

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.

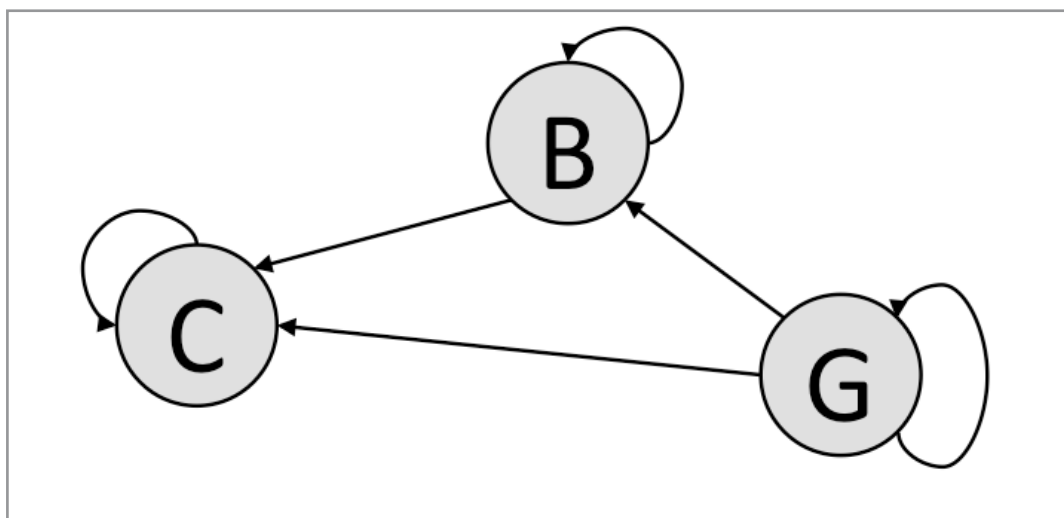


Figure 1: Business Relationships (B = Business; C = Customer/Citizen; G = Government)

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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1.2.1 PRIMARY PROCESS

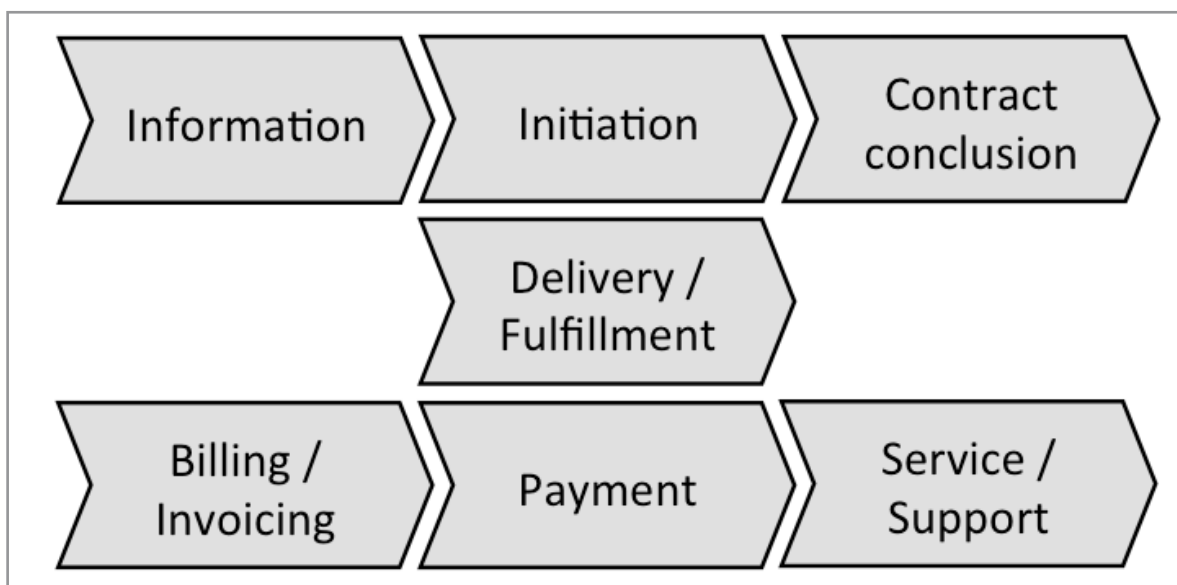


Figure 2: The primary process

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.)



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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.

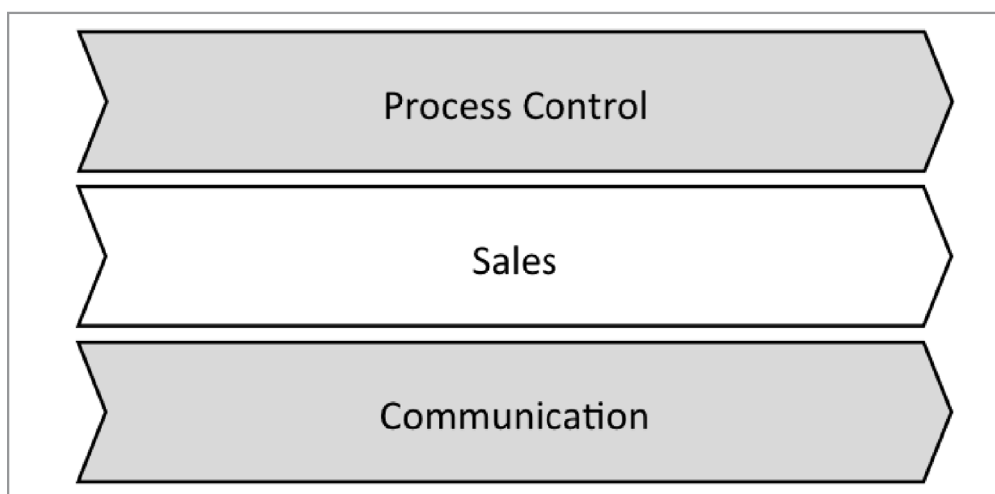


Figure 3: The secondary process

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.

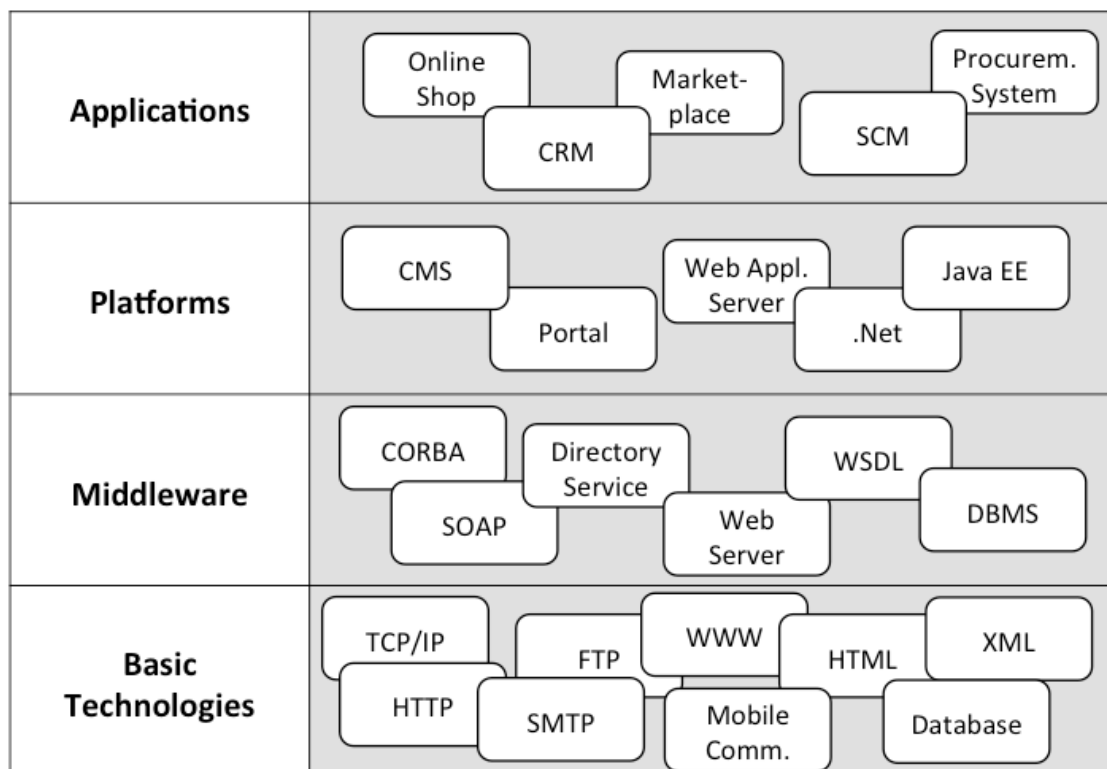


Figure 4: Technologies for E-Commerce

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 7.9×10^{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.



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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

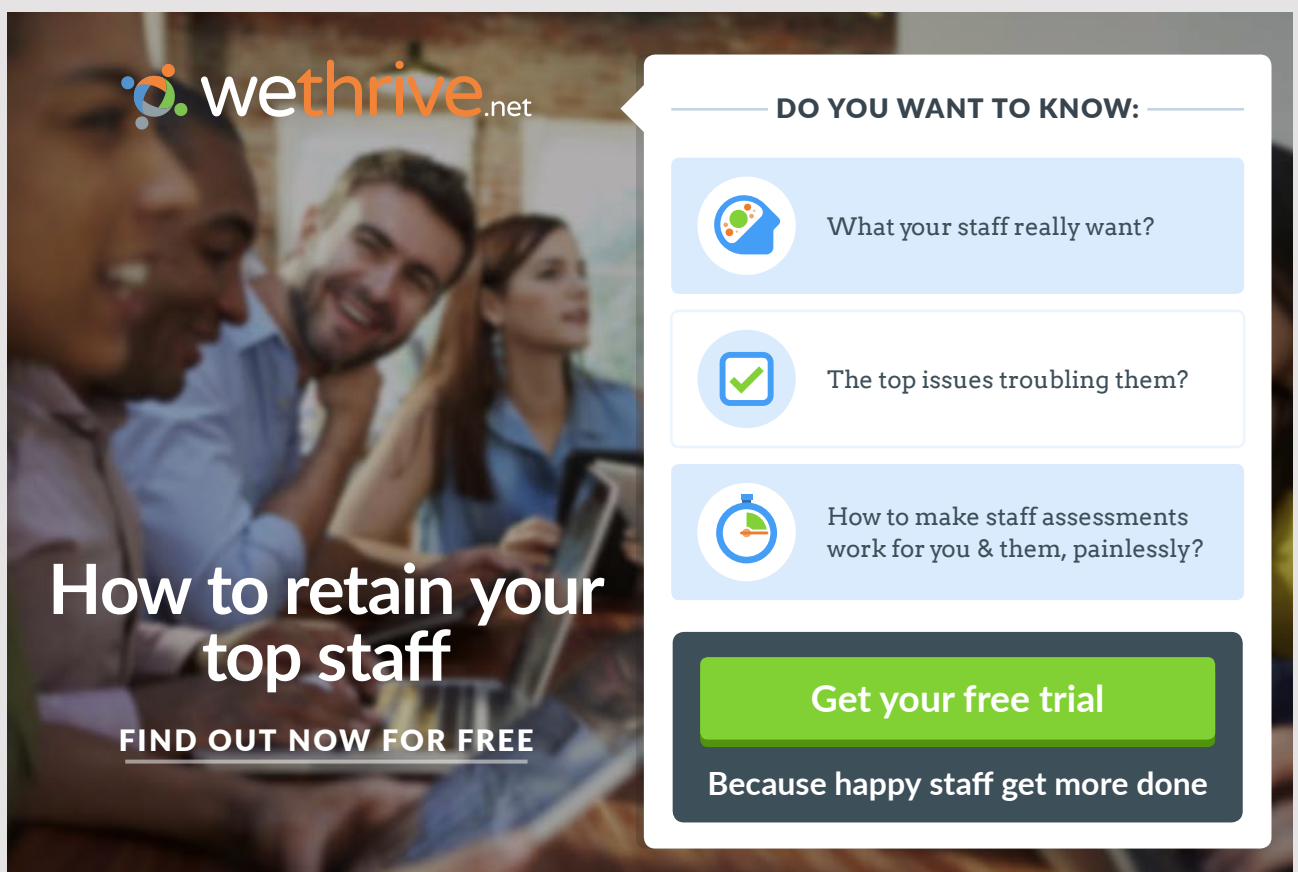
UMTS (Universal Mobile Telephone System) was developed in the 3rd Generation Partnership Project (3GPP). It is a mobile cellular system for networks based on the GSM standard and provides transmission rates up to 384 kbit/sec, with HSDPA up to 14,4 Mbit/sec.

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.

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).

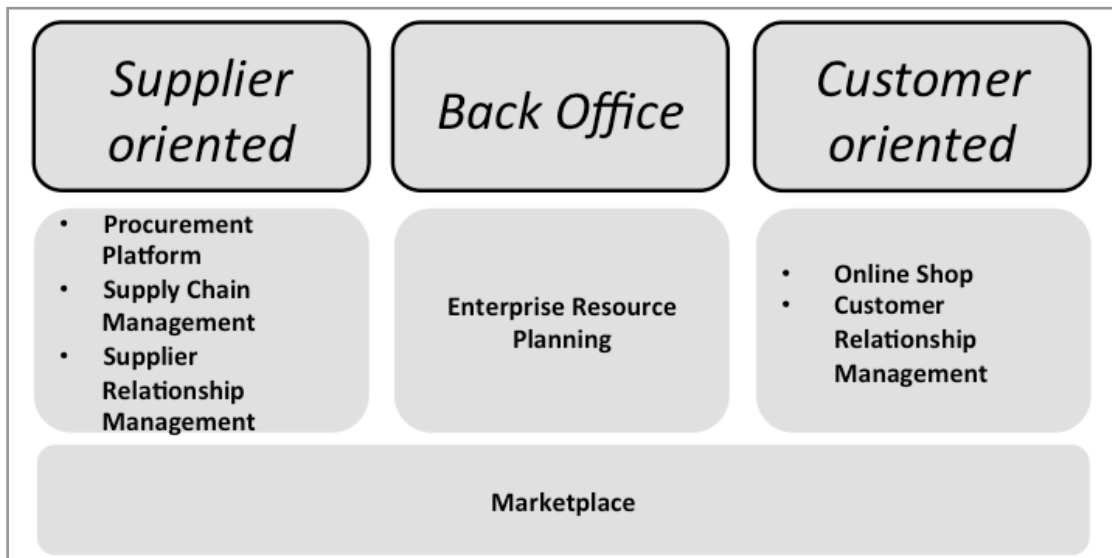



Figure 5: Software architecture

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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?