why could we see the criminal liability of search engine operators differently from access providers?

Q6.03: Review the threat catalogue of German BSI. Which threats are especially relevant for E-Commerce? Do you see further threats, which are not listed here?

Q6.04: List internal rules of a firm, which have to be followed in running the firm's online shop.



## 6.6.2 PREPARATION FOR FINAL EXAMINATION

T6.01: Please define the term “security”.

T6.02: Please list the four risk management strategies!

T6.03: Some people tell, that employees are one of the greatest threats of every organization. Why do they come to that opinion?

T6.04: Let two organizations have an encrypted data exchange. Describe the communication protocol if they decide to use asymmetric encryption.

T6.05: Describe the communication protocol if an electronic signature is used.

T6.06: What is the objective of business continuity management?

## 6.6.3 HOMEWORK

Find out specific risks within E-Commerce. Do all participants have similar risks? Which risk management strategies do they need?

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# 7 ELECTRONIC PAYMENT

## Learning objectives

In this chapter you will learn,

- how money helps to make business,
- which payment methods are of interest for E-Commerce,
- which role is played by banks and payment service providers,
- how cyber money is an appropriate means for running an E-Commerce business.

## Recommended pre-reading

- Mohapatra 2013, chapter 4.

## 7.1 BUSINESS AND MONEY

Money makes the world go round. It is the “lubricant” of powerful economic areas – we also need money to make business in the Web. We know economic areas without money, but they usually are restricted to small geographic areas – and if you look closely on them, you will find some kind of money, too. Why does money arise almost inevitably? The reason is that money is a means to buffer (the value of) achievements over time.

Money plays a basic role in the economic cycle with the subsequently listed steps:

- Deliver a product or a service.
- Get money for it.
- Offer money to get a product or service.
- Get the product or service.
- Spend the money for the delivered product or service.

Notes and coins are a universal medium of exchange. The specific physical entities (notes, coins) are independent from the actual owner. They are long living and divisible into very small units. However, the owner has the problem of fraud and the problem of loss.

The physical value of the medium (notes, coins) is much lower today than its business value. Thus it needs authorization by a central bank. The business value is commonly accepted and in some way guaranteed by the authorizing institution. However, the economic areas where specific notes and coins can be used are limited because of different currencies.

The handling of notes and coins is very simple. Transaction costs (on farmer's market) are extremely low. Business transactions with notes and coins allow complete anonymity of the participants. However, there are some restrictions due to laws.

Real economic areas use money in cash and book money. Business with **money in cash** runs as follows:

- Customer and supplier come together physically (at the same location).
- The supplier has a product or service offering; the customer has notes and coins.
- Both partners exchange product or service and money synchronously.

Prerequisites are:

- The customer assumes that the supplier is the legal owner of the goods.
- The supplier assumes that the customer is the legal owner of the money.
- The customer checks goods; the supplier checks notes and coins.
- Customer and supplier do not have to know each other.

Problems are:

- Notes and coins must be accepted by both partners.
- Notes and coins must be authentic (no bad money).
- Notes and coins can be lost or stolen or disappear.

Today most business transactions are conducted without the use of notes and coins. We usually do business with book money. Business with **book money** runs as follows:

- Customer and supplier need a banking account; this makes some kind of bank necessary (the bookkeeper).
- The bookkeeper guarantees that the account balance is given and he transfers the money if requested by the account owner. He guarantees that the account owner can exchange the amount of his account balance into notes and coins every time.
- Book money is linked to the banking account and the account owner. Thus transactions cannot longer be conducted completely anonymously.
- The account owner has to pay the bookkeeper for his services (transaction costs).
- There is a higher protection against fraud and loss – but of course no perfect security.

Finally the following question must be answered: How can we transfer “real” money into the economic area “Web”?

## 7.2 THE PAYMENT CHALLENGE

First we differentiate following categories of money:

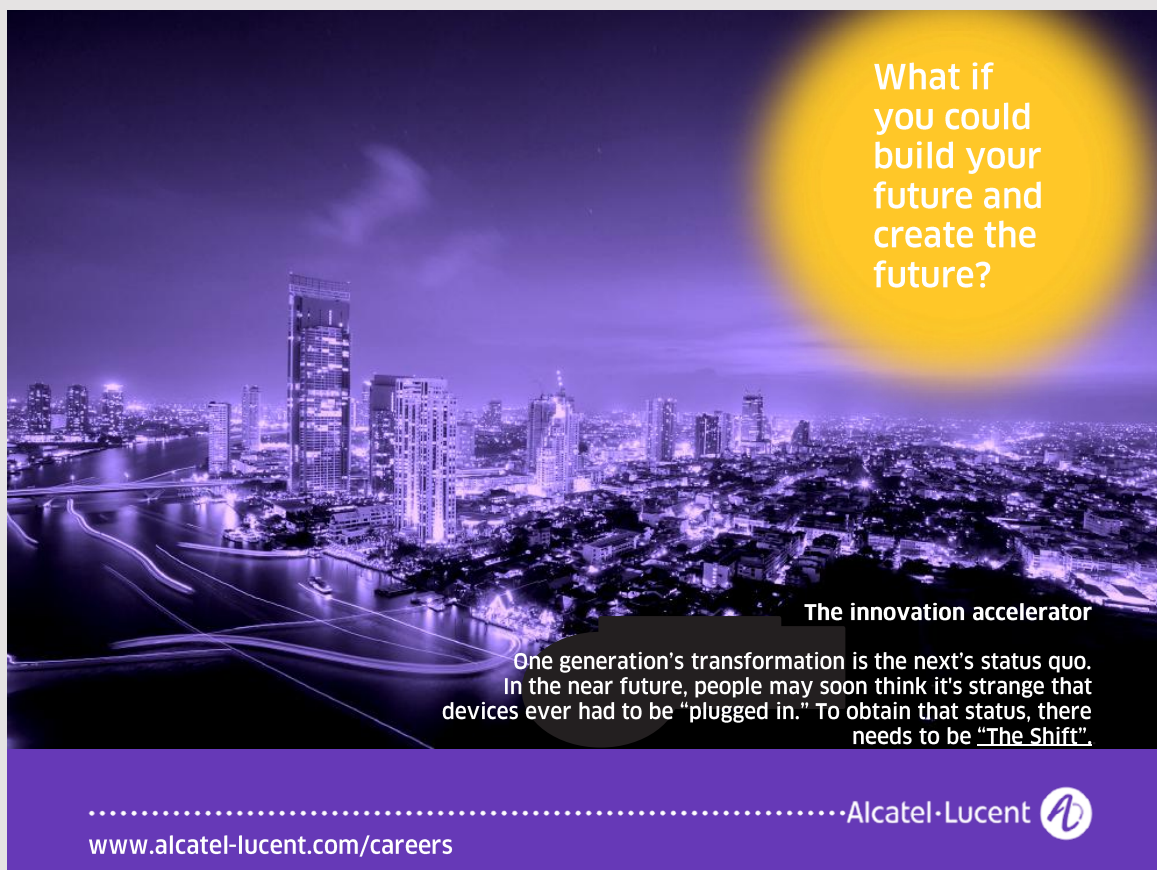
- Money in cash,
- Book money,
- E-money.

Primary payment methods are:

- Cash payment,
- Bank transfer,
- Debit note,
- Wallet payment.

Derivative payment methods are:


- Debt collection and billing methods,
- Check-based methods,
- Mobile phone based methods,



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- Credit card based methods,
- E-Mail based methods,
- Prepaid charge card based methods.

### 7.2.1 ASSESSMENT OF PAYMENT METHODS

The assessment of payment methods from a supplier's point of view is conducted due to a **magic triangle** given by:

- Acceptance by customer,
- Protection of supplier against shortfall in payment,
- Costs.

**Technical parameters** for the selection of appropriate payment methods are:

- Periodicity of payment (one time/periodic, e.g. subscriptions),
- Internationality of business,
- Anonymity of customers,
- Level of payment guarantee (protection against shortfalls in payment, protection against delays in payment),
- Distribution and acceptance of the method.

Also payment amounts and **cost structure** determine the selection of payment methods:

- Invoiced amount,
- Payment dependent costs: customer, supplier (fix per transaction or variable per transaction, e.g. sales volume dependent),
- Payment independent costs (for customer, for supplier):
  - one time costs: procurement costs, setup and adjustment costs (dealer, third parties, public fees),
  - periodic costs: basic charges for services and software, rental fees for hardware.

**Security requirements** for selecting a payment method are:

- Transaction control & monitoring,
- Secure authentication,
- Liability scope.

Finally the integration into the sales process has to fulfil requirements from the workflow as well as requirements from the technical implementation.

## 7.3 PAYMENT PROCEDURES

Let us now consider payment procedures in detail.

### 7.3.1 PAYMENT PER INVOICE

The course of action is:

- Order,
- Delivery,
- Sending an invoice (integrated into delivery, separated from delivery),
- Payment (after receipt of delivery, after receipt of invoice, per bank transfer),
- Confirmation of incoming payments.

Potential problems are:

- Delivery without invoice,
- Invoice without delivery,
- Deviations between delivery and invoice,
- No payment by the customer,
- Delayed payment by the customer.

This payment method should be assessed as follows:

- This payment procedure is not an integral part of E-Commerce.
- The risk is totally carried by the supplier.

### 7.3.2 PAYMENT PER CASH IN ADVANCE

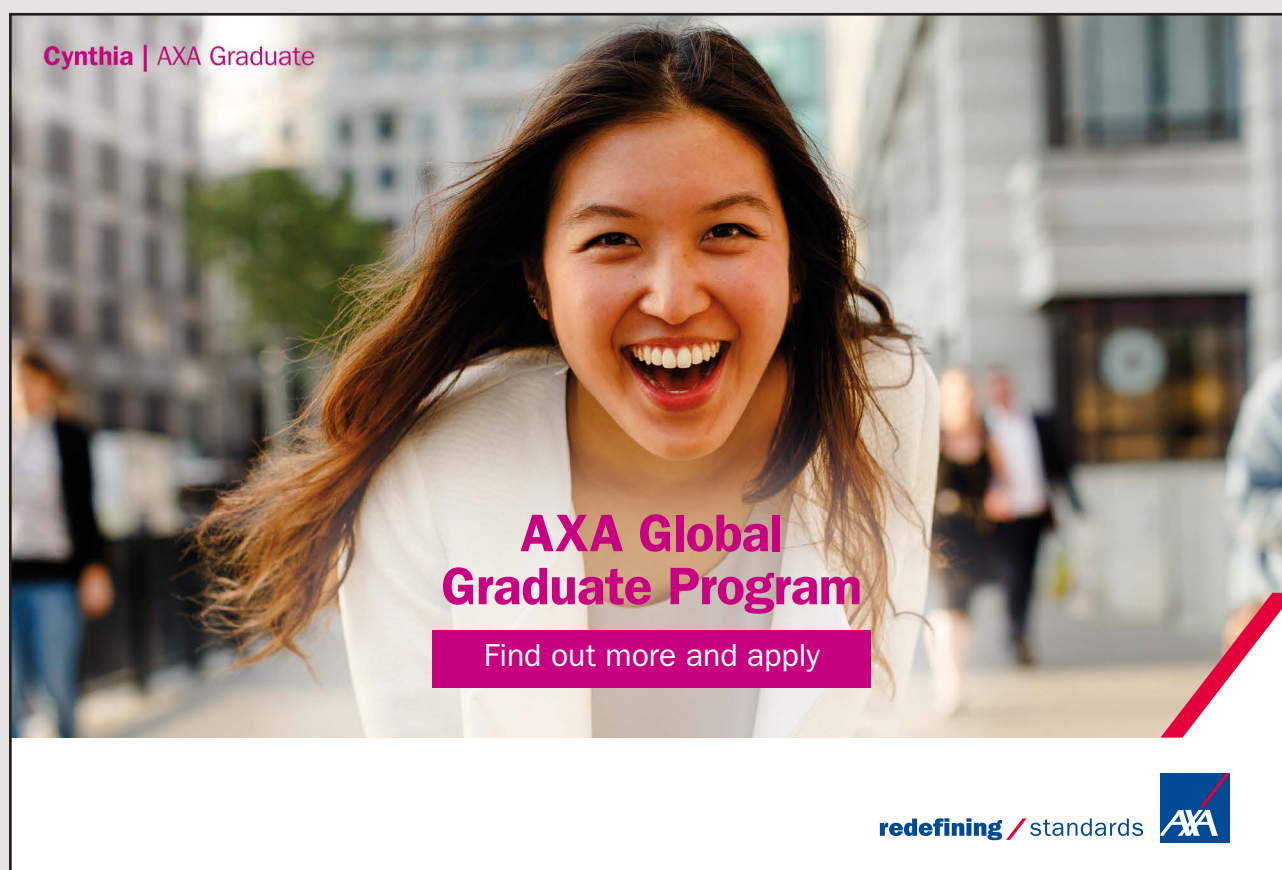
The course of action is as follows:

- Order,
- Invoicing and sending an invoice,
- Payment,
- Delivery after receipt of payment.

Let us consider in more detail the payment method **GiroPay**, which since 2000 is provided by GiroPay GmbH. The firm was founded by a group of German banks. The course of action is:

- Initiation of a payment via GiroPay; statement of a Bank identifier code (BIC) by the customer himself or by the supplier,
- Re-direction to the Web-banking portal of the customer's bank by the supplier (on his Web portal),
- Log-in with account number and pass word by the customer at his bank,
- Order confirmation of a pre-filled money transfer form by the customer at his bank,
- Transfer of a confirmation of payment and re-direction to the Web shop by the customer's bank,
- Credit entry of the payment amount on the bank account of the supplier by the customer's bank.


The first surrounding condition is that the customer account must have allowance for online banking and customer's bank must attend the GiroPay – method. The second is that the supplier must have a bank account, must have a contract with a GiroPay supplier bank, and must be linked technically to the GiroPay service provider.



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Potential problems are:

- Duration from payment to delivery,
- Deviations between payment amount and delivery volume,
- Confirmation of payment receipt.

This payment method should be assessed as follows:

- The payment is not an integral part of E-Commerce.
- The risk is completely assigned to the customer.

### **7.3.3 PAYMENT PER CASH ON DELIVERY**

The course of action is:

- The customer orders with C.O.D. He has to specify a delivery address.
- The delivery is done with an invoice. The supplier forwards the parcel or letter together with the invoice to his delivery service provider. The delivery service provider forwards the parcel or letter to the customer.
- The cashing is done on delivery. The customer forwards money to the delivery service provider.
- Delivery is confirmed by the customer and receipt of cash is noticed.
- The delivery service provider transfers the money to merchant's bank.
- Confirmation of payment by the supplier.

Surrounding conditions are:

- The customer must provide delivery and payment data.
- The delivery service provider has to take over the cashing function.

There are several potential problems:

- Delivery is not possible because the customer is not present at the delivery address,
- Deviation between delivery and invoice,
- Availability of cash at the customer,
- Problem of change money.



This payment method should be assessed as follows:

- This payment method is not an integral part of E-Commerce.
- The method is risk neutral.

### **7.3.4 PAYMENT PER DEBIT NOTE**

The course of action is:

- Order: together with the allowance for bank collection to take money from the customer's bank account,
- Clearance: submission of the debit note by the supplier at his bank/collection of the requested amount from the customer's account by the supplier's bank,
- Delivery to the customer,
- Forwarding the invoice (if not handled via the Web).

Surrounding conditions are:

- Customer has a giro contract with his bank.
- Supplier has a cashing contract with his bank.
- Customer's bank and supplier's bank have a debit-note-handling contract.

Potential problems are:

- Money collection "bursts" (Customer's account balance is bad),
- No delivery,
- Deviation between delivery and invoice.

This payment method should be assessed as follows:

- Simple application,
- Trustee function of the bank,
- Risk more on the customer's side,
- Security issues (Account data in the Web).

### 7.3.5 PAYMENT PER CREDIT CARD

The course of action is:

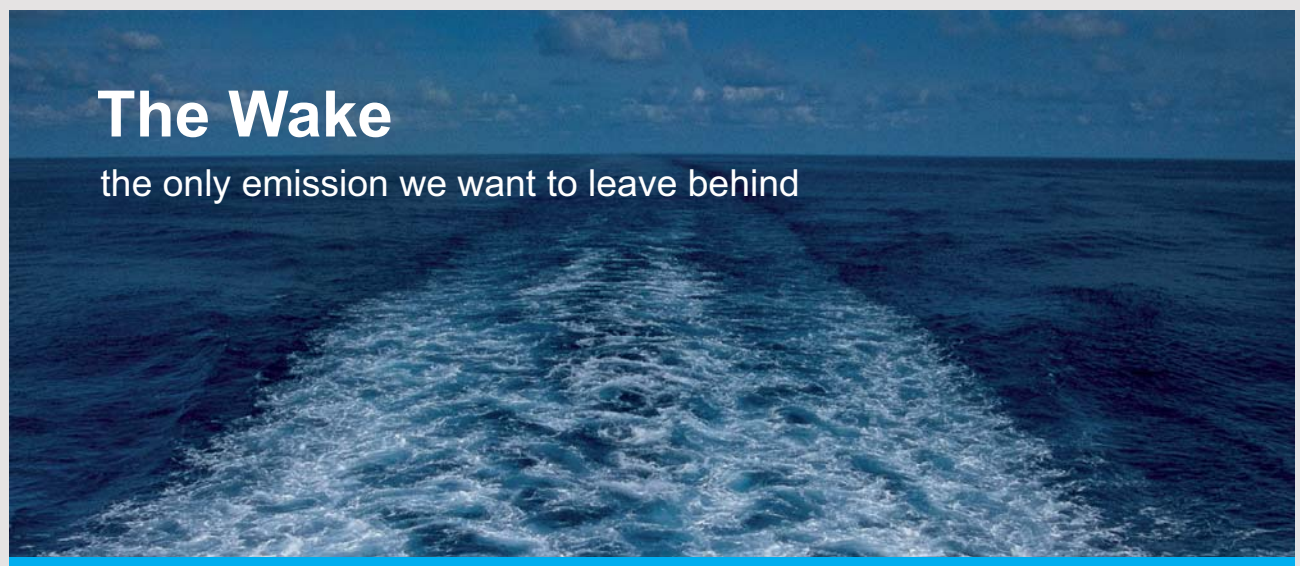
- Order,
- Invoicing,
- Payment acceptance by credit card,
- Delivery,
- Forwarding of invoice (if not done via the Web).

Surrounding conditions are:

- The customer must have a credit card contract with a bank.
- The merchant must have a credit card acceptance contract with a bank and must be technically linked to a Payment Service Provider.

Potential problems are:

- No delivery,
- Deviation between delivery and invoice,
- Payment dysfunctions.




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This payment method should be assessed as follows:

- Payment is guaranteed by the credit card company.

### **7.3.6 E-PAYMENT**

E-Payment methods have been developed especially for E-Commerce and supplement the traditional payment methods. Payment functions are adopted by specific E-Payment providers to unburden the supplier. E-Payment uses for the most part well known traditional payment methods and combines or bundles them to new services.

Course of action:

- Customer initiates a payment at the supplier,
- Supplier transfers payment request to an E-Payment provider,
- E-Payment provider leads customer to his payment site,
- Customer confirms payment,
- E-Payment provider transfers payment confirmation to supplier,
- E-Payment provider charges bank account of customer,
- E-Payment provider creates credit note for bank account of supplier.

Selected E-payment methods are presented subsequently.

#### **E-Mail based methods like PayPal**

PayPal members are able to send money to any person in the covered countries, if they have been registered with personal and account data and if receiver has an E-Mail-address. If the payment receiver does not have a PayPal account he will be informed via E-Mail, that he has received an amount of money. To be able to use the money and transfer it to his banking account he must register himself as a PayPal member. PayPal can be used also via smartphone or other Web enabled devices

Transferred data are protected with SSL encryption. Finance data of the sender (e.g. credit card number or banking account number) are not communicated to the receiver of the money. This shall avoid misuse of the data by the receiver of money.

#### **Smart Card based methods**

The course of action is:

- Go to the bank and fill your wallet/purse,
- Pay with the content of your wallet/purse (is used typically at POS (Point of Sales), e.g. ticket machine, car park pay desk).

Features:

- Bank only needed to fill the card,
- The bank is not involved in the business transaction,
- Physical medium (see also notes and coins),
- For Web transactions connect card reader to computer,
- Use independently from owner is possible,
- In fact the money card is a wearable account which is with the customer offline,
- Variation: Throwaway money card – smart card is loaded one-time, the stored amount can only be paid at once; after this transaction the card becomes valueless.

Problems:

- For every transaction you need specific equipment to read the money card.
- Is the amount shown identical to the amount, which is stored on the card?
- Does the supplier only take the money, which he is allowed to take?
- Are third parties able to steal money from the card?

Examples are paysafecard and T-Pay MicroMoney.

### **Mobile phone based methods like mpass**

mpass is a payment method, which integrates online shopping in the Web with mobile phone technology. In combination with the personal mpass-PIN and a SMS to authorize a payment this method is considered to be very secure.

You need a German mobile phone number and a German bank account. There may be similar variant in other countries. This depends on the market position of the mobile phone company.

After an initial (and free) registration the customer can use the method as he wants and needs it.

The course of action is:

- Select mpass as your payment method in the shop,
- Enter mobile phone number and mpass-PIN,
- Receive a SMS with a request to confirm purchase,
- Answer “YES” to SMS; payment is released,
- Invoiced amount is collected from your banking account.

### Cashing and billing methods like ClickandBuy

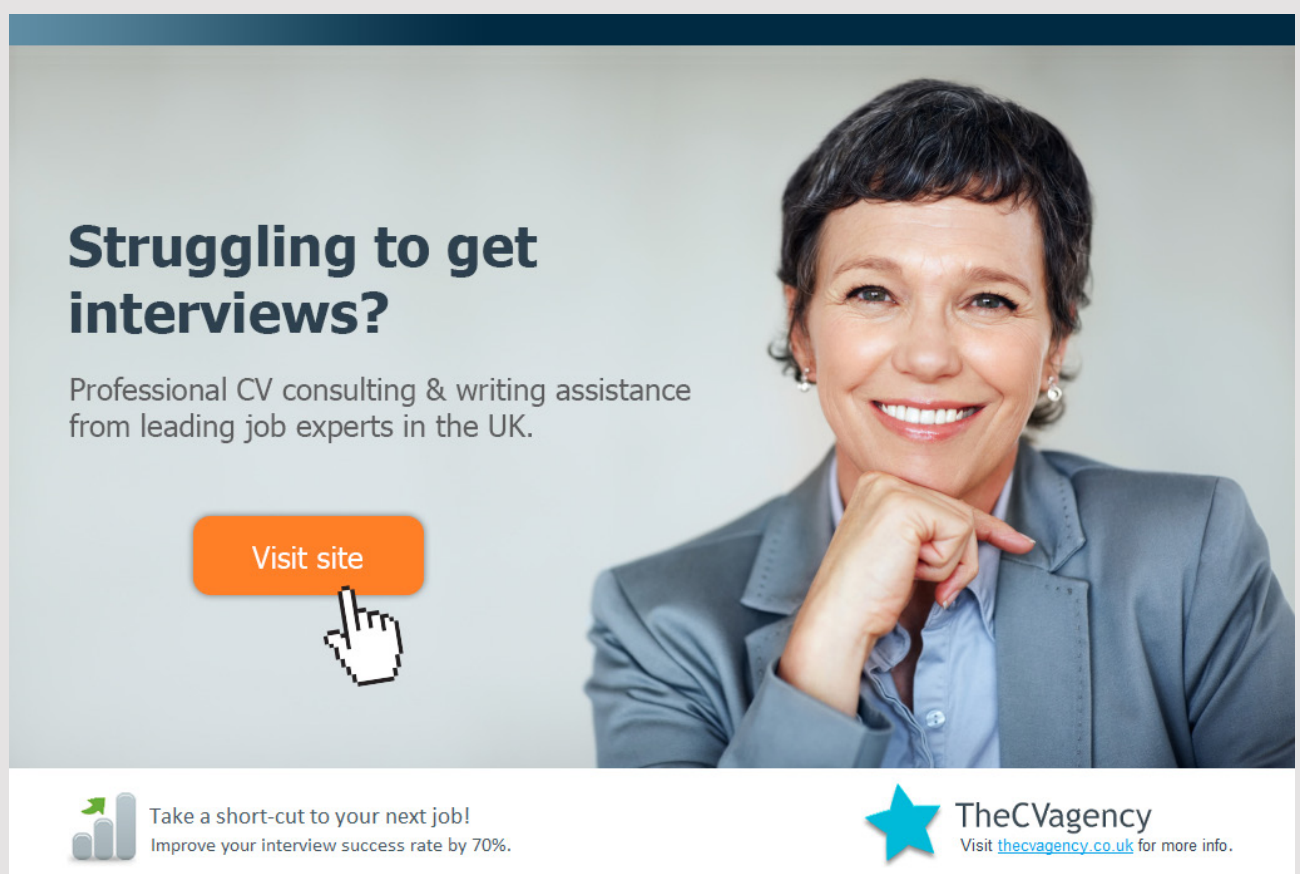
ClickandBuy provides a customer account where banking account and credit card data of customer are stored on a ClickandBuy server. In an online shop the customer has to enter only his ClickandBuy user name (E-Mail address) and his password. He does not show his banking account or credit card data; these data are not transferred via the Web.

Some well-known online shops, which accept payments by ClickandBuy are: Apple iTunes Store, T-Online Musicload, Steam, bwin, Test.de, FAZ.NET, iStockphoto.

## 7.4 RECEIVABLES MANAGEMENT

Delay of payment can be caused by:

- Chargeback of credit card payment,
- Chargeback of a debit note,
- Delayed payment of invoice.




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Cashing methods are:

- Dunning letters,
- Dunning by phone,
- Visits,
- Identification of debtors.

If your own cashing activities have not been successful (customer did not pay or did not pay the correct amount of money), then you can forward this case to a lawyer. He will conduct the following activities:

- Announcing legal activities,
- Reference to judgements,
- Copy of statement of case.

If the activities of the lawyer are not successful, then he will forward the case to the court. Court procedure will be:

- Dunning procedure,
- Lawsuit,
- Pressing a criminal charge, if suspicion of cheating.

## **7.5 CYBER MONEY**

### **7.5.1 PRELIMINARY REMARKS**

Cyber money (or digital currency) is a category of money represented in electronic form for the purpose of financial transactions over the Internet. It is a form of currency or medium of exchange that is electronically created and stored (i.e., distinct from physical media, such as banknotes and coins).

A virtual currency has been defined in 2012 by the European Central Bank as “a type of unregulated, digital money, which is issued and usually controlled by its developers, and used and accepted among the members of a specific virtual community”. The US Department of Treasury in 2013 defined it more tersely as “a medium of exchange that operates like a currency in some environments, but does not have all the attributes of real currency”.

The key attribute, which a virtual currency does not have according to these definitions, is the status as a legal tender.

### 7.5.2 VIRTUAL MONEY

**Strong definition:** Virtual money consists of value units, which are stored on electronic media and can be generally used to conduct payments. Neither the supplier nor the customer has to be the issuer of these value units.

**Comprehensive definition:** Virtual money are all means of payment and clearing methods which are based on technical innovations and potentially can lead to a substitution of notes and coins and bank reserves as well as to the creation of new types of currencies.

**Implementation of virtual money:** If you draw money in a bank you get a mix of notes and coins (the famous household mixture). As an analogy the bank could send you money documents which you could store on your computer or a smartcard. These money documents would be interchangeable like real cash.

**Requirements:** The money documents must be authentic (signature). Is there a counter-entry on the banking account? The money documents must be protected against copying or duplicating them.

**Handling:** The money documents can be transmitted via E-Mail (encrypted, electronic envelope). They can be processed at a virtual counter or virtual cash register, where the customer forwards a money document (upload) and gets change money (download).

Protection against theft can be ensured via a virtual safe on the disc (encrypted disc area) or money storage on a separate medium.

Problems are:

- There must a currency unit be defined.
- Who is authorized to print money documents?
- Global currency: Who guarantees for the value (takes over the central bank function)?
- Private currency: Value must be guaranteed by the issuer.
- Private currency: Currency exchange rate with public money has to be fixed.
- No Web transaction is really anonymous.

Examples are: debit cards, stored-value cards, E-Cash, and electronic checks.

### 7.5.3 CRYPTOCURRENCY

A cryptocurrency is a type of digital token that relies on cryptography for chaining together digital signatures of token transfers, peer-to-peer networking and decentralization. In some cases a proof-of-work scheme is used to create and manage the currency.

**Bitcoin** is the most widely used and well-known cryptocurrency. Many of the current cryptocurrencies are based on Bitcoin. Bitcoin is the first decentralized peer-to-peer payment network that is powered by its users with no central authority or middlemen. It was the first practical implementation and is currently the most prominent triple entry bookkeeping system in existence.

Behind the scenes, the Bitcoin network is sharing a massive public ledger called the “**block chain**”. This ledger contains every transaction ever processed, which enables a user’s computer to verify the validity of each transaction. The authenticity of each transaction is protected by digital signatures corresponding to the sending addresses therefore allowing all users to have full control over sending bitcoins. Thus, there is no fraud, no chargebacks and no identifying information that could be compromised resulting in identity theft.



The advertisement features a dark blue background with the 'FACTCARDS' logo in white and light blue. Below the logo is a white text block asking if the user works in academia, research, or science and if they have thought about working and moving to the Netherlands. Five colorful cards are displayed: 'Arriving' (yellow, 33), 'Living' (green, 50), 'Studying' (orange, 51), 'Working' (orange, 101), and 'Research' (purple, 50). A light blue button at the bottom right says 'VISIT FACTCARDS.NL'. To the right of the graphic, on a light grey background, is a text block describing the website's content and accessibility.

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Abstract of the original **Bitcoin Whitepaper**: A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an on-going chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but also proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and re-join the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

The principal of Bitcoin is that we define an electronic coin as a chain of digital signatures. Each owner transfers the coin to the next by digitally signing a hash of the previous transaction and the public key of the next owner and adding these to the end of the coin. A payee can verify the signatures to verify the chain of ownership.

For further information see: [weusecoins.com](http://weusecoins.com) or [bitcoin.org](http://bitcoin.org). In the meantime another digital money has come up, which is denominated **Bitmint** and has already got a good assessment from experts.

#### 7.5.4 CRITICISM

Many of these currencies have not yet seen widespread usage, and may not be easily used or exchanged. Banks generally do not accept or offer services for them.

There are concerns that cryptocurrencies are extremely risky due to their very high volatility and potential for pump and dump schemes.

Regulators in several countries have warned against their use and some have taken concrete regulatory measures to dissuade users. The non-cryptocurrencies are all centralized. As such, they may be shut down or seized by a government at any time.

The more anonymous a currency is, the more attractive it is to criminals, regardless of the intentions of its creators. Anyone with the right skills can issue Digital Currency. It can be compared to issuing bonds with zero interest rate, no real security behind them and thus no real obligation for the issuer to pay back the amount. This means that the issuer, who succeeds in selling his currency to other users, can earn a great deal of actual money at the expense of his users.

Forbes writer Tim Worstall has written that the value of Bitcoin is largely derived from speculative trading.

## **7.6 EXERCISES**

### **7.6.1 QUESTIONS FOR YOUR SELF-STUDY**

Q7.01: What is the general approach of E-Payment providers? Can we see some general principles of their business models?

Q7.02: E-payment normally is considered from the supplier's point of view. On the other hand there is a risk for the customer that the (supposed) supplier takes his money and does not fulfil the order. Make an assessment of the payment methods with respect to a risk minimisation for the customer.

Q7.03: Find out the most popular E-Payment systems. What are their advantages/disadvantages? Which payment services should a new start-up company offer to its customers?

### **7.6.2 PREPARATION FOR FINAL EXAMINATION**

T7.01: What is the magic triangle of electronic payment methods?

T7.02: What is the added value of payment service providers?

T7.03: If you are the owner of an online shop, you can decide whether your customers have to pay after delivery by a money transfer from their bank account to your bank account or with a credit card. Both variants have advantages and disadvantages for you. Assume that you can select only one of both methods. Which one would you select? Why?

### **7.6.3 HOMEWORK**

Finally all payment methods assume, that the customer has some kind of account and pays with book money. Consider a society, where many people (not only a small minority) are willing to pay with cash only. What can you do to make them customers of your online shop? Be creative!

## 8 PERFORMANCE MANAGEMENT

### Learning objectives

In this chapter you will learn,

- what are the basic terms of ICT performance management,
- that KPIs and scorecards are important tools for ICT performance management,
- what are the main control objects in the ICT area,
- how you can measure the performance in the ICT area,
- what are the potentials and methods of Web analytics.

### Recommended pre-reading

- Wiggers et al 2004.



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## **8.1 FOUNDATIONS OF PERFORMANCE ANALYSIS**

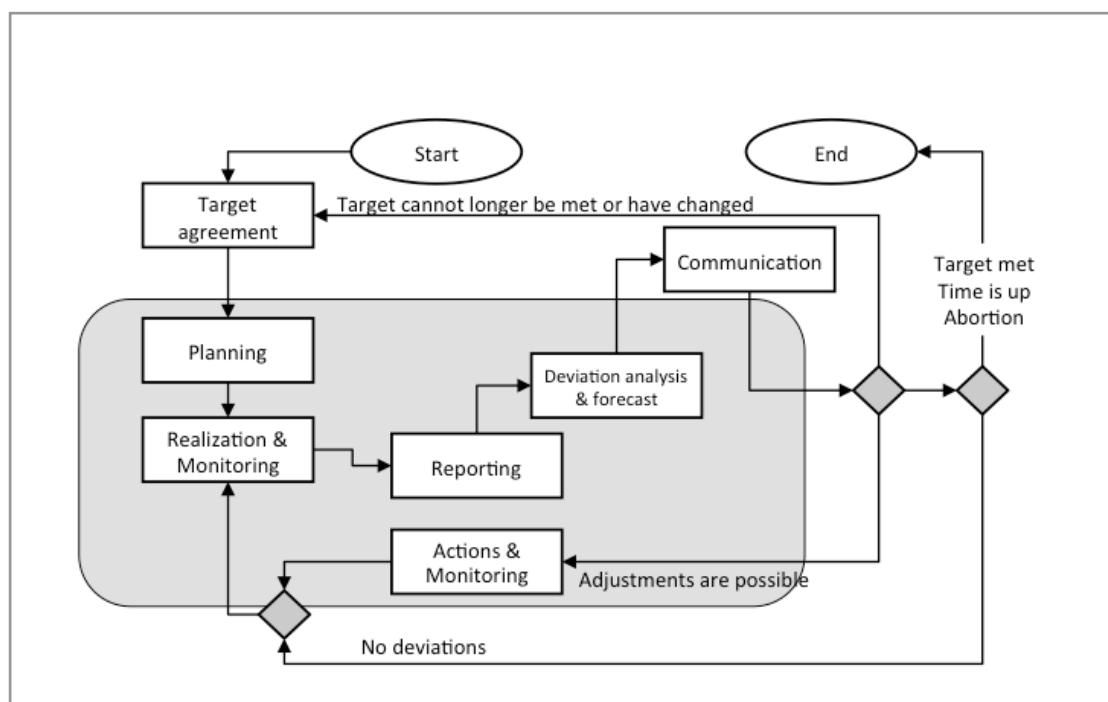
### **8.1.1 BASIC TERMS**

To control something means to make decisions. Making decisions is a primary management duty. In Germany the discipline to support managers in decision-making is called “Controlling”; in the “English” world this discipline is called “performance management” or “performance analysis”. This specific category of management support comes from some kind of division of labour on management levels. The manager is (and will always be) responsible/accountable for decisions. The controller or performance analyst is responsible/accountable for transparency (which is needed to make good decisions). He is somehow a service provider to the management.

Subsequently we will use the terms “principal” and “agent”, thus referring to the so-called principal-agent theory. The one who delegates responsibility for something is the principal. The one, who takes over responsibility from a principal, is an agent. In complex organizations managers take over responsibility from higher management positions or from the owner of the organization. They are agents. The question for the principal is whether the agent really does what he wants him to do. He also has to establish procedures to monitor and measure the activities of his agents.

### **8.1.2 CONTROL CYCLE**

The agent resp. manager takes over responsibility for a specific task or control object (e.g. a project or a process). Because he/she is an expert in that field he/she will be able to do the job better as the principal himself/herself. Or he/she will get the job just because the principle does not have enough capacity or time to do the job himself/herself. However, the principal is the client or customer and the agent is the contractor or supplier. Both parties will negotiate a contract in which it is clearly described what the agent has to do and how the principal has to reimburse the work of the agent. Finally there is one question: How can the principal ensure that the agent works in his sense and for his (the principal's) objectives and the moral hazard is avoided.



**Figure 6:** The control cycle

### Stages of the control cycle

Management can be clearly described with the model of the control cycle (see figure 6). This control cycle has several specific steps:

- **Target agreement:** Agree with principle on the targets, which have to be reached by the control object. Take over responsibility to reach these targets.
- **Planning:** Plan how to reach the agreed targets and set sub-ordinate targets.
- **Realization & Monitoring:** Operate to reach the agreed targets and monitor the degree of target fulfilment.
- **Reporting:** Prepare monitoring data for management & forward scorecard(s) to management.
- **Deviation analysis & Forecast:** Analyse reported data and conduct forecast of future development of data.
  - Result 1 = No deviations.
  - Result 2 = Deviations can be eliminated or reduced possibly due to changes of targets. Define and initiate correcting actions.
  - Result 3 = Deviations cannot be eliminated or reduced/Targets will not be reached, possibly due to changes of targets.
  - Result 4 = Targets have been reached successfully/Time is over/Task has been aborted.

- **Communication:** Inform the principal...and other stakeholders
- Select next step due to the result of data analysis:
  - Result 1: Continue with regular operation and get back to step “Realization & Monitoring”.
  - Result 2: Go to the step “Actions & Monitoring”.
  - Result 3: Go to the step “Target Agreement” and re-negotiate targets with principal. If targets are not longer reachable agree on abortion of management task.
  - Result 4: Got to “End”.
- **Actions & Monitoring:** Run corrective actions and monitor the degree of target fulfilment.

### 8.1.3 KPIS AND SCORECARDS

#### Definition of an indicator

An indicator is a number, which measures the planned resp. expected or real occurrence of an attribute of a control object.

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Indicators are measuring instruments in complex systems; they support the responsible persons in managing resp. controlling of these systems.

**KPI = Key Performance Indicator:**

- Indicator = shows an attribute which is important for target achievement and management,
- Performance = output orientation; what has been achieved,
- Key = concentrate on the most important information.

### **Definition of a scorecard**

This you will find in well known books on microeconomics: A scorecard is a well structured set of indicators which are related to each other and as a whole deliver a complete information about the control object.

So it is more precise:

A scorecard is a list  $K(t) = (k_1(t), k_2(t), k_3(t), \dots, k_n(t))$  of indicators and describes the planned/expected or real position of a control object at the point of time  $t$  in an  $n$ -dimensional state space. The indicators of the scorecard represent the relevant attributes (relevance due to the targets) of the control object and they are the coordinates of this control object in the defined state space.

Based on this definition scorecards

- help the management to control target oriented,
- are an important management tool,
- have to be used actively and periodically by the management,
- have to be fed with planned values,
- should not have too much indicators (otherwise you will not see the wood because of so many trees. Rule of thumb: Twenty is plenty.),
- have to concentrate onto those attributes, which are really relevant for reaching the targets,
- have to be fed with actual values,
- should be generated and fed with data with minimal efforts.

**Examples of scorecards** (in ICT environments):

- Ticket Management Process (You will find such processes in call centres or service organizations. Customers will send requests and expect that the call centre or service provider gives an answer, initiates a service delivery or eliminates an incident, etc. Those requests are documented in a ticket and this ticket runs through the process until successful completion.)
  - Number of registered tickets,
  - Average duration from initiation to completion of tickets,
  - Number of successfully closed tickets per call agent and hour,
  - Reopen rate of closed tickets (If the customer is not satisfied with the result of his request he can re-open the ticket and enforce a new processing of his request),
  - First resolution rate of closed tickets (Tickets can be successfully completed by the agent who first deals with the ticket),
  - Escalation rate of tickets (Ticket cannot be completed by the agent initially dealing with it and has to be forwarded to another agent, e.g. an expert),
  - Portion of tickets in category X,
  - Portion of tickets coming from customer group Y,
- Project
  - Degree of target achievement (e.g. measured by the portion of work packages, which have already been finished),
  - Quality of delivered results (e.g. measured by the portion of conducted quality assurance activities where no error has been found),
  - Percentage of budget already consumed,
  - Degree of meeting deadlines (e.g. measured by the portion of deadlines, which have been met in time),
  - Volume/number of changes (moving targets!),
  - Volume/number of unresolved problems,
  - Portion of external experts in the project team.

There are several categories of indicators:

- **Management indicators** are included in target agreements. Target values to be reached are defined/negotiated.  
Example: The (average) duration of a process or the quality level of project results are management indicators because the manager is able to change things. His compensation will depend on reaching the agreed targets.



- **Information indicators** describe the environment of the management task. They give hints to the (non-) reachability of the agreed targets. Expected values of these indicators are documented.  
Example: The number of registered tickets and the volume of requested project changes are information indicators. These indicators are like the weather. The manager cannot change it but he has to know the actual values to do his job properly.
- **Benchmarks** serve to compare different but similar control objects. They are often used to compare control objects from different organizations. Objects must be comparable and all objects to be compared must be measured with the same indicators.  
Example: The (average) duration of a specific project could be appropriate to be used as a benchmark because it can be generated similarly for different organizations. Benchmarks can be management indicators as well as information indicators.

Sometimes a fourth category of indicators is considered, the **analytic indicators**. These indicators are important for management but they can be generated only from time to time, e.g. once per year, because actual values change slowly. A typical example of an analytic indicator is the skill level of a group of employees. This shall be improved over time but will take a significant amount of time until improvements can be measured.



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## Indicators and control cycle

Indicators play an important role in the control cycle. Managing something with a scorecard somehow is a synonym for managing it with control cycles.

- **Target agreement:** Define targets with KPIs and target values.
- **Planning:** When shall the indicators have reached the defined values resp. subordinate target values?
- **Realization & monitoring:** Collect input data from the running operation (to create actual values of KPIs).
- **Reporting:** Create actual values of KPIs from monitoring data.
- **Deviation analysis & forecast:** Analyse deviations between planned and actual values of the indicators. Forecast how the actual values of the indicators will look like in the future if management does not step in.
- **Communication:** Inform principal and stakeholders via the defined indicators.
- **Actions & monitoring:** Collect the input for the indicators (to create actual values).

## 8.2 ICT PERFORMANCE MANAGEMENT

In this sub-chapter we will consider the main control objects of an ICT organization or ICT service provider. This will help us to better understand the particularities of performance management in the area of E-Commerce. You will find similar structures in other areas of your organization.

### 8.2.1 CONTROL OBJECTS IN THE ICT AREA

First let us consider the different levels of control objects in the ICT area. All types of control objects can also be found similarly outside the ICT area in every business environment.

#### Elementary objects

- **ICT Service:** An ICT service is delivered by your internal IT department or an external ICT service provider. Each service will be controlled by a (small) scorecard, which is contained in the so-called service level agreement (SLA). The scorecards of different services will be similar or even identical but this does not always make sense.
- **ICT Process:** This means an internal process of your internal or external ICT service provider. Do not confuse with business processes. Each process will be controlled with a (small) scorecard. The scorecards of different processes will be similar or even identical if the type of process is the same. However, you will find different types of processes and due to this specific scorecards make sense.

- **ICT System:** This means hardware and software, e.g. application systems. Each system will be controlled with a specific scorecard. From a customer's point of view system are not so interesting because they are integrated into services. But internally (in the ICT organization) systems are specific control objects. The scorecards of different systems will be similar or even identical.
- **ICT Project:** Projects are conducted to build new ICT services, processes or systems or to improve ICT services, processes or systems. Each project will be controlled with a specific scorecard. For specific projects it may be helpful to add specific indicators to the scorecard.

### Portfolio objects

We also have to consider groups of the above mentioned elementary control objects. Management does not only have to control each single service, process, system or project, but also the total group of all services, all processes, all systems, and all projects.

- **ICT Service portfolio** (Service catalogue (ITIL)): Sometimes a service portfolio is called a service catalogue or structured list of services. A service portfolio will be controlled with a service portfolio scorecard.
- **ICT Process portfolio:** The process portfolio is often considered as "the" organization or a sub-organization, e.g. a team, group or department. A process portfolio will be controlled with a process portfolio scorecard.
- **ICT System portfolio** (System landscape, system architecture): A system portfolio is often denominated as system landscape or system architecture. A system portfolio will be controlled with a system portfolio scorecard.
- **ICT Project portfolio:** A project portfolio will be controlled with a project portfolio scorecard.

Possibly an ICT organization has defined several service, process, system or project portfolios. There may be a hierarchy of portfolios.

### Cross-section control objects

To integrate an ICT organization completely we also need control objects, which are not covered by services, processes, systems or projects. We denominate them here as cross-section control objects. Important representatives of those control objects are:

- **ICT resources**, e.g. personnel, ICT infrastructure,
- Information security management,
- **GRC management:** Governance, Risk, Compliance.

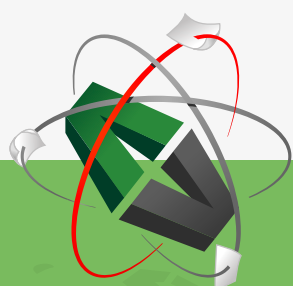
However, there may be additional relevant control objects in this category.

## Overall view onto ICT

If we consider ICT in an organization then we can easily define different roles with respect to ICT. Most organizations use ICT to support their business processes. So we can have different views onto ICT, the view of the customer of ICT services (IT Demand), the view of the supplier of ICT services to the organization (IT Supply) and the comprehensive view of the owner or top management of the organization (IT governance).

- **IT Demand**
  - This is the responsibility of the ICT customer or consumer.
  - The ICT customer has to plan and communicate his needs.
  - The ICT customer is responsible to use ICT services in his business processes efficiently.
- **IT Supply**
  - This is the responsibility of the internal or external ICT service provider.
  - The service provider has to make service offerings.
  - The service provider has to provide ICT services effectively and efficiently.

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- **IT Governance**
  - This is the responsibility of top management.
  - Top management has to establish the rules of the ICT “game” for the organization (Who is allowed or who has to provide which ICT services? Who is allowed or who has to consume which ICT services?).
  - Top management has to ensure the long-term survival of the organization, of course including the chances and risks of ICT for the organization.

### 8.2.2 PARTICULARITIES OF E-COMMERCE

If we want to conduct performance management for E-Commerce then we have, of course, to deal with business and business performance management. And we could use all methods and approaches, which have been turned out to be successful in traditional business areas. However, ICT systems play an important role in the area of E-Commerce. And thus it is clear that E-Commerce performance to a significant part is the performance of the involved ICT systems, especially those application systems which we have already discussed, e.g. online shops or procurement platforms or digital marketplaces, etc.

Let us consider online shops or websites a little deeper. Because a website is an ICT system all methods and approaches of ICT performance management can be used. So we could measure the availability, response times and so on as we can do it for arbitrary application systems. You will find a lot of specific metrics and KPI proposals if you read books about IT service management (Forbes 2016).

However, some things are different from traditional ICT systems and services.

First of all, **most users are not known to your organization** (unless you only consider registered users) because they are not members of your organization (See B2C business, online shop). What are the consequences?

- The user is not a member of your organization. He is free in what he does, how he does it and when he does it. You cannot dictate the rules as you can do it for the members of your organization. Perhaps he wants to visit your website after midnight and not during the normal opening hours.

- The user brings his own device. Due to well established standards it should not be a problem for him to connect to your website. But sometimes the browser, the version of the browser or the quality of the network do play a role. And your website should be able to automatically adapt to the specific parameters of the user's device whether it is a traditional office desktop or the newest version of a super smartphone.
- You do not know how many users you really have or will have. You just can make statistics and forecasts. In your organization you will exactly know how many users you will have at maximum. So planning and capacity management are much more vague as within your organization.

Secondly, **ICT systems in the E-Commerce area cross boundaries of organizations** (See B2B business). This leads to the challenge of interfaces. Though standards make it quite easy to couple your ICT systems with the ICT systems of your business partners a lot of work remains to do:

- Standards always allow some interpretation. To let ICT systems cooperate all systems have to work with the same interpretation of the standards...
- When different systems are linked things can go wrong. What about error handling, security and consistency of data in case of breakdowns?
- We also have some ownership and even legal issues. In a value chain we have a chain of ICT systems. Who is responsible for the chain of systems as a total system? Who is the owner of which part of the total system and how is the distribution of responsibility? How are the costs of the ICT system chain assigned to the partner of the value chain?

Another issue will arise later on, when we consider Website Controlling/Web Analytics. We will see that this is not only an issue of ICT performance management but also rather a subarea of sales and marketing performance management.

### 8.2.3 PROJECT PERFORMANCE

Let us start with an often-used definition of a project (Kuster et al 2015, p. 32):

A project is a temporary endeavour undertaken to create a unique product or service.

This is, of course, the same for E-Commerce projects. However, there are some **specific challenges for projects in the area of E-Commerce**:

- Those projects will often have several project sponsors/awarding authorities, possibly from different organizations, even legal entities. This lets project steering become a serious challenge. We have to care for the setup and management of the **steering committee**.
- Often project results are not well defined or at least strongly moving, because E-Commerce is a completely new area for the whole organization. This will lead to a significant **change management** challenge.
- Sometimes a **project programme** (network of interlinked single projects) is initiated and the development of an online shop or a website is just a part of a complex endeavour.
- We have a mixture of **development and customizing** due to the fact that parts of the new system are off the shelf software and other parts have to be developed individually for the specific environment.
- We have a high portion of **infrastructure issues** (e.g. hardware, network, devices, databases).

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- We have a high portion of **integration issues** due to the combination of a big variety of components and sub-systems.
- We have a high portion of **security issues**.
- A significant volume of **re-working** will be needed after “Go Live” of the E-Commerce system.
- We have high-level requirements to the **quality** of the system due to the specific nature of E-Commerce applications.
- We have to involve **unknown users**.
- We have high-level requirements to **usability** of the application.
- **Monitoring** and assessing the progress of the project is a real project management issue.
- There will be a lot of efforts for **testing and quality assurance** (e.g. real life test environment).
- The assessment of the expected **financial and non-financial benefits** (Do not forget to consider cannibalization effects) will not be easy.
- E-Commerce projects need **specific skills** of the project team members. Thus some **training** will be necessary.
- We have some significant **project risks** (no experience with E-Commerce; no experience with the related technologies).

This leads to several specific recommendations:

- Define rough targets and get a commitment from all stakeholders.
- Keep the planning open, but work on the basis of a clearly defined roadmap.
- Centralize change management.
- Have an effective risk management.
- Have a professional and real-time project monitoring.
- Have an acute project steering.

#### 8.2.4 SYSTEMS PERFORMANCE

After projects have been successfully finished the new or modified system, which was the result of the project, has to be transferred to the daily operation, which is either taken over by an internal ICT department or by an external ICT service provider.

#### Questions:

- Which systems/sub-systems/components are used for E-Commerce?
- Are all systems/sub-systems/components clearly defined?
- Can we measure the resource consumption of the systems/sub-systems/components?



- Can we determine the true costs of our E-Commerce systems, which do not only include the ICT costs but also the costs of the user organization working with the system?
- Which overhead and infrastructure costs (indirect costs) must be assigned to the E-Commerce systems?
- What is the output of the systems/sub-systems/components which are to be considered? Can we measure the output? How can we measure it?

### **Challenges:**

- Boundaries of E-Commerce systems are not so precisely defined as in traditional application systems.
- E-Commerce systems use to a high degree general infrastructure systems and middleware components.
- In the case of service oriented architectures (SOA) the services will (hopefully) be used by various systems.
- Master the clearance regulations for used external services.

### **Tools from cost accounting:**

- Cost unit accounting
- Cost distribution sheet

### **Internal service charges:**

- What is the output of our E-Commerce system?
- How can we measure the output quantity?
- Who is the (internal) customer of the E-Commerce system and thus has to pay it?
- Can we distribute the output to the different (internal and external) customers and what are the results of this distribution?
- Is the customer able to plan the output quantity?

## **8.2.5 SERVICE PERFORMANCE**

E-Commerce is in the responsibility of sales and marketing management. It depends heavily on ICT but is not at all an ICT activity. However, the E-Commerce management does not want to care for hardware and software. They want to get the machines provided and operated by a specialized service provider.

## Definition of services

- The **value proposition**: A service is a means of delivering value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs and risks.
- The **value composition**: We always ask for the business value of a service:
  - **Service Utility**: functionality from the customer's perspective – what the services does, what the customer gets, fitness for purpose,
  - **Service Warranty**: Assurance that an IT service will meet agreed requirements – how well the service is done, how it is delivered, fitness for use.

## Challenges

- Who is the service customer? Who is responsible for the business done with E-Commerce?
- Who is the user of the service (people inside and outside of the organization)?
- Who decides the service levels?
- Who are the partners, which agree on the service levels?
- How can we measure the realized service levels?

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The basis of performance management for a service is a service level agreement (SLA). Each service has a specific SLA. If the ICT service provider is an external organization then SLAs are part of the contract. If the service provider is the internal ICT department then SLAs are internal documents. SLAs are always established by the ICT governance function.

#### **Service Level Agreement (Structure of the document):**

- **Basic information:** partners of the agreement & signatures, summary/short description/scope/limits, start of agreement/end of agreement/other due dates, reviews (when, how, who?), responsible contact persons (also in a case of an escalation),
- **Service description:** specification/definition, availability of service, capacity to be provided, security/business continuity, expected resp. accepted quantities (upper limits, lower limits), priorities in case of incidents or trouble (incident management), workflow for changes (change management),
- **Service Reporting:** content, addressees, deadlines,
- **Charging:** prices (levels, validity), clearing procedures, deadlines for invoicing, booking/payment, bonus malus rules.

### **8.3 WEB ANALYTICS**

In contrast to traditional shops or information points the digitized versions in the E-Commerce world allow a detailed measurement of all on-going activities. So the responsible management has many opportunities to measure and analyse, to manage quantitatively.

#### **8.3.1 POTENTIAL OF WEB ANALYTICS**

- Generally:
  - In an online shop you are able (technically) to monitor and to document the behaviour of the visitors completely and detailed.
  - You have much better possibilities to analyse than in a real shop.
  - But care for privacy protection of your (potential) customers.
- Benefits in detail:
  - Support management and decision making,
  - Analyse website usage and optimize website,
  - Improve user focus of website (usability, see Lin et al 2013, pp. 53–66),
  - Conduct search engine optimization (SEO),
  - Optimize online marketing,
  - Optimize sales process and related processes, e.g. billing or complaints management,
  - Optimize customer relationships,
  - Optimize profit,
  - Gain competitive advantage.

Categories of Web Analytics are:

- **Web performance management** (WPM) is the planning, analysis and control of all website related activities and processes as well as all E-Commerce actions to continuously improve the success of your organization.
- **Web content performance management** (WCPM) contains the analysis and examination of the content usage or content demand to continuously optimize your online offering and your website.
- **Web user performance management** (WUPM): serves the analysis of visitor properties and visitor behaviour to consecutively optimize visitor and customer focus, customer exploitation, development and loyalty. Additionally WUPM supports the segmentation of customers or visitors.

### 8.3.2 WEB ANALYTICS AND KPIS

If you run a website then there should be targets for it. Targets are corresponding to management questions. Subsequently we list some typical questions related to websites/online shops. In brackets you will find KPIs or metrics, which show the degree of target achievement or the value of a relevant attribute.

A lot of questions do not ask for a number but for a name, a key word or another attribute. The answer, of course, is not a KPI, but an information, which is strongly related to KPIs. A typical representative of that category of management questions is: What are our 10 customers with the highest sales volume? The process to find this out is as follows:

- Find out the sales volume of all your customers (within a specific period of time).
- Build a list or table with the name or identifier of the customers and the corresponding sales volume.
- Sort the list in decreasing order of the sales volumes.
- Take the first 10 entries of this list.

This is a list of 10 KPIs.

#### Management questions

- How many visitors did we have in general/due to a specific campaign (number of visitors/visits, number of visitors/visits due to a specific campaign)?
- Where are the visitors located geographically (List of x-most found geographic origin of visitors; referrer = pointing URL)?
- What is the technical infrastructure the users have (List of x-most used browsers/devices)?

- What are the most used sites/most used entry sites (List of x-most used sites/entry sites)?
- What are the most used exit sites (List of x-most used sites to leave)?
- How do users navigate through our website (List of x-most used paths of navigation)?
- What were users looking for (List of x-most used key words/search phrases)?
- How much sites are called per visit (Number of site calls per visit so that x% of all visits have a higher number of site calls)?
- How much time do users spend for their visits (Time interval T so that x% of visits have a longer duration as T)?
- Which portion of the visitors left the shop already after invocation of the first site (Bounce Rate)?
- Which portion of users was seriously interested in buying something (Portion of users who filled their shopping cart)?
- Which portion of the visitors ordered something (Conversion rate: Portion of users who finalized a shopping transaction)?
- How much did visitors really buy (Value of shopping cart content so that x% of the visitor bought more?)
- What are our top-/flop products (List of x products with highest/lowest sales volume)?
- Which portion of the visitors had already visited the shop earlier?



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- How much sales did we make due to a specific marketing campaign?
- Which products were sold due to a specific advertisement?
- How much sales did we generate per invested unit of marketing costs?
- How effective are our advertising media (e.g. Banner, Newsletters)?
- How much users have been interested in our newsletter (Number of new registrations for the newsletter)?
- How much users have been interested in detailed product information (Number of product information brochure downloads)?
- How much users have been interested in a direct dialogue with us (Number of requests via contact form)?
- How much users have rated our products (Number of product reviews by customers/visitors)?

### Classification of data

- **Raw data**, which are needed as input to website-related KPIs: page views, visits, visitors/multiple visitors, registered users, 1-Click visits/n-click visits, usage quantities of sites, entry sites, exit sites, link usages, coverage of banner advertising, click-throughs of banners, key words for searching, top-Level-Domains/Sub-domains, transferred data volume (downloads, Flash-Animations, streaming Media, RSS = Really Simple Syndication), transmission errors, used browsers/operating systems,
- **Combination of raw data**: portion of 1-click visits (related to total number of visits), portion of n-click visits (related to total number of visits), depth of visit: Number of page views per visits, portion of multiple users (related to total number of users), portion of registered users (related to total number of users), click paths (Sequence of page views), portion of re-used user information, click-Through-Rate, related to coverage, response rate for request forms, portion of dynamic sites,
- **Indicators related to time**: (average) duration of visits, (average) duration of absence, frequency of visits, average response time of server, average duration for downloads, course of usage, degree of capacity utilization for data transfer, incident rate, intensity of incidents: Downtime through incidents,
- **Indicators, which include website external data**: number of Web customers, portion of Web customers, loyal customers, customer potential (which can be reactivated), portion of abandoned shopping carts, customer segmentation, costs of user acquisition (Basis: Costs of a promotion action), costs of customer acquisition (Basis: Costs of a promotion action), cross-selling potential (non-related products), up-selling-potential (related products), average number of clicks per transaction.

## Selected indicators

- Conversion rate:
  - Total: portion of visitors who purchased something,
  - Partial: information vs. visit, shopping cart vs. information, order vs. shopping cart, delivery vs. order, payment vs. delivery,
  - Effects on sales (example):
    - Basic data: annual visits of new customers = 50.000, average value of shopping cart = 80 EUR, portion of new customers who become regular customers = 25%, annual follow-up purchases per customer = 2,
    - Effect of one-time increase of conversion rate by 1%: additional new customers = 500, additional sales 1. year = 40.000 EUR, additional sales 2. year = 60.000 EUR, additional sales 3. year = 80.000 EUR,
- Stickiness: ability to keep the visitor on own website,
- Slipperiness: ability to get into fast and short interaction with user,
- Recency: time since last purchase,
- Prosumer rate (prosumer = producer + consumer): portion of users with active contributions,
- Integrator rate: portion of users who get integrated into digital value chain,
- Price for 1.000 contacts: costs to place the advertisement means 1.000 times (e.g. banner),
- Cost per click (CPC),
- Cost per action (CPA) resp. cost per transaction,
- (CPX): Costs to generate an action with a specific marketing action X (e.g. order, flyer download, request for call, etc.),
- Cost-to-sales-relation: ratio of additional sales and costs, which can be assigned directly to a marketing action.

## Methods

- Basically:
  - Data collection on the server (**log-file analysis**),
  - Data collection on the client (**count pixel analysis** (alternative to log-file analysis): Course of action: website is called by user, website is delivered with integrated count pixel, count pixel is invoked by analysis server, count pixel is delivered; customer access is documented; Also: page tagging),

- Website call statistics,
- Click path statistics:
  - Result for an example (“Guideline”):
    - Access: directly = 8,24%, via “Start” = 47,09%, via “Online-Version” = 8,90%, via “PDF-Download” = 7,53%, via “News” = 3,70%, via “Studies” = 2,94%, via other sites = 21,63%,
    - Exit: from website = 13,38%, to “Online-Version” = 27,31%, to “PDF-Download” = 23,82%, to “Start” = 12,05%, to “Studies” = 3,01%, to “Printed version” = 2,74%, to other sites = 16,91%,
  - Why customers do not follow the pre-given path of navigation:
    - No hints to the next step,
    - User does not find link where he/she expects it to be,
    - User does not find information where he/she expects it to be,
    - User is side-tracked: site too complex/site confusing,

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- Why customers cancel the sales process:
  - Loading time of website,
  - Website not correctly presented,
  - Missing information,
  - Information inapprehensible,
  - No clear error messages in the case of missing or incorrect input,
  - Too much information requested,
  - Missing Link to subsequent site,
  - Customer does not find link to subsequent site,
- **Clickmap:** A clickmap is like a transparent slide, which is laid over the website and shows how often specific links on this site have been clicked,
- **Heatmap:** The heatmap also shows, where users have clicked. But in contrast to a clickmap also clicks onto unlinked text or graphics are measured. So you can determine where the user has expected a link and you can insert it afterwards,
- User identification with **cookies:**
  - Definition of a cookie: A magic cookie, or just cookie for short, is a token or short packet of data passed between communicating programs, where the data is typically not meaningful to the recipient program; the contents are opaque and not usually interpreted until the recipient passes the cookie data back to the sender or perhaps another program at a later time; the cookie is often used like a ticket – to identify a particular event or transaction,
  - First visit: website is called, website is delivered, cookie is placed,
  - Subsequent visit: website is called, website is delivered, cookie data are transferred to the server, cookie is updated.

### Tool selection

- Which methods the tool should support?
- Do you want to do the analysis on your own computers or do you want to let it be done by an external service provider?
- Are there data privacy requirements, which the tool has to fulfil?
- How many users shall have access to the tool?
- Which time is accepted for the generation of the analyses and the reports?
- Which interfaces should the tool have (e.g. to ERP system, data warehouse, etc.)?
- How expensive is the tool allowed to be (dependent from marketing budget and expected savings potential through Web controlling)?
- Which support services do you need, e.g. installation support, consulting during analysis?

## **Conclusion**

In the E-Commerce area we have a comprehensive potential for data collection and data analysis. We have to observe the economic principle also in website controlling. Not everything, which seems to be of interest, improves the management capability of our organization.

Basis for measurement and generation of indicators always must be clearly defined targets – however we must be flexible enough to cope with the dynamic of the E-Commerce. Measured data must be stored and administered. This must be documented in the requirement documentation.

The website-analyst is the most important user of the system and must be a member of the project team.

## **8.4 EXERCISES**

### **8.4.1 QUESTIONS FOR YOUR SELF-STUDY**

Q8.01: Describe the stages of the control cycle.

Q8.02: Explain the different categories of indicators and give some examples for each category.

Q8.03: Develop a scorecard to control a project.

Q8.04: Develop a scorecard to control a service.

Q8.05: Which organization in your firm should be made responsible for Web analytics activities?

### **8.4.2 PREPARATION FOR FINAL EXAMINATION**

T8.01: What is a scorecard?

T8.02: Define the conversion rate in your online shop.

T8.03: Explain the difference between a clickmap and a heatmap.

T8.04: How does a cookie work?

### **8.4.3 HOMEWORK**

Build a scorecard to monitor an online shop.

Build a scorecard to monitor a supply chain.

## 9 ADVICES FOR EXERCISES

Q = Question/AQ = Answer

T = Test/AT = Answer

### 9.1 BASICS AND DEFINITIONS

#### 9.1.1 QUESTIONS FOR YOUR SELF-STUDY

Q1.01: Where do you use the opportunities of E-Commerce actually in your daily life?

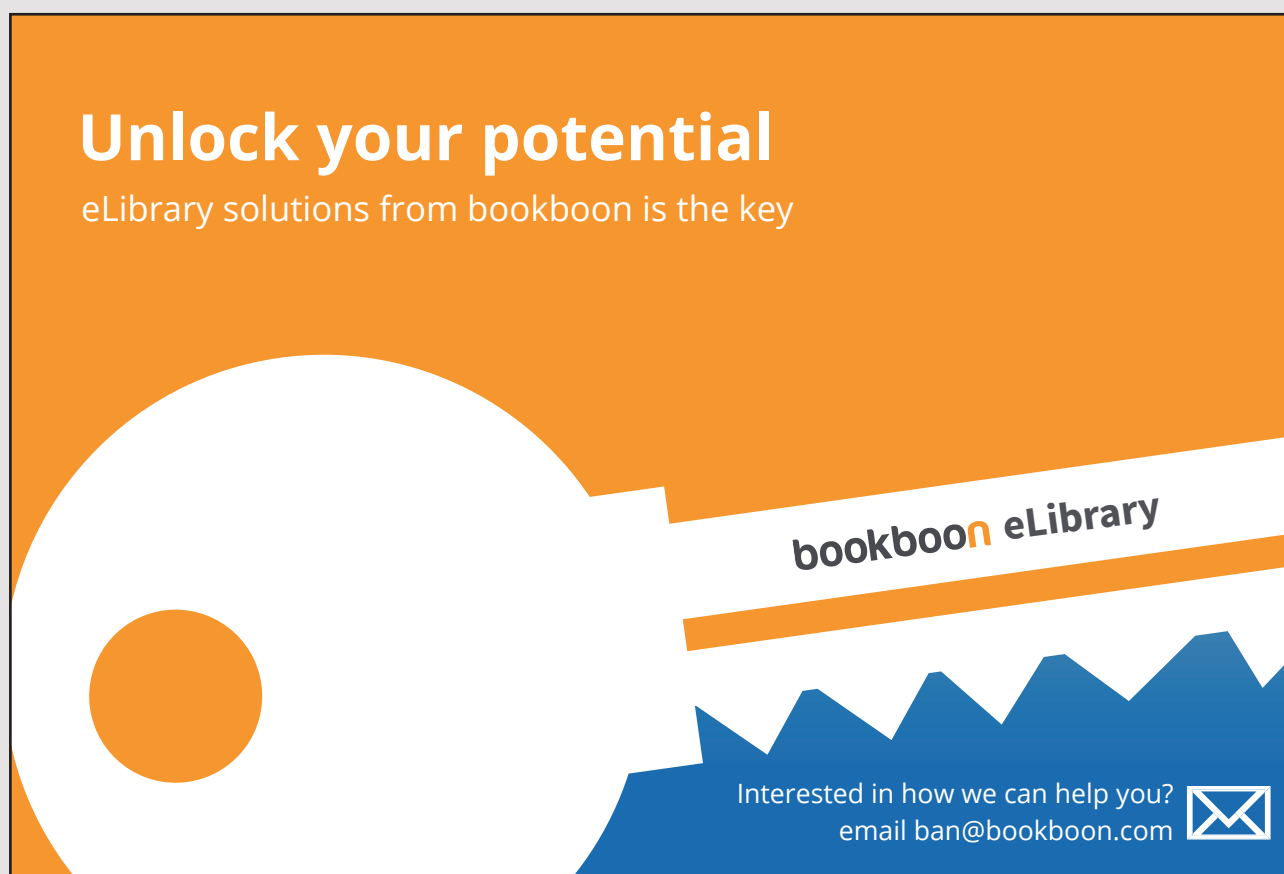
AQ1.01: Examples are buying books or shoes, electronic banking. You will find further examples.

Q1.02: Which companies do you know which are doing E-Commerce?

AQ1.02: Examples are Amazon, Alibaba, Starbucks. You will find many other examples.


Q1.03: Consider the Internet-based businesses, which we have listed above. Are they really new business categories?

AQ1.03: See 1.2.1.



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Q1.04: Find additional advantages and disadvantages of digital businesses.

AQ1.04: An advantage for the customer is, that he can get products, which would have never been offered to him in traditional business. A disadvantage for the customer is, that he might have a currency exchange risk if he buys from companies in foreign countries. An advantage for the provider is, that in E-Commerce he gets more data about his customers. A disadvantage for him is the harder competition.

Q1.05: Consider the above-mentioned technical and economic challenges of E-Commerce. Try to find answers to the various questions, which we have listed.

AQ1.05: Technical challenges – consequent orientation towards Web technologies, encryption of data when storing them, education and training of personnel in IT and user departments. Economic challenges – communication and cooperation with business partners, assessment of new business partners, making “good” contracts, researching the markets carefully, document strategies, run test markets, consequent monitoring and professional performance measurement, improving communication with business partners, changing and re-designing business processes due to new IT systems and workflows.

Q1.06: What is E-Commerce? How is it different from traditional business models?

AQ1.06: See 1.1.3 and 1.2.1.

Q1.07: What are different business models available for E-Commerce?

AQ1.07: See 1.2.3.

Q1.08: How can customers benefit from E-Commerce?

AQ1.08: See 1.2.2 and 1.2.4.

### **9.1.2 PREPARATION FOR FINAL EXAMINATION**

T1.01: We have discussed about E-Commerce, E-Business and E-Procurement. Is there any relationship between these three terms? What is the difference between E-Commerce and E-Business? What is the difference between E-Commerce and E-Procurement?

AT1.01: E-Commerce = selling side, E-Procurement = purchasing side, E-Business = including both sides.

T1.02: E-Commerce is so successful, because we have the Internet. Do you agree to that statement? Why? What would happen, if tomorrow morning the Internet had shut down? What would happen, if tomorrow we would only have traditional telephone lines?

AT1.02: Internet provides a general infrastructure, globally available (7\*24), robust, reliable and flexible. Without the Internet business processes will slow down significantly, with dial-up and point-to-point connections there will be strong technical constraints for conducting business, availability of systems and providers will decrease due to lower reliability.

T1.03: Please define the term “M-Commerce”.

AT1.03: See 1.1.5.

T1.04: E-Commerce has advantages as well as disadvantages. Give one example for the customer’s perspective. Give one example for the supplier’s perspective.

AT1.04: See 1.2.2.

## **9.2 FRAMEWORKS AND ARCHITECTURES**

### **9.2.1 QUESTIONS FOR YOUR SELF-STUDY**

Q2.01: Compare the fundamental sales process as it has been shown here to your daily life and the “traditional” sales process. What is different? What is new? What is missing?

AQ2.01: The sequence of steps may be different. Human actors do not see each other. Mechanisms for trust building are needed.

Q2.02: How much should a business manager know about technical subjects? What is “need to know”? What is “nice to know”?

AQ2.02: The manager must understand the functionality and the complexity. It is helpful if he has a sound understanding of the technologies. This will help him to more effectively communicate with the technical experts.

### **9.2.2 PREPARATION FOR FINAL EXAMINATION**

T2.01: Please list the seven plus one steps of the fundamental selling/purchasing process.

AT2.01: See 2.2.

T2.02: There are three basic types of software systems in the E-Commerce: online shop/marketplace/procurement platform. Characterize them by the number of suppliers and customers.

AT2.02: Shop = 1 supplier & n customers, marketplace = m suppliers & n customers, procurement platform = n suppliers & 1 customer.

T2.03: One basic technology of E-Commerce is abbreviated by TCP/IP. Was does this mean? What are the two functions, which are covered by this technology?

AT2.03: TCP/IP = Transmission Control Protocol/Internet Protocol. TCP = physical layer and data link. IP = address layer. See 2.3.1.

T2.04: Explain the two abbreviations B2C and B2B. Do you think it could make sense to define a business type C2C? Why?

AT2.04: B2C = business to consumer, B2B = business to business, C2C = consumer to consumer (can be considered as a specific variant of B2C or B2B).

## 9.3 B2C BUSINESS

### 9.3.1 QUESTIONS FOR YOUR SELF-STUDY

Q3.01: How can we get to the point where the consumer wants to buy something from us?

AQ3.01: Customer must find us and must be interested in our offerings.

Q3.02: How should we make the business, so that the customer is satisfied and that we as the supplier are satisfied as well?

AQ3.02: This similar to traditional business – good presentation of products and services, simple contracting, quick delivery, comfortable and trustworthy payment, fair prices.

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Q3.03: You are a producer of a specific product, which you deliver in various packaging sizes and different trade units. What are the consequences for the identification of the product, e.g. to determine your sales quantities?

AQ3.03: We need an identifier for each product, must be able to identify each size and trade unit of the product, and must have a minimal unit so that each trade unit is a multiple of this unit.

Q3.04: Think that you run an online shop. How can you make sure that the customer, just placing an order, is a real customer, will accept the delivery and then pay the invoice?

AQ3.04: Let him pay before delivery, ask for his street address and check it carefully.

Q3.05: Think that you sell digital goods. How can you ensure that the customer does not disclaim the delivery of a digital good?

AQ3.05: For example – provide the good in an encrypted form and provide a key to decrypt it only after the customer has paid.

### **9.3.2 PREPARATION FOR FINAL EXAMINATION**

T3.01: If you are the owner of an online shop, you can decide whether your customers have to pay before delivery or after delivery. Both variants have advantages and disadvantages for you. Assume that you can select only one of both methods. Which one would you select? Why?

AT3.01: Let them pay after delivery, trust in your customers though it will not always be successful.

## **9.4 B2B BUSINESS**

### **9.4.1 QUESTIONS FOR YOUR SELF-STUDY**

Q4.01: Describe the difference between B2B and B2C business.

AQ4.01: See 4.1.2.

Q4.02: Consider that you were a book-on-demand company. How could a B2B relationship to a big (electronic) bookshop look like? What is the process? What are the business rules?

AQ4.02: Requests for eBooks are forwarded automatically. Incoming request starts provision of an encrypted copy of the book. Decryption key is sent to the bookshop so that he can forward it to his customer. With the provision of the book copy an invoice to the bookshop is generated automatically and sent electronically to the bookshop.

Q4.03: We have described the advantages of the involved parties for a strong B2B relationship. What are the disadvantages for the involved parties?

AQ4.03: Disadvantages for the customer side – supplier gets access to customer's data and systems. Customer is “locked in” to the supplier, external partner influences design and change of internal processes. Disadvantages for the supplier side – supplier must be open for different customer needs, supplier is “locked in” to customer organization, and agreed business rules allow some insight into internal structure of supplier organization.

Q4.04: Find information about marketplaces. What are they offering? How long have they been in the market? Why are they successful?

AQ4.04: See remarks in chapter 4 and run an own research in the Internet.

## 9.4.2 PREPARATION FOR FINAL EXAMINATION

T4.01: What does the abbreviation EDIFACT mean?

AT4.01: Electronic Data Interface for Administration, Commerce and Transport.

T4.02: Consider a B2B relation between a producer of goods and a merchant. What are the specific advantages for both parties? Give two examples for both parties.

AT4.02: Producer and merchant can synchronize planning activities, reduce stocks, optimize delivery of goods and supply with goods, optimize transportation – all with respect to the needs of both parties. Examples – cooperation of consumer product producers and retail outlet firms, production and distribution of cars.

T4.03: Which consequences does a B2B relation have for the involved IT systems?

AT4.03: Data must be transferred seamlessly without media breaches. System operations must be synchronized. Development and change management must be coordinated. Legal issues must be considered, e.g. with respect to the usage of software licences.

## 9.5 IMPACT OF E-COMMERCE

### 9.5.1 QUESTIONS FOR YOUR SELF-STUDY

Q5.01: Are the statements on specific impacts of E-Commerce true? If yes, under which prerequisites? If no, what are the reasons?

AQ5.01: See 5.4. The answer depends somehow on your personal point of view. Find out, what are your assumptions (may be that they are given or determined by your political, religious or ethical orientation).



Q5.02: Show examples for disintermediation and examples for re-intermediation.

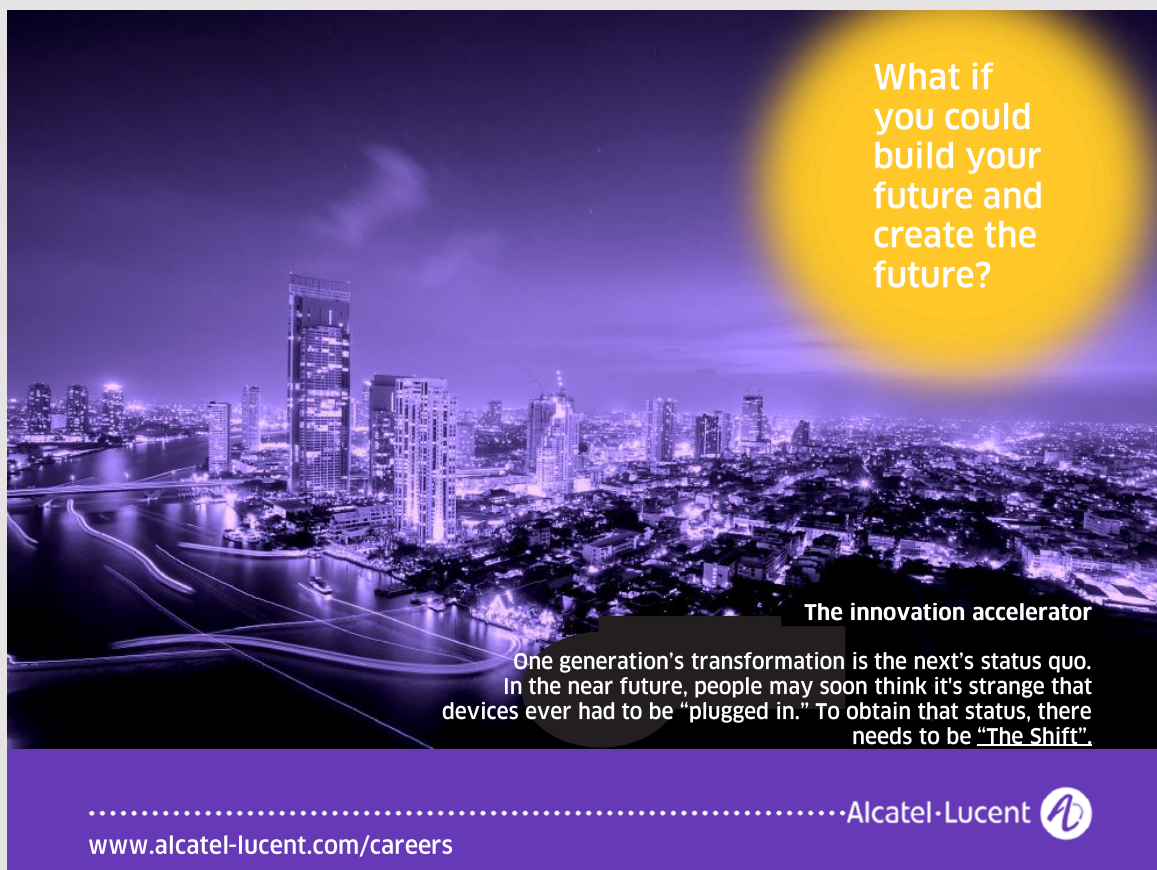
AQ5.02: Merchants are eliminated because producers sell directly to customers. Portals are created to bring together the offerings of competitors or service providers with supplementary offerings. Gross or retail trade organisations are eliminated. Logistics service providers take over cashing functions.

Q5.03: Do you agree with the macroeconomic impacts described here? Is the list of the described impacts complete or can you identify other impacts?

AQ5.03: See 5.3.1. Your agreement depends on your assumptions and expectations as well as your political, religious or ethical background. Only those people can realize the benefits of E-Commerce who have access to the digital world.

Q5.04: Do you agree with the microeconomic impacts described here? Is the list of the described impacts complete or can you identify other impacts?


AQ5.04: See 5.3.2. Again it depends on your assumptions and expectations as well as your political, religious or ethical background. Medium sized business may suffer from digitalization (due to 5.4.4). Is there an optimal degree of information supply? Does a flooding with data always help the customer?



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## 9.5.2 PREPARATION FOR FINAL EXAMINATION

T5.01: Does E-Commerce increase or decrease price levels? What are the reasons for your answer?

AT5.01: E-Commerce will lead to decreasing selling prices due to intensified competition. However, there is the danger of eliminating competition, which finally can lead to monopoly situations. The monopoly will be able to increase prices.

T5.02: Why do we have temporary monopolies? Why is their duration limited?

AT5.02: Monopolies in the digital world tend to be temporary situations due to changes in technologies and new opportunities to design new services and bundle service elements in new ways.

T5.03: Explain the term “hollywood economics”.

AT5.03: See 5.4.15.

T5.04: Explain the term “externality” and give two examples of this impact.

AT5.04: See 5.4.8.

## 9.6 SECURITY AND COMPLIANCE MANAGEMENT

### 9.6.1 QUESTIONS FOR YOUR SELF-STUDY

Q6.01: Why is the access provider not able to guarantee successful access to any computer attached to the Internet?

AQ6.01: Access provider can guarantee access to the computer (address) but not whether the computer is up and running or whether the owner allows access to a specific computer.

Q6.02: Why could we see the criminal liability of search engine operators differently from access providers?

AQ6.02: Search engines do not provide illegal content; they are only looking for phrases. Many phrases can have a legal and an illegal meaning at the same time (meaning depends on context).

Q6.03: Review the threat catalogue of German BSI. Which threats are especially relevant for E-Commerce? Do you see further threats, which are not listed here?

AQ6.03: See [www.bsi.bund.de/grundschutz](http://www.bsi.bund.de/grundschutz).

Q6.04: List internal rules of a firm, which have to be followed in running the firm's online shop.

AQ6.04: Deliver only to verified addresses. Deliver to new customers only if they have paid before delivery or by credit card. Identify customers by credit card or feedback from commercial agencies.

### 9.6.2 PREPARATION FOR FINAL EXAMINATION

T6.01: Please define the term "security".

AT6.01: See 6.3.

T6.02: Please list the four risk management strategies!

AT6.02: See 6.1.6.

T6.03: Some people tell, that employees are one of the greatest threats of every organization. Why do they come to that opinion?

AT6.03: People know a lot about internal structures, about technical environment and about weaknesses.

T6.04: Let two organizations have an encrypted data exchange. Describe the communication protocol if they decide to use asymmetric encryption.

AT6.04: Each partner creates a key having a public part and a private part. If A wants to send a message to B he encrypts his message with the public part of B's key and sends the encrypted message to B. B decrypts the message with the private part of his key, which has never been published outside. If B wants to send a message to A he encrypts with the public part of A's key and A decrypts the message from B with the private part of his key.

T6.05: Describe the communication protocol if an electronic signature is used.

AT6.05: Electronic signature is an application of asymmetric cryptographic methods. It differs from the encryption as follows. The sender of a message creates a key with a private and a public part. He encrypts with the private part of his key. The receiver takes the public part of the sender's key and decrypts the received message. If the decryption works successfully then the receiver knows that he got the message from a specific sender.

T6.06: What is the objective of business continuity management?

AT6.06: See 6.1.6. Business operations should not completely break down even if essential parts like IT systems broke down completely.

## 9.7 ELECTRONIC PAYMENT

### 9.7.1 QUESTIONS FOR YOUR SELF-STUDY

Q7.01: What is the general approach of E-Payment providers? Can we see some general principles of their business models?

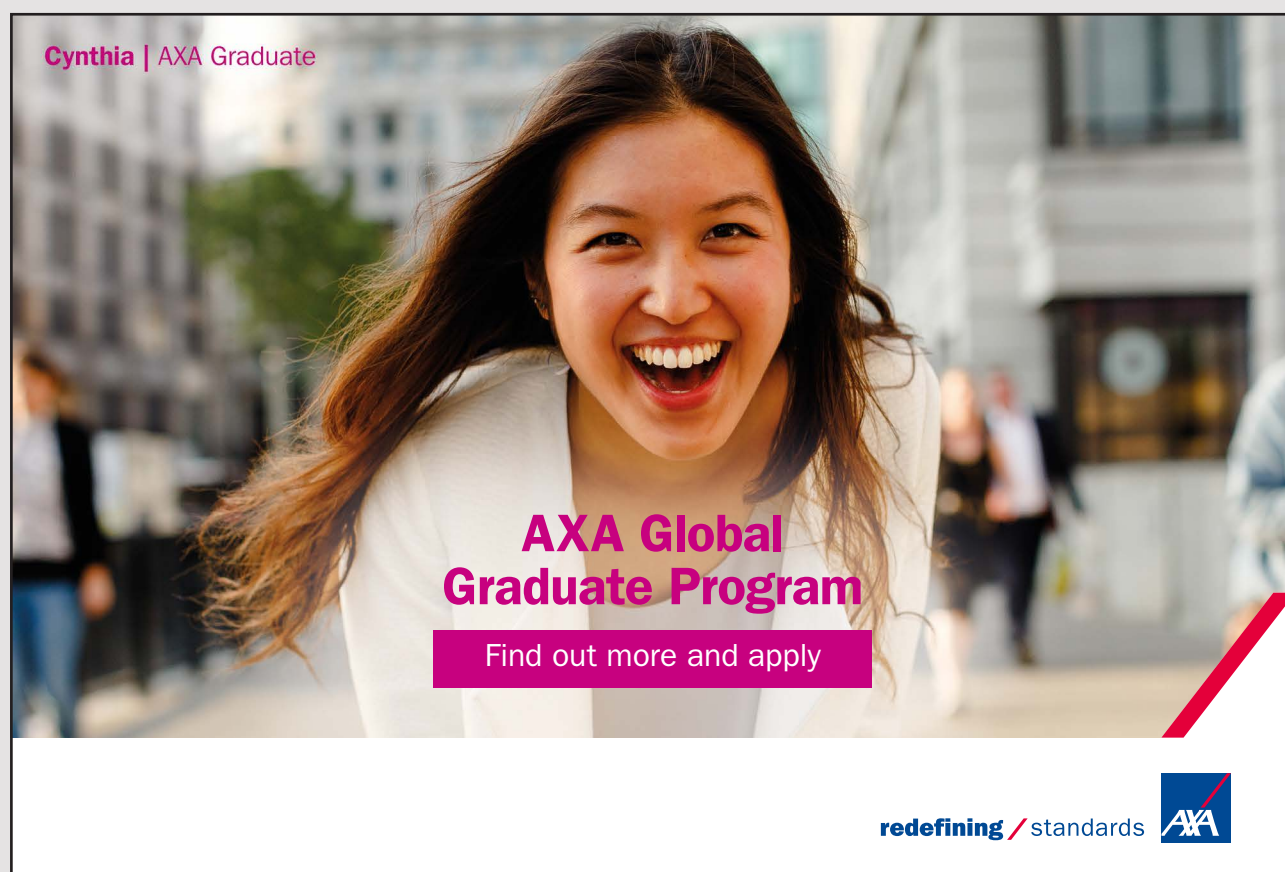
AT7.01: See 7.3.

Q7.02: E-payment normally is considered from the supplier's point of view. On the other hand there is a risk for the customer that the (supposed) supplier takes his money and does not fulfil the order. Make an assessment of the payment methods with respect to a risk minimisation for the customer.

AQ7.02: All methods where payment is done after delivery. May be that supplier and customer can share risk by partial payments, one part before delivery and the second part after delivery.

Q7.03: Find out the most popular E-Payment systems. What are their advantages/disadvantages? Which payment services should a new start-up company offer to its customers?


AQ7.03: See 7.3. The relevance of a payment method depends on the specific cultural, technical and sometimes even legal environment.



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## 9.7.2 PREPARATION FOR FINAL EXAMINATION

T7.01: What is the magic triangle of electronic payment methods?

AT7.01: See 7.2.1.

T7.02: What is the added value of payment service providers?

AT7.02: Ease of international payments, business partners do not know bank account data of other business partners, protections against shortfalls in payments, protection against delay of payments.

T7.03: If you are the owner of an online shop, you can decide whether your customers have to pay after delivery by a money transfer from their bank account to your bank account or with a credit card. Both variants have advantages and disadvantages for you. Assume that you can select only one of both methods. Which one would you select? Why?

AT7.03: You could choose payment by credit card because then you are sure to get your money. However, then you have to pay painful fees to the payment provider. Alternatively you could choose the traditional money transfer. This would avoid paying high fees but you would have to “pay” with a higher risk of payment shortfalls.

## 9.8 PERFORMANCE MANAGEMENT

### 9.8.1 QUESTIONS FOR YOUR SELF-STUDY

Q8.01: Describe the stages of the control cycle.

AQ8.01: See 8.1.2.

Q8.02: Explain the different categories of indicators and give some examples for each category.

AQ8.02: See 8.1.3.

Q8.03: Develop a scorecard to control a project.

AQ8.03: Degree of progress, related to final project result. Quality of already generated output. Degree of budget or personnel capacity consumption. Degree of adherence to schedules and milestones. Number of unresolved problems. Number or volume of change requirements. Risk value.

Q8.04: Develop a scorecard to control a service.

Answer: Service availability. Number of service breakdowns. Consumption of (financial) service budget. Service quality, e.g. number of incidents per user. Restart time in case of service breakdowns. Number of produced service units. Number of incoming incidents (service specific). Number of service specific change requests. Number of unresolved problems (affecting the service).

Q8.05: Which organization in your firm should be made responsible for Web analytics activities?

AQ8.05: Marketing & sales department because behaviour of shop visitors and customers is analysed.

## **9.8.2 PREPARATION FOR FINAL EXAMINATION**

T8.01: What is a scorecard?

AT8.01: See 8.1.3.

T8.02: Define the conversion rate in your online shop.

AT8.02: Portion of shop visitors, which purchased something from the shop or portion of shop visits, which were finished with the purchase of goods from the shop.

T8.03: Explain the difference between a clickmap and a heatmap.

AT8.03: See 8.3.2.

T8.04: How does a cookie work?

AT8.02: See 8.3.2

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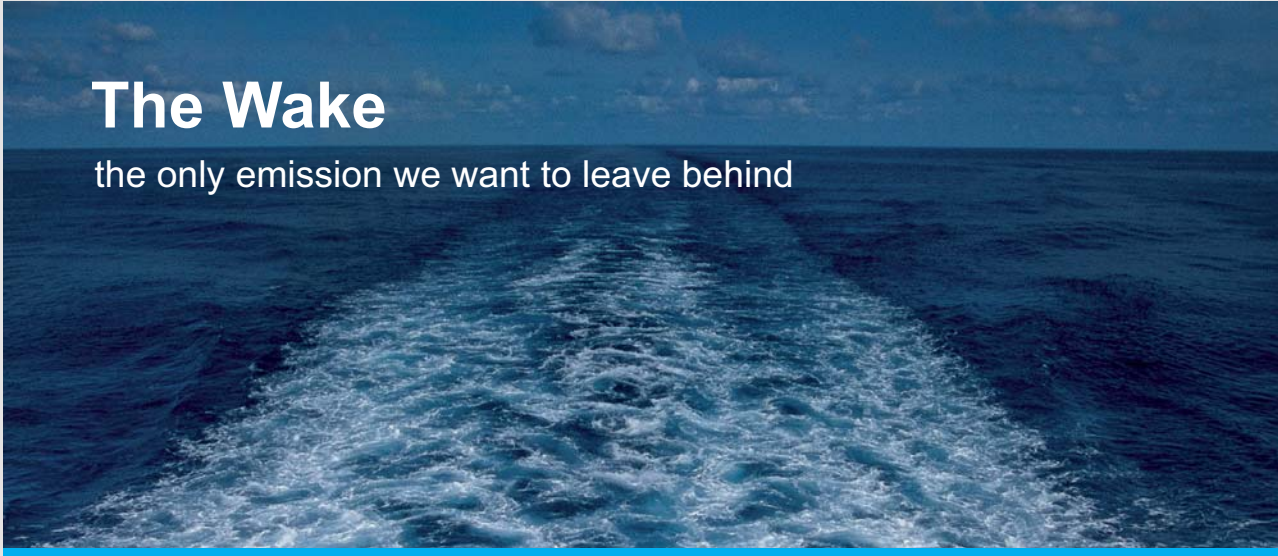
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