

ICT and e-Business in the

Telecommunication Industry

ICT adoption and e-business activity in 2006

e-business
w@tch



About e-Business W@tch and this report

The European Commission, Enterprise & Industry Directorate General, launched the *e-Business W@tch* to monitor the growing maturity of electronic business across different sectors of the economy in the enlarged European Union, EEA and Accession countries. Since January 2002, the *e-Business W@tch* has analysed e-business developments and impacts in manufacturing, construction, financial and service sectors. All results are available on the internet and can be accessed or ordered via the Europa server or directly at the *e-Business W@tch* website (<http://ec.europa.eu/comm/enterprise/ict/policy/watch/index.htm>, www.ebusiness-watch.org).

This document is a sector study by *e-Business W@tch*, focusing on the telecommunication services (telco) industry. Its objective is to describe how companies in this industry use ICT for conducting business, to assess the impact of this development for firms and for the industry as a whole, and to indicate possible implications for policy. Analysis is based on literature, interviews, case studies and a survey among decision-makers in European enterprises from the telco industry about the ICT use of their company.

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Contact

For further information about this Sector Study or the *e-Business W@tch*, please contact:

		
<p>Berlecon Research GmbH Oranienburger Straße 32 D-10117 Berlin Germany Fax: (49-30) 285296-29 info@berlecon.de</p>	<p>e-Business W@tch c/o empirica GmbH Oxfordstr. 2, 53111 Bonn, Germany Fax: (49-228) 98530-12 info@ebusiness-watch.org</p>	<p>European Commission Enterprise & Industry Directorate- General Technology for innovation, ICT industries and e-business Fax: (32-2) 2967019 entr-innov-ict-ebiz@ec.europa.eu</p>

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Executive Summary

Objectives and scope of the study

This document is a sector study by *e-Business W@tch*, focusing on the **telecommunications** (telco) industry. Its objective is to describe how companies in this industry use ICT for conducting business, to assess the impact of this development for firms and for the industry as a whole, and to indicate possible implications for policy. The analysis is based on literature, interviews, case studies and a survey among decision-makers in European enterprises from the telco industry about the ICT use of their company.

The telecommunications industry as defined for the study's focus covers business activities subsumed as "Telecommunications" under NACE Rev. 1.1 DL 64.2.¹

Adoption of ICT and e-business in 2006: The statistical picture

Telco companies have a forerunner position as intensive users of ICT and e-business in almost all application areas. Moreover, the wide diffusion of e-business technologies also among smaller enterprises distinguishes the sector from most other industries studied.

- **The internet is an integral part of daily work routines in the telco sector.** A large majority of employees in telco companies (on average about 90%) have access to the internet and are well connected via sophisticated ICT infrastructure. In fact, all statistical indicators reflecting the adoption of ICT infrastructure components are clearly above the average of all sectors covered by the *e-Business W@tch* in 2006.
- **Telco companies spend every fifth Euro of their investments for ICT and e-business technologies.** Survey results on ICT investments underline the relevance of ICT in this sector. In fact, ICT and e-business technologies are the basis for service provision, the sectors' output and are also needed for process support. Furthermore, ICT budgets of telco companies are likely to increase in the future.
- **Proprietary solutions and XML-based standards are most widespread as basis for e-business transactions.** In general, the use of e-business standards, particularly XML-based, is more widespread in the telco industry than on average in other sectors surveyed. However, a large share of telco companies reported using proprietary solutions for e-business transactions (based on agreements between several business partners).
- **Telco companies of all sizes make wide use of e-business tools in almost all application areas.** While complex ICT systems (e.g. Customer Relationship

¹ NACE Rev. 1.1 is a 4-digit classification of business activities. It is a revision of the 'General Industrial Classification of Economic Activities within the European Communities', known by the acronym NACE and originally published by Eurostat in 1970.

Management systems) are more widely diffused among large enterprises, telco companies of all sizes said that they use intensively rather simple e-business applications (e.g. e-ordering).

- **Most product and process innovations in the telco industry are ICT-enabled.** Overall, the share of telco companies that pursued product or process innovations during the past 12 months is higher than in all other sectors polled. About three quarters of all product innovations and almost 90% of process innovations were enabled by ICT.
- According to surveyed companies, **customers' expectations and fierce competition are the main drivers of e-business activities in the telco sector. Limited company size and security concerns were identified as the main barriers.** Overall, only a marginal share of telco companies (mainly micro companies) reported that e-business does not play any role for the way their company operates.

Analysis of e-business key issues

The telco industry has a dual role as user and supplier of ICT and e-business technologies. The analysis of **e-business key issues** in this report reflects both perspectives: **Convergence-driving technology developments** have been identified as key issue related to the supply of telco services. **Marketing, sales and customer care are core business areas supported by ICT tools** in this sector.

Convergence in the telecommunications sector

Although there is no single definition of convergence, this term is frequently used to describe technology trends that lead to blurring lines between different industries and their offerings. Convergence-driving technology trends include the increasing relevance of new broadband access technologies, Voice over IP (VoIP), IPTV and mobile telco services. The relevance of these trends for European businesses in different industries is reflected in the survey results.

- **Broadband connections are already widespread among businesses in Europe with DSL being the main driver of broadband penetration today.** Two of three companies in Europe (on average over all 10 sectors studied) reported having broadband access, according to the survey findings. Significant usage shares are observed for all size bands and sectors. DSL turned out as the most popular broadband access technology. But there is a large variety of other broadband technologies, which may serve as complements or alternatives to DSL.
- **A significant share of European businesses across different industries said that they already use VoIP.** While usage shares are quite high in all size bands, this technology seems to be particularly attractive for large companies – one out of five firms with 250 or more employees in this sector reported using VoIP.
- **An increasing relevance of mobile services among businesses in Europe, however, is only partly reflected by the survey findings.** Only a marginal share of companies across the 10 sectors studied in 2006 (4%) reported using wireless

broadband connections. In addition, mobile technologies for remote access are primarily used by companies in high-tech industries and among larger firms in Europe.

Further case-study-based analysis illustrates impacts of convergence-driving technology developments (including IPTV) on industry structure and competition in the telco industry.

ICT to support marketing, sales, and customer care

ICT and e-business technologies to support marketing, sales, and customer care are of high relevance in the telco industry as revealed by the 2006 survey results. Customer Relationship Management (CRM) is a complex task in this sector. Marketing and sales departments have to deal with mass-market issues, heterogeneous needs of different target groups, and an increasing range of products and services. ICT and e-business tools play a central role as a basis for the provision of customer services and to support marketing management in this sector. Insights into the practical use of ICT to support such activities are provided by numerous business examples and case studies.

- **Telco companies are forerunners in using ICT to support marketing and sales processes.** According to this year's survey results, the diffusion of customer-facing e-business applications in the telco sector is significantly above the use of such tools across all sectors studied by the *e-Business W@tch* in 2006. Case studies presented in Section 4.2 of this report illustrate the manifold potential of ICT for marketing and sales support in this industry.
- **ICT and e-business technologies also show a strong impact on activities of smaller companies in this sector.** The relatively high diffusion of customer-facing e-business tools among smaller companies is what distinguishes the telco sector from most other sectors studied. A case study presented in Section 4.2 of this report illustrates that even simple e-business tools (e.g. product websites) may have significant impact on the business activities of smaller telco companies.
- **The use of ICT to support customer-related activities goes beyond the adoption of core applications like CRM systems.** Use of Supply Chain Management (SCM) software and e-marketplace services to optimise supply chain processes also impacts the sales success of telco companies.

Implications for enterprises

According to the 2006 survey results, three out of four telco enterprises perceive e-business as important for their company operations. Due to the dual role of telco companies as suppliers and users of e-business technologies, these technologies affect all business fields. According to the analysis in this report, main implications by ICT and e-business are relevant for the following areas:

- **Marketing, sales and customer care:** As shown by the survey results and confirmed by the analysis, marketing and sales is a key e-business application area in this sector. In fact, there are many opportunities provided by customer-facing e-business technologies to support sell-side activities of telco companies. However, not only large companies can profit from ICT usage. Basic e-business

tools, such as product websites, when applied in an innovative way may also help small companies to establish a visible brand and build an extensive customer base.

- **Products and services offered:** More than 50% of telco companies reported a positive impact of ICT on the quality of products and services. In fact, new technologies based on the internet (e.g. VoIP and IPTV) are likely to substitute traditional telco services and enhance the range of products and services offered.
- **Automation and streamlining of business processes:** More than 60% of telco companies reported a positive impact of ICT on the efficiency of business processes, according to the survey findings. Competition and saturation in traditional telco market segments have led to increased cost pressure in this sector. As shown by the survey findings and confirmed by the analysis, particularly larger telco companies are concerned with streamlining and automating internal processes in order to save on costs.

ICT impacts on competition

About two thirds of companies in this sector, irrespective of their size, perceive increased competition due to ICT. In fact, fierce competition and saturation of traditional telco markets are driving product innovations which are based on new ICT and e-business developments. Telco companies are forced to adopt new technologies for services like IPTV in order to remain competitive and to initiate growth in an increasingly converging environment.

However, entering new market segments places additional challenges for internal process organisation. New processes, e.g. for billing and marketing new service offerings, have to be defined and implemented. Thus, innovative use of ICT both as an input for new products and to support the transformation process is of increasing importance in this sector.

Policy implications

Based on the analysis of the use of e-business technologies by telco companies in this report and discussions with industry representatives, **neither a need for promoting ICT adoption in this sector nor for counteracting ICT-induced market failure were identified**. Rather, the telco sector appeared as a forerunner in almost all e-business application areas with adoption rates strongly above those of other sectors surveyed. In addition, the relatively high usage rates of e-business technologies by micro and small companies distinguish the telco sector from other sectors surveyed.

E-business practices in the telco industry may rather serve as role model for a successful combination of market liberalisation efforts and the use of e-business technologies. The experiences of the telco sector might be a helpful input for the discussion of liberalisation efforts in other sectors. In addition, examples for the innovative use of e-business technologies by telco companies like *Budget Telecom* might serve as input for promoting e-business technologies to SME in less e-business-intensive sectors.

1 Introduction

1.1 About *e-Business W@tch*

Policy background

The European Commission launched *e-Business W@tch* in late 2001 to monitor the adoption, development and impact of electronic business practices in different sectors of the economy in the European Union.

The initiative is rooted in the **eEurope Action Plans** of 2002 and 2005. The eEurope 2005 Action Plan defined the goal "*to promote take-up of e-business with the aim of increasing the competitiveness of European enterprises and raising productivity and growth through investment in information and communication technologies, human resources (notably e-skills) and new business models*".² *e-Business W@tch* has been an important instrument for the European Commission to assess the developments and progress in this field.

The **i2010** policy³, a follow-up to eEurope, also stresses the critical role of ICT for productivity and innovation, stating that "*... the adoption and skilful application of ICT is one of the largest contributors to productivity and growth throughout the economy, leading to business innovations in key sectors*" (p. 6). The Communication anticipates "*a new era of e-business solutions*", based on integrated ICT systems and tools, which will lead to an increased business use of ICT. However, it also warns that businesses "*still face a lack of interoperability, reliability and security*", which could hamper the realisation of productivity gains (p. 7).

In 2005, in consideration of globalisation and intense international competition, the European Commission launched a **new industrial policy**⁴ to create better framework conditions for manufacturing industries in the coming years. Some of the policy strands described have direct links to ICT and e-business developments. One of the new sector-specific initiatives covered by the policy is the taskforce on information and communication technologies (ICT) competitiveness. The taskforce with stakeholders representatives focuses on identifying and proposing measures to remove obstacles that inhibit ICT take-up among enterprises. Another initiative is to conduct a series of competitiveness studies, to include for ICT, food, and fashion and design industries, in order to analyse trends affecting the competitiveness of these industrial sectors.

These policy considerations constitute the background and *raison d'être* of *e-Business W@tch* as an observatory of related issues and a core theme for the analysis. Within this broader policy context, two further important facets regarding the mission of the initiative

² "eEurope 2005: An information society for all". Communication from the Commission, COM(2002) 263 final, 28 May 2002, chapter 3.1.2

³ "i2010 – A European Information Society for growth and employment." Communication from the Commission, COM(2005) 229 final.

⁴ "Implementing the Community Lisbon Programme: A Policy Framework to Strengthen EU Manufacturing - towards a more integrated approach for Industrial Policy." Communication from the Commission, COM(2005) 474 final, 5.10.2005

are relevant. First, *e-Business W@tch* studies focus on **sectors** (and not on countries). Second, special emphasis is placed on developments and implications for small and medium-sized enterprises (**SMEs**).

e-Business W@tch is one of several policy instruments used by DG Enterprise and Industry in the field ICT industries and e-business. Other instruments include

- the e-Business Support Network (**eBSN** – a European network of e-business policy makers and business support organisations),
- the **eSkills Forum** (a task force established in 2003 to assess the demand and supply of ICT and e-business skills and to develop policy recommendations),
- the **ICT Task Force**, a group whose work is to draw together and integrate various activities aiming to strengthen Europe's ICT sector, and
- activities in the areas of **ICT standardisation**, as part of the general standardisation activities of the Commission.⁵

Focus and scope

Since its launch, *e-Business W@tch* has published e-Business Sector Studies on more than 20 sectors of the European economy, four comprehensive synthesis reports about the state-of-play in e-business in the European Union, statistical pocketbooks and various other resources, such as newsletters and special issue reports. All publications are available at www.ebusiness-watch.org ('resources').

e-Business W@tch presents a '**wide-angle**' perspective on the adoption and use of ICT in the sectors studied. The topic is not restricted to the measurement of e-commerce transactions (the volume of goods and services traded online), but also comprises an assessment of the degree to which business processes, including intra-firm processes, are electronically linked to each other and have become digitally integrated.

In essence, *e-Business W@tch* studies cover the whole field of what could be described as **collaborative commerce** (see following chapter). However, it becomes practically impossible to cover in detail all areas and facets of e-business in a single sector study. Therefore, each study focuses on a few specific issues, thus allowing the reader to zoom into these topics in more detail.

In addition to the analysis of e-business developments, the studies also provide some **background information** on the respective sectors. Readers, however, should not mistakenly consider this part of each report as the main topic of the analysis. An *e-Business W@tch* sector report is not a piece of economic research on the sector itself, but a study which focuses on the use of ICT and e-business in that particular sector. The introduction to the sector is neither intended, nor could it be a substitute for more detailed industrial analysis.

⁵ The 2006 ICT Standardisation Work Programme complements the Commission's "Action Plan for European Standardisation" of 2005 by dealing more in detail with ICT matters.

Methodology

e-Business W@tch combines quantitative and qualitative research elements. The quantitative analysis of ICT and e-business adoption by firms is based to a large extent on representative **surveys** among decision-makers in European enterprises ("e-Business Survey"). Interviews are conducted by telephone, based on a standardised and computer supported questionnaire (CATI⁶ method). In total, more than 25,000 enterprises were interviewed in the surveys of 2002, 2003 and 2005. The most recent survey (conducted in April/May 2006) covered more than 14,000 enterprises from 10 sectors in all EU Member States and most EEA and Candidate Countries.⁷

The *e-Business W@tch* Surveys have won recognition by the international research community as a useful instrument for **piloting** new e-business metrics. The experience gained from this piloting is used, for example, by Eurostat for planning and developing their own survey of ICT use by businesses.

e-Business W@tch complements the statistical picture by a more detailed presentation of concrete e-business activity in individual enterprises from the sectors covered, mainly in the form of brief **case studies**. About 75 case studies are conducted in 2006 adding to more than 100 case studies conducted in previous years. Evidence from the survey and case studies is backed up by **desk research** and **interviews** with industry representatives and e-business experts.

The importance of networking and debate

Since its first implementation in late 2001, *e-Business W@tch* has increasingly developed from a market observatory into a **think-tank and intermediary**, stimulating debate among stakeholders at an international level about the economic and policy implications of e-business. The positive feed-back and large uptake for the various publications and statistics provided by the *e-Business W@tch*, for example their exploitation by various research institutions, reflects the demand for sectoral e-business analysis and discussion on related issues.

e-Business W@tch uses several mechanisms for debate and networking with stakeholders. An important platform for this is the **website** (www.ebusiness-watch.org), where all reports and survey data are published. Furthermore, results are presented and discussed with industry at **workshops**, within and via the **Advisory Board**, and, lastly, through the participation of study team members in other events, such as conferences, workshops and working groups organised by third parties.

⁶ Computer Assisted Telephone Interviews, a widely used method in representative household or decision-maker surveys.

⁷ The EEA (European Economic Area) includes, in addition to EU Member States, Iceland, Liechtenstein and Norway. Candidate Countries, which are candidates for accession into the EU, are (as of May 2006) Bulgaria, Croatia, Romania and Turkey.

The **mission** of e-Business W@tch is to monitor, analyse and compare the development and impact of e-business in different sectors of the European economy – not the sectors themselves.

Its **objective** is to provide reliable results, based on commonly accepted methodologies, which are not readily available from other sources and will trigger the interest of policy-makers, researchers, and other e-business stakeholders for more in depth analyses or statistical surveys.

e-Business W@tch has adopted a “wide-angle” perspective in its **approach**. The necessary trade-offs are transparently depicted in each of its deliverables.

The definition of sectors and the adequate level of aggregation

Economic sectors constitute the main level of analysis for e-Business W@tch. The 2006 studies cover sub-sets of **ten different sectors** whose configuration and definition are based on the NACE Rev. 1.1 classification of business activities.⁸

Over the years since its initial implementation in late 2001, e-Business W@tch followed a roll-out plan in the coverage of different sectors.⁹ In each new period, some new sectors (not covered in previous years) were added.

The rather broad aggregation of various business activities into sectors in earlier implementation periods (2002-2004) made it possible to cover a broad spectrum of the economy, but also caused challenges for the analysis of e-business developments. In cases where rather heterogeneous sub-sectors were aggregated, it was sometimes difficult to make general observations or draw conclusions for "the sector" at stake. It also turned out that industry has a clear preference for comparatively narrow sector definitions.

The approach for selecting and defining sectors which was used in 2005 and 2006 reflects these concerns. Many of the sectors studied since 2005 are sub-sectors that had been part of larger aggregations in 2002-2004. A further argument for "**zooming in**" on former sub-sectors is that the broad picture for whole sectors is already available from earlier e-Business W@tch studies.

The **selection** of sectors in 2006 has been made on the basis of the following considerations:

- The **roll-out plan** of 2003.
- **Policy relevance** of the sector from the Commission's perspective.
- **Interest articulated by the industry** in previous years on studies of this type.
- The current **dynamics of e-business** in the sector and the impact of ICT and electronic business, as derived from earlier e-Business W@tch sector studies.

⁸ NACE Rev. 1.1 is a 4-digit classification of business activities. It is a revision of the 'General Industrial Classification of Economic Activities within the European Communities', known by the acronym NACE and originally published by Eurostat in 1970.

⁹ See website: "selection of sectors" (www.ebusiness-watch.org/about/sector_selection.htm)

The 10 sectors studied in 2006

The 10 sectors which are monitored and studied in 2006 include six manufacturing sectors, construction and three service sectors. The pulp and paper manufacturing industry is a 'new' sector, i.e. it had not been covered by the *e-Business W@tch* in any earlier period of implementation; the other nine sectors have been covered in previous years, mostly as parts of aggregated sectors (see Exhibit 1-1).

Exhibit 1-1: Sectors studied by e-Business W@tch in 2006

No.	NACE Rev. 1.1	Sector	Reference to earlier (most recent) coverage
1	DA 15 (selected groups)	Food and beverages	2005
2	DC 19.3	Footwear	2003/04 (as part of the textile and footwear industry)
3	DE 21	Pulp, paper and paper products	--
4	DL 30, 32.1+2	ICT manufacturing	2004 (as part of electrical machinery and electronics)
5	DL 32.3	Consumer electronics	2004 (as part of electrical machinery and electronics)
6	DM 35.11	Shipbuilding and repair	2004 (as part of transport equipment manufacturing)
7	F 45.2+3 (selected classes)	Construction	2005 (in a broader aggregation, including F 45 in total)
8	H 55.1/3, I 63.3, O 92.33/52	Tourism	2005
9	I 64.2	Telecommunication services	2004 (as part of ICT services)
10	N 85.11	Hospital activities	2004 (as part of health and social services)

1.2 "e-Business" – the conceptual framework

Fresh momentum after the 2001 odyssey

Although the 'new economy' revolution has not taken place as it seemed for a short moment in history it might, the **evolutionary development** of electronic business does not seem to have come to an end. On the contrary, the maturity of e-business has substantially increased across sectors and regions over the past five years. It has been a quiet revolution this time, but as a result, a **new picture of the digital economy** is beginning to emerge. ICT and e-business do matter in the global economy – probably even more than during the hype of the late 1990s.

The overall economic situation and market conditions for business innovation and investment have been difficult for European companies during the last few years. Nevertheless, e-business shows a dynamic development in the European Union. Drivers are new technological developments (wireless access technologies, for example) and the increasing **competitive pressure** on companies in a global economy. Firms are in

constant search for opportunities to cut costs. This has probably been the most important promise of electronic business: cutting costs by increasing the **efficiency of business processes**, internally and between trading partners in the value chain.

From e-Commerce to e-Business

As part of this maturing process, electronic business has progressed from a rather specific to a very broad topic over the past 10 years. Initially, however, particularly in the mid 1990s, the policy and research focus was very much on **e-Commerce**, which can be defined as online commercial transactions.

The term '**transactions**' refers to exchanges between a company and its suppliers or customers. These can be other companies ("B2B" – business-to-business), consumers ("B2C" – business-to-consumers), or governments ("B2G" – business-to-government). In the broad sense, transactions include commercial as well as other exchanges, such as sending tax return forms to the tax authorities. In the context of this study on e-business, transactions are predominantly commercial business transactions (see boxes for definitions).

Glossary

Definitions by standardisation groups (ISO, ebXML)

The term "business transaction" is a key concept underlying the development of e-standards for B2B exchanges. Therefore, definitions have been developed by the various standards communities as an underpinning for their practical work. Examples are:

- **Business:** "a series of processes, each having a clearly understood purpose, involving more than one party, realized through the exchange of information and directed towards some mutually agreed upon goal, extending over a period of time [ISO/IEC 14662:2004]"
- **Business transaction:** "a predefined set of activities and/or processes of parties which is initiated by a party to accomplish an explicitly shared business goal and terminated upon recognition of one of the agreed conclusions by all the involved parties even though some of the recognition may be implicit" [ISO/IEC 14662:2004]"
- **e-Business transaction:** "a logical unit of business conducted by two or more parties that generates a computable success or failure state [ebXML Glossary]"

If transactions are conducted electronically (**e-transactions**'), this constitutes e-Commerce. Transactions can be broken down into **different phases** and related **business processes**, each of which can be relevant for e-Commerce. The pre-sale (or pre-purchase) phase includes the presentation of (or request for) information about the offer, and the negotiation about the price. The sale / purchase phase covers the ordering, invoicing, payment and delivery processes. Finally, the after sale / purchase phase covers all processes after the product or service has been delivered to the buyer, such as after sales customer services (e.g. repair, updates).

Exhibit 1-2: Process components of transactions

Pre-sale / pre-purchase phase	Sale / purchase phase	After sale / purchase phase
<ul style="list-style-type: none"> ■ Information about offer ■ Price comparisons ■ Negotiations between seller and buyer 	<ul style="list-style-type: none"> ■ Placing an order ■ Invoicing ■ Payment ■ Delivery 	<ul style="list-style-type: none"> ■ Customer service ■ Guarantee management ■ Credit administration ■ Handling returns

Practically each step in a transaction can either be pursued electronically (online) or non-electronically (offline), and all combinations of electronic and non-electronic implementation are possible. It is therefore difficult to decide which components actually have to be conducted online in order to call a transaction (as a whole) 'electronic'.

In this context, during 2000 the OECD proposed broad and narrow definitions of electronic commerce both of which are still valid and useful.¹⁰ While the narrow definition focuses on 'internet transactions' only, the broad definition defines e-Commerce as "*the sale or purchase of goods or services, whether between businesses, house-holds, individuals, governments, and other public or private organisations, conducted over computer-mediated networks. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the goods or service may be conducted on- or offline*" (OECD, 2001).

Glossary

Definition of key terms for this study

- **e-Transactions:** Commercial exchanges between a company and its suppliers or customers which are conducted electronically. Participants can be other companies ("B2B" – business-to-business), consumers ("B2C"), or governments ("B2G"). This includes processes during the pre-sale or pre-purchase phase, the sale or purchase phase, and the after-sale / purchase phase.
- **e-Commerce:** Electronic Commerce. The sale or purchase of goods or services, whether between businesses, house-holds, individuals, governments, and other public or private organisations, conducted over computer-mediated networks. (OECD)
- **e-Business:** Electronic Business. Automated business processes (both intra- and inter-firm) over computer mediated networks. (OECD)
- **e-Interactions:** Electronic Interactions include the full range of e-Transactions, and in addition collaborative business processes (e.g. collaborative design) which are not directly transaction focused.

¹⁰ In 1999, the OECD Working Party on Indicators for the Information Society (WPIIS) established an Expert Group on Defining and Measuring Electronic Commerce, in order to compile definitions of electronic commerce which are policy relevant and statistically feasible. By 2000, work of the Group had resulted in definitions for electronic commerce transactions.

The addendum regarding payment and delivery is an important part of the definition, but can be debated. The difficult question is which processes along the different transaction phases constitute e-Commerce and which do not (see Exhibit 1-2). The OECD definition excludes the pre-sale or purchase phase and focuses on a specific part of the sale / purchase phase, namely the ordering process. *e-Business W@tch* follows the OECD position on this issue.¹¹

e-Commerce, defined in this way, is a key component of **e-business**, but not the only one. In recent years, it has been increasingly acknowledged among policy and research communities that the focus on e-commerce transactions may be too narrow to capture the full implications of e-business. A wider, business process oriented focus has been widely recognised. Reflecting this development, the OECD WPIIS¹² proposed a (broader) definition of 'e-business' as "*automated business processes (both intra-and inter-firm) over computer mediated networks*" (OECD, 2004, p. 6). In addition, the OECD proposed that e-business processes should integrate tasks and extend beyond a stand-alone or individual application.

This definition reflects an understanding of e-business that encompasses more than e-commerce transactions. The broad concept of e-business also includes the digitisation of **internal business processes**, as well as **cooperative** or **collaborative processes** between companies which are not necessarily transaction-focused. Collaborative e-design processes between business partners are a typical example from industrial engineering. The OECD definition implicitly indicates that the focus and main objective of electronic business is to be found in business process automation and integration, and the impacts thereof.

To bridge the gap between 'e-Commerce' and 'e-Business', it was proposed in earlier years (mainly around 2000) to use the term '**c-Commerce**' (collaborative commerce). Although this concept was rather abandoned when the new economy bubble burst, it has some value as it stresses the role of ICT for cooperation among enterprises. If web service and other emerging technologies (e.g. RFID, mobile applications) hold their promise, the digital integration of B2B trading processes could be taken to a new level, possibly with a considerable impact on industry structure. If so, it could be worth revisiting the former 'c-Commerce' concept.

e-Business and the company's value chain

Given the broad concept of e-Business applied for this study, which concentrates on business processes and a company's interactions with its environment, some further structuring and mapping of processes is necessary. Michael Porter's framework of the company value chain and value system between companies (Porter, 1985) is still valid and useful in this context, although dating back 20 years to the pre-e-business era.

A **value chain** logically presents the main functional areas ('value activities') of a company and differentiates between primary and support activities. However, these are

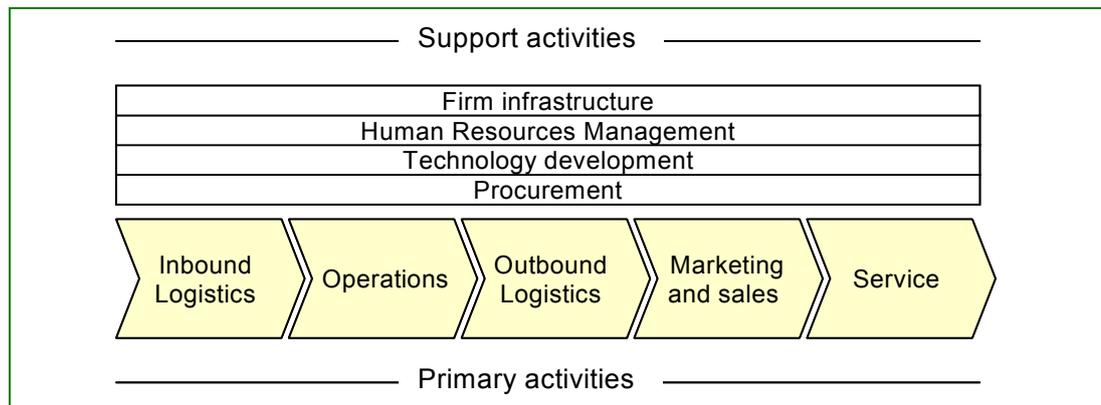
¹¹ This is reflected in the updated wording of the respective survey questions in 2006, when for "placing / accepting online orders" was asked instead for "purchasing / selling online".

¹² Working Party on Indicators for the Information Society

"not a collection of independent activities but a system of interdependent activities", which are "related by linkages within the value chain" (p. 48). These linkages can lead to competitive advantage through optimisation and coordination. In fact, it is exactly here that ICT have a major impact, as they are a key instrument to **optimise linkages** and thus increase the efficiency of processes.

The **value system** expands this concept by extending the perspective beyond the single company. The firm's value chain is linked to the value chains of (upstream) suppliers and (downstream) buyers, resulting in a larger set of processes – the value system. e-Commerce, i.e. electronic transactions, occurs within this value system.

Exhibit 1-3: Value chain framework of a company by Michael Porter



Source: Adapted from M.E. Porter (1985) – simplified presentation

Key dimensions of this framework (notably inbound and outbound logistics, operations, and the value system) are reflected in the **Supply Chain Management (SCM)** concept. Here, the focus is on optimising the procurement-production-delivery processes, not only between a company and its direct suppliers and customers, but also aiming at a full vertical integration of the entire supply chain (Tier 1, Tier 2, Tier n suppliers). In this concept, each basic supply chain is a chain of sourcing, production, and delivery processes with the respective process interfaces within and between companies.¹³ The analysis of the digital integration of supply chains in various industries has been an important theme in sectors studies previously prepared by *e-Business W@tch*.

e-Business and innovation

A very important aspect for *e-Business W@tch* studies is the link between ICT and innovation. The European Commission places great emphasis on the **critical role of innovation** for European businesses in order to stay competitive in the global economy.¹⁴ On the other hand, a strong competitive pressure provides powerful incentives for companies to continuously engage in innovation and R&D. Thus, innovation, competition and competitiveness are closely intertwined.

¹³ cf. SCOR Supply-Chain Council: Supply-Chain Operations Reference-model. SCOR Version 7.0. Available at www.supply-chain.org (accessed in March 2006).

¹⁴ See, for example, "An innovation-friendly, modern Europe". Communication from the Commission, COM(2006) 589, 12 October 2006.

ICT have been identified and widely recognised as a major **enabler of innovation**, in particular for **process innovation**. According to the *e-Business W@tch* survey 2006, 75% of those companies that had introduced new business processes in 2005 reported that this innovation was directly related to or enabled by ICT.

In many cases, the implementation of **e-business processes** in a company will constitute a process innovation in itself. In **manufacturing** sectors, e-business has triggered significant innovation inside the companies, notably in supply chain and delivery processes, such as automatic stock replenishing and improved logistics. In **service** sectors such as tourism, the innovative element is more evident in the way that external transactions are accomplished. For example, if a company starts to sell its services online, this can imply innovation in the service delivery process and in customer communication.

In some sectors, particularly in ICT manufacturing, consumer electronics and telecommunications, ICT are also highly relevant for **product innovation**.

However, as more companies strive to exploit the innovation potential of ICT, it becomes more difficult for the individual company to directly gain competitive advantage from this technology. e-Business is becoming a necessity rather than a means to differentiate from competitors.¹⁵ In addition, the introduction of innovation can cause **substantial costs** in the short and medium term, as it may take time before the investments pay off. This causes challenges in particular for small and medium-sized companies. It is one of the reasons why *e-Business W@tch* focuses on such challenges in its sector studies (see also 'Policy Background' in chapter 1.1).

¹⁵ Cf. Carr, Nicholas (2003). "IT Doesn't Matter". In: Harvard Business Review, May 2003.

2 Context and Background

2.1 Sector definition – scope of the study

Scope of the study

This report focuses on ICT and e-business issues in the telecommunications (henceforth: telco) industry, as defined by business activities subsumed under NACE Rev. 1.1¹⁶ I 64.2: “Telecommunications”.

Exhibit 2-1: Business activities covered by the telco industry (NACE Rev. 1.1 and 2)

NACE Rev. 1.1		Business activities
Division	Group	
64	2	Telecommunications
NACE Rev. 2 (Draft)		
61	1	Wired telecommunications activities
	2	Wireless telecommunications activities
	3	Satellite telecommunications activities
	9	Other telecommunications activities

The classification of telecommunication services by NACE Rev.1.1 as sub-sector of “Post and telecommunications” (NACE 64) and without any further subdivision reflects the heritage of many companies in this sector as state monopolies providing (fixed-line) telephony and fax services. But the landscape of telecommunication services is much more diverse today with a large range of output and heterogeneous ecosystems.

The proposed NACE Rev. 2 already incorporates this complexity by defining a distinct division for telecommunications and further differentiating wired, wireless, satellite and other telecommunication activities.¹⁷ According to the explanatory notes supplementing the proposed NACE revision, the telco sector includes “*activities of providing telecommunications and related service activities, that is transmitting voice, data, text, sound and video.*”¹⁸ The focus is on the transmission of content, whereas the creation of content is excluded. The (wider) approach of NACE Rev. 2 is also in line with the EC’s regulatory framework on electronic communications reflecting the technology neutrality concept¹⁹ with regards to convergence of the telecommunications, media and information technology sectors.²⁰ The report follows this approach.

¹⁶ NACE Rev. 1 is a 4-digit activity classification released in 1990. It is a revision of the “General Industrial Classification of Economic Activities within the European Communities” (NACE), originally published by Eurostat in 1970.

¹⁷ NACE Rev. 2, Draft, April 12, 2006.

¹⁸ Eurostat (2006): “NACE Rev. 2 – Draft structure and explanatory notes”, page 142, April 2006 (<http://forum.europa.eu.int/irc/dsis/nacecpacon/info/data/en/index.htm>)

¹⁹ In this context, “technology neutrality” is used as a concept by which Member States neither promote nor discriminate against the use of a particular type of technology.

²⁰ See EC (2002): “Directive on a common regulatory framework for electronic communications networks and services (Framework Directive)”, Official Journal of the European Communities, 7 March 2002 (see http://ec.europa.eu/information_society). It should be noted that the whole EU

Telco supplier landscape

The supplier landscape is highly fragmented with regard to the heterogeneous platforms used for data transmission and the different types of content transferred. One can roughly distinguish suppliers with respect to their business approach into network operators and resellers. Network operators (also carriers), as the term indicates, are running an own network for voice and data transmission. Within the spectrum between providers of telco services operating their own network (i.e. incumbent operators) and pure resellers acquiring wholesale transmission capacity, there are various types of service providers. Many service providers operate their own backbone network and combine it with incumbent operators' local access networks by means of interconnection agreements. In this – simplified – context and with respect to the type of network operated, the industry can be distinguished in different groups, including:

- **Fixed-line telephony operators**, i.e. the traditional domain of incumbents,
- **Internet carriers** (along with resellers of internet access) are often referred to as Internet Service Providers (ISPs),
- **Mobile/wireless network operators** including mobile telephony carriers (e.g. GSM, GPRS or UMTS) and operators of new wireless internet access technologies (e.g. WiMAX or Flash-OFDM, see Section 4.2.2), and
- **TV cable companies** (often simply called cable companies): The importance of this group varies between different European countries. While Italy or Greece, for example, have no tradition of TV cable access, in Belgium almost every household has access to cable TV.²¹

Within most of these segments, co-existence of incumbents (i.e. former state monopolies) and so-called alternative network operators can be observed. Whereas alternative network operators often focus on one of the segments listed above, incumbents can usually be found in various business areas related to telecommunications.²² This is, for example, demonstrated by the corporate structure of the German incumbent Deutsche Telekom in the following box.

regulatory framework for electronic communications and services is currently under review (see http://europa.eu.int/information_society/policy/ecommm/index_en.htm).

²¹ OECD (2003): Broadband and telephony services over cable television networks. DSTI/ICCP/TISP (2003)1/FINAL, November 7, 2006.

²² In this regard, a further distinction could be made between the fixed-line telephony market, which saw a transition from a monopolistic to an open market, and the mobile market, which was open to competition from the outset.

Deutsche Telekom is present in multiple service areas

Broadband / fixed-line: The broadband business arm provides network operation, access to the internet as well as multimedia content offerings. The division includes the T-Com and T-Online units. **Mobile Communications:** Deutsche Telekom's T-Mobile division provides mobile communication and mobile internet services. **Business Customers:** Via its T-Systems division, Deutsche Telekom offers ICT services to corporate customers. T-Systems is further divided into two subdivisions, Enterprise Services (approximately 60 major corporate customers) and Business Customers.

Source: Deutsche Telekom 2005 Annual Report.

The provision of telco services, however, does not necessarily require an own network infrastructure. Many resellers (also called 'virtual network operators' or service providers) entered the market as a result of the liberalisation drive in the telco market in the 1990s. One example is French Budget Telecom, as presented in the case study in Section 4.2.3.

Overall, the segmentation above might already be regarded as outdated in the light of current market dynamics. In fact, lines between single telco market segments are blurring due to convergence of platforms and technologies. One result of this development is that almost all supplier groups presented above are offering internet access services today. Chapter 4.1 of this report focuses on current dynamics in the telco markets and discusses implications of convergence issues for single telco companies as well as for the structure of the telco industry as a whole.

Links to related sectors

Telecommunication services only unveil their full value in combination with input from other sectors. Thus, there are strong links between the telco industry and related sectors, including:

- **Network infrastructure manufacturing:** A reliable network is essential for the quality of telecommunication services. This explains the numerous strategic co-operations between network operators and network infrastructure providers. For instance, British Telecom (via its "BT Exact" research arm) has entered into a strategic partnership with Ciena, Huawei, Lucent and Siemens to test and roll out high-speed fibre networks²³.
- **Device manufacturing:** Telecommunications devices are not only a complement needed to use telco services; their design and functionality is an important sales proposition in the increasingly competitive telco market. This also helps explain why several telco companies offer devices under their own brands. For example, mobile operator O2 (a subsidiary of Telefónica, Spain) offers the "Xda" line of smartphones under its brand²⁴. An interesting development with possible impacts

²³ British Telecom (2005): BT signs contract with 21st century network suppliers. Press Release, December 22, 2005.

²⁴ Smith, Tony (2004): O2 unveils Xda IIs, Ili Wi-Fi pocket PCs. The Register, September 9, 2004.

on the relationships between telco companies and device manufacturers is the migration of intelligence from networks to end user sets. Telco devices, for example, are increasingly able to support different network technologies (e.g. mobile telephony networks and Wi-Fi) and to switch between them.²⁵

- **IT services industry:** A functional ICT infrastructure requires a seamless interplay of ICT components and telecommunication services. The interdependence between IT and telecommunications industry also explains why almost all incumbents in the telco market have strong IT services units. Examples for notable players in the IT services market, which are subsidiaries of telco incumbents, include BT Global Services and Orange Business Services.
- **Content industry:** In line with the rising popularity of digital content, e.g. music or videos distributed via the internet, relationships to the content industry are of increasing importance. For instance, France Télécom and Buena Vista International Television have signed a video on demand agreement. Buena Vista's entertainment content is delivered through France Télécom's Wanadoo broadband service and the MaLigne IPTV offering²⁶.

Links between the telco industry and related industries will also play a role for the discussion of e-business trends in Chapter 4 in this report. The trend towards convergence as discussed in Chapter 4.1, for example, also results in blurring lines between the telco industry and related sectors. In addition, the need to collaborate with companies of related sectors is also an important driver for the use of ICT and e-business technologies to support the exchange of information.

2.2 Industry background

This chapter aims to provide further insight into the economic background of the telco industry. Section 2.2.1 presents industry statistics reflecting size, structure and economic strength of the sector. Section 2.2.2 discusses current trends and challenges telco companies are facing.

2.2.1 Industry statistics

The following statistics provide an overview of the size and structure of the telecommunication industry, using key economic indicators from Eurostat's New Cronos database. New Cronos is structured in nine parts ("themes"). Most of the data used in this chapter are derived from theme 4, "Industry, trade, and services" / sbs (structural business statistics). All statistics presented were prepared by DIW Berlin, which gathered

²⁵ It would be worthwhile to analyse the consequences of this development for market structure and competition in the telco and device manufacturing industry. However, such an effort is out of the scope of this report.

²⁶ France Télécom (2006): France Télécom signe avec Buena Vista International Television pour développer son offre de vidéo à la demande. Press Release, April 4, 2006.

the most recent data available from Eurostat (December 2004). Gaps in the official statistics resulting from missing data for individual countries or the respective year in the time-series of a country were imputed, based on economic calculations and estimates by DIW.²⁷

Size structure of the telco industry

Large players have a dominant position in this sector: Although only a marginal share (2%) of all telco companies in the EU-15 employed more than 250 people in 2000, large companies accounted for the overwhelming share of value added and people employed in this sector. This finding can be explained by the fact that the operation of networks is very capital intensive and subject to economies of scale. Activities by SMEs are only of small importance in terms of employment and value added. In fact, competition and declining prices are mainly a result of the combination of market regulation with the entry of alternative operators of a significant size. Nevertheless, small telco companies have a role to play with regard to competition in this sector and this role, although limited, should not be ignored.²⁸

Exhibit 2-2: Industry structure in the telecommunications sector (NACE 64.2) in the EU-15 (2000)

	Total (EU-15)	1–9 empl.	10–49 empl.	50–249 empl.	250+ empl.
		in % of total EU-15			
No. of enterprises ²⁹	12,929	84.1%	10.6%	3.5%	1.7%
Value added at factor cost (million €)	115,387.7	1.2%	0.8%	2.7%	95.3%
No. of persons employed (million people)	10,110	2.6%	3.1%	5.1%	89.3%

Source: Eurostat New Cronos / DIW Berlin

The dominance of large players in this sector is also attributable to former monopolistic structures. Although a large number of new players entered the market in the past decade driven by liberalisation efforts in many European countries, incumbents are still at the forefront.

²⁷ For some structural data, however, no recent figures are available. For example, data on the size structure of the telecommunications industry in Europe, i.e. the number and percentage of firms by their number of employees (see Exhibit 2-2) are still only available for the year 2000.

²⁸ See, for example, the case studies on *Budget Telecom* (France), *WiMAX AG* (Switzerland) or *Upnet* (Lithuania), which are presented in Sections 4.1 and 4.2 of this report.

²⁹ An enterprise is defined by Eurostat as the smallest legally independent unit that is obliged under commercial or taxation law to keep its own books and produce a separate annual report. The number of enterprises refers to all companies that carry out activities subsumed under NACE 62.2 (telecommunications) including network operators and service providers. More information available at http://europa.eu.int/estatref/info/sdds/en/ebt/ebt_inlb_empl_sm.htm.

Economic indicators by country

Detailed data on production and employment in the telco industry are available for 18 EU countries (referred to as EU-18) in 2003. Since telco services are only to a small degree subject to international trade, the size of the telco sector within a certain country (compared to those in the entire EU) typically reflects the size and economic strength of the country itself. Accordingly, large industrial countries like the UK, Germany or France also have a large telco industry in terms of production value, value added and employment.³⁰

The data displayed in Exhibit 2-3 indicates that telco companies from several Eastern European countries were below EU average in terms of productivity. Differences in technical infrastructure may explain this finding. However, it has to be kept in mind that the data displayed reflects the situation as of 2003. In that time, the technical infrastructure in Eastern Europe may have been a bit less developed than it is the case today.

Exhibit 2-3: Production value and value added in the telecommunications sector in EU-18* and EU-25 countries (2003)

		Production Value		Value Added	
		Million €	% of EU-18	Million €	% of EU-25
BE	Belgium	11,831.4	3.9%	5,467.3	3.2%
CZ	Czech Republic	3,686.5	1.2%	2,063.2	1.2%
DE	Germany	54,966.5	18.3%	31,478.1	18.3%
EE	Estonia	480.3	0.2%	234.1	0.1%
ES	Spain	24,267	8.1%	15,228.1	8.8%
FR	France	52,974.2	17.6%	23,485.5	13.6%
IT	Italy	46,349.0	15.4%	22,086.5	12.8%
CY	Cyprus	389.0	0.1%	319.8	0.2%
LV	Latvia	541.7	0.2%	344.5	0.2%
LT	Lithuania	687.7	0.2%	306.7	0.2%
LU	Luxembourg	1,579.5	0.5%	625.2	0.4%
HU	Hungary	2,925.6	1.0%	1,801	1.0%
AT	Austria	4,755.2	1.6%	3,346.3	1.9%
PT	Portugal	6,629.1	2.2%	3,081.7	1.8%
SK	Slovakia	1,067.5	0.4%	603.1	0.3%
FI	Finland	6,196.8	2.1%	2,150.9	1.2%
SE	Sweden	9,572.2	3.2%	3,455.8	2.0%
UK	United Kingdom	72,027.8	23.9%	33,968.4	19.7%
	EU-18*	300,927	100.0%	150,046.2	87.1%
	Others			22,271.7	12.9%
	EU-25			172,317.9	100.0%

* EU-18 is EU-25 excluding Denmark, Greece, Ireland, Malta, The Netherlands, Poland, Slovenia.

Source: Eurostat New Cronos / DIW Berlin

³⁰ In this respect, it should be noted that data presented in the following tables 2-4 and 2-5 refer to telco companies' home business only and do not include activities of their subsidiaries abroad.

Exhibit 2-4: Employment, productivity and labour cost in the telecommunications sector in the EU-18 and EU-25 (2003)

		Employment	Productivity	Labour Cost
		Number of persons employed	1,000€ per person employed	1,000 € per person employed
BE	Belgium	32,859	166.4	64.2
CZ	Czech Republic	24,778	83.3	17.7
DE	Germany	196,291	160.4	60.3
EE	Estonia	2,789	83.9	14.3
ES	Spain	71,372	213.4	50.5
FR	France	157,061	149.5	58.5
IT	Italy	99,582	221.8	47.5
CY	Cyprus	2,592	123.4	38.2
LV	Latvia	5,777	59.6	11.9
LT	Lithuania	6,687	45.9	10.7
LU	Luxembourg	966	647.2	60.8
HU	Hungary	21,416	84.1	25.2
AT	Austria	21,161	158.1	45.6
PT	Portugal	16,972	181.6	48.9
SK	Slovakia	11,414	52.8	11.1
FI	Finland	19,579	109.9	44.0
SE	Sweden	28,618	120.8	56.8
UK	United Kingdom	242,435	140.1	54.4
	EU-18	962,349	155.9	52.3
	Others	183,651	121.3	34.0
	EU-25	1,146,000	150.4	49.4

Source: Eurostat New Cronos / DIW Berlin

2.2.2 Trends and challenges

During the 1990s the environment of the telecommunications industry has become increasingly rough and saw increased competition and cost pressure. In light of these circumstances there is an increasing need for developing new markets, streamlining processes and efficiently manage customer relationships.

Trends causing increased cost pressure and competition

Increased competition and cost pressure is a major trend in this industry, as confirmed by all experts interviewed in the course of this report. Going more into detail, major drivers of increased competition and cost pressure include:

- **Market liberalisation and regulation:** Market liberalisation efforts in the 1990s were followed by the market entry of a large number of resellers and alternative network operators. Also, national regulatory authorities (NRAs) were established to monitor implementation of the rules, including inter alia control prices and tariffs (e.g. Bundesnetzagentur in Germany, Comisión del Mercado de las

telecomunicaciones in Spain and Ofcom in the UK³¹). These measures have likely contributed to increased competition and subsequent price pressure in this sector (see also annual report by the European Commission).³²

- **Convergence of platforms and technologies:** The increasing relevance of convergence-driving technologies leads to the blurring of lines between traditional market segments and, thus, results in increased competition. Fixed-mobile convergence and substitution, increasing broadband take-up and the opportunity to transmit voice over Internet Protocol (VoIP), for example, led to the entry of new players in the telephony market (see Section 4.1.3). Moreover, as a consequence of fixed-mobile convergence mobile operators like Vodafone try to gain a foothold in the fixed line business and offer their products as an alternative to traditional phone lines³³. Following these developments fierce competition and falling prices are observed in this market segment. Similar developments can be reported for the internet and TV access services segments. Broadband access services, for example, are an integral part of offerings of many TV cable companies like Cabovisao (Portugal) or ONO (Spain). In return, many incumbents (see Section 4.1.4) are beginning to offer TV access services.
- **Market saturation in conventional segments:** The growth potential in traditional market segments, e.g. fixed and mobile telephony or dial-up internet access, is rather limited today. While mobile telephony, for example, was a growth driver during the 1990s, the mobile market in Western Europe is widely saturated today – but not so much in the new Member States. In 2005, the average penetration rate for EU-25 countries was at 91% and for the EU-15 countries it had reached even 92%.³⁴ These very high penetration rates, especially for mobile voice, represent a challenge that individual mobile companies will face in pursuing a purely voice-based growth track.
- **Low return on investment in 3G networks:** Mobile operators invested heavily in 3G licenses to build and operate networks. Operators paid a total €109bn only for UMTS licenses in 2000³⁵. However, these investments served to maintain the status quo and rather increased the cost pressure than paid out in terms of customer or revenue increase. Despite a 2G-to-3G substitution, the number of subscribers to 3G-based services is still marginal compared, for example, to GSM users. As of September 2005, around 15 million people in the EU had subscribed to 3G services. In contrast, GSM subscribers in Europe are estimated at more than

³¹ European Monitoring Centre for Change (2005): Trends and drivers of change in the EU telecoms sector – Mapping report. Cf. pp. 13-14 for an overview of European regulation agencies.

³² EC (2006): Communication on “European Electronic Communications Regulation and Markets 2005”. COM (2006) 68 final, Brussels, February 20, 2006.

³³ Vodafone (2006): New organisational structure at Vodafone. Press Release, April 6, 2006.

³⁴ EC (2006): Communication on “European Electronic Communications Regulation and Markets 2005”, 11th implementation report, COM (2006) 68 final, Brussels, February 20, 2006 (http://europa.eu.int/information_society).

³⁵ The Economist (2004): Vision, meet reality. September 2, 2004.

400 millions.³⁶ This slower than expected trend is also due to low UMTS network deployment which causes unavailability of the service.

Implications for telco companies and ICT key issues

Regarding the developments described above, telco companies are challenged to:

- **Develop new markets:** Increased price competition and saturation in traditional market segments increase the pressure on telco companies to develop new markets to initiate growth. Assumed growth segments include the provision of broadband internet, VoIP and the distribution of higher-value digital content. These fields are also often discussed in relation to so-called triple play offers, i.e. the combined provision of internet, voice and TV services.
- **Support customer relationships:** Efficiently managing customer relationships is a priority in an environment characterised by an increasing number of competitors in almost all telco market segments. In fact, customers that want to sign up for an internet connection, telephony service or TV access today can choose between a large number of suppliers, originating from different market segments. Opportunities to differentiate from competitors, however, are limited since customers usually do not care about the underlying technology as long as the service is reliable and reasonably priced.
- **Streamline business processes:** Lean and flexible processes are a precondition to deal with increased cost pressure as well as to adjust business models in a rapidly changing market environment. Thereby, the necessity to streamline business processes affects both internal workflows as well as the collaboration with business partners, e.g. device manufacturers or content providers.

This report is focussing on the role of ICT and e-business technologies to overcome these challenges. The **use of ICT** to support internal workflows and collaboration with external partners is reflected in the results of the new *e-Business W@tch* survey 2006 presented in Chapter 3. The first part in Chapter 4 discusses opportunities and barriers related to the development of new promising telco segments, including **broadband internet** (Section 4.1.2), **VoIP** (Section 4.1.3) as well as **IPTV and “triple play”** (Sections 4.1.4 and 4.1.5). The second part of Chapter 4 is about the use of ICT and e-business to **support customer relationships**, as well as marketing and sales activities in this sector.

³⁶ GSM World (2006): Brief history of GSM and the GSMA – available at: <http://www.gsmworld.com/about/history.shtml> (April 23, 2006).

2.3 Review of earlier sector studies

In previous sector studies by *e-Business W@tch*, the telecommunications sector was analysed as part of ICT services, which also included IT services³⁷. Therefore, it seems reasonable to take survey results published in those studies as a starting point for the analysis in this report. In the 2004 report, for example, the ICT services sector in its entirety turned out to be a forerunner in the usage of ICT and e-business technologies. Usage ratios of the ICT sector significantly ranged above those of other sectors surveyed in almost all application areas. The main reason for this intensive IT usage is that companies in this sector as providers of ICT services are already familiar with the benefits of ICT and e-business technologies as well as with strategies for their integration.

We expect a similar outcome when focusing on the telecommunications sector. Admittedly, the telecommunications industry differs from providers of IT services in terms of company size, market structure and the way services are produced.³⁸ This may lead to differences in the way IT and e-business technologies are used. IT supporting customer relationship management, for example, is a key issue for both sub-sectors. However, telco companies need technologies suitable to support activities on the mass markets, while IT services companies rather have to support collaboration with single clients. Accordingly, there might also be some slight differences in the usage rates for single IT systems. This, in fact, was a motivation for restricting the 2006 analysis of *e-Business W@tch* to the telecommunications sector. This way, clearer results can be obtained, given the sector's homogeneity.

The main reason for the intensive ICT usage (i.e. familiarity with e-business technologies and strategies for their deployment) is valid for both ICT services sub-sectors. Therefore, the authors expected that telco companies will report in the 2006 e-Business Survey usage ratios similar to or larger than those observed for the entire ICT services sector. The survey results of 2006 are presented and discussed in the following Chapter 3.

³⁷ See, for example, *e-Business W@tch* Sector Study on the ICT Services Sector (May 2004). Available at www.ebusiness-watch.org ('resources').

³⁸ See comparison between telecommunications services and computer-related services in *e-Business W@tch* / European Commission (2004): "Electronic Business in the ICT services sector", Sector Study No. 08-II, Section 2.1.1, pp. 18-19.

3 Adoption of ICT and e-Business in 2006

Background information about the e-Business Survey 2006

e-Business W@tch collects data on the use of ICT and e-business in European enterprises by means of representative telephone surveys. The e-Business Survey 2006 was the fourth survey after those of 2002, 2003 and 2005. It had a scope of **14,081 interviews** with decision-makers in enterprises from 29 European countries.³⁹

Most of the tables in this report feature a breakdown of the population of enterprises based on the aggregate of 10 EU countries – **the "EU-10"**.⁴⁰ In these countries the survey covered all 10 sectors (at least to some extent) and therefore comparability of the sample across sectors is given. The EU-10 represent more than 80% of the total GDP and inhabitants of the EU-25 and are thus to a large extent representative for the whole EU. In the **telco industry** 1554 interviews were conducted; out of these, 829 with companies from the EU-10.

The survey was carried out as an **enterprise survey**, i.e. focusing on the enterprise as a business organisation (legal unit) with one or more establishments. Similarly to 2005, the 2006 survey also included only **companies that use computers**. The configuration of the survey set-up (e.g. sampling) reflects the mandate of *e-Business W@tch* to **focus on sectors** and **SMEs**. As a result, comparisons should mainly be made between sectors and between size-bands of enterprises. Breakdowns by country are also possible, but should be treated cautiously, for several reasons (see Annex I).

More detailed information about the survey methodology, including information about sampling and the business directories used, the number of interviews conducted in each country and sector, data on non-response rates, as well as selected results by country are available in **Annex I** and on the *e-Business W@tch* website.

Interpretation of survey results for the telecommunication industry

When comparing results by size band and country, the limited sample size has to be taken into account. In order to facilitate the interpretation of data and to avoid confusion, the following rules for data presentation have been applied:

- **Results that are based on less than 25 observations are not displayed** due to their limited statistical explanatory power.

³⁹ The survey was conducted in March-April 2006 using computer-assisted telephone interview (CATI) technology. Field-work was co-ordinated by the German branch of Ipsos GmbH (www.ipsos.de) and conducted in co-operation with their local branches and partner organisations. The countries covered include EU Member States, Acceding and Candidate Countries, and countries of the European Economic Area (EEA).

⁴⁰ The EU-10 cover the Czech Republic, Germany, Spain, France, Italy, Hungary, the Netherlands, Poland, Finland and the UK.

- **Results based on a sample size between 25 and 50 are displayed with the notification** that they are only of indicative value due to the limited number of observations. Survey results on e-business activities of large telco companies, for example, are based on less than 50 enterprises and, thus, should be interpreted with caution.

3.1 ICT infrastructure

3.1.1 Basic ICT infrastructure: internet access and ICT networks

Modern **ICT infrastructure** is essential for the successful supply of telco services. In fact, telco companies not only have an important role as suppliers of ICT infrastructure and services; they also necessitate an efficient network infrastructure as well as powerful and secure internet connections for the provision of their services and the use of advanced e-business applications.

Broadband internet connections, for example, are not only an output of this industry. Rather, they also form the basis for specific telco services such as the delivery of Voice over Internet Protocol (VoIP) or the provision of public WLAN (Wireless Local Area Network) access points. Specialised providers of VoIP (e.g. Skype or Upnet, cf. Section 4.1.3) or of public WLANs (e.g. in restaurants or gas stations) often use the broadband infrastructure of other telco companies. Finally, broadband is also the basis for advanced e-business applications used in the telco industry, e.g. to support internal and external collaboration and to provide customer services over the web.

Indeed, telco companies are well equipped with basic ICT infrastructure and **internet connections**. As could be expected, the respective usage rates (cf. Exhibit 3-1) are significantly above the all-sectors average. Practically all telco companies, for example, reported having access to the internet and the huge majority of companies even said that they have broadband access, irrespective of their size.

The high relevance of the internet for telcos' work processes is indicated by the large **share of employees with internet access**: About 90% of employees in the telco industry – more than double as much as on average in all 10 sectors studied this year – have access to the internet. Similar high rates are only observed in other high-tech sectors, such as Consumer Electronics (80%) and ICT manufacturing (74%). In fact, in these sectors the internet has already become the main channel for communication and the primary way to store and access information.

Accordingly, there is also greater need for **accessing the company network from remote locations** (e.g. by managers or field services), and for connecting PCs via a **Local Area Network (LAN)**. In addition, wireless LANs installed in telco companies allow for flexible (wireless) access to the internet with mobile devices within a company location and, thus, further facilitate the collaboration of employees. Indeed, deployment ratios for remote access solutions, LANs and WLANs as well as for Virtual Private Networks to secure remote access connections are significantly above the all-sectors average (see Exhibit 3-2).

Exhibit 3-1: Internet access and remote access to company network

	Companies with internet access		Companies with broadband internet access		Average share of employees with internet access**		Remote access to company network	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Weighting:								
Telecoms (EU-10)	100	99	88	85	n.a.	90	74	46
Micro (1-9 empl.)		99		85		90		41
Small (10-49 empl.)		100		87		87		70
Medium (50-249 empl.)		100		85		79		83
Large (250+ empl.)		100*		79*		74*		93*
All 10 sectors (EU-10)	95	93	76	69	n.a.	43	35	16
Micro (1-9 empl.)		89		62		51		12
Small (10-49 empl.)		98		75		29		22
Medium (50-249 empl.)		99		83		33		43
Large (250+ empl.)		99		84		44		60
Food & beverages	95	88	72	64		25	35	14
Footwear	96	89	75	62		28	17	10
Pulp & paper	99	94	80	68		40	56	21
ICT manufacturing	100	99	84	79		74	69	35
Consumer electronics	98	97	87	74		80	51	32
Shipbuilding & repair	100	100	87	86		30	41	27
Construction	95	90	72	64		47	25	13
Tourism	93	90	72	68		53	38	13
Telecommunication	100	99	88	85		90	74	46
Hospitals activities	100	98	85	78		41	39	34
Base (100%)	firms using computers		firms using computers		firms with internet access		firms using computers	
N (for sector, EU-10)	829		829		817		829	
Questionnaire reference	A1		A3		A2		A5	
* Data only indicative due to low number of observations (N ~ 25-50).								
** Please read: "The average share of employees with internet access in a telco company is 90%"								

Source: *e-Business W@tch* (Survey 2006)

Section 4.1.3 and the respective part in Annex III discuss in detail the different usage scenarios and related benefits for the users of **VoIP** services. It turns out that the advantages of so-called "internet telephony" for enterprises go beyond cost savings for voice traffic. Rather, a telephony system based on the internet allows for more flexibility, e.g. initiating telephony conferences, and more efficient maintenance due to converged networks for voice and data communication. Thus, it is not surprising that telco companies are not only active as suppliers of VoIP services: More than one third of telco companies reported that they use VoIP applications.

Exhibit 3-2: Networks and protocols used

Weighting:	LAN		W-LAN		Use Voice-over-IP		Use VPN for remote access	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecoms (EU-10)	94	74	52	44	45	37	78	50
Micro (1-9 empl.)		71		42		36		45
Small (10-49 empl.)		94		51		45		62
Medium (50-249 empl.)		94		52		50		81
Large (250+ empl.)		100*		76*		52*		83*
All 10 sectors (EU-10)	65	46	32	16	16	13	57	26
Micro (1-9 empl.)		35		12		14		20
Small (10-49 empl.)		59		21		11		32
Medium (50-249 empl.)		84		37		13		57
Large (250+ empl.)		96		47		22		79
Base (100%)	firms using computers		firms using computers		firms using computers		Firms enabling remote access	
N (for sector, EU-10)	829		829		829		491	
Questionnaire reference	A4a		A4b		A4c		A6d	
* Data only indicative due to low number of observations (N ~ 25-50).								

Source: e-Business W@tch (Survey 2006)

3.1.2 Use of Open Source Software

Telco companies are also intensive users of **Open Source Software (OSS)**. OSS refers to computer software under an open source license, such as the GNU General Public License⁴¹. An open-source license is a copyright license for software that makes the source code available for any interested party. It typically allows for modification and redistribution without having to pay royalties or licensing fees to the original authors or programmers. In the past years, public awareness of OSS has grown steadily, driven by the Linux operating system as one of the best-known projects. Besides Linux, other OSS such as the MySQL database or the Firefox internet browser (a spin-off of the Mozilla browser) have gained significant market share⁴².

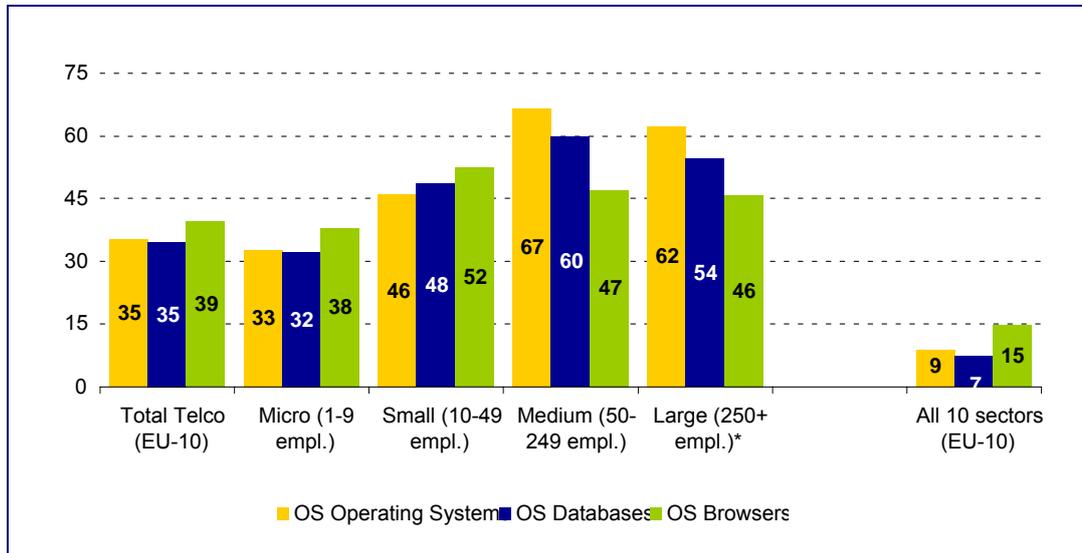
Value propositions of OSS include lower ICT costs due to free licences and independence from specific ICT service providers. Based on this, OSS is discussed by some observers as a possible driver of ICT adoption by smaller companies. However, the survey results indicate considerable differences depending on company size and sector. OSS is particular widespread in larger firms and companies in ICT-related sectors like the telco industry (see Exhibit 3-3). In contrast, OSS deployment ratios are still relatively limited in small companies and in industries that are less familiar with ICT-specific issues.

⁴¹ <http://www.gnu.org/licenses/gpl.html>

⁴² Almost 10% used Firefox as of December 2005, compared to 85% for Microsoft's Internet Explorer. Cf. Burns, Enid (2006): The browser wars of 2005. Clickz Stats, January 6, 2006.

One reason for this might be that OSS often lags behind proprietary competitors in terms of marketing efforts and customer support. Although these issues are increasingly being addressed⁴³, particularly catering to smaller companies might still be problematic. In fact smaller companies often do not have extensive in-house ICT competencies to implement and manage OSS components (see also Chapter 3.2).

Exhibit 3-3: Companies using Open Source (OS) Software



Base (100%): Companies using computers. N (for sector, EU-10) = 829.

Weighting: in % of firms. Questionnaire reference: G8

* Data only indicative due to low number of observations (N ~ 25-50).

Source: *e-Business W@tch* (Survey 2006)

3.1.3 ICT security measures

E-Business W@tch already analysed security controls and other measures applied by European enterprises to counter online security threats in the 2005 survey. The results (presented in a special report⁴⁴) indicated that basic components such as firewalls and secure servers – for those enterprises requiring these measures – already exhibited high levels of penetration. Following-up on to the ICT security study, questions on selected security measures that were of particular interest to policy were included in the 2006 *e-Business Survey* as well.

"Secure server technology" means that data exchange between computers is based on certain technical standards or protocols, as for instance "Secure Sockets Layer" (SSL). SSL is a commonly used cryptographic protocol for securing message transmission over the internet. The SSL protocol has recently been succeeded by the Transport Layer

⁴³ Marson, Ingrid (2006): Firefox ads published in Europe. ZDNet UK, December 3, 2004.

⁴⁴ See *e-Business W@tch* Special Study on ICT Security, e-Invoicing and e-Payment Activities in European Enterprises, September 2005. Available at www.ebusiness-watch.org (cf. "Resources").

Security (TLS) protocol, but it is still widely used⁴⁵. In the telco industry, 45% of all firms reported using Secure Server Technology, according to the survey results (see Exhibit 3-4). This relatively high deployment rate is hardly surprising as this technology is usually closely linked with **e-commerce** activities. In fact, the deployment rate is on par with the relatively high percentage of telco companies stating that they receive orders from customers online (40%).

Exhibit 3-4: ICT security measures used by enterprises

	Secure Server Technology		Digital Signature or Public Key Infrastructure		Firewall	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecoms (EU-10)	72	45	38	23	96	86
Micro (1-9 empl.)		41		20		85
Small (10-49 empl.)		74		37		96
Medium (50-249 empl.)		72		37		95
Large (250+ empl.)		86*		74*		100*
All 10 sectors (EU-10)	36	20	21	15	78	62
Micro (1-9 empl.)		16		13		56
Small (10-49 empl.)		23		17		73
Medium (50-249 empl.)		36		25		84
Large (250+ empl.)		64		39		94
Base (100%)	firms using computers		firms using computers		firms using computers	
N (for sector, EU-10)	829		829		829	
Questionnaire reference	G9a		G9b		G9c	
* Data only indicative due to low number of observations (N ~ 25-50).						

Source: *e-Business W@tch* (Survey 2006)

As can be expected, firewalls are widely used by companies from all of the 10 sectors studied in 2006 by *e-Business W@tch*. The fact that firewalls in the telco industry are even more widespread than on average across all sectors is a further indicator for telco companies' advanced equipment with basic ICT infrastructure.

An **e-signature** is a piece of electronic information attached to or associated with a contract or another message used as the legal equivalent of a written signature. Electronic signatures are often used to mean either a signature imputed to a text via electronic means, or cryptographic means to add non-repudiation and message integrity features to a document. The term "**digital signature**" specifically refers to a cryptographic signature, either on a document, or on a lower-level data structure. The rationale for measuring the adoption of digital signatures is that it is an important step towards the

⁴⁵ Storer, Amy (2005): Industry welcomes next-gen TLS VPN. SearchNetworking.com, April 26, 2005.

integration of business processes between different enterprises, specifically for the legal recognition of electronic documents, e.g. **invoices**.⁴⁶

In 2005, *e-Business W@tch* asked companies whether they had "*rules that specify the use of digital signatures or Public Key Infrastructure*", as part of a question regarding the use of ICT security measures. In total, about 10% of all firms (accounting for about 20% of employment) reported that they have indeed such rules. Figures in 2006 appear to be slightly higher with the adoption of e-invoicing as a possible key driver. For the telco industry, almost one quarter of firms reported using digital signatures / **public key infrastructure** (see Exhibit 3-4).

3.2 ICT Skills, Outsourcing and ICT Budgets

As already indicated by the survey results on ICT infrastructure, telco companies have a forerunner position as users of ICT and e-business technologies. This leads to the expectation that sector demand for ICT skills and efforts for their development as well as investments in ICT are more pronounced than in the other sectors covered by the 2006 e-Business Survey.

3.2.1 Demand for ICT skills and skills development

Overall, the survey results support this hypothesis. About one third of telco enterprises employ **ICT practitioners**, more than twice as much as on average in all sectors surveyed. Moreover, about 20% of telco companies said that they provide regular ICT training to their employees (see Exhibit 3-5). However, the double role of telco companies as suppliers and users of ICT should be taken into account when interpreting these figures. ICT skills are not only needed to support internal e-business applications, but also to support technical platforms for services provision and to provide value-added IT services related to the core offerings.

In fact, as a consequence of convergence in the telco industry (see discussion of convergence trends in Chapter 4.1) technical platforms for services provision and billing have to be adopted, e.g. to support provision and billing of VoIP or IPTV services. Accordingly, ICT specialists are needed for operating and maintaining new (converged) platforms. This may also explain the considerable share of larger telco companies which reported that they had **hard-to-fill vacancies for ICT jobs** in 2005.

In addition, many telco companies offer communication solutions and IT services beyond their core offerings. In order to support the rollout of Flash-OFDM services, for example, T-Mobile Slovakia (see case study in Section 4.1.2) has service teams providing equipment and installation services onsite. Thus, ICT practitioners need to be recruited to fulfil these tasks.

⁴⁶ To this end, in 1999, the European Union issued the Electronic Signature Directive.

Since a large part of employees have access to the internet, telco companies are in a good position to use internet-based technologies for skills development. Accordingly, about 30% of telco companies reported using **e-learning** applications, i.e. offering training support with electronic learning materials – more than double as much than on average in all sectors covered. The use of e-learning applications, however, is not necessarily an indicator for the support of ICT skills. It can be used for ICT-related training, but also for other sector-specific or even company-specific training curricula.

Exhibit 3-5: Demand for ICT skills and skills development

	Companies employing ICT practitioners		Regular ICT training of employees		Companies with hard-to-fill vacancies for ICT jobs in 2005		Companies using e-learning	
	Weighting: % of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecoms (EU-10)	63	33	52	21	12	5	41	28
Micro (1-9 empl.)		30		17		4		26
Small (10-49 empl.)		48		36		14		40
Medium (50-249 empl.)		63		55		13		34
Large (250+ empl.)		83*		65*		15*		57*
All 10 sectors (EU-10)	27	14	22	13	2	1	21	11
Micro (1-9 empl.)		12		9		2		12
Small (10-49 empl.)		15		16		0		11
Medium (50-249 empl.)		29		28		2		19
Large (250+ empl.)		59		41		6		35
Base (100%)		firms using computers		firms using computers		firms using computers		firms using computers
N (for sector, EU-10)		829		829		829		829
Questionnaire reference		B1		B4		B2		B5

* Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

3.2.2 Outsourcing of ICT services

Telco companies can be expected to make heavy use of **IT outsourcing** services. They are intensive users of ICT and e-business technologies, while not all applications are business critical. By outsourcing non-core IT services (e.g. the maintenance of desktops or call centre infrastructure to specialised third parties) telco companies may more efficiently focus on their core competencies and realise cost savings.

In this regard, the share of telco companies that reported to have outsourced ICT services in 2005 (14%) seems rather low at first glance (see Exhibit 3-6). However, this finding should be carefully interpreted, because it only indicates outsourcing activities in 2005 and not the general attitude of telco companies towards outsourcing. Typical outsourcing contracts last between three and six years. Thus, it is likely that many telco companies have outsourced ICT services already before 2005.

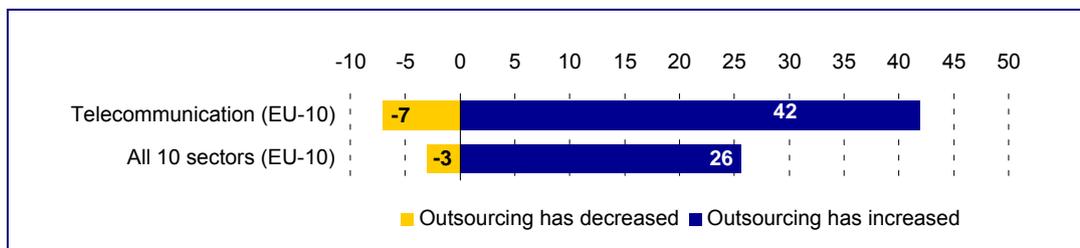
Exhibit 3-6: Outsourcing and spending on ICT

	Have outsourced ICT services in 2005		Share of ICT budget as % of total costs		Have made ICT investments in 2005		Difficulty to draw funds for investments	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecoms (EU-10)	24	15	12	21	88	70	31	11
Micro (1-9 empl.)		13		21		67		(**)
Small (10-49 empl.)		21		21		89		(**)
Medium (50-249 empl.)		25		9*		90		(**)
Large (250+ empl.)		41*		(**)		93*		(**)
All 10 sectors (EU-10)	19	14	6	5	65	50	19	15
Micro (1-9 empl.)		8		5		39		25
Small (10-49 empl.)		21		5		60		3
Medium (50-249 empl.)		21		6		78		6
Large (250+ empl.)		31		6		86		29
Base (100%)	firms using computers		all firms (excl. "don't know")		firms using computers		Firms with external funding sources for their ICT investments	
N (for sector, EU-10)	829		493		829		53	
Questionnaire reference	B6		C1		C3		C5	
* Data only indicative due to low number of observations (N ~ 25-50).								
** Values not displayed because number of observations (N) is <25.								

Source: e-Business W@tch (Survey 2006)

In fact, Exhibit 3-7 indicates that the overall trend seems to be an increase of service outsourcing in the telco sector. Asked whether outsourcing would increase, decrease or remain the same in 2006/07 (compared to 2005), more than 40% of companies from the telco sectors that have outsourced IT services in 2005 anticipated an increase, and only very few companies said that outsourcing would rather decrease.

Exhibit 3-7: Outsourcing trend: percentage of companies that have increased / decreased their outsourcing activities in 2005



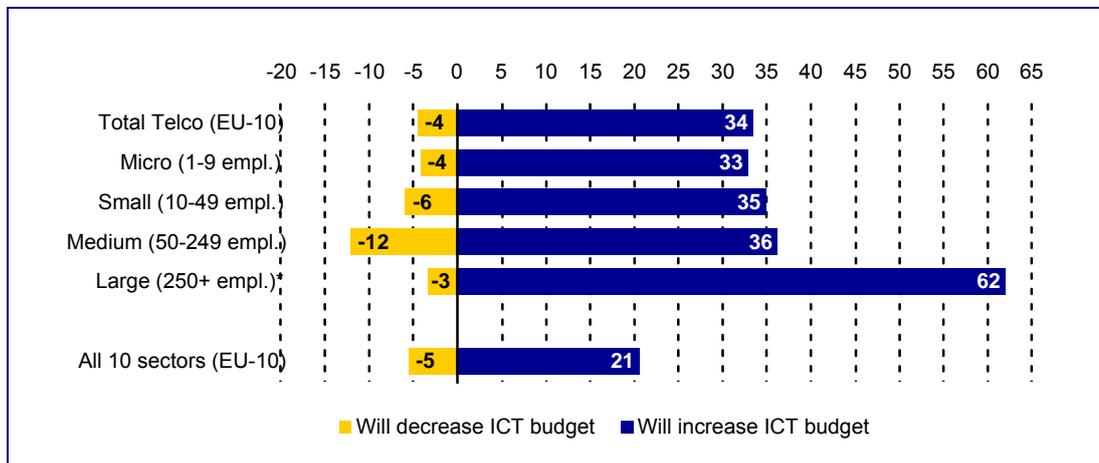
Base (100%): Companies that have outsourced ICT services. N (for sector, EU-10) = 152.
 Weighting: in % of firms. Questionnaire reference: C2.

Source: e-Business W@tch (Survey 2006)

3.2.3 ICT investments

As an indicator for ICT intensity, *e-Business W@tch* asked companies about the share of ICT investments as percentage of total costs. As could be expected, ICT investments in the telco sector are significantly higher than in other sectors covered by the 2006 *e-Business Survey* (see Exhibit 3-6). On average every fifth Euro of total expenditures has been spent for ICT and e-business technologies, according to the survey results. This finding can be explained by the fact that ICT is not only used to support internal workflow and the collaboration with business partners. It is also needed as a basis for service provision. Investment goods in this sector, for example, include base stations for the rollout of wireless services as well as platforms for managing and billing telco services.

Exhibit 3-8: ICT budget trend: percentage of companies that plan to increase / decrease their ICT budgets in 2006/07



Base (100%): Companies using computers (excl. "don't know"). N (for sector, EU-10) = 781.

Weighting: in % of firms. Questionnaire reference: C2.

* Data only indicative due to low number of observations (N ~ 25-50).

Source: *e-Business W@tch* (Survey 2006)

The trend towards convergence in the telco sector is one of the main drivers of **ICT expenditures** today and in the future. Telco companies are challenged to install and integrate new platforms to provide services like VoIP or IPTV. Respectively, more than two thirds of telco companies reported that they already invested in ICT in 2005. Among medium-sized and large enterprises this share is even larger, nine out of ten companies said that they invested in ICT.

This trend is likely to continue: A considerable share of telco companies, particularly among large enterprises, reported that they expect an increase of the ICT budget in the future (see Exhibit 3-3). The European Foundation for the Improvement of Living and Working Conditions names, for example, investments in **new billing platforms as a major trend** in the telco industry: "Most European operators now run several different billing systems simultaneously. As legacy billing systems become obsolete, operators are

replacing them with a unified platform that addresses the complex business requirements of a multi-product telco, and that offers advanced features such as IP billing.”⁴⁷

However, there is a significant (albeit small) share of telco companies saying that they expect a decrease in ICT investments, particularly among medium-sized companies. A possible reason for this finding could be that these companies have already invested in new services provision and billing platforms. The expected decrease in ICT budgets could also be reasoned by cost saving measures of single telco companies due to the increasing cost pressure in this sector.

In 2006, *e-Business W@tch* also asked companies about the **major source of funds** to finance their ICT investments⁴⁸, and if they experienced any difficulties in deriving funds from this source (in case the sources were external). In all of the 10 sectors surveyed, **self-financing** (from cash-flow generated) is the dominant source of funds for ICT investments – see Exhibit 3-9. In the telco industry, almost 80% of firms say that this is their major source. **Bank loans** are typically used for larger ICT investments. However, they are the major financing source for only a marginal share (4%) of telco firms. Venture capital is insignificant compared to the other sources: Only about one in hundred firms stated that this is their major source for ICT investments. About 10% of telco companies reported drawing from public funds or other sources.

Exhibit 3-9: Major source for investments in ICT

	Cash-flow financing		Bank loans		Venture capital		Public funds and other	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecoms (EU-10)	71	79	2	4	2	1	6	9
Micro (1-9 empl.)		81		5		1		9
Small (10-49 empl.)		74		4		1		10
Medium (50-249 empl.)		58		4		3		11
Large (250+ empl.)		69*		1*		1*		1*
All 10 sectors (EU-10)	74	82	5	7	1	1	9	7
Micro (1-9 empl.)		82		8		1		2
Small (10-49 empl.)		81		6		1		2
Medium (50-249 empl.)		70		8		1		2
Large (250+ empl.)		67		2		1		8
Base (100%)	firms that have made investments in ICT							
N (for sector, EU-10)	668		668		668		668	
Questionnaire reference	C4		C4		C4		C4	

* Data only indicative due to low number of observations (N ~ 25-50).

Source: *e-Business W@tch* (Survey 2006)

⁴⁷ European Foundation for the Improvement of Living and Working Conditions (2005): “Trends and drivers of change in the EU telecom sector: Mapping Report”, European monitoring center of change (emcc), www.eurofound.eu.int.

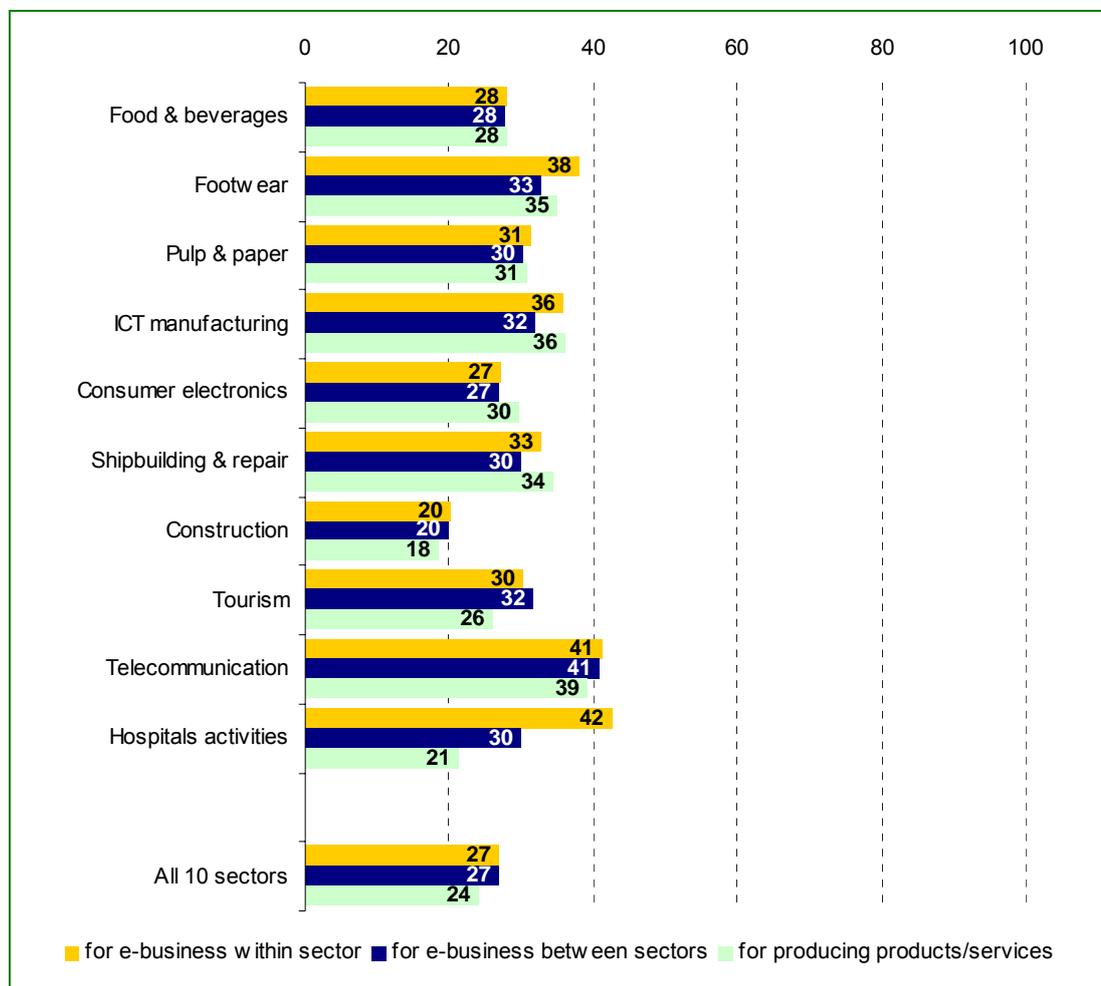
⁴⁸ Ideally, a question about the breakdown of investments into the different financing sources would be asked; however, only few interviewees would be in a position to spontaneously answer this question on the telephone; furthermore, such a question would be extremely time-consuming. Thus, the only feasible solution was to ask for the *major* source.

3.3 Standards and Interoperability

3.3.1 Perceived importance of interoperability and related problems

Interoperability refers to the "ability of two or more systems to exchange data, and to mutually use the information that has been exchanged"⁴⁹. Interoperability should be of importance for the telco industry, where seamless interplay of ICT systems is the basis for collaboration with business partners, advanced customer services and the provision of services. In order to reveal the **perception of interoperability** in the sectors studied, e-Business W@tch asked companies whether they regard interoperability as critical for conducting e-business with companies from their own sector, from other sectors, and for producing their products or services.

Exhibit 3-10: Perceived importance of interoperability: percentage of companies saying that interoperability is critical ...



Base (100%): Firms using computers. N (for sector, EU-10) = 769. Weighting: in % of firms.
Questionnaire reference: G5a-c.

Source: e-Business W@tch (Survey 2006)

⁴⁹ Definition by IEEE and ISO, cf. e-Business W@tch Special Study on e-Business Interoperability and Standards, September 2005, p. 14. Available at www.ebusiness-watch.org ('resources').

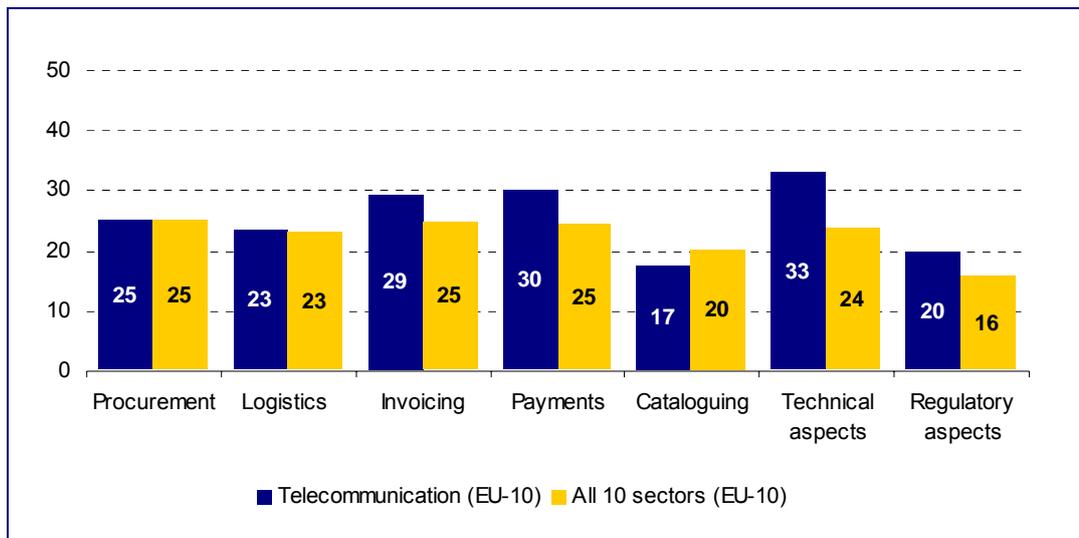
Overall, results do not show any pronounced differences between sectors, maybe with the exception of the construction industry. In the telco industry, about 40% of all companies reported regarding **interoperability as critical** in all of the three categories surveyed. Although this share is above the average of all sectors covered, it also indicates that almost half of those telco companies for which e-business plays a role in their day-to-day routines (almost 80%, see Chapter 3.8) are not aware of the critical role of interoperability. Interestingly, there are no pronounced differences between different size classes in the perception of the importance of interoperability.

e-Business W@tch also asked companies whether they experience any **difficulties** stemming from a **lack of interoperability**. Only those firms were asked which said that interoperability was critical for e-business and/or providing the products; seven potential problem areas were suggested. The business functions where most telco companies reported facing interoperability challenges are technical aspects, invoicing and payments. While the interpretation of “technical aspects” is rather vague, the relatively high share of companies reporting interoperability problems with the processing of invoices and payments has some clear indications.

First, it indicates the increasing importance of electronic **invoicing and payment**, particularly in the telco industry. In fact, for telco companies serving mass markets, invoicing and billing are major cost drivers. Thus, almost all larger telco companies have taken efforts to replace expensive and error-prone paper-based processes by the electronic transfer of invoices and payments. Accordingly, the share of companies that reported sending e-invoices is more than twice as high in the telco industry as on average in all sectors studied in 2006 by the *e-Business W@tch*.

However, there are apparently still **unsolved problems** with regard to the compatibility of systems and standards in this field of e-business. In fact, billing and invoicing in the telco industry is complex as it includes a large range of services, e.g. mobile and fixed voice, internet and TV access, which are provided for heterogeneous customer groups. Thus, the required seamless interplay of services platforms is challenging. This complexity is even likely to increase with the importance of new convergence-driving technologies such as VoIP or IPTV.

Exhibit 3-11: Problems due to a lack of interoperability: firms experiencing difficulties in ...



Base (100%): Firms that say that interoperability is critical for their e-business. N (for sector, EU-10) = 489. Weighting: in % of firms. Questionnaire reference: G6.

Source: e-Business W@tch (Survey 2006)

3.3.2 Use of e-business standards

A "standard", used as a technical term, is "a technical specification approved by a recognised standardisation body for repeated or continuous application, with which compliance is not compulsory".⁵⁰ There are national, European, and international technical standards. The agreement on shared technical standards is an instrument to achieve interoperability between different systems. Without interoperability of ICT systems, which requires standards and compatibility between standards, advanced forms of e-business (such as the digital integration of systems in B2B exchanges) is hardly possible.

e-Business W@tch has been continuously reporting on the **take-up of e-business standards** in different industries in Europe. Results of previous e-Business Surveys are summarised and discussed in the special report on "e-Business Interoperability and Standards", where it was clearly indicated that "the share of companies that exchange standardised data increases with the firm size". It was also noted in the same report that EDI-based standards are mainly used in manufacturing sectors and in retail, whereas XML-based standards are more used than on average in business services and high-tech sectors.⁵¹

⁵⁰ Directive 98/34/EC laying down a procedure for the provision of information in the field of technical standards and regulation, 22 June 1998 (<http://ec.europa.eu>).

⁵¹ e-Business W@tch / EC (2005): "e-Business Interoperability and Standards – A Cross-Sector Perspective and Outlook", 2005, see p. 12, <http://www.ebusiness-watch.org/resources>.

This summary holds true also for this year's findings with regard to the telco industry. Overall, standards are more widespread in the telco industry than on average in the 10 sectors studied this year. However, a considerable share of telco companies reported using “**proprietary standards**”. These are solutions agreed upon data exchange between certain business partners than standards as defined in the paragraph above, i.e. approved by a recognised standardisation body.

In addition, standardised data exchange seems to be less widespread among smaller enterprises, particularly with regard to XML-based standards. In so far, the results support policy conclusions of the special report focussing on SMEs and asking policy makers **to increase awareness and support mechanisms, with emphasis on SMEs**.⁵²

Exhibit 3-12: Use of e-standards

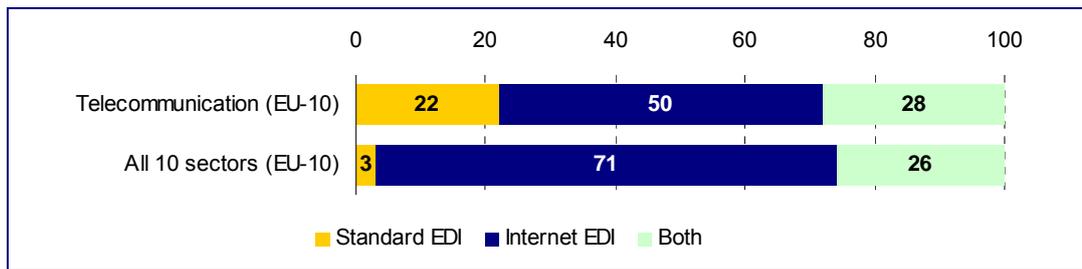
Weighting:	EDI-based standards		XML-based standards		Proprietary standards		Other standards	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecoms (EU-10)	13	5	29	14	37	23	6	4
Micro (1-9 empl.)		4		11		21		4
Small (10-49 empl.)		11		27		32		10
Medium (50-249 empl.)		5		34		38		5
Large (250+ empl.)		27*		43*		34*		3*
All 10 sectors (EU-10)	9	3	11	5	19	12	4	2
Micro (1-9 empl.)		2		6		10		1
Small (10-49 empl.)		4		5		13		2
Medium (50-249 empl.)		10		10		24		2
Large (250+ empl.)		29		27		31		7
Base (100%)	firms using computers							
N (for sector, EU-10)	829		829		829		829	
Questionnaire reference	G1a		G1b		G1c		G1d	
* Data only indicative due to low number of observations (N ~ 25-50).								

Source: *e-Business W@tch* (Survey 2006)

As already elaborated in the special report, **XML-based standards** are particularly widespread in high-tech sectors, including telecommunications. According to the 2006 survey findings, this share is most likely to increase in the future: more than half of traditional EDI users in this sector –significantly more than EDI users in all 10 sectors studied this year (3%)– said that they plan to **migrate from EDI to XML** (cf. Exhibit 3-14). This might also explain why the share of EDI users that reported exchanging data based on a modern internet EDI structure is smaller than the all-sectors average. If migration to XML is already planned, investments in internet EDI do not make much sense.

⁵² Ibid, p. 9.

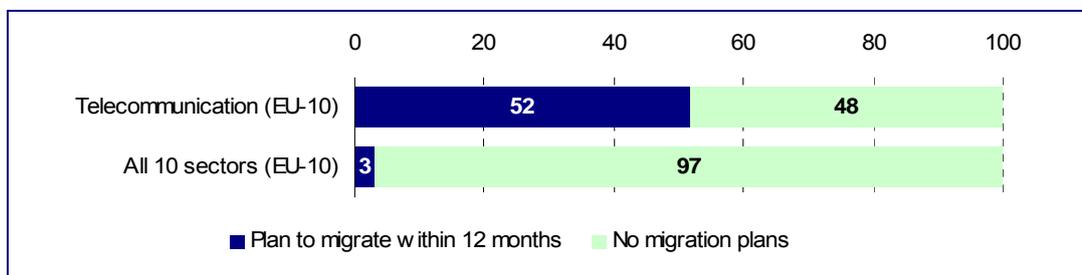
Exhibit 3-13: Types of EDI used



Base (100%): Companies using EDI. N (for sector, EU-10) = 58.
Weighting: in % of firms. Questionnaire reference: G3

Source: e-Business W@tch (Survey 2006)

Exhibit 3-14: Companies planning to migrate from EDI to XML based standards



Base (100%): Companies using EDI. N (for sector, EU-10) = 52
Weighting: in % of firms. Questionnaire reference: G4

Source: e-Business W@tch (Survey 2006)

3.4 Internal and External e-Integration of Processes

Introduction

The use of ICT and e-business to support and optimise intra-firm processes and collaboration with business partners has become increasingly important in the telco industry. In fact, lean and flexible processes are a precondition for telco companies to deal with increased cost pressure as well as to adjust business models in a rapidly changing market environment (see also discussion in Section 2.2.2). The necessity to streamline business processes affects both internal workflows as well as the collaboration with business partners, e.g. device manufacturers or content providers.

By means of **digitisation of formerly paper-based processes**, information and documents related to incoming or outgoing orders can be **seamlessly processed** along the value chain – thus, making the entire ordering workflow less labour intensive and error-prone. In addition, underlying software systems support controlling and management by enabling full transparency of all business processes. Furthermore, **collaborative** processes within and between companies are supported, such as sharing

of information between employees (for example over an intranet) and business partners, planning and demand forecasting, organising and archiving documents, and human resources management. Finally, integrated information systems supporting the information exchange with suppliers and resellers help to ensure a fast and seamless delivery of telco services and complementary products.

3.4.1 Use of software systems for internal process integration

In the telco industry, about 40% of companies reported having an **intranet**, which can be used as a platform for the secure exchange of information within a company and, as an option, the implementation of internal training programmes. This high diffusion of intranets, which is almost twice as high as the all-sectors average again underlines the importance of internet-based applications to support daily work routines in this sector.

Enterprise Resource Planning (ERP) systems are software systems that help to integrate and cover all major business activities within a company, including product planning, inventory management, order tracking, human resources, projects management, and finance. Ideally, they link business processes electronically across different business functions and thus help to improve efficiency in operating those processes. Although problems solved by ERP systems are typically of higher relevance in manufacturing industries than in service sectors like telecommunications, more than half of large enterprises and almost one third of medium-sized enterprises in the telco sector reported using ERP systems (see Exhibit 3-15).

This result can also be taken as an indicator for the increasing importance of **internal and external collaboration** in the telco industry. In fact, the sector output today often is no stand-alone service (e.g. the provision of fixed-line telephony). It is rather a combined offering including different telco services and products of related sectors (e.g. telecommunication equipment). Thus, ICT systems are needed to support the planning of resources required and to support the necessary data exchange between the different internal and external parties involved.

In the 2006 survey, *e-Business W@tch* asked those companies that do not use an ERP system whether they have dedicated **accounting software** (other than just spreadsheet calculation programmes, such as MS Excel). In smaller companies, accounting software typically substitutes to some extent the functionality of ERP software used in larger firms. However, this is valid on a far simpler level and with a lower potential for automating order-related document flows. Overall, it turns out that a large majority of companies, particularly among medium-sized and large companies, reported using some kind of accounting software (either ERP system or dedicated accounting software).

While micro enterprises might also manage their accounting processes via a simple spreadsheet program, it is difficult to imagine how about 10 to 15% of small and medium-sized companies in this sector do so without specific software. A possible explanation might be that these companies have outsourced their entire accounting process to specialised service providers and thus do not need any relevant software. Particularly among smaller companies, **outsourcing of accounting tasks** can be a preferred alternative to the employment of specialists in this field.

Exhibit 3-15: Use of ICT systems for internal process integration

Weighting:	Intranet		Accounting software		ERP system		Document Management system	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecoms (EU-10)	76	41	83	61	32	11	25	13
Micro (1-9 empl.)		36		58		9		11
Small (10-49 empl.)		68		82		21		19
Medium (50-249 empl.)		78		90		32		30
Large (250+ empl.)		91*		96*		53*		30*
All 10 sectors (EU-10)	42	23	70	57	19	11	19	13
Micro (1-9 empl.)		19		50		7		11
Small (10-49 empl.)		28		70		16		13
Medium (50-249 empl.)		43		85		25		19
Large (250+ empl.)		76		88		45		42
Base (100%)	firms using computers		firms not using an ERP system		firms using computers		firms using computers	
N (for sector, EU-10)	829		637		829		829	
Questionnaire reference	D1a		D1e		D1d		D1c	

* Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

Special software systems for **document management** are typically used to archive and manage documents of any type in digital format; this is highly relevant for example in the insurance industry (management of insurance policies), but to a lesser degree in the telecommunication industry. This could explain the relatively small usage rate, which is similar to the average of all industries covered by the 2006 e-Business Survey. However, this does not mean that sharing of or access to documents is not important. But in many companies (particularly smaller ones), these tasks are supported by simpler e-business technologies such as intranets.

3.4.2 Use of ICT for cooperative and collaborative business processes

As already discussed with regard to ERP systems, the increasing complexity of output (e.g. combined offerings including multiple telco services and products from related sectors) requires internal and external collaboration. Accordingly, the deployment of tools for online cooperation and collaboration⁵³ in the telco value chain is clearly above the average of all sectors covered for all tasks listed in Exhibit 3-16. More than one third of telco companies, for instance, said that they use **online tools for sharing documents**. This high share underlines that there are e-business tools suitable to support this task in the telco industry and probably less complex alternatives to document management systems.

⁵³ "Cooperation" means splitting a common, centrally managed task into sub-tasks which are performed by different partners of the cooperation. "Collaboration" means that several partners work together on the same task at the same time.

About 20% of telco companies reported using online tools for collaborative design ("e-design") with other companies – almost three times as much as in all 10 sectors studied this year. However, it is difficult to draw a clear line as to which software applications and which practices are included or not. For telco companies, for example, there might be some need to discuss the design of telco equipment with partners from the respective industries. It remains unclear whether specific design platforms are used for these tasks.

Therefore, the figures should be used indicatively for these applications. Another example is collaborative **forecasting of demand**. There are quite sophisticated tools for calculating demand, determining the amount and time of production and thus the demand for various inputs (supply goods), storage capacity and other services. Figures for the adoption of related systems in the telco industry are similar to those for collaborative design. Deployment ratios are again well above the average of other industries. Although there might be some need to exchange information on this issue, there remains some doubt that demand forecasting is more important in the telco industry than in most manufacturing sectors studied this year. The same point can also be made with regard to systems for **managing capacity and inventory online**.

Exhibit 3-16: Online cooperation and collaboration within the value system

	Share documents in collaborative work space		Manage capacity / inventory online		Collaborative design processes		Collaborative forecasting of demand	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecoms (EU-10)	51	36	29	19	27	19	29	23
Micro (1-9 empl.)		34		17		19		22
Small (10-49 empl.)		50		28		21		28
Medium (50-249 empl.)		57		33		25		26
Large (250+ empl.)		46*		28*		21*		26*
All 10 sectors (EU-10)	27	14	22	10	15	7	20	11
Micro (1-9 empl.)		10		8		5		10
Small (10-49 empl.)		19		14		8		13
Medium (50-249 empl.)		31		21		13		19
Large (250+ empl.)		47		41		25		41
Base (100%)	firms with internet access							
N (for sector, EU-10)	824		824		824		824	
Questionnaire reference	D5a		D5e		D5d		D5c	
* Data only indicative due to low number of observations (N ~ 25-50).								

Source: e-Business W@tch (Survey 2006)

3.5 e-Procurement and Supply Chain Management

Introduction

At first glance, one could expect that the **importance of e-business tools to support procurement processes** and supply chain management in the telco industry would be rather low. Compared to manufacturing sectors like consumer electronics, for example, the telco supply chain is less complex and fragmented. Main input for the provision of telco services is ICT equipment, including base stations, cable, network management and billing solutions. These investment goods may account for a high procurement volume, but are typically not procured on a regular basis. Thus, the need to streamline procurement processes or to support regular information exchange between telco companies and suppliers of ICT equipment seems to be rather low.

A closer look reveals, however, that there is also a business case for the use of sourcing, procurement, and supply chain management tools in the telco industry. Telco services are typically offered in combination with telecommunication equipment such as telephony devices, SIM (Subscriber Identity Module) cards, modems and antennas for internet access. These products are characterised by short life cycles and fashion dependence. The management of this fickle demand requires an intensive collaboration with suppliers.

In addition, many telco companies do not have an own network infrastructure, but resell services provided by other telco companies. e-Business tools can help to support collaboration between these resellers and specialised telco companies (e.g. independent VoIP providers) and network carriers. Finally, when implementing e-procurement tools, telco companies may also profit from the fact that many business partners are companies from ICT-related sectors, e.g. telco equipment and electronics manufacturers. Companies in these sectors are typically intensive users of e-business technologies. Thus, the integration of business partners – a major prerequisite for e-business activities – should be less of a problem in this sector.

3.5.1 B2B online trading: companies placing orders online

The share of telco companies that reported placing orders online is clearly above the all-sectors average. More than three quarters of the companies in this sector reported that they place orders online. In addition, more than half of these companies said that the e-ordering volume is larger than 25% of their total orders. Interestingly, there are no size-specific differences in e-ordering activities. A possible explanation for this finding is that electronic orders can already be placed via a simple web form or an online catalogue which is provided by a supplier. Thus, e-ordering does not pose a major challenge, neither for large nor for smaller enterprises. The following exhibits provide a more detailed picture about e-ordering activities in the telco industry.

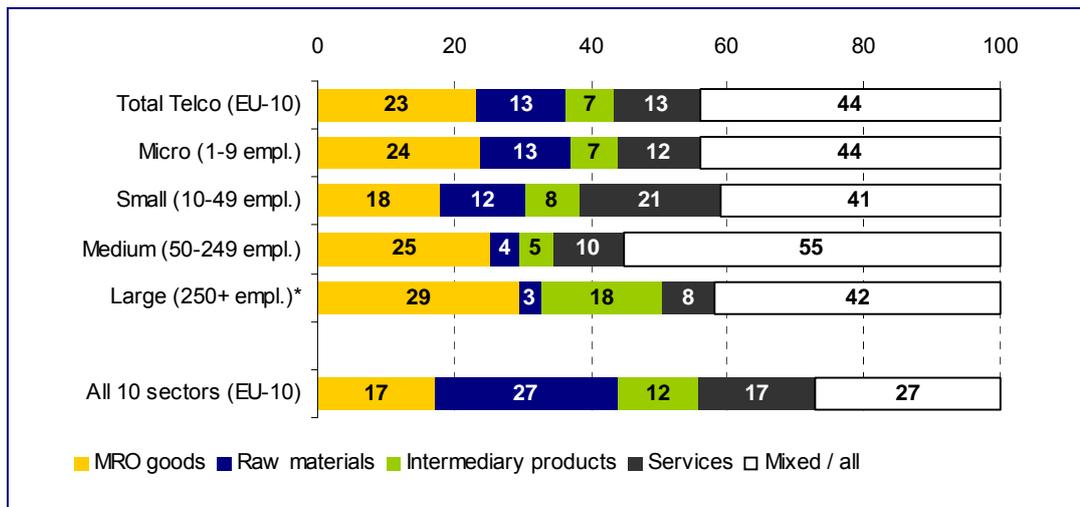
Exhibit 3-17: Companies ordering supply goods online

	Place orders online		Place 25% and less of orders online		Place more than 25% of orders online		Use specific ICT solutions for e-sourcing	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecom (EU-10)	78	77	54	49	46	51	26	12
Micro (1-9 empl.)		77		49		51		11
Small (10-49 empl.)		80		47		53		23
Medium (50-249 empl.)		77		60		40		24
Large (250+ empl.)		84*		45*		55*		29*
All 10 sectors (EU-10)	57	48	74	75	26	25	16	9
Micro (1-9 empl.)		44		73		27		7
Small (10-49 empl.)		54		80		20		10
Medium (50-249 empl.)		60		76		24		16
Large (250+ empl.)		68		75		25		29
Food & beverages	54	39	86	91	14	9	14	5
Footwear	35	29	83	87	17	13	9	5
Pulp & paper	59	49	81	75	19	25	14	8
ICT manufacturing	72	69	67	49	33	51	20	10
Consumer electronics	70	71	60	47	40	53	16	9
Shipbuilding & repair	62	53	78	69	22	31	18	12
Construction	53	51	74	72	26	28	12	6
Tourism	60	39	77	72	23	28	20	12
Telecommunication	78	77	54	49	46	51	26	12
Hospitals activities	67	67	71	73	29	27	19	12
Base (100%)	firms using computers		firms placing orders online		firms placing orders online		firms using computers	
N (for sector, EU-10)	829		617		617		829	
Questionnaire reference	E1		E3		E3		E7	
* Data only indicative due to low number of observations (N ~ 25-50).								

Source: *e-Business W@tch* (Survey 2006)

Most companies (44%) reported that they order different products and services online. Among companies that focus their e-ordering activities on a specific product group, the electronic procurement of MRO (Maintenance, Repair and Operation) goods is most widespread. Like companies in other industries, telco companies have constant need for so-called indirect goods, including MRO goods and office supplies. Although these goods are of less strategic importance and do not account for extensive procurement volume, processes related to their procurement are cost-intensive. Here, e-business tools can help to streamline procurement and sourcing processes and thus to reduce procurement costs. Other suggested input groups seem to be less important and are to a degree difficult to interpret for this sector. (see Exhibit 3-18).

Exhibit 3-18: Main type of supply goods ordered online



Base (100%): Companies placing orders online (without "don't know"). N (for sector, EU-10) = 625.

Weighting: in % of firms. Questionnaire reference: E4 .

* Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

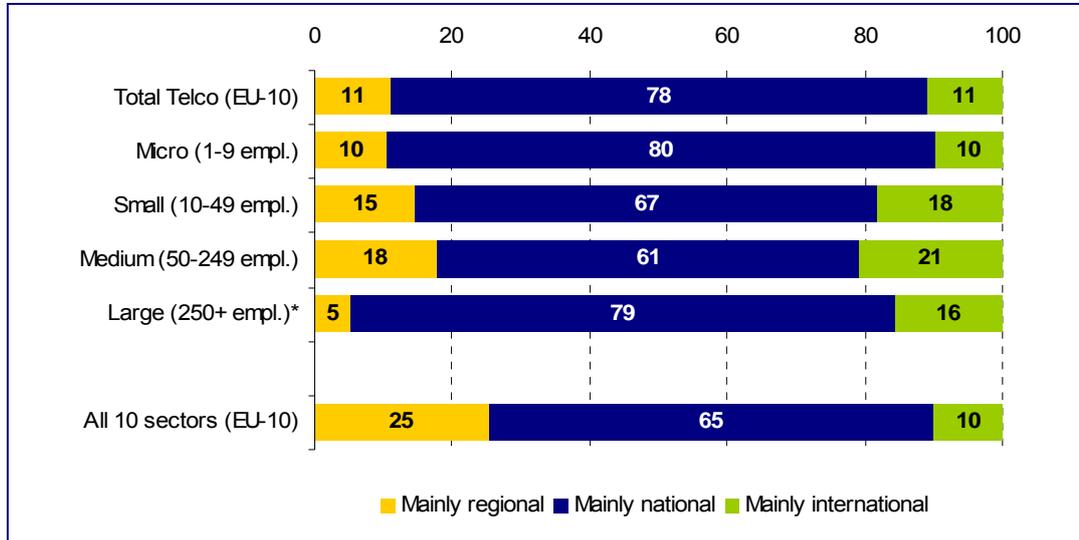
Most suppliers for telco companies' electronic purchases are located in the same country or region (see Exhibit 3-19). This is in line with the all-sectors average but with telco companies focussing more on national than regional suppliers. Only a relatively small share of telco companies shows a truly international e-procurement scheme. The revealed pattern is likely to reflect the supplier structure in the telco sector. In fact, for many telco companies it seems to make more sense to procure simple goods (e.g. for MRO) from national dealers than to order them from abroad and thus to bear additional costs (e.g. for transportation).

A new question in 2006 was whether the financial processes in trading with international suppliers were mainly paper-based, internally automated or externally automated. It is acknowledged that this question remains a bit vague, as the difference between "internally automated" and "externally automated" is rather tentative, and because a telephone interview situation does not allow to go into an in-depth discussion about these issues. Even so, it gives an idea of the back-office integration of financial processes in international business.

According to the survey results, about 40% said that they do not have international trading relationships (see Exhibit 3-20). From the rest, more than half of the telco companies (with international trade relationships) reported having automated related financial processes (at least internally). One may expect that the share of companies doing international trade and having automated related financial processes should increase with firm size. In fact, larger companies typically have more resources for international sourcing strategies and profit relatively more from process automation. While a comparison of the results for micro, small and medium-sized telco firms supports this hypothesis, results for large enterprises are in contrast to it. The authors are not aware of a specific reason for the finding. When speculating about an explanation for this

pattern, however, the limited number of observations particularly for larger enterprises should be kept in mind.

Exhibit 3-19: Main location of suppliers in e-procurement



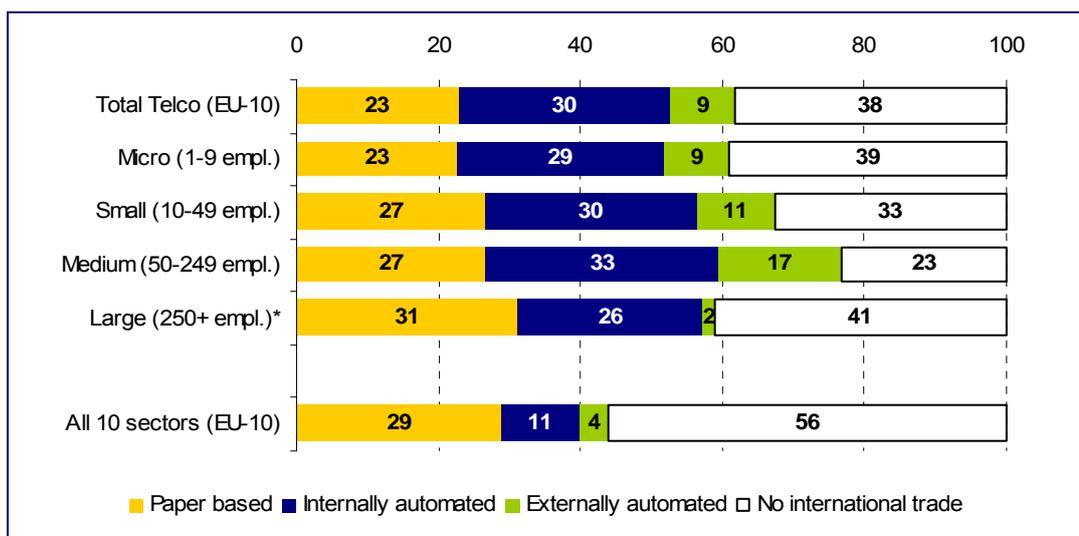
Base (100%): Companies placing orders online (without "don't know"). N (for sector, EU-10) = 623.

Weighting: in % of firms. Questionnaire reference: E5.

*Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

Exhibit 3-20: Integration of financial processes in international e-trade



Base (100%): Companies placing orders online (without "don't know"). N (for sector, EU-10) = 596

Weighting: in % of firms. Questionnaire reference: E6.

* Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

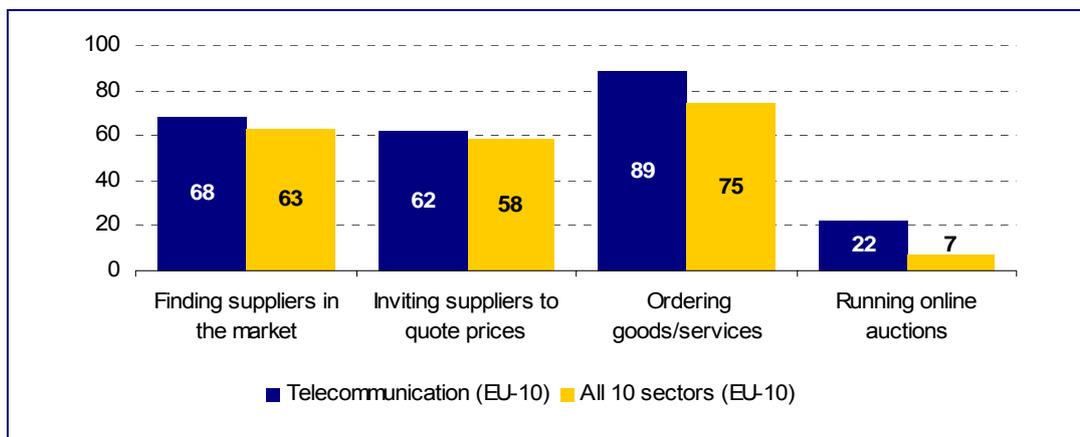
3.5.2 Use of specific ICT solutions for sourcing and supply chain management

As in 2005, *e-Business W@tch* asked companies whether they "support the selection of suppliers or procurement processes by specific ICT solutions." The rationale for this question is to further test whether electronic procurement is in fact a systematic and **digitally integrated** process in a firm, or rather an occasional business activity without much significance for the overall business.

In the telco industry, only **slightly more than 10% of all firms** reported using specific software solutions or internet-based services for e-procurement (see Exhibit 3-17). This shows that there is a considerable gap between the percentage of companies which said that they place at least some orders online (77%) and those that reported using special software or services for doing so (12%). This imbalance is mainly observed among smaller telco companies, while specific ICT solutions to support the ordering processes are also widespread among large telco companies. It can be assumed that companies without such software place orders mainly through websites or extranets of suppliers, which does not require any special e-procurement system. The digital back-office integration of procurement-related processes (all the way from ordering to the receipt of goods / services) is probably not very advanced in these cases.

Those companies with procurement systems tend to use them for multiple functions, including ordering goods and services (89%), finding suppliers in the market (68%), inviting suppliers to quote prices (62%) and placing orders (56%). These findings are largely in line with the results from most other sectors (cf. Exhibit 3-21). About one out of five companies with special ICT systems for procurement said that it runs online auctions among suppliers. This is a higher incidence than in most other sectors (7% on average) studied this year by *e-Business W@tch*.

Exhibit 3-21: Sourcing and procurement processes supported by specific ICT solutions



Base (100%): Companies using specific ICT solutions for e-procurement. N (for sector, EU-10) = 148.
Weighting: in % of firms. Questionnaire reference: E8.

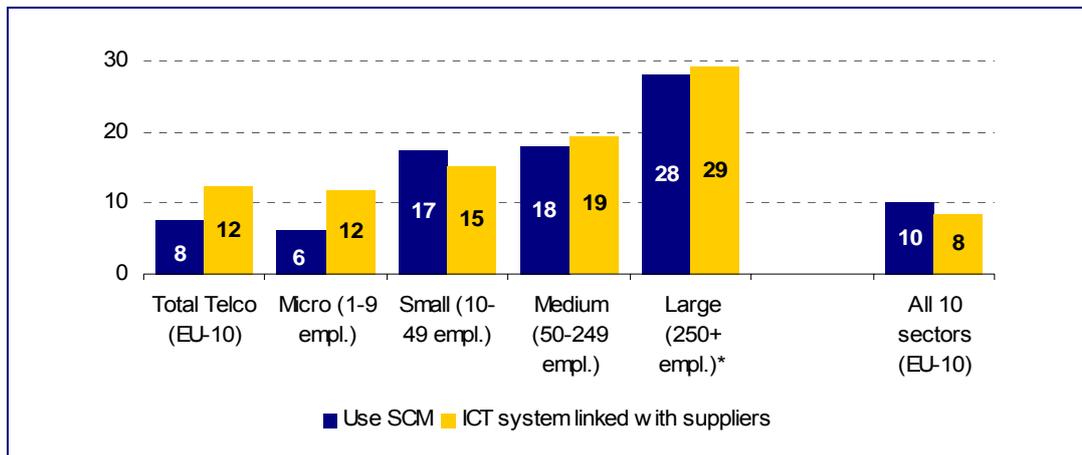
Source: *e-Business W@tch* (Survey 2006)

The integration of ICT systems with those of suppliers and the use of Supply Chain Management (SCM) systems are further indicators for the degree of process integration on the supply side. SCM systems typically integrate information systems of business partners along the supply chain with the purpose to facilitate information exchange of supply chain partners and to use the aggregated information for capacity and inventory management. These tasks are of particular importance in manufacturing industries with fragmented supply chains – they are less relevant for the telco industry. One potential application area for SCM systems in the telco industry is the coordination of the delivery of complimentary products, e.g. telephony equipment, which is needed for combined offerings.

Accordingly, SCM systems are slightly less widespread in the telco industry (8%) than on average in all sectors covered by the e-Business Survey 2006 (10%). As in other industries surveyed, the use of SCM systems increases with firm size. While less than 10% of micro enterprises reported using a SCM system, close to 20% of SMEs and almost 30% of large telco enterprises said that they have adopted a SCM software.

e-Business W@tch also asked companies whether their ICT system was linked to that of suppliers. Linking ICT with that of suppliers is a prerequisite for the installation of SCM systems as well as for the use of more sophisticated procurement and sourcing solutions, which allow for information exchange between buyers and suppliers. Accordingly, the proportion of companies having linked their ICT systems with those of suppliers is similar to the share of companies using a specific ICT solution to support ordering processes and having an SCM system installed.

Exhibit 3-22: Supply chain integration: use of SCM and ICT links with suppliers



Base (100%): Companies using computers. N (for sector, EU-10) = 829.

Weighting: in % of firms. Questionnaire reference: D1f, F13a.

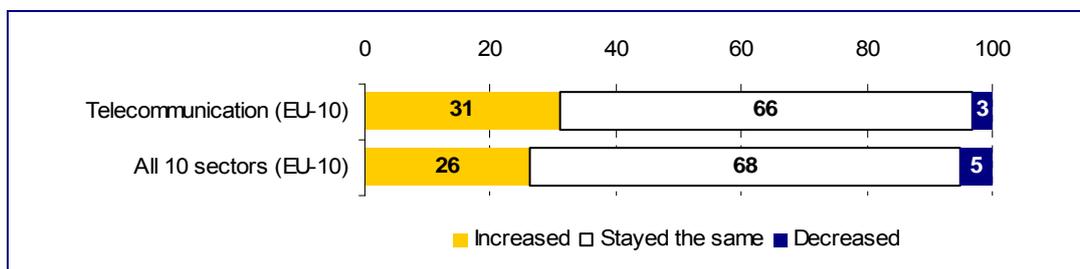
* Data only indicative due to low number of observations (N ~ 25-50).

Source: *e-Business W@tch* (Survey 2006)

3.5.3 Impact of e-sourcing

As in previous years, *e-Business W@tch* asked companies that use e-procurement whether this has had an impact on the selection of suppliers, i.e. whether the number of suppliers has rather increased or decreased due to their e-procurement strategy, or whether this had no impact on the number of suppliers. A majority of companies from the telco industry, as in most sectors studied this year, reported that e-procurement has **no effect on the number of suppliers** (66%). Almost one third stated that the number has increased, probably because e-sourcing has helped to find new suppliers in the market. Only a marginal share (3%) of firms said that they have consolidated their supplier base by means of e-procurement.

Exhibit 3-23: Impact of e-sourcing and e-procurement on the number of suppliers



Base (100%): Companies placing orders online (without "don't know"). N (for sector, EU-10) = 608.
Weighting: in % of firms. Questionnaire reference: E9

Source: *e-Business W@tch* (Survey 2006)

This finding is somewhat in conflict with the fact that many large firms that have established (or are establishing) sophisticated e-procurement schemes have the explicit target to **streamline their supplier base**.⁵⁴ ICT enables them to bundle procurement activities of different locations or even branches in order to exploit economies of scale. However, previous sector studies by *e-Business W@tch* have already shown that it is hardly possible to support this evidence by data from the e-Business Survey. The main reason is that supplier consolidation is a strategy that is mainly followed by the largest firms; thus, results do not really show up in this SME-focused survey. However, effects clearly have an economic impact.

⁵⁴ See, for example, Berlecon Research (2003): "IT im Supply Management 2004", Survey of 200 German companies across various sectors with more than 500 employees on the use of ICT for procurement, July 2004. According to the survey results, more than 90% of companies interviewed had carried out initiatives to consolidate the supplier base or planned to do so within the following two years.

3.6 e-Marketing and Sales

Introduction

The use of ICT to support marketing, sales, and customer services is a key application area of e-business in this sector. This is a complex task since most telco companies serve thousands or even millions of customers with heterogeneous needs. Since product differentiation is often limited in the telco sector, marketing and related customer services are of high relevance to differentiate from competitors. In fact, for customers of telco companies and resellers in the telco market it is almost impossible to distinguish between the quality of broadband access or phone connections offered by different providers. Thus, the quality of customer service (e.g. the convenience of setting up a contract) and marketing are highly important for the business success of telco companies.

ICT, and in particular the internet, can be used in multiple ways to support marketing and sales activities, including the communication with different customer groups, offering products for sale, and developing new marketing strategies. The following paragraphs present statistical results of the e-Business Survey 2006 on the use of e-business technologies for marketing and sales activities. The findings show how e-business technologies are actually embraced by telco companies of different sizes. Case studies and business examples presented in chapter 4.2 will further support this analysis.

3.6.1 Companies receiving orders from customers online

Overall picture

About 40% of all firms active in the telco industry in the EU-10 stated that they “*allow customers to order goods or book services online from the website or through other computer mediated networks*”. As could be expected, this figure is clearly above the all-sectors average. There are many smaller telco companies, e.g. in the reseller market, that have based their business model completely on the internet, including the ordering process. This is also reflected by survey results. In fact, with regard to e-ordering there are no significant differences between size classes. Accepting orders online seems to be even more widespread among micro companies than among SMEs.

However, this result also indicates that about 60% of telco companies do not use the internet for this type of customer service. One possible explanation might be that a large share of customers still prefers traditional channels for booking telco services, e.g. via post mailing or in retail stores. Thus, for some telco companies (e.g. telcos with a regional focus) it might not be economic to invest in a solution supporting e-ordering activities by customers.

Furthermore, findings need to be put into perspective by the relative share of customer orders received online (as percent of the total order volume). In the telco industry, as in most other sectors surveyed, the majority of those companies that enable customers to

order online said that these orders account for **up to 25% of their total orders** received (see Exhibit 3-24).

Exhibit 3-24: Companies receiving orders from customers online

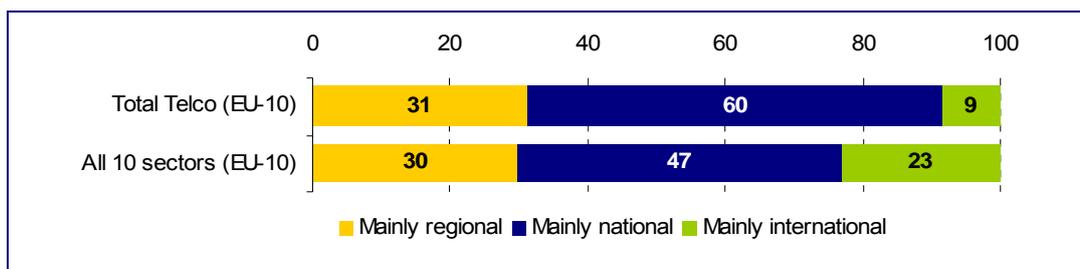
	Accept orders from customers online		Receive 25% and less of orders online		Receive more than 25% of orders online		Use specific ICT solutions for e-selling	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Weighting:								
Telecoms (EU-10)	36	40	66	63	34	37	37	21
Micro (1-9 empl.)		40		63		37		19
Small (10-49 empl.)		37		62		38		28
Medium (50-249 empl.)		35		68*		32*		35
Large (250+ empl.)		63*		(**)		(**)		62*
All 10 sectors (EU-10)	35	25	73	75	27	25	18	9
Micro (1-9 empl.)		23		79		21		6
Small (10-49 empl.)		26		76		24		12
Medium (50-249 empl.)		29		75		25		16
Large (250+ empl.)		26		74		26		27
Base (100%)	firms using computers		firms accepting orders online		firms accepting orders online		firms using computers	
N (for sector, EU-10)	829		323		323		829	
Questionnaire reference	F4		F6		F6		F10	
*Data only indicative due to low number of observations (N ~ 25-50).								
** Values not displayed because number of observations (N) is <25.								

Source: e-Business W@tch (Survey 2006)

Location and type of customers placing online orders

Exhibits 3-25 and 3-26 provide further insights into the **characteristics of customers placing orders online**. According to the 2006 survey results, most telco companies are focussed on national or regional markets. Therefore, it is not surprising that also telco customers that order online are mainly located in the same country or region. Accordingly, only a marginal share of e-ordering activities appears to be carried out mainly by international customers.

Exhibit 3-25: Main location of customers that order online

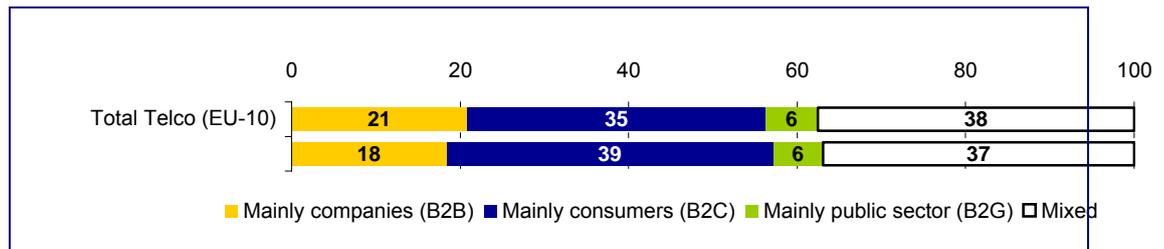


Base (100%): Companies accepting orders online (without "don't know"). N (for sector, EU-10) = 340.
Weighting: in % of firms. Questionnaire reference: F7.

Source: e-Business W@tch (Survey 2006)

As could be expected, much of the e-commerce activity in the telco industry is either **focused on B2C or is mixed**. About one third out of those companies that accept orders online stated that these are mainly from consumers and about 40% indicated that these orders are coming from any of the three specified areas. About 20% said that orders are mainly from business customers. This share is probably composed of telco companies focussed on the B2B market and of telco providers selling their services through wholesale and retail intermediaries.⁵⁵

Exhibit 3-26: Main type of customers that order online (B2B / B2C / B2G)



Base (100%): Companies accepting orders online (without "don't know"). N (for sector, EU-10) = 344
Weighting: in % of firms. Questionnaire reference: F8.

Source: *e-Business W@tch* (Survey 2006)

3.6.2 Diffusion of specific ICT solutions and CRM systems

Use of specific ICT solutions for marketing and sales support

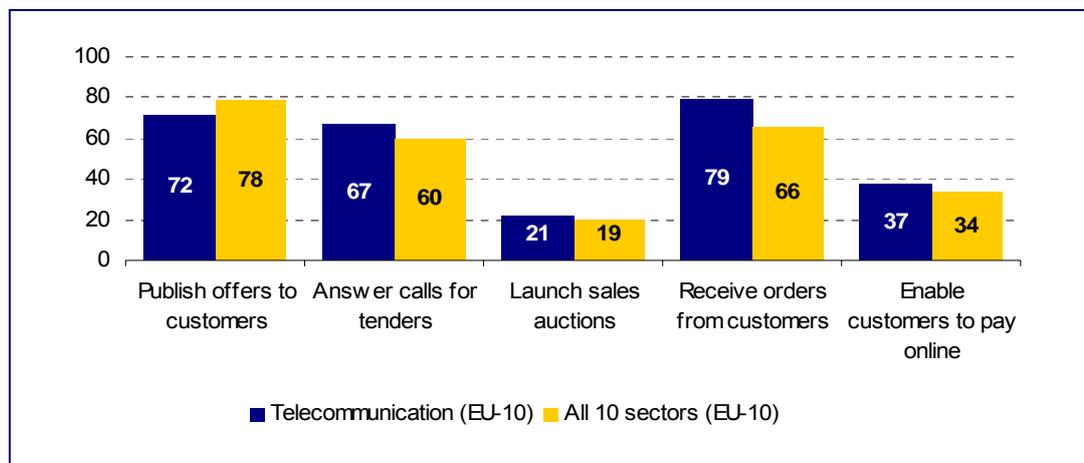
As in 2005, *e-Business W@tch* asked companies whether they "support marketing and sales processes by specific ICT solutions." The rationale for this question is to gather further insight whether the e-commerce activities of companies are **digitally integrated** processes, or whether they use rather "simple" forms of e-commerce, such as receiving orders by e-mail without any system integration of the related information and document flow.

As could be expected, the share of telco companies using specific **ICT solutions for marketing and sales support** is clearly above the average of all sectors covered by the 2006 e-Business Survey. About one out of five telco companies reported using specific software solutions or internet-based services for its marketing and sales activities (see Exhibit 3-24). As in other sectors studied this year, the diffusion of these solutions increases with company size; the pattern (in terms of functions supported) does not seem to differ in this industry. Nevertheless, the considerable share of small companies supporting marketing and sales activities by specific ICT solutions distinguishes the telco industry from most other sectors studied in 2006 by the *e-Business W@tch*.

⁵⁵ The relatively high share of consumers among e-commerce customers on the all-sectors average is mainly owed to the high significance of this customer group in the tourism industry, where about 50% of companies focus their e-commerce activities on the consumer market only.

Those companies that have dedicated sales systems in place, tend to use them mainly for **enabling customers to place orders** (79%), **publishing offers** to customers (72%) and for **answering calls for tenders** (67%) – see Exhibit 3-27. Enabling customers to pay for the services ordered online is less common (37%). The latter incidence shows how important it is to differentiate between the various phases of e-commerce transactions when analysing this topic. Enabling customers to place an online order is in many cases still separate from the payment of this order. In that case, payments are often processed in traditional ways, e.g. via bank transfer upon receipt of an invoice for the respective order.

Exhibit 3-27: Marketing and sales processes supported by specific ICT solutions



Base (100%): Companies using specific ICT solutions for marketing / sales. N (for sector, EU-10) = 217. Weighting: in % of firms. Questionnaire reference: F11.

Source: *e-Business W@tch* (Survey 2006)

Use of CRM systems and integration of ICT systems

CRM systems help companies to systematically increase their knowledge about customers and their related profitability – as well as to build marketing strategies and to design customer services based on that intelligence. Three levels of application of CRM are commonly distinguished:⁵⁶

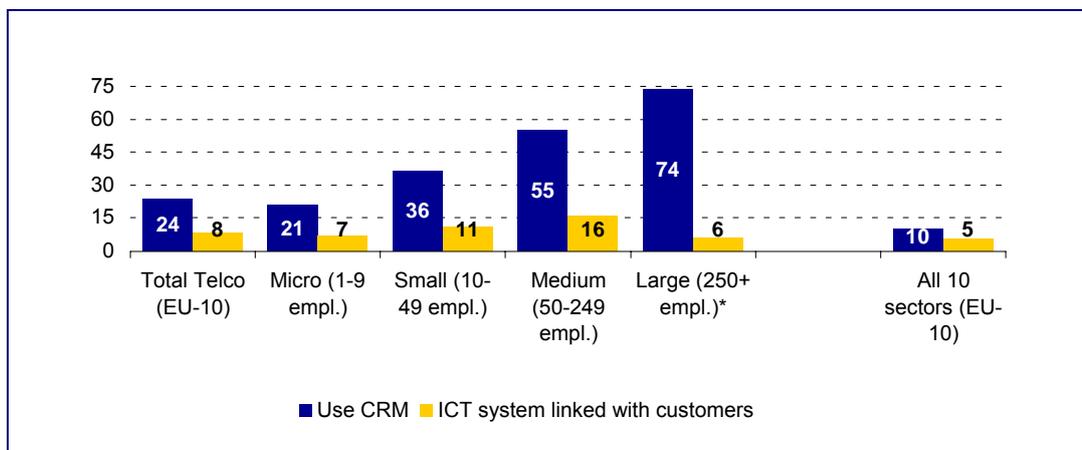
- **Operational CRM:** supporting front-office work by storing basic data on customers (e.g. addresses, track record of contacts); front-office will enter new data as part of their work; operational CRM mainly is of particular importance to support the work of call centres.
- **Analytical CRM:** analysis of data gathered through operational CRM in order to segment customers; a specific requirement for analytical CRM software for the telco sector is the capability to deal with mass data.

⁵⁶ Cf. www.mariosalexandrou.com/definition/crm.asp: "CRM Definition"

- **Collaborative CRM:** facilitates interactions with customers through all channels (personal, letter, web, e-mail) and supports co-ordination of employee teams.

Indeed, such systems are widespread in the telco industry, where many companies are operating on a mass market and the quality of customer service is a major competitive factor (see Exhibit 3-28). Almost one fourth of telco companies said that they have installed a CRM system – a share which is more than double as on average in all 10 sectors studied this year by the *e-Business W@tch*. CRM software suites are quite expensive and require a lot of organisational effort to be effectively implemented in a company. This should be the main reason why the diffusion of CRM systems increases with firm size (see Exhibit 3-28).

Exhibit 3-28: Use of CRM and integration of ICT systems with customers



Base (100%): Companies using computers. N (for sector, EU-10) = 829.

Weighting: in % of firms. Questionnaire reference: F2, F13b.

*Data only indicative due to low number of observations (N ~ 25-50).

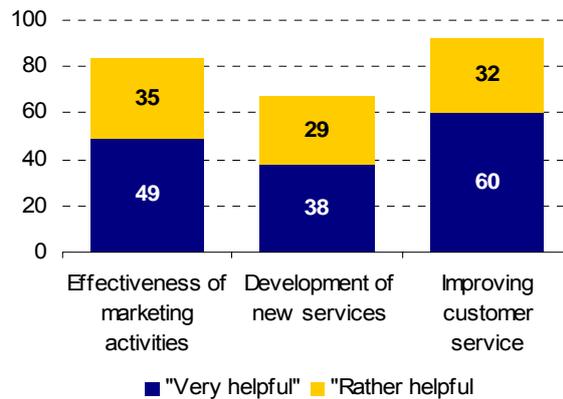
Source: *e-Business W@tch* (Survey 2006)

CRM refers to a broad range of methodologies and software applications that help an enterprise manage customer relationships in an organised way. Normally, this is based on some kind of database providing systematic information about customers and their purchasing history. Ideally, this information lends support to management, sales, service provision, and possibly customers themselves. For instance, data can be used to match customer needs with product plans and offerings, or by reminding customers of service requirements. The manifold ways of CRM usage are also reflected by the survey results on **perceived benefits of CRM systems** as illustrated in Exhibit 3-29. Companies using a CRM system were asked how they rate the utility of CRM systems for different business purposes.

More than 90% of telco companies that reported using a CRM system perceived it as helpful or even very helpful for improving customer services. This item rather relates to operational and collaborative CRM usage.

Moreover, more than 80% of CRM software users in the telco industry named increased effectiveness of marketing activities as helpful and more than two thirds reported that the CRM system is a viable basis for developing new products or services.

Exhibit 3-29: Perceived utility from CRM use



Base (100%): Companies using a CRM system.
N (for sector, EU-10) = 250/248/253. Weighting: in % of firms.
Questionnaire reference: F3

Source: e-Business W@tch (Survey 2006)

e-Business W@tch also asked companies whether their ICT system was linked to that of customers. Such links are typically a prerequisite for collaborative CRM solutions as well as for integrated e-commerce systems between companies. In the telco industry, almost 10% of companies reported that they have connected their ICT systems with those of customers – more than on average in all 10 sectors studied this year.

ICT integration with customers is of particular importance for larger telco companies, who are selling services via reseller networks and, thus, have to exchange data with associated trading partners on a regular basis. Accordingly, the share of telco companies with mutually integrated ICT systems increases with company size – if SMEs are regarded. The low share of large telco companies reporting links to customers remains puzzling. However, these numbers should be interpreted with caution due to the small sample size.

3.6.3 Deployment of e-Invoicing

In the 2006 e-Business Survey, special attention was paid to the issue of electronic invoicing (e-invoicing). e-Invoicing is a computer-mediated transaction between a seller / biller (invoicing entity) and a buyer / payer (receiving entity), which **replaces traditional paper-based invoicing processes**. In case of e-invoicing, the invoice is electronically generated and sent by the biller and electronically received, processed and archived by the payer. In practice, e-invoicing typically goes along with making payments electronically.⁵⁷

It is widely recognised that the use of e-invoicing promises rather easy-to-achieve cost savings for both parties involved (invoicing entity and receiving entity), because processing invoices in a standardised, electronic format can be accomplished much faster compared to the often cumbersome handling of printed invoices. The cost saving potential obviously depends on the number of invoices that have to be processed; companies and sectors differ widely in this respect.

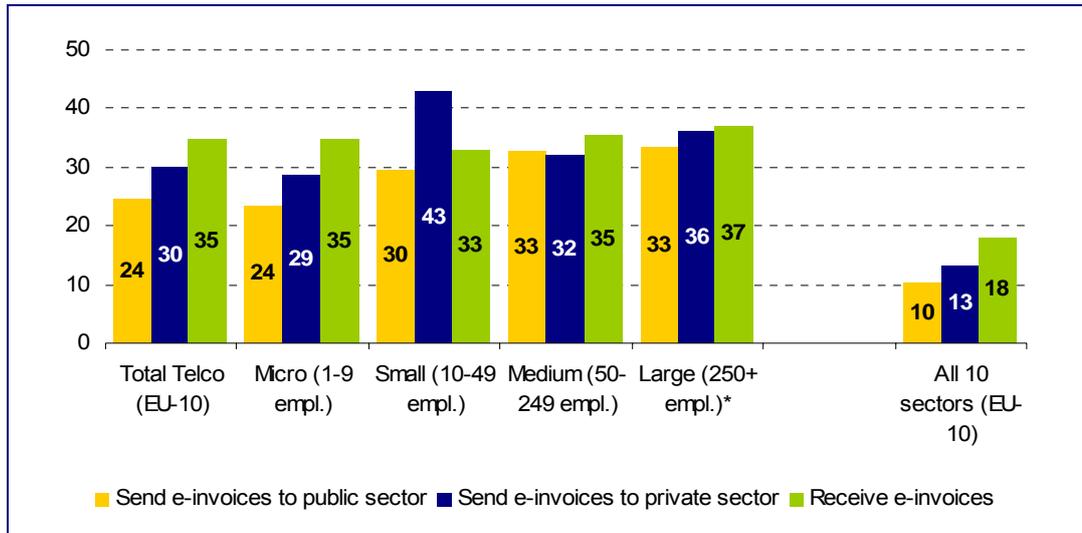
For telco companies the invoice is also of strategic importance as crucial communication channel with customers. This makes the invoicing process even more challenging. There is, for example, the constant need of offering and billing new services. In this sector, "time to market" is often driven by the ability to invoice new service offerings. In addition, invoices themselves are often used as marketing platform for the promotion of new services. Finally, there are high expectations by customers that go beyond correct fee calculation. Customer requests include consistent information about their current status (one invoice for all subscribed services) and an overview about all past financial transactions. Taking this into consideration, there should be extensive need for e-business technologies to support the invoicing processes in this sector.

Indeed, e-invoicing is widespread in the telco industry. About a third of telco companies surveyed in 2006 reported **sending e-invoices to customers** – more than twice as much as in all sectors surveyed (see Exhibit 3-30). Additionally, the share of telco companies which reported **receiving e-invoices** is also significantly above the average of all 10 sectors studied this year by *e-Business W@tch*. This high share can be also explained by the fact that telco companies' major suppliers are typically originating from other high-tech industries, e.g. ICT manufacturing, where e-invoicing is also widespread.

There are many small telco companies, e.g. in the reseller market, that have based their entire business model on the Internet. Thus it is not surprising and in line with the results on e-ordering activities that for the use of e-invoices no large differences between different size classes are observed.

⁵⁷ For more background information on e-invoicing activities of enterprises, see *e-Business W@tch* Special Report "ICT Security, e-Invoicing and e-Payment Activities in European Enterprises" (September 2005). Available at www.ebusiness-watch.org ('resources').

Exhibit 3-30: Adoption of e-invoicing



Base (100%): Companies with internet access. N (for sector, EU-10) = 824.

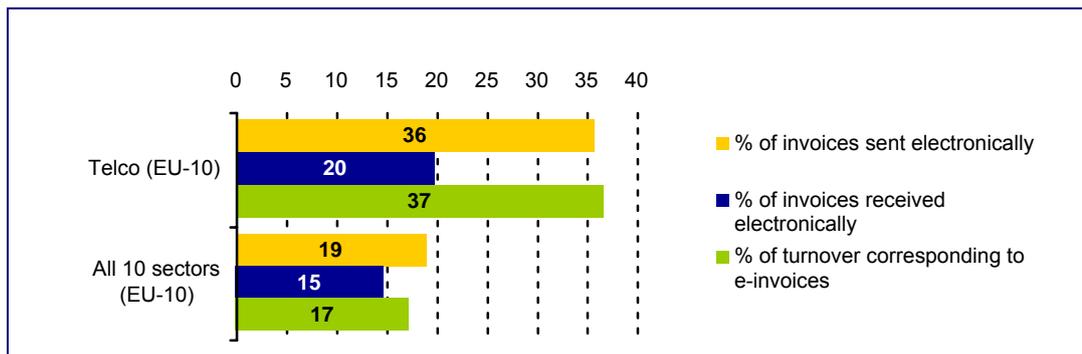
Weighting: in % of firms. Questionnaire reference: D5.

* Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

When focusing on those companies that actually use e-invoicing, the **average share of e-invoices** (measured as percentage of a company's total invoices sent or received) is again clearly above the average figure for the total of the 10 sectors. On average, e-invoicing users from the telco industry reported that about one in three invoices is sent electronically and about one in five invoices received is an e-invoice (see Exhibit 3-31).

Exhibit 3-31: Share of e-invoices as % of total invoices



Base (100%): Companies sending/receiving e-invoices (without "don't know"). N (for sector, EU-10) = 233/239/197. Weighting: in % of firms.

Questionnaire reference: D6, D7, D8

Source: e-Business W@tch (Survey 2006)

3.7 ICT and Innovation

With increased competition in the telco market (see Chapter 2.2), the **capability to innovate** is constantly gaining importance. In fact, being able to launch new products and quickly bring them to market is a key challenge to stay competitive in this sector. In addition, shrinking revenues in traditional telco segments force telco companies to increase process efficiency in order to save costs. Indeed, ICT and e-business technologies play a critical role for product and process innovations by telco companies.

In this context, *e-Business W@tch* asked companies whether they had launched any new or substantially improved products or services in the course of the 12 months prior to the interview, and if they had introduced new or significantly improved internal processes in that period. Companies indicating that they had actually introduced innovations were then asked follow-up questions on the role of ICT for their innovation activity.⁵⁸

Exhibit 3-32: ICT and Innovation activity

	Companies with new product innovation in 2005		Share of ICT-enabled product innovations		Companies with process innovation in 2005		Share of ICT-enabled process innovations	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Weighting:								
Telecoms (EU-10)	62	46	86	76	55	34	92	89
Micro (1-9 empl.)		44		75		31		89
Small (10-49 empl.)		55		83		53		90
Medium (50-249 empl.)		61		74		58		89
Large (250+ empl.)		74*		93*		57*		97*
All 10 sectors (EU-10)	32	24	50	45	32	20	75	63
Micro (1-9 empl.)		22		41		16		69
Small (10-49 empl.)		25		42		25		57
Medium (50-249 empl.)		33		45		38		71
Large (250+ empl.)		48		49		53		81
Base (100%)	firms using computers		firms with product innovation		firms using computers		firms with process innovation	
N (for sector, EU-10)	829		443		829		363	
Questionnaire reference	I1		I2		I3		I4	
*Data only indicative due to low number of observations (N ~ 25-50).								

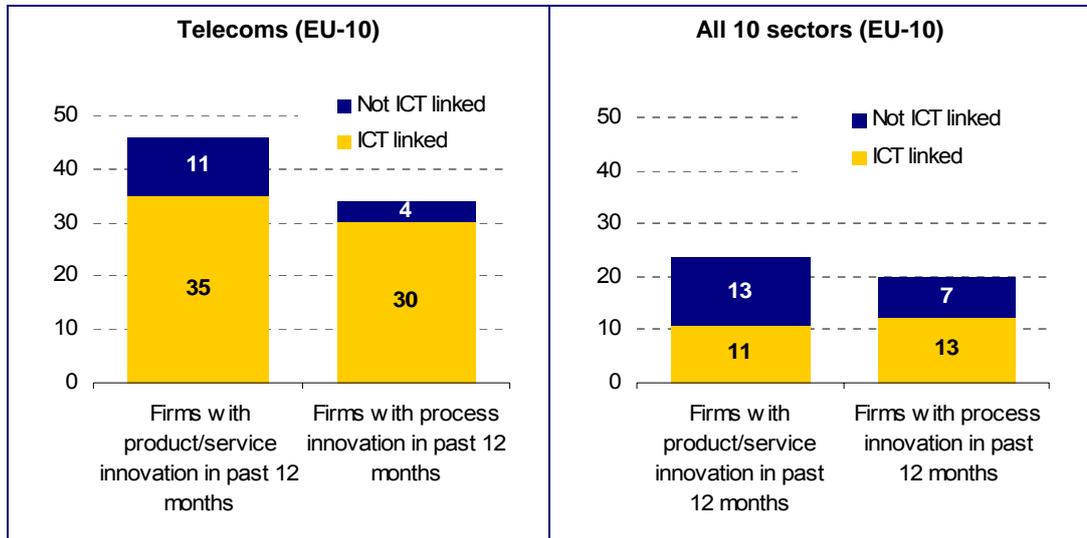
Source: *e-Business W@tch* (Survey 2006)

Almost half of enterprises in the telco industry said that they had launched new (or improved) products in 2005. Thus, the occurrence of **product innovation** is clearly higher than on average in all 10 sectors surveyed. As could be expected, ICT plays a critical role for product innovation in this sector. About three quarters of all product innovations have been directly related to or enabled by ICT (see Exhibit 3-33).

⁵⁸ See also the special report about “the role of new companies in e-business innovation and diffusion”, available at www.ebusiness-watch.org ('resources').

The importance of ICT is even more significant for **process innovation**. In total, about one third of telco companies reported that they have carried out significant process improvements in 2005. About 90 of those companies – across all size bands – confirmed that these innovations were critically linked to ICT. It is important to note that ICT-induced process innovation prevails in almost all sectors covered by the 2006 e-Business Survey.

Exhibit 3-33: The role of ICT for product and process innovation



Base (100%): Companies using computers. N (for sector, EU-10) = 829. Weighting: in % of firms. Questionnaire reference: I1 – I4

Source: e-Business W@tch (Survey 2006)

Case studies presented in Chapters 4.1 and 4.2 provide illustrative **examples for product and process innovations enabled by ICT**. New wireless broadband technologies like Flash-OFDM or WiMAX, for example, are a viable basis for the commercial rollout of broadband services in rural regions (see case studies on *WiMAX Telecom* and *T-Mobile Slovakia* in Section 4.1.2). Moreover, the internet provides many opportunities for the provision of new customer-related services, as illustrated in the case study on *Budget Telecom* in Section 4.2.3.

By establishing as early adopters of new convergence-driving technologies like VoIP and IPTV, new players like the Lithuanian VoIP provider *Upnet* and the Spanish ISP *Grupalia Internet* (see Chapter 4.1) have the opportunity to challenge incumbents in traditional telco segments. Finally, the importance of e-business technologies to shorten time-to-market for new product launches and to reduce process costs is illustrated in the case studies on the implementation of a new CRM system by *Swisscom Mobile* and the use of e-procurement services by *COSMOTE* (see Chapter 4.2.3).

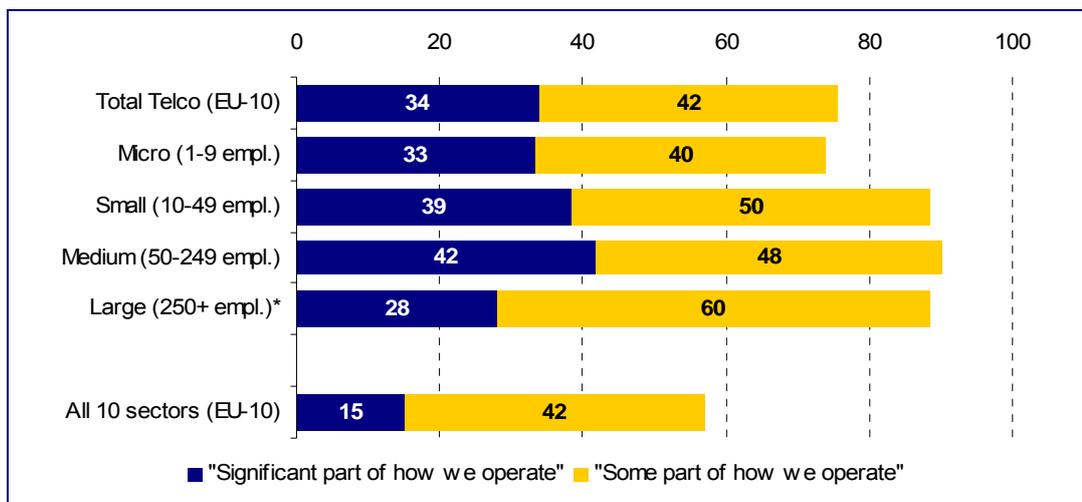
3.8 Drivers and Inhibitors for the Uptake of e-Business

As a general indicator for the impact of e-business on company operations in different sectors, *e-Business W@tch* asked the companies whether “*e-business constitutes a significant part of the way your company operates, or some part or none at all.*” The answers to this question underline the high **impact of e-business** in the telco industry: More than three quarters of telco companies recognised a significant or at least some impact of e-business on their operations (see Exhibit 3-34).

Among telco companies with 10 or more employees, however, the respective share is about 90%. This indicates that most of the ‘e-business sceptics’ in this sector are micro companies, a finding which is also in line with the results of other sectors studied this year. However, it should be noted that more than three quarters of micro companies in this sector reported a significant or some impact of e-business on their company operation. This share is clearly above the all-sectors average. In addition, the fact that companies do not perceive an important role for e-business does not necessarily mean that they are not doing e-business.

Follow-up questions were asked about drivers and inhibitors of e-business activities. Results are presented, respectively, in the following two sub-chapters.

Exhibit 3-34: Perceived overall importance of e-business for company operations



Base (100%): Companies using computers (excl. "don't know"). N (for sector, EU-10) = 819.

Weighting: in % of firms. Questionnaire reference: H1.

*Data only indicative due to low number of observations (N ~ 25-50).

Source: *e-Business W@tch* (Survey 2006)

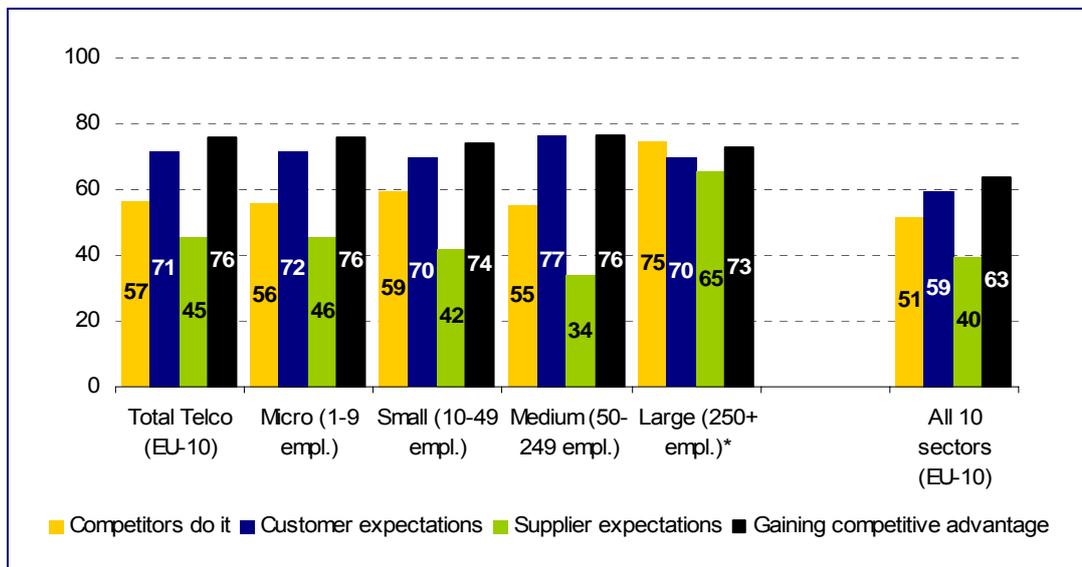
3.8.1 Drivers of e-business adoption

Those companies confirming that e-business constitutes "a significant part" or "some part" of the way they operate were asked to indicate important **reasons for doing e-business**. Four main reasons were suggested, in order to find out whether it was more a reaction to external pressure (i.e. from customers or suppliers), or whether companies saw an opportunity to gain competitive advantage.

Replies show that all reasons are perceived as relevant, with **customers' expectations** and the opportunity to **gain competitive advantage** being regarded as the most important ones (see Exhibit 3-35). Suppliers are not the main driving force; rather pressure is coming from customers. Due to the increasing availability of internet access among consumers, demand for customer-related services provided via the internet increases.

Reflecting these expectations, many small players entered the telco market, e.g. as resellers, with internet-centric business models during the time of the internet boom and market liberalisation. This type of companies also challenges large incumbents to make use of e-business opportunities in order to retain their market shares. This might also explain, why imitative behaviour (i.e. "because competitors do it") as a reason for doing e-business is particularly widespread among large players in the telco industry. The case study on the French reseller *Budget Telecom* in Section 4.2 illustrates the business approach of a small telco company that carries out almost all business activities via the internet.

Exhibit 3-35: Drivers of e-business adoption: Companies saying that ... was an important reason for starting e-business



Base (100%): Companies saying that e-business is a part of their operations. N (for sector, EU-10) = 662
 Weighting: in % of firms. Questionnaire reference: H2.

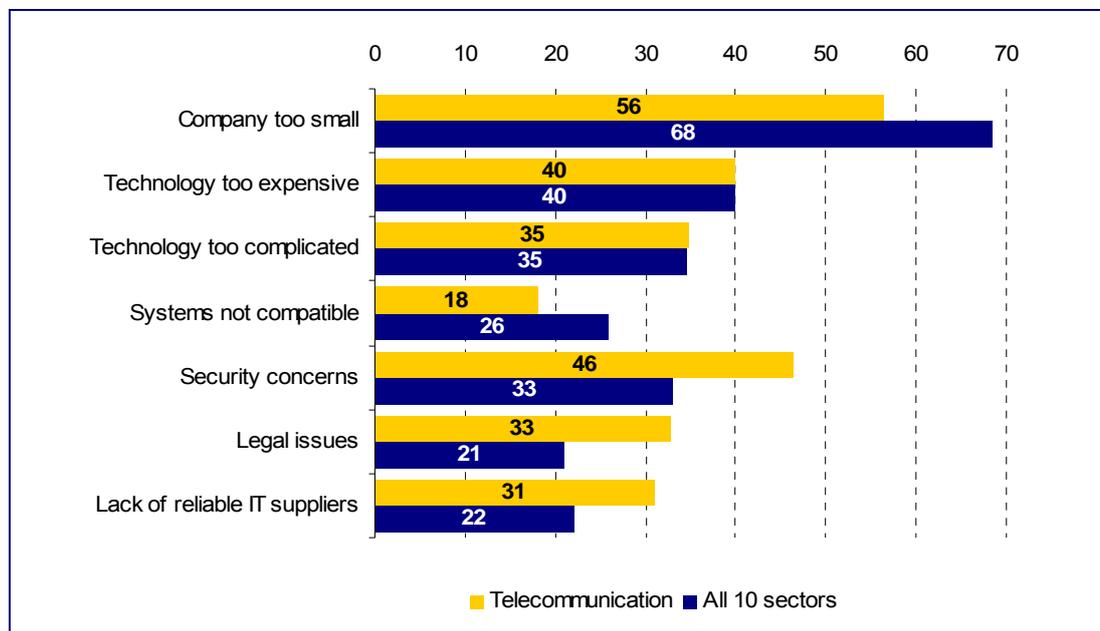
*Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

3.8.2 Barriers to e-business adoption

In order to reveal main barriers for e-business adoption, companies that did not perceive any impact of e-business on the way the company operates were asked for **reasons for not engaging in e-business**. Suggested items and the respective survey results are displayed in Exhibit 3-36. Taking into account that the largest part of “e-business sceptical” telco companies are micro enterprises, it is not surprising that barriers like “**company too small**” and “**technology too expensive**” were reported as major inhibitors of doing e-business in this sector. While these reasons also prevail in most other sectors (usually among SMEs), **security concerns** seem to be particularly widespread in the telco industry indicating pronounced awareness of security issues and, in general, closer affinity with ICT in this sector.

Exhibit 3-36: Barriers to e-business adoption as perceived by companies



Base (100%): Companies saying that e-business does not play a role in their operations.
N (for sector, EU-10) = 157. Weighting: in % of firms. Questionnaire reference: H3.

Source: *e-Business W@tch* (Survey 2006)

Many key e-business applications used in this sector (e.g. CRM systems or internet-based customer services) are dealing with sensitive customer data. Thus, unauthorised access as a major **security threat** could cause significant damages for telco companies. Another major security threat for telco companies are virus and spam attacks. In fact, the *e-Business W@tch* special report on ICT security (2005) concluded that “*in general, sectors with high levels of widespread communication, especially as part of a B2C business model, show the highest incidence of damage from these causes*”.

Technologies to protect companies from unauthorised access such as secure server technology or a firewall are less widespread among micro enterprises than among larger players in this sector (see Section 3.1.1). This might also explain to some extent, why security concerns are widespread among “e-business sceptical” telco companies – which are mainly micro companies.

As already indicated in the introduction, however, the large majority of telco companies (even among micro and small enterprises) are intensive users of e-business technologies. Accordingly, the entry barriers described above are based on the **answers of only a marginal share of telco companies**. Therefore, it would not be appropriate to conclude from security concerns among e-business sceptical telco firms on a general security problem among this sector's companies.

3.9 Summary

Key indicators of e-business usage are summarised in the **e-business scoreboard and index** displayed in Exhibit 3-37 below. The graphs illustrate the forerunner position of telco enterprises as intensive users of ICT and e-business technologies. Due to the double role of telco companies as users and suppliers of ICT, this finding is hardly surprising. Additionally, it is in line with earlier *e-Business W@tch* surveys (see Chapter 2.2).

In contrast to most other sectors covered by the e-Business Survey 2006, **e-business technologies are widely used across all size-bands in the telco sector**. Accordingly, the forerunner telco enterprises' position is reflected in the e-Business Index for both enterprise- and employment-weighted results. (While enterprise-weighted results rather reflect the activities of small and micro enterprises – which make up the overwhelming share of all telco firms – employment-weighted data typically puts more emphasis on the activities of large companies, which comprise a large share of the sector workforce.)

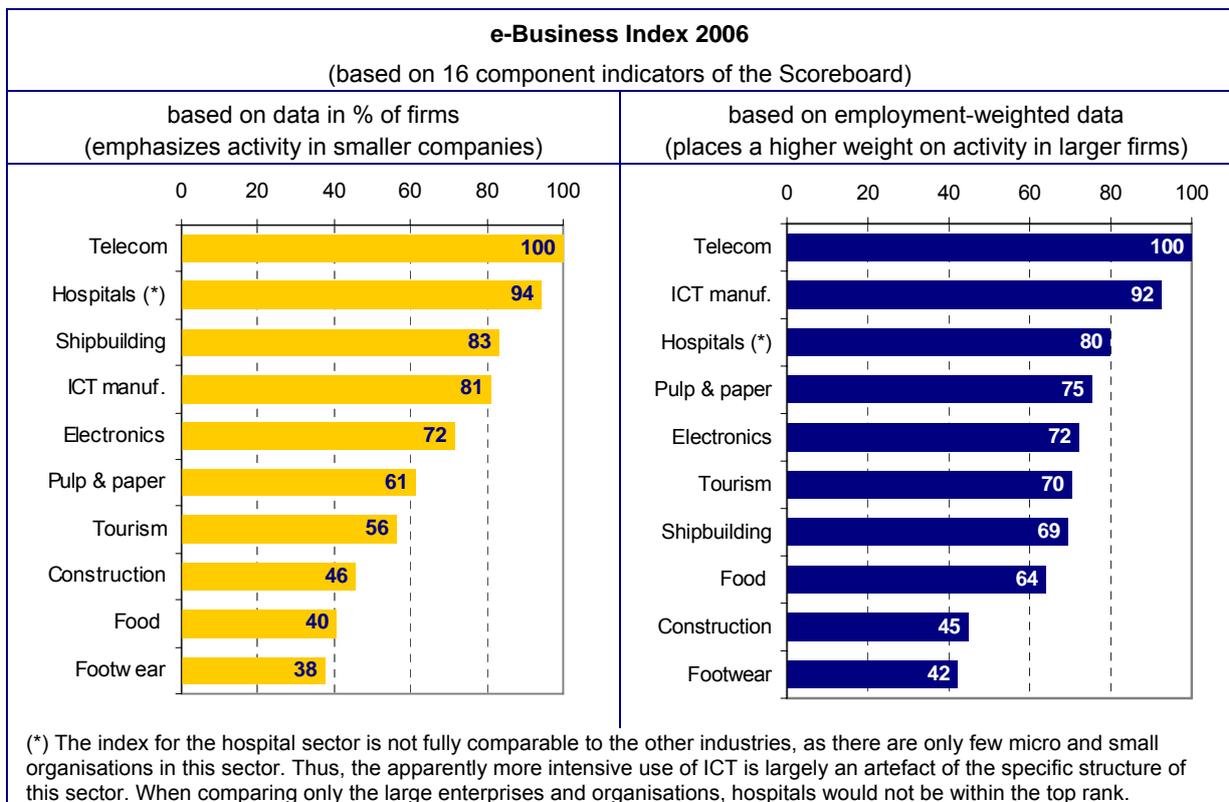
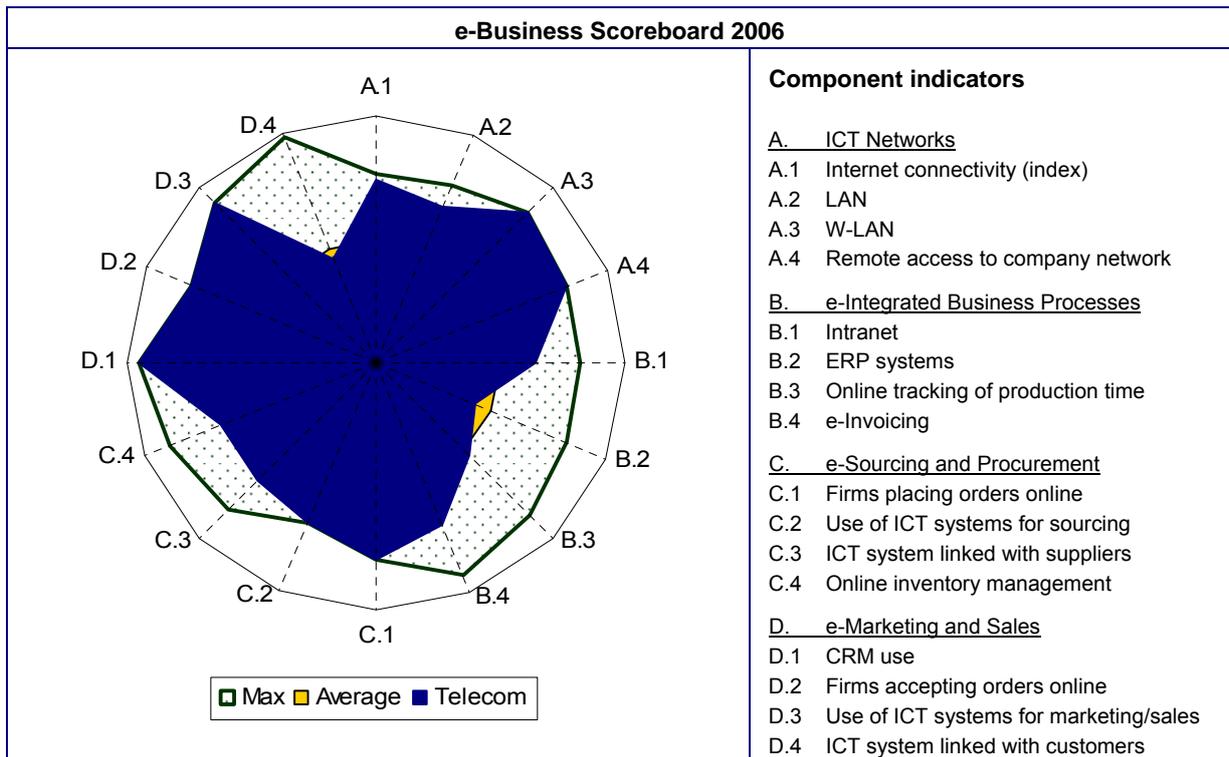
Key application areas – where the telco sector sets standards – are the **use of ICT infrastructure / ICT networks** and of **e-business technologies for marketing and sales support**. The forerunner position in the use of ICT infrastructure can be explained by the familiarity of telco companies with technologies in this field due to their position as suppliers of infrastructure services. Marketing and sales support is of high strategic relevance in this sector that is characterised by increasing competition and limited opportunities for product differentiation. It is remarkable that telco companies are also forerunners in using simple e-procurement and sourcing tools compared to other sectors surveyed – although procurement processes should be of less strategic importance in the telco industry than in manufacturing sectors.

Main findings

The main findings of the e-Business Survey 2006 related to activities in the telco sector are summarised in the following box:

- **The internet is an integral part of daily work routines in the telco sector.** A large majority of employees in telco companies (on average about 90%) have access to the internet and are well connected via sophisticated ICT infrastructure. In fact, all statistical indicators reflecting the adoption of ICT infrastructure components are clearly above the all-sectors average.
- On average, **telco companies spend every fifth Euro of their total expenditures for ICT and e-business technologies.** Survey results on ICT investments underline the relevance of ICT in this sector. In fact, ICT and e-business technologies are the basis for services provision, the sectors' output and are also needed for process support. ICT budgets of telco companies are likely to increase in the future.
- **Proprietary solutions and XML-based standards are most widespread as basis for e-business transactions.** In general, the use of e-business standards, particularly XML-based, is more widespread in the telco industry than on average in all 10 sectors studied this year. However, a large share of telco companies reported basing e-business transactions on proprietary solutions (agreements between several business partners.)
- **Telco companies of all sizes make widespread use of e-business tools in almost all application areas.** While complex ICT systems (e.g. ERP, SCM and CRM systems) are more widely diffused among large companies, telco companies of all sizes make intensive use of rather simple e-business applications (e.g. e-ordering).
- **Most product and process innovations in the telco industry are ICT-enabled.** Overall, the share of telco companies that reported having pursued product or process innovations during the past 12 months is higher than in all other sectors polled. Almost three quarters of product innovations and almost 90% of process innovations were enabled by ICT.
- **e-Business drivers in the telco sector are customer expectations and competition. Limited company size and security concerns are main entry barriers.** Overall, only a marginal share of telco companies (mainly micro companies) reported that e-business does not play any role for the way their company operates.

Exhibit 3-37: e-Business Index and Scoreboard 2006 ⁵⁹



Source: e-Business W@tch (Survey 2006)

⁵⁹ See Methodology Annex for information about the structure and computation of the scoreboard.

4 Current e-Business Trends and Implications

Topics in focus

This chapter analyses ICT and **e-business key issues in the telco industry**, focusing on major trends and their implications for this sector. It is important to note, however, that e-business technologies are not only used by telco companies to support business processes, but they also play a role as integral parts of the products supplied. Telco company's role as suppliers of e-business technologies, in turn, impacts the e-business usage in other industry sectors studied by *e-Business W@tch*.

Thus, this chapter deals with **telco companies' dual role** as users and suppliers of ICT and e-business technologies. First, the chapter analyses the relevance of recent convergence-driving technical developments that likely have an impact on the sector's output. Second, it analyses the use of ICT to support customer-facing e-business activities by telco companies as a key issue regarding the use of e-business technologies in this sector. The choice of these issues is also a result of the discussion with industry representatives at the kick-off workshop of *e-Business W@tch 2006* in Brussels.

- **Convergence in the telecommunications industry:** Convergence processes, driven by new technologies like Voice over IP (VoIP), IPTV and mobile telco services lead to blurring borders between traditional telco segments and accelerate competition in this sector. Chapter 4.1 will provide a broad picture on recent convergence trends in the telco industry. It will discuss the relevance and impacts of recent convergence-driving technology developments in this sector and – as far as the use of these technologies is concerned - in other sectors studied by the *e-Business W@tch 2006*. Furthermore, the chapter analyses challenges with regard to so-called triple play strategies, which are often discussed as a natural outcome of convergence processes in the telco industry.
- **ICT to support marketing, sales and customer care:** Telecommunication service companies increasingly rely on the internet for their sales, marketing and customer service activities. The use of the internet enables companies to offer the services at a significantly lower cost than for traditional channels. Based on relevant survey findings (see Section 3.6), opportunities and challenges related to the use of ICT and e-business technologies to support marketing and sales processes in the telco industry are discussed in Section 4.2. Case studies also presented in that section illustrate requirements for customer-facing applications by telco companies of different size and with different business focus.

Exhibit 4-1: Case studies and business examples presented in this report

Chapter	Company / project	Country	Topic(s)
4.1.2	Case study: <i>WiMax Telecom AG</i>	Switzerland/ Eastern Europe	Rollout of wimax networks in Central and Eastern Europe.
4.1.2	Case study: <i>T-Mobile Slovensko</i>	Slovakia	Commercial rollout of a Flash-OFDM network in Slovakia
4.1.3	Case study: <i>Upnet Taide</i>	Lithuania	Chances and challenges by the provision of VoIP services in Lithuania
4.1.3	Business example: <i>Skype</i>	Luxembourg	The success story of a startup in the VoIP market
4.1.5	Case study: <i>Grupalia Internet S.A.</i>	Spain	Chances and challenges related to the realisation of triple play strategies
4.2.3	Case study: <i>Budget Telecom</i>	France	Use of the internet as marketing and sales channel by a small telco player
4.2.3	Case study: <i>Brutélé</i>	Belgium	Implementation and usage of a new CRM and billing system
4.2.3	Case study: <i>Swisscom Mobile</i>	Switzerland	Implementation and usage of a new integrated CRM system
4.2.4	Case study: <i>COSMOTE</i>	Greece	Use of e-marketplace services to support procurement processes
4.2.4	Business Example: <i>PT Comunicacoes</i>	Portugal	Use of SCM software for the optimisation of logistics processes

Source: *e-Business W@tch* (2006)

4.1 Convergence trends in the telecommunications industry

As already discussed in Section 2.2.2, convergence of technologies and platforms is likely to change the landscape of the telco sector. Moreover, digital convergence impacts the European economy as a whole. This is also reflected in the i2010 – First annual report on the European Information Society (2006): “*i2010 identifies digital convergence as the main driver of change and aims at ensuring that the EU will fully benefit from the opportunities and prospects for strengthening the Single Market.*”⁶⁰ This chapter will shed some more light on current convergence trends in the telco industry as well as related opportunities and challenges for telco enterprises.

However, convergence is not only a key issue in the telco industry. It is rather a cross-sectoral issue with impacts on all three high-tech industries studied by *e-Business W@tch* 2006, i.e. ICT manufacturing, CE manufacturing, and the telco industry. Therefore, Section 4.1.1 will provide an overview on this issue from a cross-sectoral perspective. It will present different types of convergence in high-tech industries and provide an overview of convergence issues discussed in the respective sector reports.

The chapter will discuss the relevance of single technology trends driving convergence in the telecommunications industry, including new broadband access technologies (Section

⁶⁰ EC (2006) “i2010 – First Annual Report on the European Information Society”, COM(2006) 215, p.5, Brussels, 19.5.2006.

4.1.2), Voice over IP (Section 4.1.3), IPTV and fixed-mobile convergence (Section 4.1.4). Moreover, Section 4.1.5 will analyse consequences of triple play strategies, which are discussed as the natural outcome of convergence-driving technology developments in the telco sector. Section 4.1.6 summarises main points of the analysis.

4.1.1 Overview: Convergence as a cross-sectoral issue

Workshop on “Convergence in High-Tech Industries”: Outcome

Convergence has been identified as an overriding trend that impacts all three ICT-related sectors studied by *e-Business W@tch* in 2006⁶¹. Due to the importance of this issue, the *e-Business W@tch* conducted a workshop, which focussed on “Convergence in High-Tech Industries”. The workshop was held on 15 June 2006, in Brussels, with almost 30 representatives from industry and policy.⁶² This section will summarize and elaborate convergence issues identified and discussed at this workshop.

Two major issues were identified following intensive discussion in the course of the workshop. First, convergence of markets, products and services is a cross-sectoral issue, bringing telecommunication services, CE manufacturing and ICT manufacturing together. Various drivers and effects of convergence can be identified that are described in this overview. Second, there are numerous different effects of convergence in ICT-related sectors. Presenters at the workshop, for example, discussed the impact of convergence on business models and innovation in high-tech sectors, the way convergence influences standardisation and interoperability issues, as well as statistical measurement of ICT manufacturing. The last paragraph of this section gives an overview over the aspects of convergence that are analysed in the three *e-Business W@tch* reports on ICT-related sectors.

Drivers, types and effects of convergence

Although there is **no single definition** of convergence, this term is frequently used to describe technology trends that lead to blurring lines between different industries and their offerings. In the course of the discussion on convergence in ICT-related sectors, the following technology trends have been named as important **drivers**:

- Digitisation of content, enabling the distribution of content over IP-based channels.
- IP transformation of telecommunication services, enabling the delivery of voice services over IP-based channels.
- Increased availability and importance of broadband internet connections in Europe, enabling the digital delivery of high value content services.
- Increasing availability and capability of mobile technologies, bringing services based on mobile and fixed-line networks together.

⁶¹ ICT Manufacturing, Telecommunication Services and Consumer Electronics – see reports on www.ebusiness-watch.org/ressources.

⁶² <http://www.ebusiness-watch.org/events/ICT.htm>

In combination, these technology developments allow for the delivery of data, voice and various content services via the same, broadly available fixed and/or mobile networks. As a result, products and services that were formerly clearly differentiated and offered by different industries or players are now provided as “converged products and services”. While, for example, CD players were formerly produced by CE manufacturers and CDs by the phonographic industry, now MP3 players with integrated music software as well as the online store to purchase music are offered by one and the same provider (e.g. Apple). Another example is the convergence of fixed and mobile telephony: formerly clearly separated offerings over different networks by fixed line and wireless operators are now increasingly offered as one service.

Most market observers agree that convergence means a deeper integration of products and services from (formerly) different industries. However, there is no consensus on the necessary degree of integration when discussing “converged services or products”. In fact, one can distinguish between **different levels of product and services integration**:

- **Cross selling and bundling**, i.e. the combination of products and/or services on a marketing and sales level by combining related offerings (e.g. mobile phones and wireless telephony services or internet access, telephony and TV access services). While cross selling is primarily a marketing concept, bundling goes a step further by focussing more on the exploitation of complementary effects, e.g. by generating one invoice for the combined service offering.
- **Integrated (seamless) services**, i.e. the technical combination of products and services, e.g. devices with integrated functionalities such as network access that allow direct access to video or audio content services. For the provision of integrated (seamless) services, collaboration of different players (or units) on the production level is required.
- **(Truly) Converged services**, i.e. integrated services (e.g. voice, internet and content) offered over one common infrastructure or over infrastructures working closely together (e.g. mobile and fixed networks). This is often also discussed as the final stage of convergence

While there are already several examples for services bundles and integrated service offerings, the provision of truly converged services is currently in the beginning.

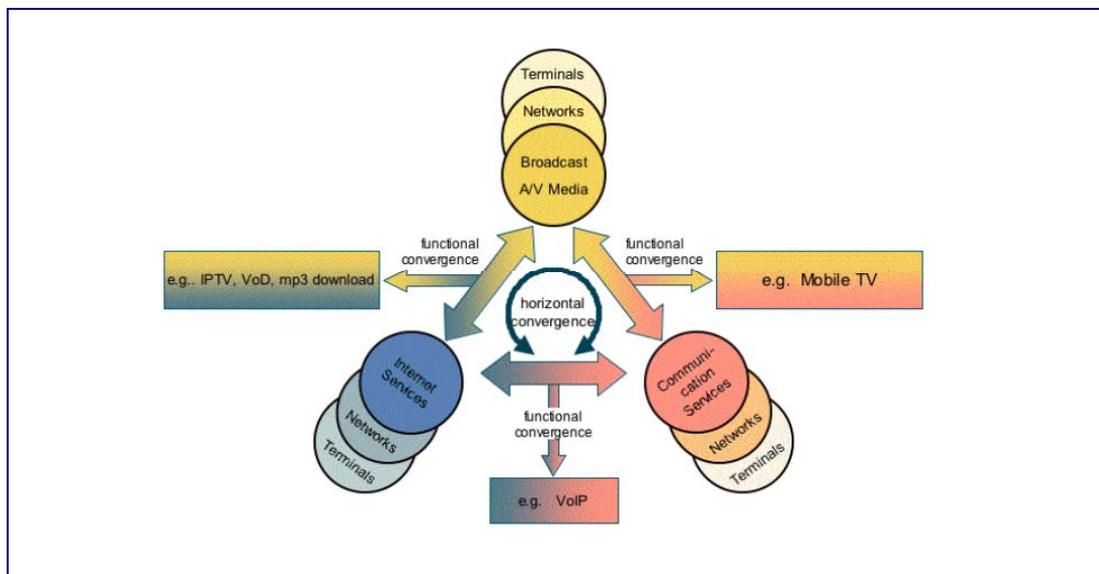
Another perspective on “convergence” and its stakeholders can be gained by distinguishing the **effects of convergence-driving technology** developments (see Exhibit 4-2):

- **Functional convergence** (also called “product and services convergence”): Formerly separated products and services are now offered as combined services or bundles (as described above). Functional convergence results, for example, in the so-called “multiple-play” strategies (e.g. triple or quadruple-play) by telco companies or internet service providers that combine e.g. Internet access, fixed and wireless telephony services and TV.
- **Vertical convergence** (also called “value chain convergence”): The necessity to seamless interplay of combined services tackles both technical and business issues. For example, CE devices need to support various digital content formats or

communication standards. In addition, the software needed to use different content and communication services needs to be pre-installed on devices. Consequently, activities along the value chain of a certain product segment need to be integrated. Issues attributed to vertical convergence include integration of supply chain processes and collaboration of manufacturing partners as well as the development of standards and solutions assuring the interoperability of products and services.

- **Horizontal convergence** (also called “market convergence”): As a consequence of convergence, lines between traditional ICT service and product segments are blurring. Issues related to horizontal convergence include:
 - Increased importance for traditional ICT sectors and necessity to collaborate with formerly clearly separated industries, in particular the content industry.
 - Blurring lines between traditional market segments of ICT related sectors leading to enforced competition, e.g. in the telco market the enforced competition between cable companies, fixed line operators, and mobile operators.
 - Entrance of new players or players from formerly different industries, into traditional ICT market segments like the VoIP software provider Skype into the telephony market or, the other way round, the ICT company Apple into the media industry.

Exhibit 4-2: Types of convergence effects in ICT related sectors



Source: Georg Lütteke (Philips/EICTA)⁶³

⁶³ Georg Lütteke: “Convergence and Interoperability”, Presentation at *e-Business W@tch* workshop on “Convergence in High-Tech Industries”, Brussels, 15 June 2006, available at <http://www.ebusiness-watch.org/events/ICT.htm>.

Convergence in *e-Business W@tch* sector reports

Some of the convergence issues listed above are covered in this year's *e-Business W@tch* reports on e-business activities in three ICT related sectors:

- The report on **ICT in the ICT manufacturing** industry identifies forthcoming convergence-related challenges and opportunities for telecommunications and network equipment manufacturing sectors. Furthermore, the report discusses the consequences of technological convergence for the economic environment and how companies operating in this sector adapt to changing market conditions.
- The report on **ICT in the CE manufacturing industry** particularly focuses on the increased impact of broadband for the sector's output, as well as on related opportunities and challenges for CE manufacturers. In addition, the report discusses standardisation activities in the field of Digital Rights Management (DRM) technologies. The increased importance of DRM technologies to protect content is also driven by convergence trends in this sector.
- The report on **ICT in the telecommunications industry** discusses the background and impact of convergence-driving technology developments, such as new broadband access technologies, VoIP, and IPTV. Moreover, it sheds some light on triple-play strategies by telco companies as an outcome of convergence in this sector.

Exhibit 4-3: Convergence issues analysed in e-Business W@tch reports on ICT-related sectors

Report Chapter	Issues	Contents
ICT manufacturing (SR 04)		
Chapter 4.1.1	Convergence and market development	<ul style="list-style-type: none"> Challenges and opportunities related to convergence for ICT manufacturers Companies' reactions to changing economic conditions Expansion into new business fields
Chapter 4.1.1	Future outlook	<ul style="list-style-type: none"> Interdependency between market developments and regulatory framework Changing business models in the PC industry The importance of complementary products for the uptake of new services and technologies
CE manufacturing (SR 05)		
Chapter 4.1	Impact of broadband	<ul style="list-style-type: none"> Impacts on sector output: converged CE products and services Opportunities and challenges for CE manufacturers Case study illustrating business opportunities for manufacturers of networked CE devices (<i>KiSS Networked Entertainment, Denmark</i>)
Chapter 4.2	Digital Rights Management (DRM)	<ul style="list-style-type: none"> Challenges related to the implementation of DRM technologies in CE devices Interoperability of DRM technologies; case study on an interoperability framework (<i>Open Mobile Alliance</i>)
Telecommunication Services (SR 09)		
Chapter 4.1.2	New broadband access technologies	<ul style="list-style-type: none"> Background and impacts for users and providers Two case studies (<i>WiMAX Telecom, T-Mobile Slovakia</i>) on the rollout of new broadband technologies in Eastern Europe
Chapter 4.1.3	Voice over Internet Protocol (VoIP)	<ul style="list-style-type: none"> Background and impacts for users and providers Case study (<i>Upnet, Lithuania</i>) and business example (<i>Skype, Luxembourg</i>) illustrating opportunities and challenges for specialised VoIP providers
Chapters 4.1.4, 4.1.5 and 4.1.6	Further aspects of convergence	<ul style="list-style-type: none"> Spotlights on convergence-driving technologies with possible future importance, such as IPTV and mobile TV Outcome of convergence on the telco market Case study on opportunities and challenges related to triple play of telco companies (<i>Grupalia Internet, Spain</i>)

Source: e-Business W@tch (2006)

4.1.2 New broadband access technologies

Increasing broadband access is one of the main drivers of convergence. This section, therefore, discusses the role of new access technologies that are likely to accelerate the diffusion of broadband internet (in the following: broadband) in Europe. The importance of this issue is also emphasised by the European Commission's recent Communication on "Bridging the Broadband Gap" (March 2006), which concludes: "*Widespread broadband access is a key condition for the development of modern economies and is an important aspect of the Lisbon agenda. The European Union must step up its efforts to encourage take-up of broadband services and stimulate further deployment, in particular in the less developed areas of the Union.*"⁶⁴

Definition and impact of broadband

There is no single definition for broadband. A few years ago, broadband was often defined as every internet access technology faster than a dial-up modem (56 kbit/s), reflecting the rising importance of ISDN connections in that time. Eurostat, for example, has defined broadband to include those lines with a capacity equal to or higher than 144 kbit/s⁶⁵. This definition, in fact, includes internet access via ISDN. Today, however, broadband is often equated to DSL or cable, which provides a much faster connection and thus allows for various types of services. For the purpose of this report, fixed-line broadband is understood to be any connection that offers high-speed access rates similar to or even higher than DSL (i.e. about 1 MBit/s). Mobile broadband usually provides lower transfer rates in the three-digit kbit/s range (e.g. UMTS: 384kbit/s).

Broadband as discussed in Chapter 2.2.2 (Implications for telco companies) may contribute to further growth of the telco industry that is confronted with market saturation in traditional segments like traditional telephony or basic internet access. Therefore, the impact does not only include increased revenue by the provision of broadband access: Increased deployment of broadband also enables services based on other promising technologies like VoIP or IPTV (see Sections 4.1.3 and 4.1.4), which are discussed as potential growth drivers for companies in this sector as well.

However, the impact of broadband is not limited to the telco industry. Its diffusion may stimulate the economy as a whole. First, broadband enables the creation of new and innovative products and services. The increase of broadband penetration, for example, led to the proliferation of a multitude of online content and service offerings like Napster's music services (illustrated in the following box).

⁶⁴ EC (2006): Communication on "Bridging the Broadband Gap", p. 3, COM (2006) 129 final, Brussels, 20.3 2006.

⁶⁵ Eurostat (2004): Structural indicators quality profile – broadband penetration. October 2004. Cf. <http://epp.eurostat.ec.eu.int/> (Mai 7, 2006)

Business example

“Napster To Go” requires broadband

Napster To Go is a subscription-based music download service. Customers can download an unlimited amount of content for the duration of their subscription for a fixed fee.

Broadband is important to make the service attractive for the customer. Downloads are only possible with high-speed internet access, as volumes can reach several hundred megabytes, depending on individual use. In addition, customers need broadband access to update their licenses when they prolong their contract with the service provider for another month or year. This too would be a nuisance or impossible with slow access over dial-up modems or ISDN.

Source: Napster To Go website (<http://www.napster.com/ntg.html>)

Second, broadband enables new e-business applications and enhances the capacity of existing ones. This way, access to broadband contributes to higher productivity of companies using ICT. Modern CRM (Customer Relationship Management), ERP (Enterprise Resource Planning) or SCM (Supply Chain Management) systems, for example, are usually internet-based and thus reach their full potential only if users have broadband access. Businesses without broadband access are missing these opportunities and risk to lose ground to their competitors. Consequently and as stated in the EC's Communication on “Bridging the Broadband Gap”: *“The availability of broadband services is one critical element in assisting local communities in attracting businesses [...]”*⁶⁶

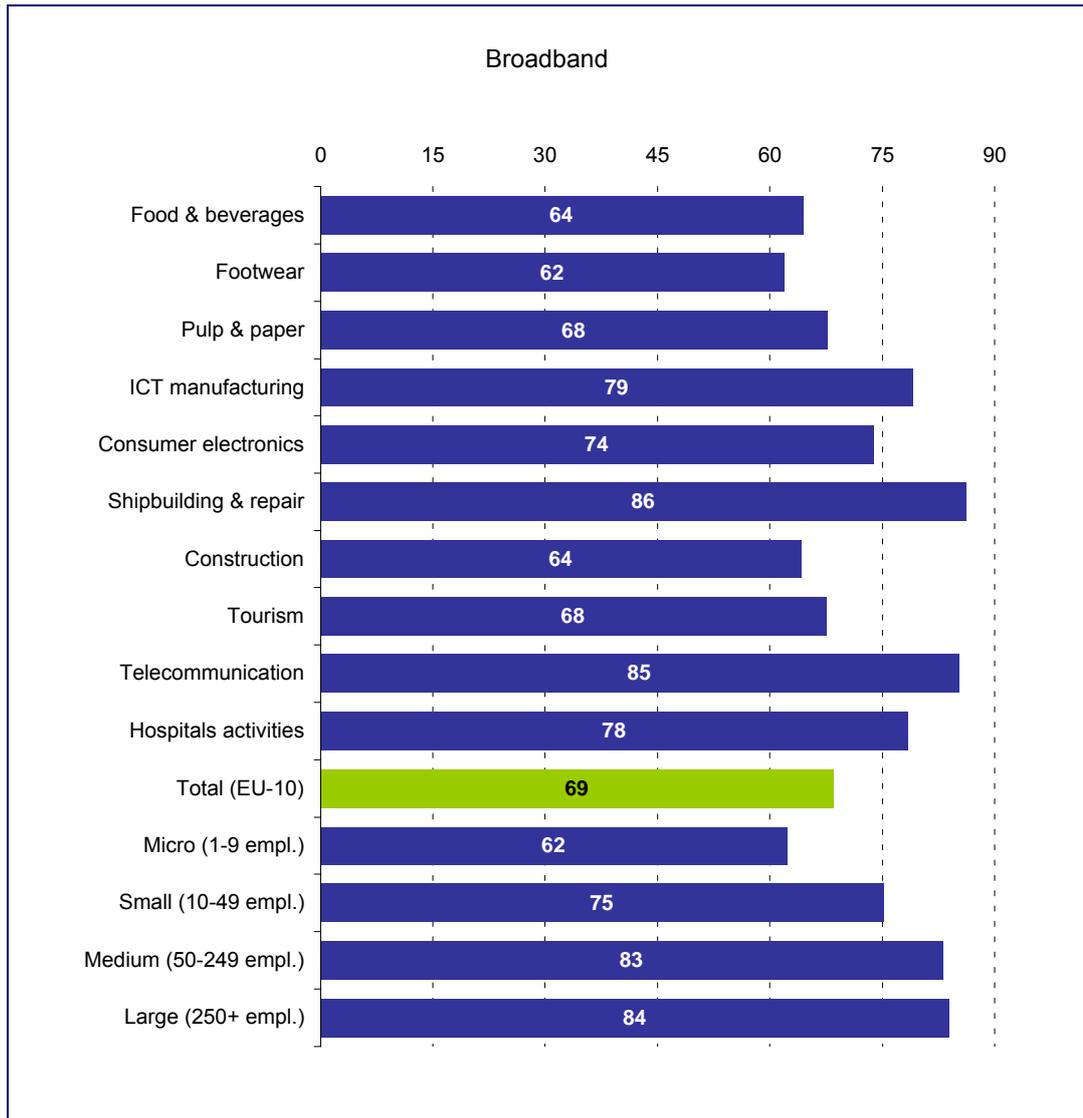
Finally, broadband may also contribute directly to the improvement of living conditions of people as it is enabling innovative healthcare applications (e.g. telemedicine), work models (teleworking) and education channels (e.g. e-learning).

Diffusion of broadband

Broadband is not a new topic for businesses. At least larger companies have for some time been in the position to rent lines in order to connect their factories and geographically dispersed subsidiaries. However, new internet access technologies like DSL provide broadband connectivity at much lower prices than leased lines and thus accelerated the widespread diffusion of this technology. Accordingly, more than two thirds of companies in sectors covered by the e-Business Survey 2006 reported having broadband internet access. In the telco industry, this share is even higher at 85% (see Exhibit 4-4). As indicated by Exhibit 4-5, DSL is a main driver of broadband access by companies in Europe.

Exhibit 4-4: Share of companies with Broadband access in the EU-10

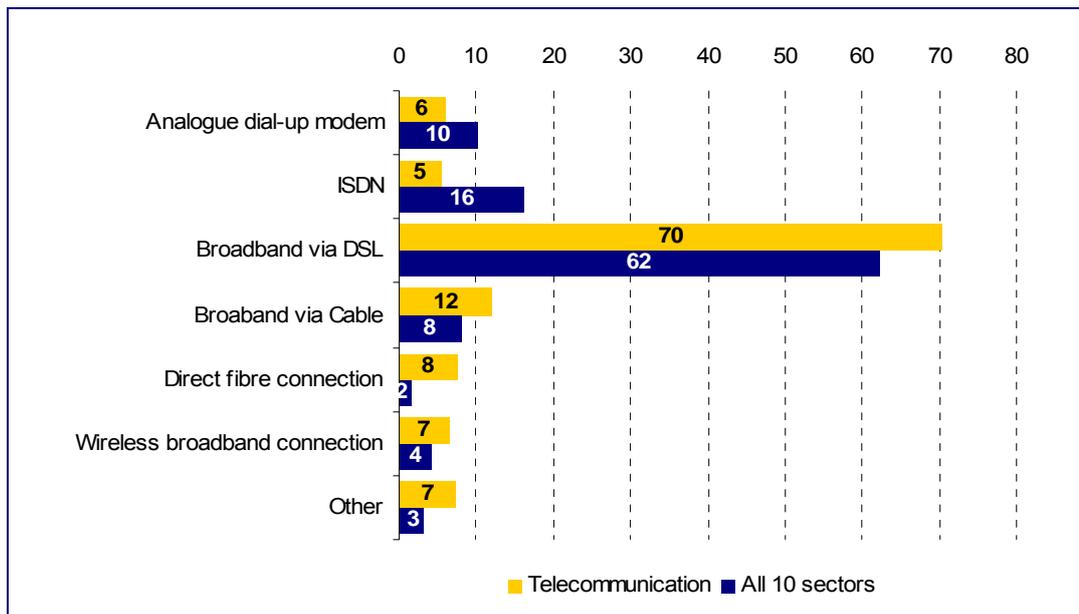
⁶⁶ EC (2006): Communication on “Bridging the Broadband Gap”, p. 4, COM (2006) 129 final, Brussels, 20.3 2006.



Base (100%): Companies with Internet access excl. 'Don't know'. N (all sectors, EU-10) = 7237.

Weighting: in % of firms. Questionnaire reference: A3

Source: e-Business W@tch (Survey 2006)

Exhibit 4-5: Internet access technologies

Base (100%): Companies with Internet access excl. d.k.. N (for sector, EU-10) = 820.
Weighting: in % of firms. Questionnaire reference: A3

Source: e-Business W@tch (Survey 2006)

Exhibit 4-6: DSL and cable subscribers per 100 inhabitants in selected EU countries

Country	DSL	Cable
Belgium	11.3	7.0
Czech Republic	3.0	1.4
Denmark	15.3	7.2
France	14.3	0.9
Greece	1.4	0.0
Germany	12.6	0.3
Hungary	4.1	2.1
Italy	11.3	0.0
Portugal	6.6	4.9
Slovak Republic	2.0	0.4
Spain	9.2	2.5

Source: OECD (2005)

A closer look at the diffusion of broadband reveals still some gaps between rural and urban areas: On average (in the EU-25), broadband penetration is more than twice as high in densely-populated areas than in less populated areas, according to Eurostat⁶⁷. This might have to do with differences in the availability of broadband technologies between urban and rural regions. As the Digital Divide Forum states: “Remote and rural regions are less well served. [...] In January 2005 broadband was available to more than

⁶⁷ Eurostat (2005): The digital divide in Europe. Statistics in focus, 38/2005.

90% of EU-15/EEA⁶⁸-urban population but only to 62% of its rural populations. [...] Broadband deployment excludes about 15% of the EU 15 population. This share increases when new member states are taken into account [...].⁶⁹

However, when interpreting these numbers, it should be taken into account that broadband is available to already 85% of the population, but current usage is much lower. Even in densely populated regions, where usually broadband is available at relatively low tariffs due to fierce competition, less than 20% of the population currently uses broadband (see Exhibit 4-7). Moreover, the case studies on the rollout of new wireless access technologies below illustrate that broadband availability in rural areas in Eastern Europe is likely to increase in the close future. But they also reveal that providers in these regions face problems with regard to promoting broadband internet technologies, since many people are not familiar with the concept of the internet and the opportunities it provides. Thus, the broadband gap seems to be rather caused by problems on the demand side than by an insufficient availability of broadband access.

Exhibit 4-7: Domestic broadband connection, by regions (EU-25)

Regions	Broadband penetration in %*
Densely-populated areas	19
Intermediate areas	16
Thinly-populated areas	8

* As percentage of total number of households with at least one member aged 16 - 74.

Source: Eurostat (2005): The digital divide in Europe. Statistics in Focus, 38/2005

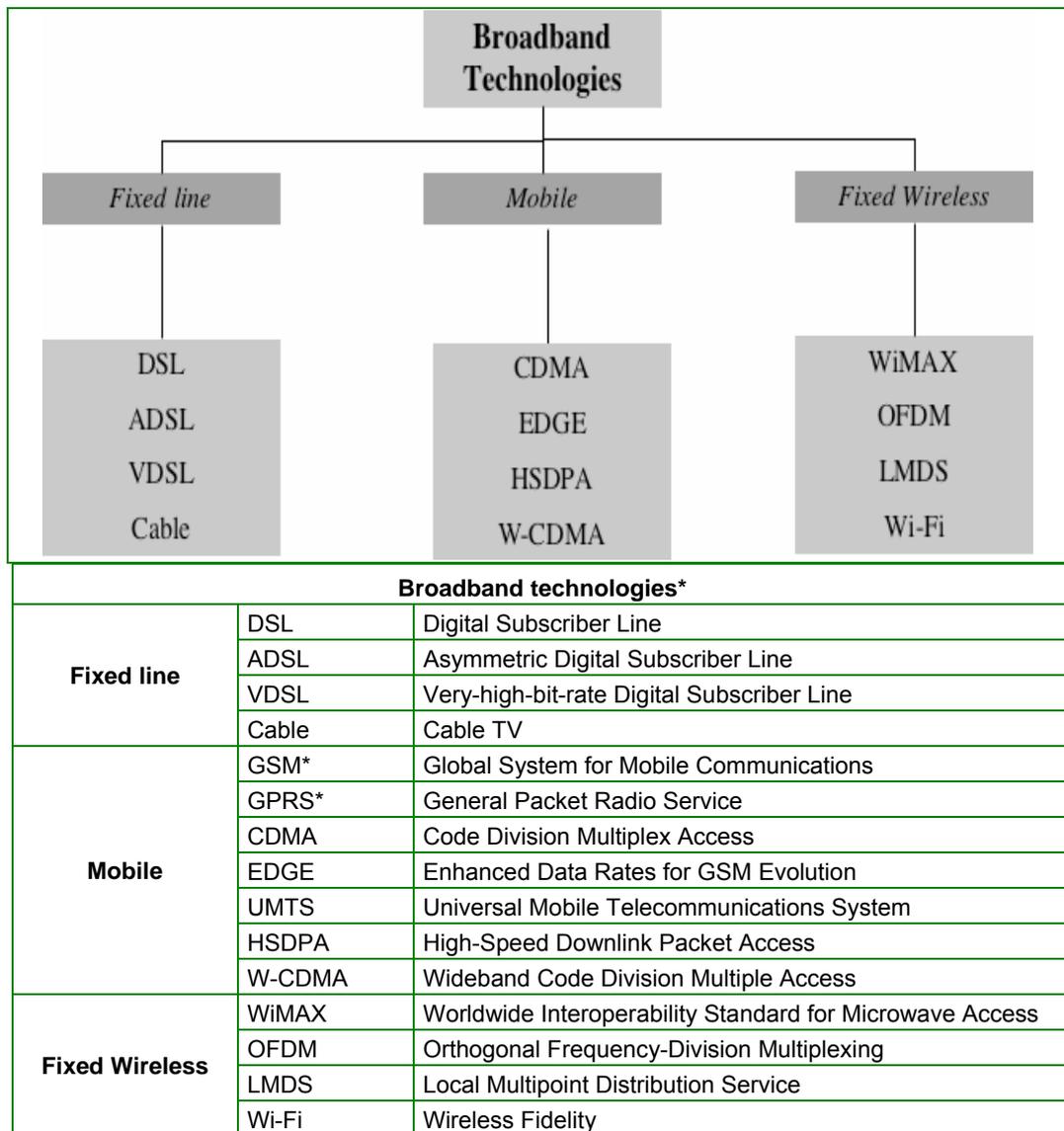
New broadband technologies: An overview

There is a large variety of new broadband access technologies that are contributing to the increasing diffusion of broadband as well as to the increased adoption of other convergence-driving technologies such as Voice-over-IP or IPTV. As illustrated in Exhibit 4-8, they can be distinguished into three different types of network technologies: fixed access technologies, mobile phone networks and fixed wireless access technologies. As follows, the three technology types and single technologies are briefly introduced.

⁶⁸ EEA is the European Economic Area. It includes the EU-25 states and Iceland, Liechtenstein and Norway. EEA excludes Switzerland.

⁶⁹ EC (2005): Digital Divide Forum Report – Broadband access and public support in under-covered Areas, Brussels, 15.07.2005.

Exhibit 4-8: Selected broadband technologies included in the report



* GSM and GPRS are not broadband technologies. GSM is 2G and GPRS, as an evolutionary development of GSM, should be considered a 2.5G technology.

Source: Berlecon Research (2006)

Fixed access technologies, like DSL and cable, typically build on an existing network infrastructure. This way, incumbents and TV cable companies have been able to exploit existing telephony and cable networks for the establishment of broadband services. As already reported, fixed access technologies like DSL and cable are the main channels of broadband access to date.

Fixed access technologies allow for relatively speedy access rates compared to most wireless access technologies. A case is VDSL, an advanced version of DSL, which is currently discussed as an accelerator of high-value content services. This technology would allow for bandwidths of up to 50 Mbit/s and, thus, facilitate the provision of TV and video-on-demand services over the internet. In fact, the examples in the box below show that the rollout of VDSL across Europe has already started.

Fact box*VDSL networks in selected European countries*

Belgium: Incumbent Belgacom is providing VDSL in various parts of the country. The commercial rollout has started already in November 2004.

Germany: T-Com, a subdivision of Deutsche Telekom's broadband / fixed-line unit, rolled out a fibre-based VDSL infrastructure in three German cities, Hamburg, Stuttgart and Munich. Over the network, speeds of up to 50Mbit/s can be reached. Using the VDSL infrastructure, T-Online, also one of Deutsche Telekom's divisions, is planning to offer IPTV services. From May 2006, T-Online is running field tests involving several hundred customers.

Slovenia: VDSL appeared on October 2005 provided by T-2 (www.t-2.net) The specialised telco provider, offers VDSL services at more than 120 locations across the country.

Spain: VDSL rollout by the Spanish incumbent Telefónica began in 2005 in selected places in Madrid. Commercial launch up is planned for 2007.

VDSL networks run are also operative e.g. in **Sweden** (Bredbandsbolaget), **Finland** (OPOY and Auria) and **France** (Erenis).

Sources: Company websites (e.g. press releases, company presentations), Information on VDSL rollouts taken from Wikipedia (<http://en.wikipedia.org/wiki/VDSL>, June 2006).

Mobile telephony networks of the so-called third generation (3G) are often being promoted as "data highways", enabling mobile distribution of higher-value content such as movies and music. Since 3G technologies theoretically provide bandwidths of up to 2 MB/s, but realistically provide around 384kbit/s, they are also discussed as serious competitors on the broadband market. UMTS is the most prominent 3G technology in Europe.

However, the commercial success of UMTS is below initial expectations. Mobile operators have to deal especially with the very high license costs and the additional costs for the network rollout on the one hand and problems in promoting the added value of mobile broadband services on the other. HSDPA (High-Speed Downlink Packet Access) – an evolutionary development of UMTS that allows for higher access rates (theoretically up to 14.4 MB/s, but currently up to 1.8 MB/s are offered), is currently discussed as a technology making mobile broadband services more attractive. Some telco companies like T-Mobile Austria⁷⁰ and Proximus (Belgium)⁷¹ have already launched commercial services based on this technology.

⁷⁰ See information about HSDPA on company website of T-Mobile Austria, www.t-mobile.at.

⁷¹ See 3G.co.uk (2006): Proximus upgrades its 3G Network with HSDPA, 8th June 2006, www.3g.co.uk.

Business example

O2 Surf@home: Access to the internet via UMTS

Mobile operator O2 offers a service that lets customers access the internet with their PCs using UMTS 3G technology. The service provides access rates of 384kbit/s, which is slower than DSL but significantly faster than ISDN. The basic monthly charge is 9.99€, with additional fees for download volumes of 10, 20 or 40 hours per month. For 40 hours the company charges 21.99€. The offering is part of O2's attempt to sell more 3G mobile broadband services.

Source: Niccolai, James (2005), O2 offers home internet access, Techworld, March 9, 2005.

Moreover, in several European countries like Austria, Germany, Slovakia and Romania, mobile operators have implemented EDGE (Enhanced Data Rates for GSM Evolution) as an alternative (and complement) to UMTS. Although EDGE is not able to provide as large access rates as UMTS, costs for licences and network rollout are far lower than for UMTS. Thus, operators like Telekom Austria provide EDGE-based services in rural areas that complement UMTS services offered in cities (see business box below).

Business example

EDGE and UMTS at Mobilkom Austria

EDGE is regarded by Mobilkom Austria both as a complement and substitute for UMTS. Business cases can be the following: First, UMTS rollout is not yet completed in a particular country. For instance, UMTS coverage in Austria was 60% in 2005. But combined with EDGE, the company can offer fast broadband access to 95% of the population. Second, there might be local resistance to the installation of further base stations that are necessary for mobile telephony. However, with EDGE no new infrastructure has to be installed – only an update of the hardware is required. Third, the rollout of UMTS might be too expensive in a particular market. In Slovenia, for example, Mobilkom offers EDGE instead of UMTS to provide higher data speeds at comparably low cost.

By January 2005, the offering of mobile broadband via UMTS had won the company 10,000 customers since its launch in October 2004. Between June and December 2005, data traffic over the company's combined UMTS/EDGE network has tripled, according to Boris Nemsic (COO Wireless).

Source: Mobilkom Austria (2005); Mobilkom Austria gibt den Startschuss für das erste flächendeckende 3G-Netz Österreichs, press release, January 20 2005.

Fixed wireless access technologies allow for wireless access only within a fixed area around the base stations (at the current stage of development). Examples are WiMAX,

Wi-Fi and Flash-OFDM. They have in common that they provide wireless data transmission. However, at the current state of development, mobility (compared to mobile phone networks) is limited as there are only fixed access areas around the base stations.

A third prominent fixed wireless broadband technology is Wi-Fi (Wireless Fidelity). Wi-Fi specifications are designed and optimised for Local Area Networks (LAN) and thus allow only for a very limited reach, e.g. within a office building, hotel or restaurant. Thus, Wi-Fi is less of a competitor than a complement for other broadband access technologies discussed in this chapter. One interesting combination, for example, would be to combine Wi-Fi with WiMax technology as stated on website of the Wi-Fi Alliance (see box below).

Business example

Wi-Fi versus WiMAX

The Wi-Fi Alliance explains the relationship between Wi-Fi and WiMAX as follows:

“Wi-Fi and WiMAX will coexist and become increasingly complementary technologies for their respective applications. Wi-Fi technology was designed and optimized for Local Area Networks (LAN), whereas WiMAX was designed and optimized for Metropolitan Area Networks.

WiMAX typically is not thought of as a replacement for Wi-Fi. Rather, WiMAX complements Wi-Fi by extending its reach and providing a “Wi-Fi like” user experience on a larger geographical scale. In the 2006-2008 timeframe, it is expected that both 802.16 and 802.11 will be available in end user devices from laptops to PDAs, as both will deliver wireless connectivity directly to the end user - at home, in the office and on the move.”

Source: www.wi-fi.org/faqs.php (April 2006)

The following two case studies illustrate activities of telco companies to roll out new fixed wireless broadband technologies in Eastern Europe. The case studies also discuss opportunities and challenges related to the network rollout. Marketing and sales of these technologies turns out as a key challenge for the service's commercial launch. The two providers in focus – that differ in company size and origin – have chosen different ways to overcome this challenge.

CASE STUDY: ROLLOUT OF BROADBAND SERVICES IN CENTRAL AND EASTERN EUROPE BY WiMAX TELECOM (SWITZERLAND)

Abstract

The development of WiMAX as a new wireless broadband technology has raised high expectations. However, the number of commercially available WiMAX services today is rather small compared to the number of broadband services provided via cable, fixed line DSL or 3G mobile technologies. One of the few providers of WiMAX services in Europe is WiMAX Telecom AG. The case study discusses WiMAX Telecom's market approach as well as challenges and success factors related to the rollout of WiMAX.

Case study fact sheet

■	Full name of the company:	WiMAX Telecom AG
■	Location:	Küsnacht (Switzerland), 100% subsidiaries in Austria, Croatia and Slovakia
■	Sector (main business activity):	Telecommunication services based on WiMAX
■	Year of foundation:	2003
■	Turnover	not disclosed
■	Number of employees:	40 employees, (March 2006)
■	Primary customers:	About 2,700 residential broadband users in Austria, Slovakia and Croatia (as of 2007)
■	Most significant market area:	Central and Eastern Europe
■	Main e-business applications studied:	Broadband access technologies
■	Key words:	Broadband, internet access technologies, WiMAX, standard

Background and objectives

WiMAX (World Interoperability Microwave Access) has often been discussed as a major step in technology outperforming conventional broadband access technologies in terms of usability, efficiency and rollout costs. WiMAX providers entering the market are also expected to position themselves as competitors of incumbents and mobile network operators. However, the number of commercially offered WiMAX services is still rather low compared to the number of services based on conventional technologies like DSL, cable modem or UMTS. One of the few providers that actually have launched commercial WiMAX services already in 2005 is WiMAX Telecom AG.

WiMAX Telecom AG is a Swiss holding registered in Kanton Zurich. It has three 100% subsidiaries in Austria, Slovakia and Croatia that run the operational business. The company claims to be a European telecommunication service provider offering WiMAX services in Austria, Slovakia and soon also in Croatia.

The business approach of WiMAX Telecom

Company foundation and launch of first services

WiMAX Telecom was founded by two partners with extensive experience in the telecommunications business: Dov Bar-Gera and Werner Kasztler. Mr. Bar-Gera describes himself as an entrepreneur who founded various telco start-ups and sold them successfully. Start-ups founded by Mr. Bar-Gera include, for instance, surfEU, a Europe-wide ISP with 1.4 million subscribers that was subsequently sold to Tiscali. Before co-founding WiMAX Telecom, Werner Kasztler worked as CEO of Telekom Austria, Ericsson Austria and BEWAG (an Austrian energy provider). Both partners' professional background as well as their relationships within the telecommunications and capital markets have proved to be success factors, as will be explained later in this case study.

WiMAX Telecom was founded with the objective to build up WiMAX networks and run commercial services in Central and Eastern Europe. First, it participated successfully in a nationwide tender for Austrian 3.5Ghz licences in 2004. Later on, WiMAX Telecom was awarded licences in Slovakia (July 2005) and Croatia (November 2005). Subsidiaries have been founded in the respective countries. At the end of 2005, commercial services were launched in Slovakia and Austria, while services in Croatia will be operational by the end of 2006.

Why WiMAX?

According to Mr. Bar-Gera, *"WiMAX Telecom wants to become a leading supplier of mobile triple play services in Central and Eastern Europe."* Triple play means the supply of broadband internet access, telephony and video services as a combined offering. *"However,"* Mr. Bar-Gera adds, *"customers currently want fast and reliable broadband access and VoIP-based telephony services at reasonable prices"*. He considers digital TV as a matter of future relevance.

Mr. Bar-Gera regards WiMAX as an optimal technology to support the company's strategy and summarises the advantages as follows: *"WiMAX is a standard-based technology, which generates relatively low capital expenditures (Capex) and allows for wireless communication."* He further explains these advantages as follows:

Standard-based: WiMAX as a term refers to a market initiative concerned about an interoperable deployment of the IEEE 802.16 standard. The industry body organising the efforts to promote the technology is the WiMAX Forum, which primarily certifies equipment. Since it is an open standard *"there is no dependency on a single technology provider"*, according to Mr. Bar-Gera. This is also an advantage compared to Flash-OFDM, a proprietary wireless broadband technology developed by the American network specialist Flarion, which belongs today to the IT company Qualcomm. As a further advantage of WiMAX' standards-based approach, Mr. Bar-Gera stresses that *"prices for equipment can be expected to decrease in the future."* The more widespread the WiMAX technology the more providers can profit from scale effects due to standardisation accompanied by decreasing prices for infrastructure equipment.

Low Capital Expenditures (Capex): *“WiMAX”, according to Mr. Bar-Gera, “requires far less capital expenditures for the network rollout than fixed line technologies such as DSL or mobile technologies like UMTS”. He explains that WiMAX allows for extensive coverage without the requirement of fixed lines for the last mile. “Particularly in rural areas the advantages of WiMAX compared to fixed line technologies are significant”, says Mr. Bar-Gera. WiMAX would also be superior compared to mobile technologies like UMTS due to lower set-up costs, and better network performance. “It turned out as an advantage that WiMAX is fully IP-based and has been driven by players from the IT sector that care more about efficiency and specifically low set-up costs than incumbents in the telecommunications market,” Mr. Bar-Gera points out.*

Mobility: Mr. Bar-Gera is convinced that *“the next WiMAX generation will allow mobile handovers [i.e. the process of transferring an ongoing call or data session from one access area to another without interruption] and thus support mobile voice and data services”*. He expects these new developments to become market ready by 2008. *“Based on this”, he adds, “WiMAX may achieve significant competitive advantages also in mature markets with high penetration rates of DSL- or cable-based services.”*

Strategy of network rollout

WiMAX Telecom’s rollout strategy is twofold and depends on the current state of the technical development. *“Areas with an underdeveloped fixed network infrastructure like rural Austria, Slovakia or Croatia will be covered first”,* according to Mr. Bar-Gera. He adds that *“the network rollout in rural regions in Austria was also motivated by public grants”*. Later on, when new developments (allowing for mobile services) are ready for the market, the company plans a complete rollout in mature broadband markets as well – like urban areas in Austria and Eastern Europe.

Regarding the commercial rollout, Mr. Bar-Gera wants WiMAX Telecom to become a price leader in its targeted market. He regards cost advantages of WiMAX compared to competing technologies as a viable basis for this strategy.

Challenges and Outcome

Mr. Bar-Gera points at three primary challenges for WiMAX Telecom:

Acting as a forerunner using new state-of-the art technology: *“As WiMAX is still a young technology, WiMAX Telecom has to put considerable effort into assuring stable and high-quality services”,* Mr. Bar-Gera stresses. He adds that *“employing highly qualified people is a key success factor to deal with this issue.”* In this regard he emphasises that *“the technical staff of WiMAX Telecom largely consists of technical engineers with a university degree.”* A further challenge related to WiMAX Telecom’s forerunner position arises from the fact that the equipment market is just evolving. Thus, problems arise related to on-time delivery of components needed for the network rollout. Therefore, Mr. Bar-Gera concludes: *“it takes some efforts to adapt our ambitions to those of technology partners”*.

Exploring a mass-market fast: *“The faster WiMAX Telecom gains market share, the faster it becomes profitable, given the considerable fixed costs in our business”,* Mr. Bar-Gera explains. Building a brand based on new technology, however, is a challenge in itself. In this regard he points out: *“The fact that IT giants like Intel are driving WiMAX is*

important to position ourselves against the incumbents in the telecommunication market". In addition, competitive prices should help to attract the interest of the targeted customers.

Need for long-term investors: *"As we are just at the beginning of the commercial rollout, WiMAX Telecom does not make profits today nor in the very near future",* Mr. Bar-Gera explains. *"Therefore, the establishment as a start-up in this segment requires patient investors",* he concludes. *"In this regard, the experiences of WiMAX Telecom's top management and their relationships within the telecommunications and capital markets turned out to be success factors."*

The participation in tendering processes for the required frequency licences have not posed problems so far. Mr. Bar-Gera emphasises that he felt treated fairly in all tendering processes WiMAX Telecom has so far participated in. He only reported one general problem with the allocation of frequencies in Germany, where frequencies are tendered for single regions rather than the whole country. Thus, *"a provider who wants to roll out a countrywide WiMAX network in Germany needs to participate in numerous tendering processes. This is associated with significant costs",* according to Mr. Bar-Gera. *"In order to utilise mobility features provided by WiMAX and to compete with incumbents, however, a country-wide network rollout is essential."*

Overall, Mr. Bar-Gera sees the company development of WiMAX Telecom as a success. *"We have been successful in winning long term investors to assure financial stability, successfully participated in licence tenders in Austria, Slovakia and Croatia and already gained a substantial customer base."* In fact, the company won more than 2,200 clients within about 6 months after the commercial rollout in Austria and Slovakia. *"Our customer base increases by 50 to 70 new customers per day",* Mr. Bar-Gera points out.

WiMAX Telecom in Slovakia

Mr. Kocisko, Managing Director Slovakia at WiMAX Telecom, provides some more insights in the technical and commercial rollout of WiMAX services in Slovakia. He explains: *"A fast network rollout was a requirement by the regulation authority for using the 3.5Ghz frequency spectrum".* Therefore, WiMAX Telecom Slovakia (operational since August 2005) initially had to direct many resources at the technical rollout of WiMAX services. *"Areas around 22 cities have been connected from August 2005 till March 2006 with another 14 cities to be connected soon",* according to Mr. Kocisko.

However, the company already started the commercial rollout of WiMAX services. He points out that at the current stage *"WiMAX Telecom offers simple broadband access services at reasonable prices."* Broadband access is offered for 14€ per month plus 22€ set up costs as well as a 100€ deposit for equipment. *"VoIP services will be added soon",* according to Mr. Kocisko. *"However, winning broadband customers in Slovakia is challenging",* Mr. Kocisko says and explains: *"Due to low internet penetration particularly in rural areas in Slovakia, people are less familiar with the advantages of the internet than in Western countries."* In April 2006, WiMAX Telecom had about 750 customers in Slovakia. However, Mr. Kocisko is optimistic that VoIP services, which will be offered at no additional costs, are likely to convince more people of the advantages of broadband internet offered by WiMAX Telecom.

In addition, he considers partnering as a success factor in order to accelerate the success of the commercial rollout. He explains: “As a new player, WiMAX Telecom does not have the brand awareness and company network of large incumbents in the telecommunication market.” In order to overcome this challenge, WiMAX Telecom Slovakia is building up a network of sales partners (e.g. computer retailers) that sell the product and provide services onsite.

Lessons learned

The case study provides insights into opportunities and challenges related to the technical and commercial rollout of broadband services based on WiMAX. Mr. Bar-Gera particularly emphasised the characteristics of WiMAX as a standardised low cost solution. In the future, WiMAX is likely to provide mobile data services, which is an advantage compared to conventional broadband technologies. Particularly in rural areas, these advantages may help WiMAX providers to position themselves as serious competitors of telecommunications incumbents.

However, despite its viability for providing broadband in rural areas, WiMAX should not be solely regarded as a local wireless technology. Next-generation WiMAX technologies are likely to support mobile services, e.g. by supporting mobile handover. But the provision of mobility services requires wide network coverage. In so far, local allocation of frequencies in Germany might inhibit the establishment of a WiMAX provider market there.

Many challenges that WiMAX Telecom is facing are owed to the early stage of technology rollout and the relative immaturity of the WiMAX market. Thereby, the discussion highlighted that a stable financial background in terms of long term investors is important for the establishment of commercial WiMAX services. In this light, grants as provided for WiMAX rollout in Austria, may also have a role to play, particularly for accelerating the provision of broadband technologies in rural areas. Finally, the discussion indicated differences in the marketing of broadband technologies between countries with high and low internet penetration. While high demand for broadband services can be expected in mature internet markets like UK, France or Germany, demand has to be created in countries with low internet penetration like Slovakia. In this light, cooperating with local sales partners may help particularly new players in this market to accelerate their sales success.

References

Research for this case study was conducted by Andreas Stiehler (Berlecon Research), on behalf of e-Business W@tch. Sources and references used:

- *Interview with Dov Bar-Gera, CEO and Co-founder of WiMAX Telecom AG, March 2006*
- *Interview with Juraj Kocisko, Managing Director Slovakia at WiMAX Telecom AG, March 2006*
- *Company website: <http://www.wimaxxed.at/>*

CASE STUDY: COMMERCIAL ROLLOUT OF FLASH-OFDM NETWORK AT T-MOBILE SLOVENSKO (SLOVAKIA)

T-Mobile Slovensko considers itself to be the innovation leader in the Slovakian mobile telephony market. In line with this strategy, T-Mobile Slovakia started the world's first commercial operation of a Flash-OFDM network in October 2005. Based on this example, the case study illustrates advantages of Flash-OFDM as compared to conventional broadband access technologies. Moreover, opportunities and challenges related to the rollout of broadband services in Slovakia will be discussed. Thereby, the market awareness of broadband services in a country with relatively low internet penetration like Slovakia turned out to be a main challenge.

Case study fact sheet

■ Full name of the company:	T-Mobile Slovensko, a.s.
■ Location:	Bratislava (Slovakia)
■ Sector (main business activity):	Telecommunication services
■ Year of foundation:	1991 (then Eurotel)
■ Turnover in last financial year:	SKK 14.5 billion (about €1.2bn)
■ No. of employees	Not available.
■ Primary customers:	Mobile telephone users in Slovakia
■ Most significant market area:	Slovakia
■ Main e-business applications studied:	Wireless/Mobile Broadband technologies
■ Key words:	broadband internet access technologies, mobile solutions, marketing and sales

Background and objectives

Flash OFDM

Flash-OFDM stands for "Fast Low-latency Access with Seamless Handoff -- Orthogonal Frequency Division Multiplexing". It is a proprietary wireless data transmission technology that has been developed by Flarion (USA)⁷². This technology company has been acquired by the telecommunications equipment manufacturer Qualcomm in 2005. Since this technology utilises a low frequency band (450Mhz) with favourable signal propagation, it seems to be well suited as a basis for the provision of broadband data services in wide geographical areas, e.g. rural regions. Thus, the technology may contribute to better availability of broadband internet in Central and Eastern European countries with extensive rural areas and low penetration of fixed lines. In October 2005, T-Mobile Slovensko began the first commercial rollout of Flash-OFDM services.

T-Mobile Slovensko

T-Mobile Slovensko is a 100% subsidiary of Slovak Telekom, in which Deutsche Telekom has a 51% stake. The company started in 1991 as Slovakia's first mobile operator under

⁷² See www.flarion.com (April 2006)

the name “Eurotel”. In 2005 the company changed its brand to T-Mobile Slovensko. The mobile operator serves more than 2 million customers, most of them via GSM.

Flash-OFDM rollout by T-Mobile Slovensko

Motivation

Mr. Juraj Droba, Director for Corporate Affairs at T-Mobile Slovensko, explains the motivation behind the rollout of Flash-OFDM. According to him, the Slovakian mobile telecommunications market in 2006 is a duopoly formed by Orange and T-Mobile Slovensko. However, “*competition in the Slovakian market is likely to increase*”, he adds. First, there is a public debate about the issue of licences for a third mobile operator. In addition, Mr. Droba expects that additional players without own infrastructure like Mobile Virtual Network Operators or Service Providers (MVNOs or SPs) may enter the market.

“With respect to increasing competition, T-Mobile Slovensko’s position as innovation leader on the Slovakian mobile market gains further importance”, concludes Mr. Droba. He explains that T-Mobile Slovensko was already the first mobile operator to have rolled out WLAN and EDGE-based data services in Slovakia. Thus, *“it is in line with T-Mobile Slovensko’s strategy to be the first company in the world to commercially roll out the broadband technology Flash-OFDM”*.

In addition, he points out that the rollout of Flash-OFDM helps T-Mobile Slovensko to get a foothold in the broadband market. He adds: *“The company’s goal is to provide broadband internet in areas where other options like DSL or cable are not feasible, e.g. rural areas, as well as to establish an alternative to existing broadband technologies.”* For this purpose, the company also examined various alternatives to Flash-OFDM, such as CDMA-based technologies. However, according to Mr. Droba, *“Flash-OFDM turned out to be the best choice”*.

Why Flash-OFDM?

Mr. Droba refers to three primary factors that have influenced the decision in favour of Flash-OFDM:

- **Efficiency of broadband coverage in wide country areas:** Most regions in Slovakia outside the capital Bratislava and major cities are sparsely populated. In order to make the provision of broadband services in such regions economical, the technology should cover a large area from a single base station. *“Flash-OFDM, which runs on a low frequency spectrum, turned out to be well suited for offering broadband access in wide country areas”*, according Mr. Droba. He adds: *“The fact that T-Mobile Slovensko as operator of an NMT network⁷³ already uses licences for the 450Mhz spectrum facilitated the decision in favour of Flash-OFDM”*.
- **High quality of service:** *“In network tests, Flash-OFDM proved high stability and limited packet latency that even exceeds stringent wired network requirements”*, according to Mr. Droba. *“These characteristics”*, he explains, *“are essential for advanced quality of service.”*

⁷³ Nordic Mobile Telephone (NMT) network, which was a predecessor of GSM and runs on 450 Mhz. Today, T-Mobile Slovensko serves only a few hundreds customers via this network.

- **Opportunity for prioritisation:** The technology allows prioritising data traffic. “Prioritisation”, Mr. Droba explains, “*is important to realise business models that rely on differentiation between customer groups. T-Mobile Slovensko, for example, offers broadband via Flash-OFDM at different speeds to regular and premium customers.*”

Mr. Droba, moreover, refers to effortless set up the Flash-OFDM service by a simple plug and play system. Thus, a SIM (Subscriber Identity Module) card, which is usually required for mobile network access, is not needed.

As a wireless data transmission technology, Flash-OFDM also allows for mobile access to data and in this regard turns out to be superior to stationary broadband technologies, e.g. DSL. However, according to Mr. Droba, “*mobility is not the first priority of T-Mobile Slovensko’s Flash-OFDM customers today, especially in the regions where no other broadband option exists.*” This is also reflected by current usage numbers: “*About two thirds of the Flash-OFDM customers access the network via desktop modems*”, according to Mr. Droba. “*Only about a third of the Flash-OFDM customers use PCMCIA⁷⁴ data cards, which allow for mobile access within the covered regions via laptops.*”

Current state of the rollout

By the end of 2005, the service has been available in selected areas of Bratislava and 19 other cities within Slovakia. Thus, “*T-Mobile Slovakia is able to provide more than 30% of the Slovakian population with broadband access*”, Mr. Droba stresses. “*By the end of the technical rollout, about 70% of the population can choose to use Flash-OFDM services for broadband internet access*”, he adds.

T-Mobile Slovensko has applied differentiated offerings with three pricing models for broadband access, depending on volume and bandwidth. In its cheapest version, up to 2GB of data can be downloaded at a bandwidth of 1Mbit/s for 15€. The premium version, allowing for a download volume of 20GB at 2 Mbit/s costs 45€. These prices are, according to Mr. Droba, comparable with offers for internet access via DSL and cable on the Slovakian market.

Challenges, success factors and outcome

Challenges and success factors

“*The rollout of Flash-OFDM places technical as well as business challenges*”, according to Mr. Droba. First, the technical network rollout itself required considerable manpower. Moreover, “*additional efforts were needed to define and set up new processes for sales, billing and customer care. These processes also needed to be implemented in the company’s IT infrastructure*”, according to Mr. Droba.

“*But the main challenge*”, he stresses, “*is marketing the new services. First, it is challenging to communicate the concept of broadband internet in general*”. He explains that many customers in Slovakia, particularly in rural areas, are not familiar with the concept and usefulness of broadband internet services in general. In fact, only about 3%

⁷⁴ Personal Computer Memory Card International Association

of the population have narrow- or broadband internet access, according to him. Thus “people have to be educated about use of broadband access for internet services to increase their motivation to purchase our Flash-OFDM package.” He further explains that in public perception broadband is often equated to DSL. Thus, additional effort is required to promote broadband access via a different access technology.

“In order to make people familiar with the concept, T-Mobile Slovensko works with try-and-buy offers, which has not been common practice in Slovakia yet”, stresses Mr. Droba. The company is even considering direct sales activities that may help communicate the unique advantages of broadband. In sum, Mr. Droba names an appropriate market communication and active sales push as the main success factors for the commercial rollout of new broadband technologies.

Outcome

Mr. Droba concludes: “T-Mobile Slovensko succeeded in establishing a reliable network based on Flash-OFDM. In this way, the company managed to claim a stake in the broadband market and could prove to be a forerunner regarding the implementation of innovative technologies on the Slovakian market.” Due to the brief time span between commercial rollout and case study interviews, Mr. Droba did not wish to disclose the current number of Flash-OFDM customers. However, he emphasises that “in order to make the Flash-OFDM rollout a complete access, T-Mobile Slovensko now has to work on marketing and sales.”

Lessons learned

The case study illustrated that advantages of Flash-OFDM go beyond its viability for the coverage of rural areas. Mr. Droba particularly highlighted technical features assuring high quality of service and the ability to prioritise data traffic, which provides the flexibility to differentiate services for different customer groups.

It turned out that marketing and sales are the main challenges when rolling out new broadband technologies, particularly in countries with low internet penetration like Slovakia. Since people are less familiar with the internet in general, additional efforts are needed to communicate the advantage of broadband. T-Mobile Slovensko, for example, tries to overcome this problem by unconventional measures such as try-and-buy offers and direct sales activities.

References

Research for this case study was conducted by Andreas Stiehler (Berlecon Research) on behalf of e-Business W@tch. Sources and references used:

- Interview with Juraj Droba, Director for Corporate Affairs at T-Mobile Slovensko, March 2006
- Company website: <http://www.t-mobile.sk/>

Summary and discussion

The discussion in the beginning of this section has shown that broadband internet may become a growth driver for the telecommunications industry as well as for the economy as a whole. Telco companies may profit from increased revenue by providing broadband services. Moreover, increased deployment of broadband also enables services based on other promising technologies like VoIP or IPTV. These services are also discussed as potential growth segments in the telco market.

Statistical data presented indicates fast broadband adoption. Among the technologies enabling broadband access, DSL is the most widespread. Besides DSL, a large variety of alternative technologies is emerging, which may serve as complements or alternatives. Thus, the diffusion of broadband technologies as well as competition in this segment is likely to increase, which may further accelerate broadband adoption in Europe.

However, the case studies on *WiMAX Telecom* and *T-Mobile Slovakia* (summarised in Exhibit 4-9) illustrate that the commercial rollout places some challenges. Making broadband services available at competitive prices turned out not to be sufficient in order to attract customers in rural regions. Particularly in areas with low internet penetration steps must be taken to communicate the benefits of broadband internet to the market.

Exhibit 4-9: Summary of the case studies on the rollout of fixed wireless technologies

	Rollout of WiMAX services by <i>WiMAX Telecom AG</i>	Rollout of Flash-OFDM by <i>T-Mobile Slovensko</i>
Characteristics of the providers:	Startup in the broadband market, which recently initiated the rollout of commercial services	Subsidiary of a big multinational incumbent with strong position in the Slovakian mobile telco market.
Business objectives stated:	Company aims to establish as European telco provider for broadband access and related services based on WiMAX technology	Company wants to strengthen position as innovation leader in Slovakian mobile market and to get a foothold in the broadband market (in rural Slovakia)
Technical features emphasised:	WiMAX: <ul style="list-style-type: none"> ■ Standard-based, technology development driven by players from the IT-industry ■ Efficiency: low capital expenditures, fully IP-based ■ Mobility features in the future 	Flash-OFDM: <ul style="list-style-type: none"> ■ Efficient broadband coverage in wide country areas, necessary frequencies already in use ■ High quality of service: stability and low packet latency rate ■ Opportunity for prioritisation
Main challenges mentioned:	<ul style="list-style-type: none"> ■ Using a new state-of-the-art technology: assuring quality of service ■ Need for patient investors: assuring stable financial basis ■ Marketing: promotion of new broadband services in Eastern Europe 	<ul style="list-style-type: none"> ■ Technical and organisational challenges: Setting up new processes and IT implementation ■ Marketing: Promotion of new broadband services in Eastern Europe
Measures to overcome marketing challenges:	Establishing partnerships with local resellers, competitive prices, marketing support by IT giants (e.g. Intel) backing the technology	'Try-and-buy' offers, direct sales activities by the company

Challenges and success factors emphasised by the interviewed companies partly differ due to their different positioning and characteristics of the technologies applied. *T-Mobile Slovensko* is an established player in the Slovakian mobile market with considerable financial and marketing power. *WiMAX Telecom*, in contrast, is a new, small player in the telco market, which has just recently started the rollout of commercial services. This explains also their differing business approaches: *T-Mobile Slovensko* introduced Flash-OFDM-based broadband services as a complement to its product portfolio and to strengthen its position in the Slovakian market. In contrast, *WiMAX Telecom*'s business case is completely based on the successful rollout of the WiMAX technology. The company, therefore, is more concerned about the need for long-term investors and problems related to its forerunner position as a provider of state-of-the-art technology.

The marketing of new broadband services in Eastern Europe turned out to be a major challenge for both *WiMAX Telecom* and *T-Mobile Slovensko*. Interestingly, measures by providers to overcome this challenge also differ due to the available financial and organisational resources. While *T-Mobile Slovensko* offers 'Try-and-Buy' and plans direct sales activities, *WiMAX Telecom* tries to establish a network of local reselling partners.

The establishment of a corporate sales force to carry out direct sales activities requires extensive resources (e.g. for employment and training of sales force representatives) and is best organised based on a widespread company network. In contrast, the establishment of a partner network might be an economic but efficient alternative for smaller companies that do not have a large company network yet. The distribution and support of products by trusted local partners, in fact, may significantly increase awareness for the company's offering and help to increase market share at relatively low costs. However, also a partner network needs to be supported. Setting appropriate incentives for the partners as well as organising efficient information exchange within the network is the key to make such measures a success.

4.1.3 Voice over Internet Protocol (VoIP)

The provision of Voice over Internet Protocol (VoIP) is a major driver of convergence in the telco industry and influences the use of ICT and e-business technologies in other sectors. This section, therefore, discusses the impact of VoIP for both users and providers of telco services.

Definition and types of VoIP usage

What all VoIP services have in common is their use of the Internet Protocol to transfer voice calls (cf. definition by EITO in the following box). However, there are multiple ways for VoIP to be implemented. For example, calls can be initiated and terminated via a computer or a VoIP-enabled phone. They can be routed over public networks (i.e. the internet) or closed networks operated by private companies. It is also possible to use wireless networks, such as 3G mobile broadband networks or fixed wireless broadband for the transmission of VoIP (see Section 4.1.2).

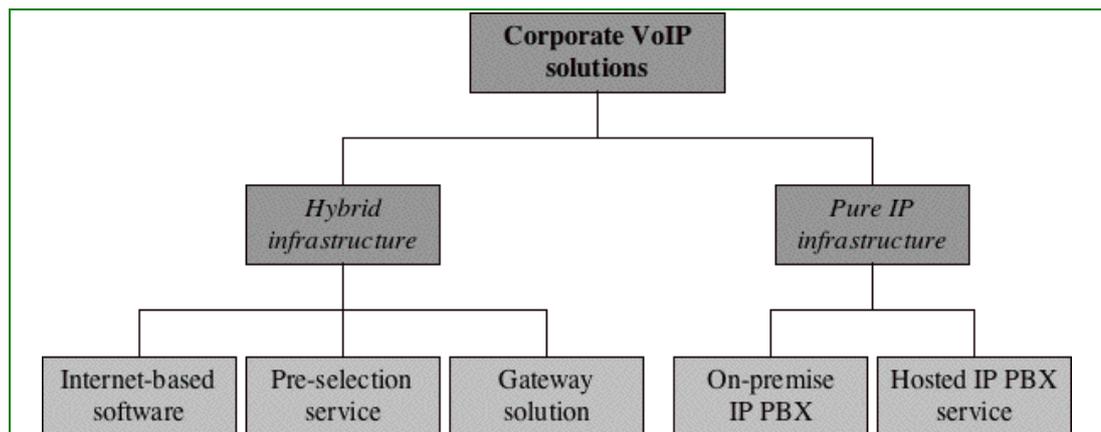
Fact box

EITO definition of IP telephony

“IP voice services refer to any voice service that is based on and carried over an Internet Protocol (IP) network. This type of transmission describes voice traffic sent over a public managed IP network or the internet that is designed to complement or compete with Public Switched Network (PSTN) traffic. The network can be operated by a service provider such as a next-generation telco, a Public Phone Operator (PTO), or an Internet Service Provider.” (EITO 2006, p. 27)

Private users typically encounter VoIP services as an internet-based P2P network service (e.g. Skype or Google Talk). But from the perspective of corporate users, there are more usage scenarios as illustrated in Exhibit 4-10. A discussion of the single usage scenarios can be found in Annex III.

Exhibit 4-10: Different approaches to VoIP implementation



Source: Berlecon Research (2006)

Impact and adoption of VoIP services

Although VoIP is currently hyped by both IT media and providers, its relevance for residential users is still marginal compared to traditional line telephony. By some OECD estimates, only 10% of all voice traffic at the global level can be classified as VoIP, with less than 1% of this traffic originating from VoIP phones in 2005⁷⁵. However, VoIP has significant growth potential. For instance, statistics published by the Telecommunications Industry Association (ITA) show that the number of residential VoIP customers in the United States more than tripled to 4.2 million users in 2005. This follows an eightfold

⁷⁵ OECD (2006): VoIP: Developments in the market. January 10, 2006. (p. 18)

increase from 150,000 in 2003 to 1.2 million at the end of 2004.⁷⁶ (The numbers exclude PC-to-PC calls.)

The relevance of VoIP is higher among business users in Europe. According to this year's e-Business Survey, 13% of companies on average over all ten sectors said that they use VoIP (see Exhibit 4-11). It is hardly surprising that VoIP is most widespread in the telco sector, where more than one third of companies use VoIP in some way. But also in other industries like ICT manufacturing, Consumer Electronics and Food & Beverages a significant share (about 20%) of companies reported using VoIP. Interestingly, there are no pronounced size-class specific differences if companies with less than 250 employees are regarded. This indicates that VoIP yields benefits for companies of all sizes.

Many providers promote cost savings as the central benefit of VoIP. This might hold true for consumer-centric services. Private customers, in fact, may benefit from national and international calls via VoIP at low or even no costs. However, for companies that might have to adapt their entire communication infrastructure in order to use VoIP, cost savings from lower telephony charges might fail to materialise in the short term.⁷⁷

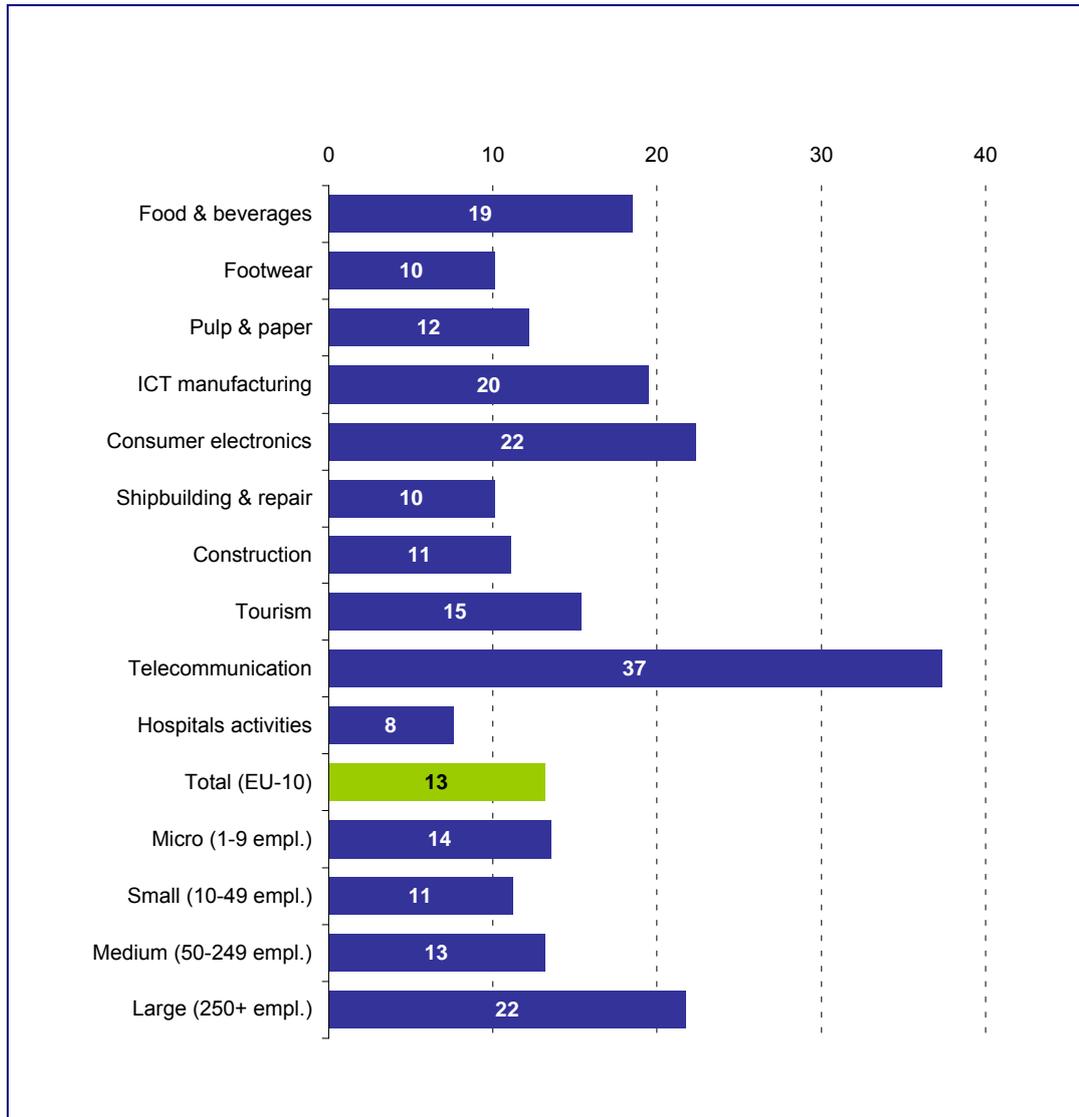
But VoIP can offer more than just cheap phone calls – particularly for companies. Companies having installed a VoIP telephony infrastructure, for example, may profit from cost savings derived from converged data and voice infrastructure, streamlined processes by integrated solutions and an increased overall flexibility. Particularly large companies, who have to manage a large workforce and an extensive company network may profit from these advantages. Accordingly, more than 20% of large companies on average over all 10 sectors studied this year reported using VoIP (see Exhibit 4-11).

However, there are also some risks related to the use of VoIP solutions, including lower telephony quality and security issues. A more extensive discussion of value propositions and risks related to VoIP can be found in Annex III.

⁷⁶ Telecommunications Industry Association (2006): Number of VoIP Subscribers more than triples in 2005 reaching 4.2 million; expected to grow to 18 million by 2009. Press Release, February 27, 2006.

⁷⁷ Schuman, Evan (2005): Del Monte cuts help desk calls by 90%. eWeek, December 2, 2005.

Exhibit 4-11: Use of Voice over IP



Base (100%): Companies using computers (all sectors, EU-10) = 7237.
Weighting: in % of firms. Questionnaire reference: A4c

Source: e-Business W@tch (Survey 2006)

Establishment of a VoIP provider market in Europe

The opportunity to route telephony calls over the internet also seems to have a significant impact on the market structure of the telco industry. Because of VoIP and open standards like SIP (Session Initiation Protocol), in fact almost anyone can offer telephony services⁷⁸. VoIP has lowered the market barriers and opened up opportunities for new players to position themselves on the telephony market.

⁷⁸ Ewalt, David M. (2005): Skype proves that anyone can sell phone service. Forbes, September 09, 2005,

One of the first companies that made use of this opportunity and subsequently challenged conventional telco players was Skype, a Luxemburg-based software company. Its VoIP approach and the related success story are discussed in the following business box.

Business example

The Skype approach and success

Skype was founded in 2003 by Niklas Zennström and Janus Friies with the backing of several venture capital firms. The Skype group consists of two units: Skype Software S.A., which offers the Skype Software, and Skype Communications S.A., which offers the VoIP Service. Skype is headquartered in Luxembourg with offices in London and Tallinn, Estonia, where the software is developed. The company, which employs about 300 people⁷⁹, has been acquired by eBay in September 2005.

Skype's business approach is the following: The company offers a software client that is installed on the user's computer or Pocket PC. The software connects the computer with other Skype users' computers over the internet and draws from their resources – forming a so-called peer-to-peer (P2P) network. The software is downloadable free of charge. Telephony, instant messaging, sending files and conferencing within the network are also offered for free.

Additional features are offered on a commercial basis. In case users want to phone someone outside the Skype network, they can buy pre-paid credit ("SkypeOut"). Likewise, Skype users can purchase a phone number by which they can be called over regular phone lines ("SkypeIn"). In 2005, Skype generated \$60m revenue with these services⁸⁰. As a basis for further commercial services, Skype also entered into partnerships with several music publishers to distribute ringtones that users can purchase to personalise the software client⁸¹.

As there are also other companies using a similar approach, Skype must grow its bundle of services at a fast pace in order to stay competitive. This explains why the company has engaged in a number of activities to reach more consumers and take a hold in serving business clients, especially small and medium sized ones. In order to reach the mass market, Skype partners with various popular internet portals like Tom.com in China (<http://skype.tom.com>) or mobile operators like Hutchinson 3 in Sweden, which offers a Skype bundle including a flatrate and 3G data card.

In an effort to enrich the user's experience, Skype partnered with Kodak to offer the "Photo Voice" service (<http://www.kodakgallery.com/photovoice>). Users can watch their private photo slideshows and simultaneously comment on them and exchange thoughts and impressions over Skype. As using the computer and headset to make calls seems not very compelling for many consumers, Skype has also entered into collaborations with communication technology providers like Panasonic or Polycom to add Skype functionality on telephone handsets.

At the same time the company tries to get a foothold in the professional market. Skype offers, for example, "Control Panel" that allows the administration of multiple accounts within a company, e.g. allocating calling credit or SkypeIn numbers. In addition, the CRM service provider

⁷⁹ Maitland, Alison (2006): Skype chief calls for change. Los Angeles Times, April 24, 2006.

⁸⁰ *ibid.*

⁸¹ Kharif, Olga (2006): Skype's music overture. BusinessWeek, April 26, 2006.

Salesforce.com has integrated Skype functionality in its CRM-on-demand offering (www.salesforce.com).

Skype's approach seemingly turned out as a success. First, within a limited time frame Skype's services gained considerable popularity. From August 2003 (when the first public Beta version was made available) until April 2005, 100 million users registered with the service⁸². Skype had 3 million simultaneous network users in May 2005. By April 2006, 6 million people on average were online within the network at any given time of the day. Moreover, Skype also managed to approach the business market. According to the company, 30% of its customers regularly use the application for business⁸³. Finally, the price for the acquisition paid by eBay illustrates the success: The internet company bought the two-year old startup for approximately €2.1bn. An additional €1.5bn is due in 2008 if certain goals are met by Skype.

Sources: Press releases and information on Skype's website: www.skype.com. For further references cf. footnotes.

With Skype as a flagship, the number of VoIP providers has sharply increased during the past two years. One online directory (<http://www.voipproviderslist.com/>) lists more than 1,700 companies providing VoIP services worldwide in April 2006 (suppliers of VoIP solutions and related IT services were not included). Today, VoIP providers are stemming from almost all conventional segments, including:

- **Incumbents in the telco market:** This group is often considered to be losing out in the VoIP development, suffering from traffic and revenue loss in their traditional telephony segment. However, VoIP can also open up new business fields for incumbents. VoIP might, for example, be used as a driver for broadband data traffic and increase the attractiveness of higher-value services as part of triple play offerings. Among incumbents having launched dedicated VoIP services are British Telecom and France Télécom.
- **Internet service providers (ISPs):** As the provision of internet access is the domain of ISPs, the supply of VoIP services by this group appears to be a natural extension of their business. For customers to use their networks for VoIP, they are only required to install a modem. Among ISPs that offer VoIP as part of their service are 1&1 (Germany), Wanadoo (a subsidiary of France Télécom) and Tiscali (Italy).
- **TV cable companies:** Cable companies traditionally deliver entertainment content, such as TV or video on demand. But many of them already started to offer broadband access over their networks. The offering of VoIP services would be a further component for the realisation of so-called triple play strategies (i.e. the combined offering of internet, telephony and TV services, see Section 4.1.5). TV cable companies that already offer VoIP services include Liberty Global Europe, Chorus Communications (both Ireland), ish (Germany) or Telewest (UK).

⁸² Reuters (2006): Skype has over 100 million registered users. April 28, 2006.

⁸³ Kharif, Olga (2006): Skype piles it on. BusinessWeek, May 3, 2006.

- **Mobile operators:** Mobile operators are facing a conflict of interest (in this respect, they are similar to the telco incumbents). On the one hand they feel threatened by VoIP travelling over their networks and thus, cannibalising their mobile minutes served. Especially operators offering unlimited-use data tariffs are vulnerable to VoIP disruptions. On the other hand, they intend to profit from these developments and offer VoIP services themselves. In February 2006, for example, the global UMTS network operator Hutchison 3 Group announced a cooperation with Skype. The division of the telco giant Hutchison Whampoa intends to launch Skype services via its networks in six countries, including Austria, Italy, Sweden and the UK, by the end of 2006. According to the respective press release, "*Hutchison views Skype as an attractive value added service, providing customers with more choice and thus further accelerating the uptake of Hutchison's 3G services*"⁸⁴. Overall, however, VoIP offerings by mobile carriers are in a very early stage of development.
- **Companies from related sectors:** VoIP services and software are also being offered by companies stemming from related sectors, including IT service providers and electronic device manufacturers. They may combine their traditional products or services with a VoIP offering. For instance, the consumer electronics manufacturer Sony offers a VoIP service ('Instant Video Everywhere') that users of the company's Vaio-branded computers can access via a specifically designed software client⁸⁵. Several IT solution providers such as Avaya offer VoIP services in combination with technical services around VoIP solutions.

Considering the large number of companies stemming from the telco industry and related sectors that are offering VoIP services, the question arises whether there are still opportunities for **independent VoIP providers** (pure VoIP players). In fact, in addition to Skype, a large number of VoIP specialists such as Wengo (France), PeerMe (USA) or sipgate (Germany) have entered the telco market. However, their potential to survive as independent players appears to be rather limited: First of all, VoIP offerings are already widespread in the conventional telco market. Moreover and as a consequence of convergence (see Section 4.1.5), combined services (e.g. triple play) are likely to gain importance. Being new entrants to the telco market, however, VoIP specialists lack the necessary know-how, infrastructure and financial backing to meet these requirements.

Nevertheless, one might argue that there could be a niche for VoIP providers targeting specific user groups and offering them low-cost telephony services. The following case study actually discusses a Lithuanian VoIP specialist pursuing such a strategy. It provides insights into business approaches, opportunities and challenges of VoIP specialists as well as illustrates the dynamics on the VoIP provider market today.

⁸⁴ Hutchison 3 (2006): Hutchison 3 Group and Skype join forces to offer Skype on mobile devices. Press Release, February 14, 2006.

⁸⁵ Cf. <http://www.instantvideoeverywhere.com/>

CASE STUDY: UPNET TRIES TO ESTABLISH VOIP-BASED SERVICES IN LITHUANIA

Abstract

Upnet Taide Baltic is a small telecommunications consulting company trying to position itself as a VoIP provider on the Lithuanian market. Based on the example of Upnet, this case study illustrates opportunities and challenges related to the establishment of VoIP services for private and business users. Thereby, dealing with low Broadband penetration in Lithuania turns out to be a main challenge for Upnet.

Case study fact sheet

■ Full name of the company:	Upnet Taide Baltic
■ Location:	Vilnius (Lithuania)
■ Sector (main business activity):	VoIP provider services (Telecommunications)
■ Year of foundation:	2001 (VoIP services starting in 2005)
■ Number of employees	6
■ Turnover in last financial year:	200,000€
■ Primary customers:	Private and professional VoIP users
■ Most significant market area:	Lithuania
■ Main e-business applications studied:	VoIP, broadband
■ Key words:	VoIP, broadband, internet access

Background and objectives

In line with the hype surrounding voice services delivered over Internet protocol (VoIP), the number of VoIP providers has increased: The “VoIP Providers List” directory (<http://www.voipproviderslist.com/>) lists more than 1,700 companies that offer VoIP services (March 2006). One of them is Upnet Taide Baltic, which offers VoIP services to private customers and businesses in Lithuania.

The case study illustrates the business approach of Upnet and discusses opportunities as well as challenges the company faces while establishing a VoIP provider model. Thus, the case study provides insights into the dynamics of the VoIP provider market in 2006.

VoIP services by Upnet

Company background

Upnet – a Lithuanian company based in Vilnius – was founded in 1998 by the Norwegian Vidar Bjerkeland. During that time, the company focussed on telecommunications consulting services. As a consequence, “Upnet was already familiar with new developments in the telecommunications market and particularly with Lithuanian standards, when entering the VoIP market in 2004”, according to Mikael Bjerkeland, Upnet’s Technical Director.

Mr. Bjerkeland admits that it may seem a bit paradoxical that he and his father as Norwegians operate a VoIP company in Lithuania. He cites his father's expertise and personal connections within the Lithuanian telecommunications market as well as the VoIP market's development in this time: *"While there were already about 40 VoIP providers in Norway in 2004 there were only two other companies active in this field in Lithuania."*

Services offered

On the "VoIP Providers List" directory, Upnet describes its offering as follows: *"Upnet Taide is providing cheap, high quality telephony for Lithuanian households and companies. Our service is based on IP telephony, which means that our customers' calls are routed over the Internet, rather than over the traditional telephone network. This enables us to offer our customers a variety of additional services while ensuring that our calls are cheaper than those of other telecommunication companies. Product types range from calling cards to direct IP telephony to your location."*

Mr. Bjerkeland explains: *"The service offering of Upnet consists mainly of three components: IP telephony and international termination services, dial-in services and VoIP solutions and related products."*

IP telephony and international termination: Upnet utilises VoIP to route telephone calls over the internet to their final destination. This way, as Mr. Bjerkeland explains, Upnet is able to offer international calls at competitive prices. The company offers these services as a wholesaler to other VoIP-based telephony providers, but also directly to businesses and private customers. However, Mr. Bjerkeland stresses that *"selling IP telephony services to end-users is difficult given relatively low internet penetration in Lithuania"* and explains: *"Using a conventional IP telephony solution requires a connection to the internet, ideally via broadband. But Broadband users outside bigger cities are hard to find in Lithuania."*

Call-in services: *"Even users that are not connected to the internet can profit from cost savings by VoIP by subscribing to Upnet's call-in service"*, says Mr. Bjerkeland. He explains this service in more detail: *"Upon opening an account at Upnet and transferring credit to it, customers may add personal telephone numbers to a database that we maintain. If they want to use Upnet services, they just have to call a local access number from which they get transferred to the desired destination."* Upnet controls this service by matching the number of the calling telephones against the numbers in the database.

Currently, Upnet runs local access numbers for Lithuania, Norway and Spain. From these countries, customers may reach Upnet's international call service via local telephone connections. The current choice of locations for local access numbers is also due to the fact that Upnet's main customer group is Lithuania's Norwegian community, according to Mr. Bjerkeland. *"Norwegians living here often commute between Lithuania and Norway, and Spain is a popular place for spending holidays."* However, *"Upnet plans to extend the call-in services by implementing local access numbers for countries all over Europe"*, he adds.

VoIP solutions and related products: VoIP connection services are only one part of the company's offer, according to Mr. Bjerkeland: *"Upnet offers tailored VoIP solutions to companies."* He adds: *"We can, for example, deliver complete VoIP call centres based on*

the open source solution Asterisk PBX.” In this regard, Upnet is also a distributor of VoIP equipment (e.g. by ATCOM, a Chinese manufacturer of VoIP hardware). Mr. Bjerkeland expects future growth of this business segment – in line with an increasing number of companies having broadband access in Lithuania.

Outcome, challenges and success factors

Overall, Mr. Bjerkeland is content with the company’s development: *“Today, Upnet has about 170 customers, including private customers and businesses. The actual number of Upnet users can be expected to be even higher as some of the customers are other providers that resell Upnet services”*. Upnet’s 2005 revenue was about 200,000€, according to Mr. Bjerkeland. He expects the company, which employs 6 people, to approach profitability in 2006.

Mr. Bjerkeland mainly identifies two challenges to Upnet’s business model. First, *“the conditions of the Lithuanian telecommunications market are a challenge for every VoIP provider”*. He explains, *“Internet connections, particularly via broadband, are generally expensive and often of low quality”*. He adds: *“Some broadband providers oversell their network capacity by more than 20 times.”* In order to make direct IP telephony services attractive under these conditions as well, the company supplies IP telephony solutions for analogue modems as an option.

Another main challenge, as Mr. Bjerkeland points out, is to win customers without having an extensive marketing budget. In this light, trust and personal recommendations are of utmost importance. He explains: *“In the emerging Lithuanian VoIP market, many providers just buy internet connections from any wholesaler offering unlimited usage and resell them to end users. As a result, many offers provide VoIP connection with insufficient quality of service. Therefore, people are becoming increasingly reluctant to sign up with any provider.”*

Mr. Bjerkeland concludes: *“In order to establish a business that can be successful in the long run, Upnet puts many efforts in assuring high quality of service.”* This leads, for example, to additional costs for providing services over high-quality internet connections. The fact that the majority of Upnet’s customers have repeatedly used the services and reloaded their prepaid accounts is an indicator, according to Mr. Bjerkeland, of the high quality of VoIP services delivered by his company.

However, it is challenging to win customers under these conditions. Thereby, Mr. Vidar Bjerkeland’s relations within the Norwegian community in Lithuania were a good starting point. In order to make the service more popular, the company particularly uses viral marketing (i.e. marketing techniques making use of existing social networks). Personal recommendations, for instance, are rewarded by a discount. In addition, Mr. Bjerkeland explains, one employee is a travelling sales person to win businesses as customers of tailored VoIP solutions offered by Upnet.

Lessons learned

An interesting point illustrated by this case study is that in the evolving VoIP market services do not only include direct IP telephony solutions requiring an internet connection. Indeed, Upnet's most popular service is its “**call-in**” **service**, where VoIP is simply used as a basis for offering telephony services at reasonable prices. Thus, telephony customers may also indirectly benefit from VoIP. Particularly in countries with relatively low internet penetration like Lithuania this type of service seems enticing to customers.

Moreover, the discussion of success factors illustrates that assuring high **quality of service** is crucial for the success of single VoIP providers as well as for the establishment of a VoIP provider market in general. Thereby, the discussion indicated that VoIP services that fail to assure sufficient connection quality might harm the VoIP market as a whole, as potential customers are reluctant to subscribe to these services.

References

Research for this case study was conducted by Andreas Stiehler (Berlecon Research) on behalf of e-Business W@tch. Sources and references used:

- *Interview with Mikael Bjerkeland, Technical Director, Upnet Taide Baltic, April 2006.*
- *Company website: <http://www.upnet.lt/>*

Summary

Although the number of VoIP users as compared to conventional telephone users can still be considered marginal, VoIP already has significant impact on the telephone market. It turned out that VoIP goes beyond Skype. In fact, VoIP services are offered by a large number of companies from various telco segments and related sectors. Telco companies, for example, may use VoIP as an instrument to promote broadband access and as an integral part of so-called triple play offerings.

In fact, almost all companies interviewed for case studies in this report stated that they are offering VoIP services or plan to do so in the near future. In this regard, the opportunities for pure play VoIP providers (often newcomers in the telco market) appear to be limited in the long term.

4.1.4 IPTV and the increasing impact of mobile services

Introduction

There are primarily two general developments discussed with regard to convergence in the telco industry:

- **IP transformation:** Given increased broadband availability at reasonable charges, traditional infrastructure services can be based on the Internet Protocol (IP) and be combined with internet-based services. Recent developments in this area are the delivery of VoIP as well as digital TV and video services over the Internet Protocol, the latter often being referred to as IPTV (see box below).
- **Increasing impact of mobile telco services:** Due to the increasing maturity of wireless technologies, almost all conventional telco services can be provided on a mobile basis. Internet, voice, and entertainment services can be accessed irrespective of time and place via mobile devices.

Whereas developments related to new broadband technologies and VoIP have already been discussed in detail (Sections 4.1.2 and 4.1.3), this section sheds some light on developments related to IPTV and the increasing impact of mobile services.

IPTV: Promises and state of rollout

In the subsequent paragraphs, the terms “IPTV” and “digital TV” are frequently used. For clarity, the following box provides the necessary definitions.

Fact box

Definition: IPTV and Digital TV

Digital TV can be any communication system for broadcasting and receiving moving pictures and sound by means of digital signals, in contrast to analogue signals for traditional TV. Thus, digital TV includes the transmission of digital signals over multiple channels, including satellite, cable, terrestrial and mobile telephone networks.

IPTV is a subset of digital TV. It can be defined as the delivery of digital TV and video content over broadband connections using the Internet Protocol.

Due to the opportunity of IPTV, i.e. the delivery of video content over the internet, TV services are no longer the exclusive domain of TV cable companies and terrestrial broadcasters. Theoretically, TV access can be provided in combination with broadband access by almost all players in the telco market, including incumbents, ISPs and mobile operators. In this regard, IPTV offerings are often discussed as the third pillar of triple play strategies, i.e. the combined offering of telephony, internet and TV services.

Compared to traditional broadcasting, IPTV provides an enhanced service environment (see Exhibit 4-12). Based on the technology, a number of benefits for telecommunication providers and customers alike can be derived. Value propositions of IPTV include:

- **Broader range of content:** IPTV is expected to provide a broader range of combined entertainment, communication and commercial services. Given the nature of the internet, almost unlimited 'digital shelf space' is available for video and music stores, online shops or games. Via the internet, conventional TV offers can be also combined with communication services such as VoIP, conferencing or instant messaging.
- **Interactivity:** While traditional broadcasting is a one-way concept, IPTV allows for interaction between user and provider. Thus, innovative TV approaches can be developed and new advertising channels opened.
- **Personalisation:** Standard features of IPTV can be expected to be electronic programming guides (EPGs), quick channel change, one-touch recording, video-on-demand and time shifting opportunities. IPTV customers may customise TV and entertainment services according to their preferences.⁸⁶

Exhibit 4-12: Comparison of IPTV and broadcast video networks

	IPTV	Broadcast
<i>Type of network</i>	Internet Protocol-based	Broadcast
<i>Type of connection</i>	Point-to-point two-way capacity	Shared one-way capacity
<i>Type of switching</i>	Network	Set-top box
<i>Ability to support an on-demand delivery model</i>	Scalable	Requires network upgrades
<i>Content switchable to consumer</i>	Theoretically unlimited	Bound by total channel count
<i>Number of CPE* providers</i>	Many	Few
<i>DRM system</i>	Open, flexible	Closed, rigid
<i>Content residing on consumer first mile</i>	Only consumer-oriented content	All broadcast content

* CPE = Customer premises equipment, e.g. set-top boxes or modems.

Source: PricewaterhouseCoopers (2005): IP transformation.

Based on these promises, market observers expect a significant growth of IPTV during the next years. One consulting company (Multimedia Research Group) estimates, for instance, that the number of IPTV subscribers worldwide is going to grow from 4.3 million in 2005 to 36.8 million in 2009⁸⁷. The company sees Europe as a leader in this market. In fact, almost all major European telco companies are developing dedicated IPTV offerings, as illustrated in the box below.

⁸⁶ Mastrangelo, Teresa (2006): IPTV: A game changer for the industry. VoIP Magazine, April 13, 2006.

⁸⁷ Research and Markets (2006): The number of IPTV is expected to grow to 36.8 million by 2006. April 21, 2006

Business example

Major telecom players offering IPTV

France Télécom: In 2003 the French incumbent launched MaLigne tv, which currently has a subscriber base of 200,000. The offering includes 200 channels and premium content supplied by Canal+ and TPS. An on-demand video library is also included.

Deutsche Telekom announced to offer IPTV in Germany, Spain and France by mid-2006. Its internet division T-Online announced to broadcast the premier soccer league live via its VDSL network in IPTV format in the Season 2006/2007.

British Telecom: BT's latest offering ('BT Vision') is a hybrid broadband / broadcast service. 30 TV channels are delivered over digital terrestrial airwaves, while broadband lines are used to deliver on-demand content. BT has also announced to include services like instant messaging and video telephony in the close future.

Telecom Italia: Since December 2005, Telecom Italia is offering IPTV via its broadband subsidiary, Alice. While the service was initially rolled out in four Italian cities, availability was extended to 17 cities in January 2006. The basic offering includes sports, movies, shows and news. In order to have access to live events (e.g. football matches), customers have to sign up for premium services. One movie, for instance, costs 3€. Live football matches are available for 4-5€ each, or 11€ a month.

Belgacom: In June 2006, the Belgian telco incumbent Belgacom has announced the commercial launch of its IPTV brand, BelgacomTV. The offer includes all major TV stations as well as pay-per-view and video-on-demand services with more than 300 movies available by March 2006. Subscribers may also watch the Belgian Soccer League: Belgacom has acquired the exclusive broadcasting rights for the competition.

Telefónica: Telefónica de España claims to have signed up 200,000 users to its 'Imagenio' IPTV service. Telefónica first launched Imagenio in Madrid, Alicante and Barcelona in early 2004. The service offers 48 television and 15 audio channels, and is available as a standalone service or as part of a triple play package; it is now available to more than four million households in 140 cities.

Further offerings: Further major players in the European telco market offering IPTV include, Austria Telekom (aonDigital TV), TDC (Denmark, TDC TV), Telia (Sweden, Telia Digital TV) or KPN (The Netherlands, Mine).

Sources: Company websites (i.e. press releases, business reports, presentations), March 2006.

At the first glance, cable operators seem to derive less benefit from this development, as they are confronted with new rivals in their core market. Cable TV providers, however, may also profit from IP transformation by using existing cable networks for the provision of broadband and telephony services. Large cable companies like Cabovisao (Portugal), ONO (Spain) or NTL (UK) already offer TV access, voice and internet services via their

network.⁸⁸ ONO has even leased additional lines from the Spanish telco incumbent Telefónica to offer voice and data services in those regions in Spain where the cable company plans to roll out its own network in the near future.⁸⁹

The increasing impact of mobile services

Another aspect of the discussion about convergence in the telco industry is the increasing impact of wireless technologies. The main value proposition is that users can access conventional telco services irrespective of time and location via mobile devices. This includes all three key segments of telecommunications: Telephony, broadband internet as well as TV and entertainment services.

- **Telephony:** The borders between fixed and mobile telephony are increasingly blurring. Driven by mobile telephony's market saturation, mobile operators have become increasingly aggressive in promoting their services as substitutes for fixed-line telephony. This trend is exemplified by the following business box, which discusses the additional launch of so-called 'Homezone' offers by mobile operators in Germany.

Business example

"Homezone" offers by mobile operators in Germany

*In 1999, mobile carrier **O2 Germany** (then Viag Interkom) was the first operator in Germany to offer so-called 'Homezones': Within a certain area around customers' homes, subscribers can call at rates similar to those offered by fixed-line operators. In addition, customers are provided a 'fixed line' number by which they can be reached within the Homezone.*

*In late 2004, **Vodafone** – the second largest mobile operator with about 179 million subscribers – launched a similar service, followed by **T-Mobile** (86 million customers) in early 2006 ('T-Mobile@home'). In case of T-Mobile, a 100% subsidiary of Deutsche Telekom, the 'T-Mobile@home' offering is even "cannibalising" the fixed-line business of its mother company.*

Sources: Information taken from providers' websites, press releases and reports, March 2006.

- **Internet, particularly broadband:** The capability of mobile phone networks (e.g. UMTS) and fixed wireless access technologies (e.g. Flash-OFDM and WiMAX) to substitute broadband technologies has already been discussed in Section 4.1.2. It was argued that Flash-OFDM and WiMAX may become possible alternatives to stationary technologies such as DSL and cable, particularly in rural areas. Within densely populated regions, UMTS and its further development HSDPA also turned out to be possible alternatives to stationary access technologies.

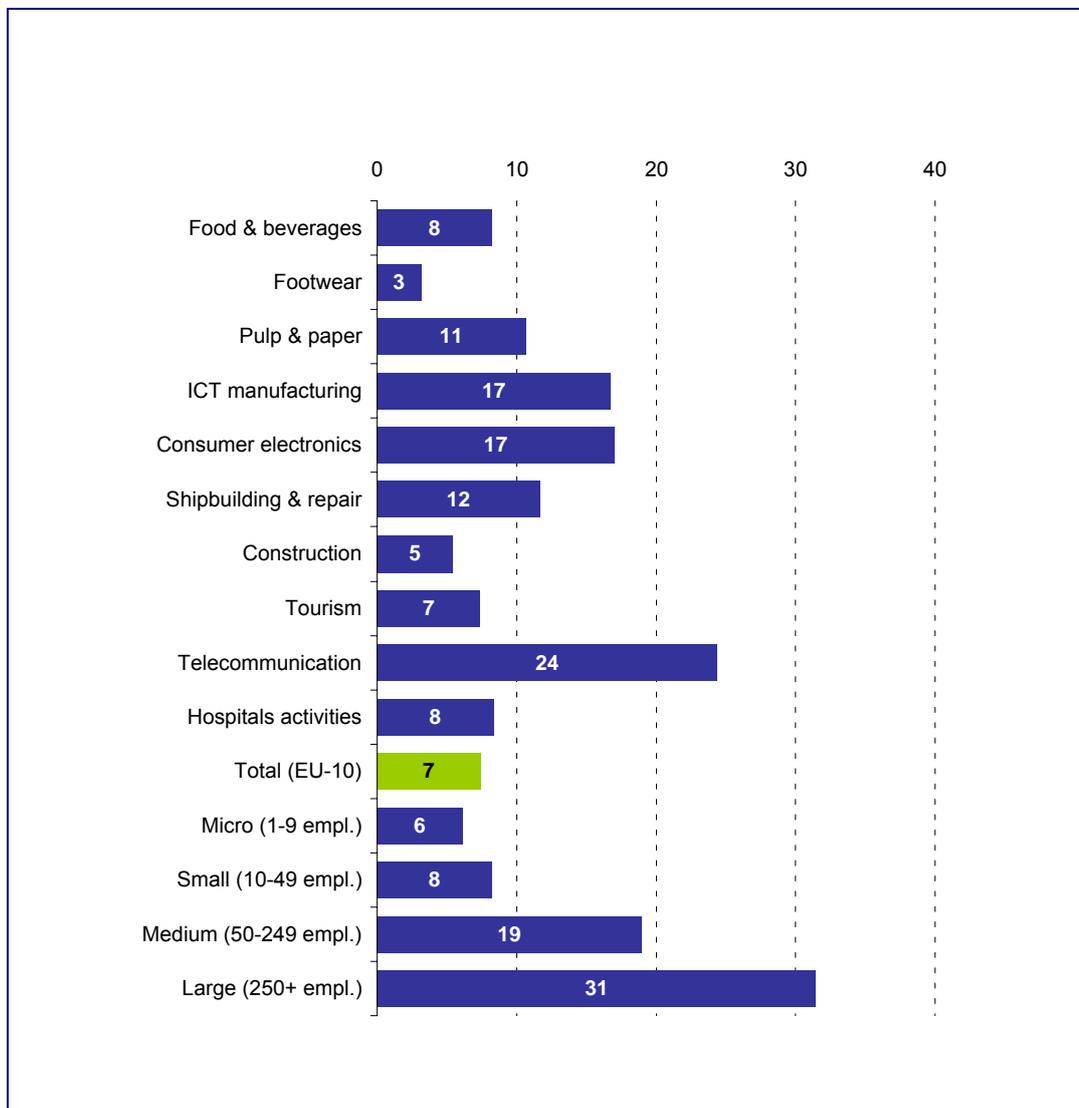
⁸⁸ See also OECD (2003): Broadband and telephony services over cable television networks, DSTI/ICCP/TISP (2003) 1/Final, November 7, 2003.

⁸⁹ MarketWatch (2005): Spain's Ono launches double play on Telefónica lines. June 1, 2006.

However, the 2006 survey findings indicate that current usage of these technologies by businesses in Europe is rather low. In fact, only a marginal share of companies (4%) across the 10 sectors studied in 2006 said that they wireless broadband connections, as indicated in Exhibit 4-5 (see Section 4.1.2). Slightly higher is the share of companies that reported using remote access opportunities via any type of mobile communication networks (7%, see Exhibit 4-13), including broadband technologies such as UMTS as well as mobile networks with limited bandwidths such as GPRS, HSCSD and GSM.

These relatively low adoption rates might also have to do with the fact that the increased importance of mobile solutions is a recent development and extensive usage experiences do not exist. Accordingly, usage shares are higher among those groups which are typical forerunners as regards the use of new e-business technologies, including high-tech industries and larger companies.

Exhibit 4-13: Remote access via mobile communication networks



Base (100%): Companies using computers. N (for sector, EU-10) = 7237.
Weighting: in % of firms. Questionnaire reference: A5*A6c

Source: e-Business W@tch (Survey 2006)

- **TV access and higher value entertainment services:** Mobile entertainment services for the mass market will no longer be limited to the download of ringtones (provided that the promises of various mobile operators become reality). First, increased availability of mobile broadband services (e.g. UMTS, HSDPA) might raise the popularity of mobile music and video download services. Various mobile operators including Telenor (Norway), Vodafone, Hutchison 3 and O2 (all with various branches across Europe), have already launched mobile music stores, where subscribers can download music files directly to their mobile phone (see providers' websites, June 2006).

In addition, mobile TV is currently being discussed as the next growth driver on the mobile market. Mobile TV means that digital television is broadcast over airwaves and received via portable devices such as mobile phones. In fact, several mobile operators have already announced to launch mobile TV services, as illustrated in the following box.

Business example

Mobile TV services in Europe

*Various mobile operators have launched or plan to launch mobile TV offers. Among them is **Virgin Mobile** (UK). In February 2006, Virgin Mobile announced to be the first operator offering its customers digital TV and radio services. The technology is based on technology developed by British Telecom (BT Movio).⁹⁰*

***Telecom Italia Mobile:** Telecom Italia's mobile division announced to launch mobile TV in June 2006. Customers can view 5 TV channels as well as football matches. By the end of 2006, the company plans to cover 75% of the population.⁹¹*

***Deutsche Telekom:** The company's T-Mobile division began to offer digital broadcasts to mobile phones in 2005. Additionally, it is going to show MTV's program and has also acquired the mobile rights to the 2006 football World Cup. It will offer live streaming of 20 matches as part of a package costing 9€ a month.⁹²*

*During 2005 and 2006, the handset manufacturer Nokia in co-operation with mobile operators and media partners runs **various pilots across Europe** to test mobile TV services based on the DVB-H broadcasting standard. Pilots were conducted in **Finland** (with Sonera), **France** (SFR), **Spain** (Telefónica Moviles) and the **UK** (O2).⁹³*

Source: Articles cf. footnotes.

⁹⁰ Virgin Mobile (2006): Virgin Mobile first to offer live digital mobile TV with BT Movio. Press Release, February 14, 2006.

⁹¹ Webster, Philipp (2006): Telecom Italia to launch mobile TV service in June using Samsung handset. Forbes, April 27, 2006.

⁹² Ewing, Jack (2006): Deutsche Telekom turns on the TV. BusinessWeek, March 9, 2006.

⁹³ MobileMonday (2006): Mobile TV set to be very popular, March 12, 2006.

Mobile TV services are currently also discussed with regard to the so-called 'digital dividend'. Digital broadcasting (being roughly six times as efficient as analogue broadcasting) allows for more channels to be carried over fewer frequencies. Cleared spectrum (the "digital dividend") offers opportunities for the rollout of new wireless technologies. Mobile TV would be a possible candidate for the allocation of available bandwidth, as pointed out by Viviane Reding (Member of the European Commission responsible for Information Society and Media) in March 2006: "*In the medium term, as mobile TV takes off, we may need further bandwidth for the new mobile audiovisual services that come on stream. This means we should start serious discussions now about the use of digital dividend for spectrum [...].*"⁹⁴

Ofcom, the UK telecom regulator, already initiated a project ('Digital Dividend Review'), to examine the options arising from the freeing of spectrum as a result of the digital switchover (see box below).

Business example

The Ofcom Digital Dividend Review (DDR)

Ofcom, the regulator for the UK communications industries, has initiated a review process for the allocation of released spectrum to enable innovative uses. The spectrum as currently used by five terrestrial TV channels in Britain (BBC1 and 2, ITV, Channel 4 and five) has been allocated 50 years ago. In the meantime there has been a number of important innovations, among them digital TV. They now necessitate the re-allocation of the high-value long range / high capacity spectrum below 1 GHz. In this regard, Ofcom sees also a need for coordination on the European level.

The cleared spectrum could be used for digital mobile services, wireless broadband and increased coverage for advanced services in rural and remote areas. In order to maximise this "digital dividend", Ofcom intends to direct the free spectrum towards those organisations that could use it to its fullest extent and potential. The regulator estimates that the programme is going to release up to 112Mhz of UHF (ultra high frequency) spectrum for new uses.

Source: Ofcom News Release (2005): The Ofcom Digital Dividend Review, November 17, 2005.

Summary

The discussion of recent convergence trends such as IPTV and the increasing impact of mobile services demonstrates that convergence is happening today and can be expected to have a serious impact on the telco landscape. All trends discussed in this section (and previous ones) concerning convergence contribute to the blurring of lines between traditional business segments – causing significant changes of the industry structure.

In light of recent developments related to convergence, **it seems impossible to predict what the telco services market will look like in the future.** However, one trend can be

⁹⁴ Reding, Viviane (2006): Television is going mobile – and needs a pan European approach. Speech at International CeBIT summit. Hannover, Germany, March 8, 2006.

clearly identified: In an environment where each conventional supplier group in the telco market is able to offer a large set of services, combined service offerings seem to be a natural outcome. This explains the intensive discussion about triple play strategies in this sector. The following section will discuss critical issues related to triple play strategies by telco companies.

4.1.5 Triple play as a consequence of convergence in the telco industry

Necessity of triple play

In light of the convergence issues discussed above, a trend towards triple play offerings (that combine voice, internet and TV services) seems to be a natural consequence. In fact, it seems unlikely that customers are going to accept multiple providers for each single service in the future. This holds particularly true in a converged world where different telco services are complementary: If consumers want to use IPTV or VoIP, for instance, they need sufficient bandwidth. Accordingly, they are more likely to sign up with a provider that can offer all services as a bundle at reasonable charges.

In addition, almost all traditional players in the telco market are required to develop new markets. As already discussed in chapter 2.2.2, this need is driven by the saturation of traditional telco segments and new developments like VoIP. Both trends are likely to increase price pressure. For instance, Evaluateserve, a consultancy, expects European and American fixed-line operators' voice revenue to decline around 40% by 2008⁹⁵. Thus, telco companies must tap additional revenue streams apart from voice. In this regard, exploring opportunities provided by IPTV to open up new revenue sources in digital entertainment appears to be self-evident.

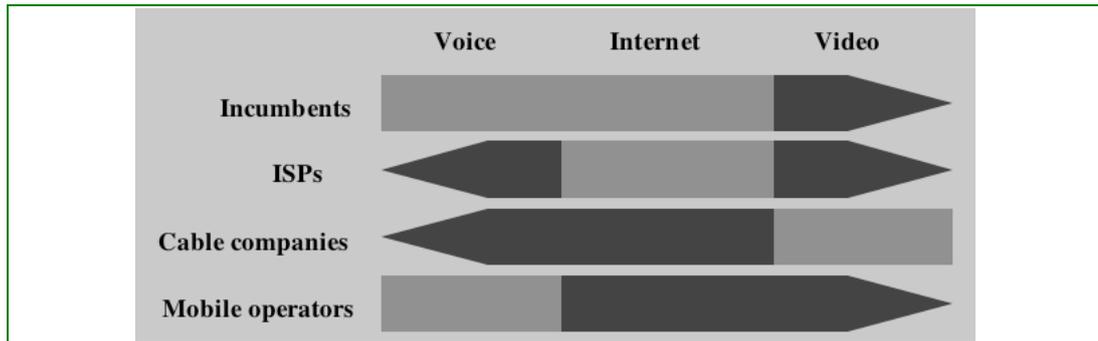
Challenges related to triple play

The launch of triple play offers is challenging as it impacts the entire business culture of telco companies. Lea Ann Champion, an executive at telco company SBC (now AT&T, USA), briefly and pointedly summarised this significant change for her company: *"We're not a telephone company anymore. We're a communications and entertainment company."*⁹⁶

Pursuing triple play strategies, in fact, requires traditional players to enter new market segments (see Exhibit 4-14). Incumbents today, for example, are usually familiar with the delivery of voice and internet access. However, in order to pursue a triple play strategy, they have to gain the necessary knowledge for the distribution of video and TV content. Likewise, TV cable companies must enter the voice and internet market to become serious competitors in the future market for communication.

⁹⁵ The Economist (2006): The meaning of free speech. September 15, 2005.

⁹⁶ The Economist (2005): The war of the wires. July 28, 2006.

Exhibit 4-14: The market for triple play offerings and relevant technologies

Source: Berlecon Research (2006), based on Deutsche Bank Research (2006)⁹⁷

It is obvious that such changes pose considerable challenges. Crucial issues to be addressed include:

- **Technical issues – Dealing with new technology platforms:** Entering new market segments is related to the implementation of new and – up to this point – unknown technologies. It requires investments in terms of financial resources and manpower to implement new technology platforms and acquire the knowledge to run them. In addition, a seamless interplay between the conventional and new platforms has to be assured and new processes (e.g. billing and customer care) implemented in IT. Last but not least, IP based offerings such as IPTV require a stable and secure broadband connection.
- **Business challenges – Winning and collaborating with content partners:** Consolidated communication and entertainment providers need to acquire content for distribution over their networks. As a consequence, telco companies need to enter into new partnerships. One case in point is the recently announced cooperation between British Telecom and Warner Music⁹⁸. The companies have agreed to develop on-demand access to Warner’s music and video library. However, in order to attract such partners, telco companies have to assure the secure distribution of content. This includes the implementation of so-called DRM (Digital Rights Management) or encryption technologies to protect content from copyright infringing use.⁹⁹
- **Organisational changes – management of processes and partners:** Setting up new business models based on triple play is also a major challenge for a company’s organisation. First, offering new services requires the definition of new processes (e.g. for marketing, customer care and billing) and employees to be qualified and familiar with the new services. Moreover, provision of new services affects also the relationships with external partners. The delivery of devices

⁹⁷ Deutsche Bank Research (2006): IT, Telekom & Neue Medien – Am Beginn der technologischen Konvergenz. Research paper, March 30, 2006.

⁹⁸ Warner Music Group (2005): Warner Music UK and BT team up for digital music offerings. Press Release, December 8, 2005.

⁹⁹ Issues related to DRM are discussed in detail in this year’s *e-Business W@tch* report on “ICT and e-Business in the Consumer Electronics Industry” (forthcoming in autumn 2006).

suitable to support the new service offering, for example, has to be assured. Thus, device partners should already be involved in an early stage when new services are planned and should be kept informed about requirements during the delivery process.

Regarding these issues, incumbents should have a good starting position in a converged telco market. First, they are already active players in various telco segments. Moreover, they have the financial resources that are necessary for investments to implement new service platforms. They typically operate extensive broadband networks and accordingly can assure high connection quality. Finally, incumbents typically have established brands and a large customer base, which they can leverage for negotiations with content providers. Similar arguments also hold true for large cable TV like ONO (Spain), NTL (UK) or Cabovisao (Portugal), which also have a network infrastructure, an extensive customer base and considerable market power. In addition, they have established relationships with content providers.

Case study: Triple play in practice

However, triple play strategies are also pursued by other players in the telco market. This is illustrated by the following case study that discusses the triple play approach of a Spanish ISP.

CASE STUDY: TRIPLE PLAY BY GRUPALIA INTERNET S.A. (SPAIN)

Abstract

Grupalia Internet positioned itself as an ISP offering internet services to business customers in Spain in 1999. In 2004, the company entered the consumer market offering broadband internet access. Next, Grupalia Internet added telephony services and – since November 2005 – also access to TV. The bundled offering, which combines Internet, Telephony and TV services, is promoted under the “Superbanda 3” (SB3) brand. The case study provides insights into opportunities and challenges related to the realisation of triple play strategies.

Case study fact sheet

■ Full name of the company:	Grupalia Internet S.A.
■ Location (HQ / main branches):	Madrid (Spain)
■ Sector (main business activity):	Telecommunication Services
■ Year of foundation:	1999
■ No of employees:	2050
■ Turnover in last financial year:	Appr. €20m
■ Primary customers:	Business and private customers in Spain
■ Most significant market area:	Internet, telephony and TV services
■ Main e-business applications studied:	Broadband, converged telco services
■ Key words	broadband, triple play, telephony, IPTV

Background

The combined offering of internet, telephony and TV services is often discussed as a natural consequence of new convergence-driving technologies (e.g. Voice over IP and IPTV) and increasing competition in the telecommunications market. Thereby, the discussion of triple play strategies mainly focuses on incumbents in the telecommunications market. However, this case study illustrates that triple play may also be an appropriate strategy for alternative players in the telecommunications market.

The case study illustrates the triple play approach of Grupalia Internet's, which started as an ISP in 1999 and became one of the first companies in Spain to offer telephony, internet and TV services as a bundle. Furthermore, the case study discusses impacts, challenges and success factors related to this combined offering. It turns out that entering new market segments in light of triple play needs time and requires a step-by-step approach

From ISP to triple player in the telecommunications market

History of Grupalia Internet and Superbanda

In 1999, Grupalia Internet entered the telecommunication market as an Internet Service Provider (ISP) offering internet access and web hosting services for businesses in Spain.

Almost five years later, the company took a first step into the consumer market launching an ADSL service – promoted under the brand “Superbanda”. Ms. Carolina Mesa, Marketing Manager at Grupalia Internet, explains: *“With Superbanda we responded to growing demand of the residential customer sector for broadband internet.”*

In the same year, Grupalia Internet started to build up and run an own optical fibre network. In March 2006, three large cities (Madrid, Barcelona and Valencia) have already been connected. Thus, the company owns 3,000 kilometres of own optical fibre. *“Running our own network is important for Grupalia Internet’s triple play strategy”*, according to Ms. Mesa, *“as the company has to assure high quality of service and security standards when offering IPTV services. The fact that we can stream content over our own network was also important for winning content suppliers as partners for our TV offering.”* (See also discussion of success factors below.)

Following the provision of broadband access, Grupalia Internet extended its product portfolio by reselling telephony services. Since then, telephony services, including local, regional and national calls, were offered together with broadband connectivity for a flat fee under the Superbanda brand. As a final step, Grupalia Internet launched SB3 (Superbanda 3) in November 2005. SB3 is a product bundle combining telephone connection, internet and TV access services.

Ms. Mesa considers the decision to go “step-by-step” as an important factor for the company’s success: *“New services cannot be integrated immediately. First, we have to build up human and technical resources in order to assure that the new services work seamlessly. In addition, each new service raises different customer expectations. In order to make service agreeable to our customers’ preferences, we need time to learn about the features of new services and how they might be used.”*

Superbanda’s offer today and further challenges

Grupalia Internet’s step-by-step approach also explains why the triple play offer looks quite simple and is only available as a complete set in Madrid in March 2006.

As of March 2006, in fact, the SB3 package consists of basic broadband and telephony services, and offers access to about 40 TV channels for people in Madrid. Additional services like video on demand and interactive games, which are often discussed in relation to IPTV offers, are not yet offered. Ms. Mesa explains that *“at the current stage it is important that our new services work seamlessly and are accepted by the customers.”*

However, she adds that the launch of additional IPTV offerings as well as telephony services via VoIP (Voice over Internet Protocol) and mobile phone connections are already planned for 2006. Grupalia Internet also intends to extend IPTV coverage in the close future. Next cities to be covered are, according to Ms. Mesa, Barcelona and Valencia.

Ms. Mesa is convinced that *“affordable prices, transparency and good services quality are of utmost importance for the successful launch of SB3.”* She elaborates on these issues and how Grupalia Internet confronts them:

- **Transparency** means clear presentation of offers and simple price structures that are easy to communicate. According to Ms. Mesa, offers should not include the typical “*small print*”, fees for extra volume and long-term contracts.
- **High quality of service** is a basic requirement, according to Ms. Mesa, to win the confidence of customers and includes both reliable technical and after sales service.
- **Competitive prices** help to overcome clients’ initial reluctance.

In order to find acceptance on the side of the customers, SB3 services are offered for a flat fee and at relatively low prices, according to Ms. Mesa. In addition, the company offers its customers support services 24 hours a day all the week.

This concept already proved to be successful in the past (i.e. before the launch of SB 3): The number of Superbanda subscribers Superbanda has increased from approximately 2,000 in September 2005 to 20,000 in March 2006. “*The fact that more than 60% of our new costumers were gained by references of existing ones confirms the high quality of service offered by Grupalia Internet*”, according to Ms. Mesa.

Major challenges related to the introduction of SB3 and IPTV in particular, as listed by Ms. Mesa, can be summarised as follows:

- **Dealing with perceived complexity of services:** “*Customers are often reluctant to use new technologies as installation is perceived as a complex task*”, she explains. In order to deal with this challenge, Grupalia Internet formed a team of technicians to carry out the initial installation onsite, free of charge.
- **Regional marketing of services:** Grupalia Internet’s IPTV service is currently available only in Madrid, whereas the other services offered (i.e. internet and telephony) can be accessed almost everywhere in Spain. Thus, Grupalia Internet has followed a localised marketing strategy for the promotion of SB3. In this regard, local newspapers turned out as an efficient channel for promotion campaigns, according to Ms. Mesa.
- **Winning content providers:** Access to IPTV and video-on-demand offerings can only be successfully marketed if there is enough content. In order to extend its entertainment offer, Grupalia Internet must seek cooperation with content providers. In this regard, Ms. Mesa points out that “*the content providers’ are primarily concerned about the secure transfer of content from the content provider over Grupalia Internet to the end user.*” According to Ms. Mesa, Grupalia Internet has overcome this challenge by putting much effort into technical verification (e.g. encryption technologies) that ensure data security.

Impact

Although it would be too early to measure the success of SB3’s launch, Mrs. Mesa evaluates the triple play strategy chosen by Grupalia Internet as a success. “*Being one of the first operators offering internet, telephony and TV connection out of one hand, has brought publicity and supported the company’s image as an innovative company and an alternative to services by incumbents.*” Being a forerunner in this field today is also

expected to help staying ahead of competition in the future. “Now, we can learn about how these services are used and which additional services are required.”

The next steps for the extension of the SB3 offer are already prepared, according to Ms. Mesa. “Our final goal is to enrich the connection services with a comprehensive entertainment offering based on IPTV, including interactive services and Video on Demand.” In order to turn this plan into reality, Grupalia Internet is negotiating with a large number of content providers, including producers, distributors and Hollywood studios. A web portal to offer entertainment content to customers has been launched already under the sbplay.com domain.

Lessons learned

The case study illustrates that triple play strategies are a appropriate strategy not only for incumbents in the telecommunications market. In contrast, Grupalia Internet, which started as an ISP just 6 years ago, is one of the first triple play providers in Spain. However, the case study also illustrated that the operation of an own network (at least in the backbone) seems to be important for winning content providers for IPTV services. It may also help to keep the data transmission costs low in the long run.

Challenges and success factors as discussed in this case study mainly deal with problems related to the launch of new technology services. First, proceeding step-by-step turned out to be an appropriate strategy and helped to learn about these services and adapt offers accordingly. In addition, competitive prices and onsite installation services (free of charge) turned out to be helpful to overcome customers' initial reluctance. Finally, high quality of service appeared to be of utmost importance. Particularly for rather new players like Grupalia Internet, that do not have an established brand, references by customers (satisfied with the quality of service) is a major source for building the customer base, as emphasised by the marketing manager of Grupalia.

References

Research for this case study was conducted by Andreas Stiehler (Berlecon Research) on behalf of e-Business W@tch. Sources and references used:

- *Interview with Caroline Mesa, marketing manager at Grupalia Internet S.A., March 2006*
- *Additional information: Material provided by Grupalia Internet*
- *Websites:*
 - Grupalia Internet, <http://www.grupalia.com/>
 - Superbanda, www.superbanda.com
 - Superbanda Entertainment, <http://www.sbplay.com/>

4.1.6 Summary and discussion

The survey findings on the use of convergence-driving technology trends and the discussion of related market developments confirmed that **convergence is no longer a futuristic vision** – it has strong implications for today's market developments in the telco industry and, thus, also for the adoption of e-business technologies in other sectors.

Broadband internet access, for example, which was mainly used by large enterprises only a few years ago, is widespread among consumers and businesses, irrespective of size and sector, today. In fact, on average about two thirds of all companies in Europe reported to use broadband connections. Broadband internet access with DSL as a main driver forms the basis for the use of new telco services like VoIP and IPTV, which are gaining increasing popularity. According to the 2006 survey results, for example, 13% of European businesses reported that they use VoIP. Among large companies with 250 and more employees this share is even at about 20%.

Mobile internet, voice, and TV services are becoming serious alternatives to traditional telco services provided via fixed line networks. However, the 2006 e-Business Survey findings indicate that only a small share of European businesses already uses wireless broadband technologies or mobile solutions for remote access. This can be attributed to the early state of this development. In fact, mobile solutions are already widespread among typical forerunner groups such as companies in high tech industries and large companies today.

The major outcome of these developments is the **blurring of lines between traditional telco segments**. While telco customers may profit from lower prices and advantages from the use of new technology services like VoIP and IPTV, telco companies are facing an increasingly competitive environment. In order to retain customer relationships under these circumstances, triple play strategies are of increasing relevance.

Market developments impact the use of e-business technologies in this sector. Combined offerings, for example, require a seamless interplay of marketing, sales, and billing systems. Thus, application integration is increasingly important in the telco industry. This issue will be further elaborated in Section 4.2 when discussing ICT to support marketing, sales, and customer care.

Addendum: "Bridging the broadband gap"

A central issue, where activities by telco companies impact ICT usage in other industries, relates to the **provision of broadband**. Broadband, as analysed in Section 4.1.2, is an important enabler of innovative applications and services. For example, it accelerates the adoption of services based on VoIP and IPTV, which are often discussed as growth segments in the telco market and are likely to be attractive for consumers (see Chapters 4.1.2 and 4.1.3).

However, while the diffusion of broadband has generally increased during the past years, there are still areas in Europe where broadband penetration is lagging behind. In fact, the EC Communication on "Bridging the broadband gap" has already identified this issue: *"Widespread broadband access is a key condition for the development of modern economies and is an important aspect of the Lisbon agenda. The European Union must*

step up its efforts to encourage take-up of broadband services and stimulate further deployment, in particular in the less developed areas of the Union.”¹⁰⁰

Interestingly, case studies conducted for this report (see Section 4.1.2) suggest that challenges related to broadband roll-out in certain new Member States in Eastern Europe might be rather caused by demand-specific issues than by limited availability of broadband services. In such cases, therefore, it might be necessary to promote not only broadband provision but also general familiarity with the basic concept of the internet and the opportunities it provides. This could, in turn, increase demand for broadband access and services.

In this context, policy could play a role at both the European and national levels. In fact, the above-mentioned EC Communication identifies a detailed list of possible policy instruments in this context. Among them, the **“creation of public services” as an efficient measure to raise broadband demand** in the long-run in regions with low internet penetration should be highlighted (see box below).

Policy example

Creation of public services to stimulate broadband demand

“Fostering the creation of modern public services: All Member States support the development of online public services. In turn, development of innovative services stimulates user demand, which facilitates infrastructure deployment. Development of modern online public services is a powerful instrument to drive broadband demand.

Action: Active policies at Member State and regional level to provide connectivity for public administrations, schools and health centres will create a critical mass of users, whilst stimulating demand by demonstrating benefits of broadband-enabled services. The Commission will take into account the stimulation effect of e-government services in disadvantaged regions in preparing its Action Plan for e-government in 2006.”

Excerpts from the EC’s Communication on “Bridging the broadband gap”. COM (2006)129 final, Brussels, 20 March 2006.

¹⁰⁰ EC (2006): Communication on “Bridging the Broadband Gap”, COM(2006)129 final, Brussels, 20 March 2006.

The main points analysed in this chapter are summarised in the following box.

Incidence and impact of convergence-driving technology developments:

- **Broadband is likely to become a growth driver for both the telco industry and the economy as a whole.** Broadband enables the creation of new and innovative services and may increase ICT users' productivity due to new or extended e-business applications.
- **Broadband connections are already widespread among businesses in Europe with DSL being the main driver of broadband penetration today.** Results of the e-Business Survey 2006 reveal that on average two out of three companies in Europe (in the 10 sectors studied) have broadband access. Significant usage rates are observed for all size bands and sectors. DSL turned out as the most popular access broadband technology. But there is a large variety of other broadband technologies, which may serve as complements or alternatives to DSL.
- **A significant share of European businesses across different industries make use of VoIP,** according to the results of the e-Business Survey 2006. VoIP services are currently offered by a large number of providers from different telco segments. Opportunities for VoIP specialists to survive as independent players seem to be rather limited.
- **An increased relevance of mobile services among businesses in Europe is only partly reflected by the survey findings.** Only a marginal share of companies across the 10 sectors studied in 2006 reported using wireless broadband connections. Today mobile technologies for remote access are primarily used by companies in high-tech industries and among larger firms in Europe.

Triple play:

- Recent convergence-driving technology trends like IPTV and the increased impact of mobile networks lead to **blurring lines between traditional telco segments** and thus are likely to further increase competition in the telco market.
- **So-called "triple play" strategies, i.e. combined offerings of voice, internet and TV services, pursued by telco companies are a natural outcome of these technology developments.** Triple play is both demand-driven as well as a preferred strategy for telco companies to retain customer relationships.
- **Realising triple play strategies poses a large number of challenges.** Critical issues include dealing with new technologies, winning and integrating content partners as well as the adjustment of internal processes and external partnerships.
- **Incumbents and large cable companies are likely to gain a leading position in this development.** However, triple play might be also an appropriate strategy for alternative players, as illustrated by the case study on Grupalia Internet (Spain).

4.2 ICT to support marketing, sales, and customer care

Marketing, sales, and customer care is an e-business key application area in the telco sector. The importance of customer-facing activities has even increased with the trend towards convergence that is ongoing with blurring lines between traditional telco segments. In light of the increased competition, high-quality customer services, and efficient marketing and sales activities are of increasing importance in order to retain customer relationships.

This chapter discusses the usage and impact of ICT and e-business technologies to support marketing, sales, and customer care in the telco industry. First, Section 4.2.1 will highlight main challenges related to sales and marketing in the telco industry and how e-business technologies may help to overcome them. Section 4.2.2 will summarise empirical findings by the e-Business Survey 2006. Section 4.2.3 will present case studies illustrating the use of core e-business applications in this field by telco companies of different sizes and with different business foci. Section 4.2.4 will discuss the use of e-business applications that primarily support telco enterprises' supply chain activities, but are also impacting customer support services. Finally, Section 4.2.5 will summarise main findings of the analysis.

4.2.1 Characteristics of customer-facing activities in the telco industry

Complexity of sell-side activities

Managing customer-facing activities in the telco industry is a complex issue. First, most telco companies are operating on a mass market. Thus, they have to deal with a very extensive customer base characterised by different backgrounds and preferences. At the same time, each customer wants to be treated individually. This challenge is not only relevant for major players in this sector. Also small players (like the telephony reseller *Budget Telecom*; see case study in Section 4.2.3) have to manage a large customer base. The company, in fact, employs only 32 people, while serving more than 100,000 active customers.

Second, there is a large number of activities that impact the sales and marketing success that need to be managed and coordinated. Processes where the marketing and sales departments of telco companies are involved, include core activities like:

- **Design, planning, and implementation of marketing activities,**
- **Management of customer contracts and support activities,** e.g. call centre support or technical support onsite, and
- **Management and coordination of sales and support channels** onsite, including activities by own sales shops and sales force as well as by resellers and franchise shops.

Other processes with an impact on the success of customer-facing activities and where marketing and sales departments of telco companies are involved include:

- **Billing and invoicing:** The reliability and comfort of the billing process as well as the capability to answer inquiries related to invoices are crucial for retaining customer relationships in the telco industry. Invoices are also used by many telco companies for communication, i.e. to promote new services to customers.
- **Supply chain management:** Telco services are typically offered in combination with complementary products and services such as telecommunication equipment and content services. Thus, sales success also depends on the fast and reliable delivery of these products. The collaboration with supply chain partners is essential to achieve this goal.
- **Product development:** The development of combined service offerings requires collaboration between marketing and sales departments, product development as well as device manufacturers and content partners.

Third, marketing and sales departments of telco companies have to deal with a large variety of services and products that need to be combined and promoted in a way that is in line with the preferences of heterogeneous customer groups.

Driven by convergence processes (see Chapter 4.1), the range of products and services supplied by single telco companies is even likely to increase in the future. While in the past many telco companies focused on the provision of either voice, internet or TV access services, triple play offers (i.e. the combined provision of all of these services) are likely to prevail in the future. Moreover, services by telco companies are often complemented with products of related sectors such as telecommunication hardware and content services. Thus, marketing and sales strategies of telco companies have to be coordinated with those of their suppliers.

Means of ICT to support marketing, sales and customer care

As indicated by the statistical findings presented in section 3.6 and summarised in section 4.2.2, ICT and e-business technologies play an important role in overcoming challenges related to customer-facing activities in the telco industry. e-Business technologies that support these processes include:

- **The internet as a channel for marketing, sales, and customer care:** Particularly smaller niche players in this sector (that do not have an extensive company network or retail stores) may use the internet as their primary channel to reach a worldwide clientele at low cost. Accordingly, more than three quarters of all telco companies reported having a company website (see Section 4.2.2). The case study on *Budget Telecom* in Section 4.2.3 illustrates the manifold opportunities for simple product websites. They can be used, for instance, as a basis for customer-related services and the automation of sales and billing processes.
- **CRM systems:** Operating on mass markets requires dealing with huge amounts of customer data. The data is needed to plan and analyse marketing campaigns as well as to support sales and customer care activities. ICT and e-business technologies may help to record, process, and present the data for the specific

needs of telco companies in a fast and efficient way. Accordingly, four out of ten telco companies reported that they use a CRM system (see Chapter 3.6). The case studies on the implementation and use of CRM systems (Section 4.2.3) illustrate the central importance of these applications for the quality of customer services.

- **ICT to support billing and invoicing:** Billing and invoicing services are directly impacting sales and marketing success of telco companies and, thus, cannot be separated from other customer services. ICT, first, helps to organise billing and invoicing processes in an efficient way. Moreover, the capability of billing systems to support different billing models is also an important competitive factor in this sector. In addition, sending invoices via the internet (e-invoices) may generate cost savings and increase the quality of customer services. Accordingly, about 30% of telco companies said that they send invoices electronically (see Chapter 3.6). The capability of billing systems to improve the quality of customer service is also illustrated by the case study on *Budget Telecom* (Section 4.2.3), that offers a “real time billing” service via its website.
- **e-Business tools for the integration of external partners (suppliers):** ICT and e-business technologies also play a role in supporting the collaboration with external partners. More than one third of telco companies, for example, reported using online tools for sharing documents (see Chapter 3.6). As discussed in the paragraphs above, telco services are often offered in combination with equipment and content services. E-business platforms like the Greek e-marketplace *cosmoONE* (see case study on *COSMOTE* in Section 4.2.4) may help to support the exchange of information between telco companies and supply chain partners, including suppliers of telco equipment on the one side and resellers of telco services on the other. Similarly, Supply Chain Management (SCM) and logistics applications may help to collect and analyse data that are relevant for optimising the delivery of products and services.

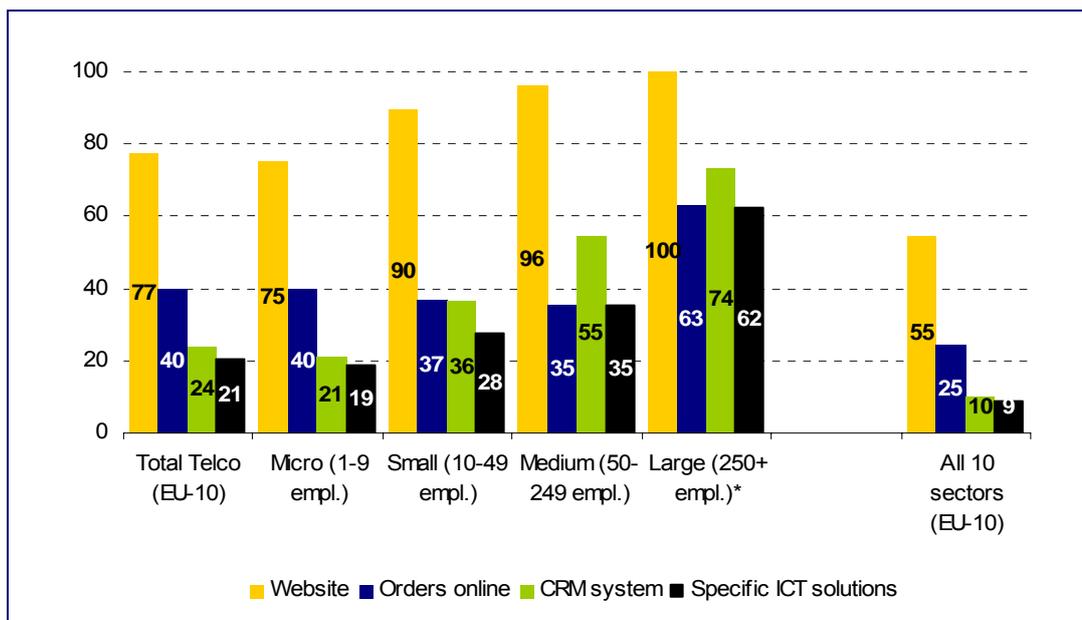
The e-business means listed above will be examined in more detail in the quantitative and qualitative analyses in the following sections.

4.2.2 Survey findings: ICT to support customer-facing activities

The overall picture: summary of survey results presented in Chapter 3

The discussion in the previous section leads to the expectation that telco companies make intensive use of e-business technologies to support customer-facing activities. Results of the e-Business Survey 2006 confirm this hypothesis (see also discussion in Chapter 3). Deployment ratios for basic customer-facing e-business applications such as company websites or tools supporting ordering and e-invoicing are significantly more widespread in the telco sector than across all sectors studied. About three fourths of micro enterprises and more than 90% of small, medium-sized and large companies in the telco sector reported having a company website, which often serves as a basis for the provision of customer services (see Exhibit 4-15). Almost one third of telco companies said that they send e-invoices to the private sector – more than twice as much as on average in all 10 sectors studied this year (see Exhibit 4-16).

Exhibit 4-15: Use of (basic) ICT applications to support customer-facing activities



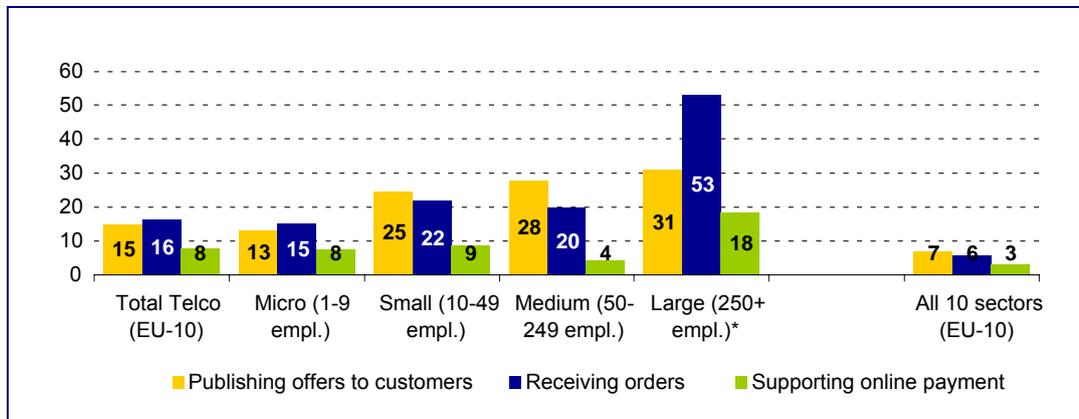
Base (100%): Companies using computers / with internet access. N (for sector, EU-10) = 829/ 824.
Weighting: in % of firms. * Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

Although more advanced ICT applications such as CRM systems are relatively less widespread, usage shares are still above the average of all 10 sectors studied by the in 2006 by the e-Business W@tch. One of five telco companies, for example, reported using specific ICT solutions to support marketing and sales processes, e.g. for publishing offers to customers (15%), receiving orders (16%) or supporting online payments (8%). These shares are more than twice as much than on average in all sectors studied this year (see Exhibit 4-16). Finally, even tools that have only indirect impact on the marketing and sales success, e.g. by supporting the information exchange between supply chain

partners, are generally more widespread in the telco industry than in most other sectors studied (see Exhibit 4-17).

Exhibit 4-16: Use of specific ICT solutions to support marketing and sales activities



Base (100%): Companies using computers / with internet access. N (for sector, EU-10) = 829 / 824.
 Weighting: in % of firms. * Data only indicative due to low number of observations (N ~ 25-50).

Source: *e-Business W@tch* (Survey 2006)

Size-specific differences and the use of CRM systems

Size-class specific differences in the deployment shares particularly appear for the use of rather advanced e-business tools such as CRM systems or specific ICT solutions in this field. This has also to do with the complexity of these technologies. Regarding the use of CRM systems, for example, the 2004 report on ICT key issues in the combined ICT services sector¹⁰¹ already concluded: *“Customer Relationship Management (CRM) systems have a clear relevance for ICT services companies, especially for telecommunications services and software vendors. However, largely due to the high cost of implementing these solutions, up until now only large companies have had access to these e-business applications, and even major players have experienced difficulties in implementing them”*.¹⁰² The new survey results partly confirm this statement: The diffusion of CRM systems in the telco sector increases almost linear with the company size.

However, it should be also taken into account that – despite its complexity – every fifth micro company, every third small, and every second medium-sized company in this sector reported using a CRM system. In fact, it is rather the relatively wide diffusion of (customer-facing) e-business tools among smaller enterprises that distinguishes the telco sector from other industries studied. In addition, some value propositions attributed to complex CRM systems may also be realised by rather simple e-business applications (see case study on Budget Telecom in Section 4.2.3). Therefore, the at the first glance seemingly low usage numbers related to the use of CRM systems, particularly among small enterprises in this sector, should no be overvalued.

¹⁰¹ *e-Business W@tch* (2004): “Electronic Business in the ICT services sector”, Sector Impact Study Nr.08-II, pp. 20-23, November 2004 (<http://www.ebusiness-watch.org/>).

¹⁰² *e-Business W@tch* (2004): “Electronic Business in the ICT services sector”, Sector Impact Study Nr.08-II, p. 20, November 2004 (<http://www.ebusiness-watch.org/>).

Exhibit 4-17: ICT support of customer facing activities (summary of survey results)

	Total Telco (EU-10)	Micro	Small	Medium	Large	All sectors (EU-10)
Basic customer-facing e-business tools						
Website	77	75	90	96	100*	55
Accepting orders online	40	40	37	35	63*	25
Sending e-invoices	30	29	43	32	36*	13
Core applications to support marketing and sales processes						
CRM systems	24	21	36	55	74*	18
Specific ICT solutions for marketing and sales	21	19	28	35	62*	9
Integration of customers	8	7	11	16	6*	5
Use of ICT with indirect impact on marketing and sales success						
Placing orders online	77	77	80	77	84*	48
Integration of suppliers	12	12	15	19	29*	8
Online tools for... ... sharing documents	36	34	50	57	46*	14
... collaborative demand planning	23	22	28	26	26*	11
... collaborative design	19	19	21	25	21*	7
Weighting: in % of firms. * Data only indicative due to low number of observations (N ~ 25-50).						

Source: e-Business W@tch (2006)

4.2.3 ICT support of marketing, sales and customer care in practice

This section includes three case studies that provide insights into the use of core e-business applications to support marketing and sales activities in the telco sector and discuss related opportunities and challenges. The case studies illustrate how telco companies use ICT and the internet in this field from very different angles. In fact, the three companies interviewed differ in terms of company size and business-focus and, thus, have distinct approaches to ICT adoption to support customer-facing activities.

The first case study on *Budget Telecom* illustrates how the small French telco service reseller embraces the internet and uses relatively simple e-business tools to build a worldwide customer base. The second case study focuses on the implementation of a new billing and CRM system by *Brutélé*, a medium-sized Belgium cable provider. The case study illustrates the importance of integrated enterprise solutions as a basis for the provision of customer services. Finally, the case study on *Swisscom Mobile*, a leading mobile operator in Switzerland, presents the use of CRM systems to support and streamline the provision of customer services and the development of new products from the perspective of a large incumbent telco enterprise.

CASE STUDY: USE OF THE WEB AS MARKETING AND SALES CHANNEL BY BUDGET TELECOM (FRANCE)

Abstract

Budget Telecom is a small French telephony service provider that offers low-cost telephony connection services to worldwide customers. The company's business model is almost entirely based on the internet that is used as a low-cost channel for acquisition and marketing activities. The increase in customers, revenue and profits confirm the success of this strategy. Therefore, the case study is an illustrative example of how small companies can use simple e-business technologies to establish a visible brand and reach customers on a global scale.

Case study fact sheet

■ Full name of the company:	Budget Telecom
■ Location (HQ / main branches):	Montpellier (France)
■ Sector (main business activity):	Telephony services
■ Year of foundation:	1999
■ Turnover in last financial year:	€14m
■ No of employees	33
■ Primary customers:	Private customers worldwide
■ Most significant market area:	France
■ Main e-business applications studied:	IT usage for marketing, sales and customer care
■ Key words:	company websites, online selling, CRM systems

Background and objectives

Budget Telecom was founded in 1999 as an internet start-up maintaining a website with information on the availability of telecommunication services. In 2000, the company entered the telecommunications market as a 'virtual network operator' (VNO) offering low-cost phone services to customers worldwide. As a VNO, Budget Telecom buys telephony minutes from network operators and resells them to customers worldwide. The company routes phone calls over wholesale operators' networks so that connections can be offered at competitive prices. By early 2006, the company globally served approximately 100,000 active customers, i.e. customers that use the service at least once a month. About 10% of the customer base is made up of businesses.

According to José Caballero, Marketing Manager at Budget Telecom, the internet plays a central role for the company's business model: "We use the internet as a channel for acquiring customers and for customer relationship management (CRM). It forms the basis for innovative service offerings and marketing activities alike. This way, we can ensure efficient processes and keep our costs fairly low, which is a precondition to establish as a low-cost telephone provider".

Use of the internet to support marketing, sales and customer care

Websites to support global niche strategies

Various websites operated by Budget Telecom are the basis for the company's web marketing and sales strategy, which Mr. Caballero briefly summarises as *"Think global, act local"*. He explains: *"Budget Telecom serves customers in niche markets worldwide. But as a relatively small company employing 32 people, we do not have the potential to physically reach all target groups"*.

In order to reach their (potential) customers, Budget Telecom operates different websites, including:

- *Gsm2world.com*, that is directed at the supply of mobile phone connections via the GSM network to customers worldwide;
- *Expat-Telecom.com* for targeting French, Spanish and British expatriates worldwide;
- *Losminutos.com*, *deminuten.be*, *lesminutes.com* and *iminuti.com* for targeting customers in Spain, Belgium, France and Italy, respectively;
- *Callshop-france.com* and *Callshop-world.com* for targeting 'call shops' (i.e. businesses that physically provide phones for making long distance calls) in France and worldwide.

Mr. Caballero points out that each niche group has to be targeted individually. Therefore all websites feature different designs and provide different types of services. In this regard he stresses: *"Although our websites appear differently to different target groups, they are operated on the same technical basis. Thus, operation and maintenance cost can be kept to a minimum."*

Websites as basis for customer services

Mr. Caballero underlines the importance of additional web-based features complementing the telephony services offered by the company. He explains: *"Five years ago it was easy to establish as a low-cost provider of telephone services. Since then, the market has become highly competitive with an increasing number of providers in this segment. This makes it more difficult to attract customers simply with low-cost offerings."* To differentiate from its competitors, Budget Telecom offers additional features via its websites that make the usage of telephony services more comfortable and derive additional value from them. Advanced web features offered by Budget Telecom include:

- **Instant account activation:** An online tool supports swift registration in order to allow customers to immediately use the services;
- **Online account management:** Customers may use this function to check contract data online;
- **Real time billing:** Customers can check billing accounts and call details in real time;

- **Automatic recharging:** Prepaid accounts that are below a minimum defined by the customer are automatically recharged.

Mr. Caballero stresses that *“the provision of customer services has helped Budget Telecom create an image as an innovative company.”* However, he admits that *“Although we were a forerunner when launching our services, many of them are now offered by our competitors as well.”* The fact that competitors can easily emulate successful services can be regarded as a main challenge in Budget Telecom’s business. Therefore, Mr. Caballero stresses: *“In order to remain successful we have to be fast in developing new and innovative services.”*

Web-based services can be promoted by ‘viral marketing’ (i.e. marketing techniques making use of existing social networks), according to Mr. Caballero. Customers of Budget Telecom, for instance, may trial telephony services for free and –supported by a web form– tell friends about it. He stresses that personal recommendations are of particular importance for virtual service providers like Budget Telecom. Also, trustworthiness has a strong impact on business success. *“A significant share of our customers were gained by recommendations from friends”*, Mr. Caballero says.

Internet for customer relationship management

Budget Telecom also uses its websites as a basis for customer relationship management. Since the majority of Budget Telecom’s customers use online services (e.g. for registration), customer data can be easily stored and processed in real time. Mr. Caballero explains: *“Our technicians have programmed applications with a web interface that allows employees that are in charge of customer care to access the necessary data.”* Mr. Caballero himself uses such applications for compiling statistics, which he needs for planning, tracking and analysing marketing campaigns. *Thus*, he concludes, *“Budget Telecom uses the web as a powerful and efficient CRM tool.”*

Impact, challenges and success factors

Budget Telecom’s web strategy has paid out, according to Mr. Caballero. The number of active customer has significantly increased from less than 1,000 (at the end of 2000) to about 100,000 in April 2006. Between 2004 and 2005, the number of customers increased from about 42,000 to 70,000. Revenue has grown by about 40% (from ca. €10m to ca. €14m) and net profit by about 30% (from ca. €1.8m to €3.2m).

Efficient use of the internet has certainly contributed to this success, according to Mr. Caballero. *“First”*, he summarises, *“the internet provides us with proximity to our customers in niche markets worldwide – after all, we are just one click away. Second, web marketing is less costly than marketing via offline channels.”*

However, in order to ensure the company’s further growth, Budget Telecom will have to increasingly focus on less internet-savvy customers, Mr. Caballero stresses. Thus, a future challenge will be to combine offline and online campaigns in an efficient way. This means to increase the use of conventional marketing channels, such as newspaper advertisement, as well as to develop services specifically attractive to less internet-savvy users.

Lessons learned

The use of web marketing strategies by Budget Telecom may be regarded as a good practice illustrating the manifold opportunities of the internet as an economical marketing and sales channel with a global reach. Particularly small companies that do not have an established brand and extensive marketing budgets may profit from these opportunities. Budget Telecom, in fact, has been able to build an extensive customer base from niche markets worldwide with only 32 employees.

However, business models relying almost entirely on the internet also pose challenges. Competitors can easily emulate service offerings and innovative concepts because they are all very transparent. In addition, the potential customer base is limited to people familiar with the internet. Thus the future success of internet-based companies like Budget Telecom will significantly depend on the company's ability to quickly react to current market developments and to communicate their services to less internet-savvy customers as well.

References

Research for this case study was conducted by Andreas Stiehler (Berlecon Research) on behalf of e-Business W@tch. Sources and references used:

- *Interview with José Caballero, Marketing Manager at Budget Telecom, March 2006.*
 - *Information material provided by Budget Telecom*
 - *Company website: www.budget-telecom.com*
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CASE STUDY: BRUTÉLÉ (BELGIUM) SUPPORTS CUSTOMER-CENTRIC STRATEGY BY NEW CRM AND INVOICING SYSTEM

Abstract

Since its market entry in 1968, the Belgium TV cable company Brutélé managed to continuously expand its range of services and to increase the number of customers. In order to ensure high-quality customer service for the larger number of customers and the broader range of telco services provided, the company installed a new CRM and invoicing system in 2003. The integrated solution provides customer care agents with complete customer profiles, which enable the provision of efficient consulting as well as technical and invoicing services.

Case study fact sheet

■ Full name of the company:	Brutélé
■ Location (HQ / main branches):	Brussels (Belgium)
■ Sector (main business activity):	Telecommunication services
■ Year of foundation:	1968
■ Turnover in last financial year:	53.6 million euros
■ Number of employees:	200
■ Primary customers:	Cable TV and broadband users (B2C and B2B)
■ Most significant market area:	Brussels and the Walloon region in Belgium
■ Main e-business applications studied:	CRM systems
■ Key words:	CRM, invoicing, integration, customer services

Background and objectives

Brutélé is currently one of the leading TV cable and broadband access providers within Belgium's French-speaking population. The company, which entered the market as a TV access provider for one Brussels municipality in 1968, serves about 300,000 households subscribing to TV access services. As of August 2006, the company's presence covers 6 Brussels municipalities and 22 municipalities in the Walloon region. Since 1999, the company offers broadband access over its own network and managed to win around 50,000 customers in this field. As a side business, the company also leases lines to other (virtual) telecommunication services providers in Belgium. Finally, it started to offer telephony services over its own network in September 2006.

One third of Brutélé's customer base are Brussels residents with the other two thirds from the Wallonia region. The customer base comprises approximately 90% residential and 10% business customers. The company operates four business centres, seven regional offices, and three call centres as main sales and customer support channels.

"The provision of efficient customer service is a central component of our business model", says Mr. Adant, General Manager of Brutélé. He further explains: "Competition in the Belgian cable TV industry is fierce, particularly in Brussels and Wallonia, which are targeted by ten different cable TV companies. In addition, competition comes from the

Belgian telecom incumbent Belgacom, which started to offer TV services in 2005. Thus, in order to provide high-quality customer service, including consulting, technical and invoicing services, it is particularly important to retain customer relationships and, as a result, to stay competitive in this converging and consolidating market.”

“Technology is a critical factor in Brut  l  ’s CRM strategy”, according to Mr. Adant. In order to provide professional customer service, CRM and billing systems should be able to integrate all relevant customer information, provide for seamless interplay with other applications used within the company, and support different service plans. “During the past years”, Mr. Adant explains, “the requirements for the technical infrastructure have significantly increased due the growing number of customers and the huge variety of services provided. The implementation of the new mySAP CRM system and mySAP IS-Utilities (IS-U) in 2003 was a major step to respond to these challenges.”

Choice and implementation of the solution

Initial situation

Before the installation of the new CRM and invoicing system, the company supported contact and invoice management using a software solution developed by the Canadian company Proxima. However, this software solution was no longer able to meet the high requirements for the provision of customer service, given the increasing number of customers and the variety of services provided.

Mr. Adant explains: *“First, the Proxima solution was integrated with other in-house applications only to limited degree. This made the provision of high-quality customer services – which require a complete customer view – almost impossible. The invoicing system, for example, used two different databases: One for the invoicing of cable TV and one for billing internet services. And it was not possible to combine them.”*

“Additionally”, he adds, “the software provider faced financial difficulties, which resulted in their failure to provide efficient support and regular upgrades to keep the system up-to-date.” In fact, Proxima filed for bankruptcy in 2002. For Brut  l  , this was the starting point to look for a new integrated solution to manage customer service and invoicing.

Choice of the solution

With lessons learned from problems with the Proxima solution, the company searched for an integrated solution that should assure seamless interplay between CRM, invoicing and other in-house applications. Mr. Adant explains: *“Our first priority was to replace the billing system by a modern solution that is based on a single open platform, allowing for the interplay with other customer-centric applications.”* In order to avoid large amounts of customisation work, this solution should come from a financially solid software developer with a large application portfolio and support capacities.

Mr. Adant adds: *“The choice for SAP was also supported by the fact that SAP R/3, a solution to support finance and accounting processes, had already been installed. Thus, all customer service-related processes can be seamlessly integrated. This includes call and contact management, service activation, invoicing across our three call centres and four business service centers.”*

Challenges during the implementation period

In February 2003, the project started with the implementation blueprint, i.e. by working out a detailed roadmap for the implementation, including the definition of all technical requirements and processes involved. In June 2003, the actual implementation started. The system went live in January 2004, first with applications for invoicing and making appointments for technical services – the main features needed by Brutélé. Later on, other CRM features were added.

Mr. Adant compares the process of launching the system to a ‘Big Bang’: *“We had to migrate from one software solution to another virtually overnight and thus encountered a lot of difficulties.”* Employees initially had problems handling the new applications. This was even more complicated as the system was not stable at that time. *“There was no opportunity for extensive software test runs since the invoicing system is a central element of Brutélé’s operational business. Thus, data had to be moved from one system to the other very quickly.”*

“Making employees familiar with the system, while at the same time assuring the delivery of high-quality customer services – even during implementation – was a critical challenge”, Mr. Adant recalls. Indeed, the company offered advance training, but it had to take into account that employees were heavily involved in their operational work. *“Balancing current workload and training within the very short project timeframe was close to impossible.”* Based on these experiences, Mr. Adant recommends to schedule enough time for change management activities. In addition, he emphasises: *“Clear commitment by the company’s management and their presence are essential to overcome main difficulties related to large IT projects like the installation of the new billing and CRM system at Brutélé”.*

Better customer service as main benefit

“The principal advantage of the new integrated system is that all customer-centric information is stored in a single database. This includes contractual data and information concerning payment history, customer interactions and inquiries”, Mr. Adant says and elaborates: *“Even mail traffic is scanned and attached to the customer file in the database. This is possible because the database has open interfaces and thus can be integrated with other company applications such as scanning tools.”*

In this way, the project’s primary goal – the optimal support of high-quality customer services – could be met, according to Mr. Adant. *“Via a direct link, customer service representatives get immediate access to information stored in the central database to have a complete customer profile, which is the basis for efficiently handling customer inquiries”.* In addition, increased quality of services can be achieved by integrating the database with the call centres’ IVR (Interactive Voice Response) systems: Requests by customers are automatically linked with the respective information retrieved from the database. Notes are then processed to the respective customer care agent in the call centre. Mr. Adant explains the advantage: *“The customer care agent is instantaneously informed about individual customers and their problems. He can greet the client in a personal tone and has all necessary information available to solve the problem in short time.”*

Finally, the integrated billing system allows for more flexibility when handling invoices. *“With the new systems, different invoicing schemes and accounts can be managed”*, Mr. Adant says, adding: *“With the old system, invoices for business customers had to be prepared individually, since volume-based billing was not supported.”* Another advantage of the new system is that invoices can be sent to customers at any time. In contrast, with the old system all invoices could only be processed and mailed at the end of the month, resulting in a significant increase in call volume and customer waiting times during that time. *“Now, Brutélé issues payment requests throughout the month”*, Mr. Adant concludes.

Rol calculation

The CRM consultancy Peppers & Rogers Group attempted to quantify costs and benefits in order to calculate the Return on Investment (RoI) for the IT investment through 2008.¹⁰³ Based on his experiences, Mr. Adant confirms the correctness of these calculations, although he emphasises: *“Our primary goal was to improve customer service in order to retain competitiveness, rather than to directly improve the company’s financial results.”*

According to Peppers & Rogers’ calculation, total costs of the project through 2008 amount to €3.2m. This includes costs for consulting (59%), operating costs (30%), hardware expenses (8%), licensing and software (3%). The solution’s total benefits, as calculated by the consultancy, amount to €5.57m. This number is composed of the following estimates by Peppers & Rogers:

- **Productivity gains in customer service centers amount to about €3.5m**, due to decreased costs per case since the business services centers are working with a single customer profile.
- **Productivity gains for desktop support call amounts to about €1.4m**, since integrated customer profiles help support staff to more efficiently access technical information and better handle inquiries.
- **Cost savings through reduced payment cycles and more accurate billing amount to about €0.4million**, generated by a more balanced billing process and more timely invoicing.

The total net cash thus amounts to about €2.4million, resulting in an IRR (Internal Return Rate) of 26% through 2008.¹⁰⁴

Lessons learned

The Brutélé case illustrates that integrated CRM and billing systems are required for the provision of high-quality customer services in the telecommunication industry. Indeed, customers are expecting to be served efficiently and individually when having a request. Assuring a high quality of service requires customer service representatives to have access to complete customer information. In light of the increasing range of services

¹⁰³ The analysis has been published in the consultancy’s CRM ROI Review, Volume 4, Nr. 2, December 2005.

¹⁰⁴ The methodology of Peppers & Rogers Group’s CRM calculation is described in more detail in their journal “CRM ROI Review”, see References.

provided by telco companies, this is a challenging task. Accordingly, Mr. Adant named the collection of all relevant customer information in one common data base, which is integrated with the CRM and billing system as well as with other in-house applications, the IT project's main advantage.

The case study also illustrated typical requirements for suppliers of CRM and billing software. Financial stability, a broad range of applications, and capabilities to continuously deliver upgrades in order to keep the system up-to-date turned out as critical criteria for the choice of the supplier. This might also explain to some extent the increasing concentration in the enterprise software market. Smaller independent suppliers of enterprise software are often not able to fulfill these requirements.

Finally, the case study discussed also challenges related to the implementation of new core systems like CRM and billing solutions. Indeed, training helps to get employees familiar with the new applications. However, employees are heavily involved in the operational business and, thus, lack time to participate the courses offered. Particularly, small and medium-sized companies like Brutélé, which typically have less time and personal resources than their large competitors, are challenged to find a balance between current workloads and training required.

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Research for this case study was conducted by Andreas Stiehler (Berlecon Research) on behalf of e-Business W@tch. Sources and references used:

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CASE STUDY: ICT-BASED CUSTOMER RELATIONSHIP MANAGEMENT AT SWISSCOM MOBILE

Abstract

Swisscom Mobile is market leader in the mobile communication market in Switzerland. In 2002, the company started to implement a new CRM system, which integrates the applications needed for the provision of customer services and sales activities. The system also connects the different distribution and support channels via a common modular platform. The case study illustrates the requirements for CRM systems by large telco firms that have to deal with an extensive number of applications needed to support customer care and sales activities at different customer touch points. It turns out that by integrating marketing and sales applications into one modular CRM platform, the time-to-market for the launch of new products and services can be significantly reduced. However, the integration of a new CRM system into an existing complex ICT environment is a long-term project, which is best carried out step by step.

Case study fact sheet

■ Full name of the company:	Swisscom Mobile AG
■ Location (HQ / main branches):	Berne (Switzerland)
■ Sector (main business activity):	Telecommunications (mobile voice and data)
■ Year of foundation:	Since 2001 as independent business unit (mobile operations of mother company Swisscom date back to 1958)
■ Turnover in last financial year:	€2.4bn.
■ Number of employees:	3.000
■ Primary customers:	Mobile voice and data users (businesses and consumers)
■ Most significant market area:	Switzerland
■ Main e-business applications studied:	Use of CRM systems
■ Key words:	CRM, system integration, EAI, company website, customer support

Background and objectives

Company background and customer care organization

Swisscom Mobile AG is the leading mobile operator in Switzerland with about 66% market share in 2006 (according to company information). The company is part of the incumbent Swisscom Group telecom holding, which owns 75% of Swisscom Mobile's stocks. Vodafone, the global mobile operator and a strategic partner, holds the remaining 25%. Swisscom Mobile, which employs about 3,000 persons, serves more than 4 million customers.

Markus Wilhelm, Head of Customer Care at Swisscom Mobile, explains the structure, goals, and challenges of the customer care organisation at Swisscom Mobile in detail. He explains that Swisscom Mobile offers a comprehensive set of services and solutions to both residential and business customers:

- **Residential customers:** Swisscom Mobile's portfolio for residential customers includes the provision of voice and roaming services, messaging, and value-added services such as SMS (Short Message Service), MMS (Multimedia Messaging Service), e-mail, and photo services. In addition, Swisscom Mobile distributes third-party content like ring tones and products by Vodafone through its sales channels.
- **Business customers:** Mr. Wilhelm divides business customers into large and global enterprises at the one hand and SMEs on the other. Swisscom Mobile's portfolio for large and global businesses includes customised solutions to establish and operate corporate mobile networks, enable remote (wireless broadband) access and support mobile office functions. Finally, the company has specific offers for SMEs, including service plans for mobile communication between company members for a fixed fee.

Swisscom Mobile carries out marketing and sales activities over four distribution and support channels, which Mr. Wilhelm refers to as 'customer touch points':

- **Points of sale** (shops and retailers): *"120 Swisscom shops, located across Switzerland, serve as the company's main sales channels"*. In addition, Swisscom Mobile products are distributed in about 25 franchise shops and through retail chains such as Mediamarkt.
- **Call centres:** Swisscom Mobile employs about 800 agents in four call centres: Two in the German-speaking part, one in the French-speaking, and one in the Italian-speaking part of Switzerland. Although call centres are not involved in activities for winning new clients yet, they form an important pillar of Swisscom Mobile's CRM strategy, according to Mr. Wilhelm: *"Call centres are the main channel for the provision of support services for customers. They are available 24 hours throughout all seven days of a week, receiving about 15,000 calls per day"*.
- **Account management:** Large business clients are catered to individually by Swisscom Mobile's sales force. Mr. Wilhelm emphasises that *"each single large client has an account manager as contact person"*.
- **Internet platform:** Currently, Swisscom Mobile's website primarily provides information about company offers. In addition, third-party content like ring tones are offered to download over the internet. *"However", Mr. Wilhelm admits, "the potential of the internet as a platform for the provision of customer services is not yet fully realised. That is why in the close future we plan to extend the internet offer by automated support services similar to those offered by call centres."*

Challenges and goals of customer care organisation

According to Mr. Wilhelm, *the central claim of Swisscom Mobile – to be the leading mobile operator with the most satisfied customers and products in Switzerland – mainly implies three critical questions for the company's customer relationship management:*

- **Differentiation from competition:** *"How do our customers perceive the way we differentiate from competition?"*
- **Revenue growth:** *"With which services do we realise growth for residential and business customers?"*

- **Efficiency and effectiveness:** *“How could we achieve our goals more rapidly and through better means?”*

Mr. Wilhelm also provides answers to these questions. “First, we have to provide the best customer service possible. This includes customer focus in all units, excellence in all customer contact points, appropriate customer life cycle management as well as dedicated strategies for targeting business key accounts and SMEs. Moreover, higher productivity and efficiency can be achieved by increasing the degree of automation, applying the same CRM processes to all customer touch points, and by shortening product development cycles.” He concludes: “An efficiently managed and carefully planned IT architecture is central to achieve these goals.” This was the starting point for the implementation of the new CRM system. The project – which is still in progress – started in 2002.

The implementation of the new CRM system at Swisscom Mobile

One central CRM system as alternative to heterogeneous legacy applications

“A major goal pursued by the CRM project is the integration of different applications needed for customer care into one common modular platform”, according to Mr. Wilhelm. “Before the implementation of the new CRM system, many autonomous legacy applications were used to support sales and support activities at different customer touch points. An IT architecture that is this heterogeneous is costly. In addition, it does not allow for optimal customer support and does not provide the agility required to react to current market developments.”

Mr. Wilhelm illustrates this further: *“For each single request – for closing a new contract, adding additional services or blocking the use of a mobile device – customer care agents had to open a different application. Thus, they did not have a complete customer view, which is the basis for efficient customer services. In addition, the implementation of new services and products required integration work on numerous applications and thus was time- and cost-intensive. Finally, processes could not be fully automated as seamless interplay of applications could not be assured.”*

In order to improve this situation, Swisscom Mobile decided to implement a new multi-channel CRM system by the CRM software specialist Siebel (acquired by Oracle in 2005). The new CRM system is based on a modular platform, which contains numerous standard packages to support sales activities and customer services. These applications can be accessed by the various customer touch points. The system is embedded in the company’s IT landscape over an up-to-date Enterprise Application Integration (EAI) infrastructure¹⁰⁵. Thus, new processes or process changes, which require the interplay of different applications, can be implemented in IT in relatively short time and at relatively low integration costs.

¹⁰⁵ In an EAI architecture, a central middleware – the Enterprise Service Bus (ESB) - connects numerous independent applications and systems (including customer care, billing, data warehouse system). Individual applications can publish messages to the bus and subscribe to receive certain messages from the bus. Each application only requires one connection to the bus. (See e.g. www.wikipedia.org).

Outcome

Although the rollout of the new CRM system has not yet been completed – in August 2006 the system has been fully implemented in the company's call centers and points of sale – Mr. Wilhelm can already name some positive effects of its implementation.

- **Time savings by business process automation:** *“Several processes such as setting up of new contracts and related confirmation processes were automated based on the new CRM system. In this way, the time for operational processes was reduced.”* First, this helps to improve the customer service level since there is less time needed to solve customer problems. Second, customer care agents are confronted with operational tasks to a lesser degree and can concentrate on individual consulting and the provision of new services.
- **Improved customer service:** *“Having all applications integrated into one system allows to provide customer care agents with a complete customer view including customer history as well as to carry out new services activities”,* Mr. Wilhelm explains.

He illustrates the potential of the new CRM system to improve customer services by Swisscom Mobile's current 'Next Best' services campaign. Based on the analysis of individual usage data (e.g. number of calls within certain regions), customers that might be better serviced by another plan were identified. This information can be easily inserted in the new CRM system. If such a customer visits any Swisscom shop or calls one of Swisscom Mobile's call centres for any reason, the agent immediately receives this information from the system and consults the customer accordingly. Mr. Wilhelm is convinced that *“service campaigns like these, which could not be implemented without a central CRM system, will contribute to retain customer relationships.”*

- **Time to market:** Compared to the initial situation, where each product change required adjustments in numerous software applications, IT implementation of new products via the consolidated architecture consumes less time, according to Mr. Wilhelm. *“Thus, time-to-market – from the initial idea to implementation in the system – can be significantly reduced. Time-to-market is a key factor in competition. With the former system, the IT implementation of new tariffs required about 12 months and more. With the new CRM system, it takes only 3 to 6 months. Swisscom Mobile's goal after the complete rollout of the CRM system is to reduce the time for the introduction of new products and tariffs to less than one month.”*
- **Reducing costs for IT maintenance and integration:** Last but not least, the new CRM system allows for the central administration of the applications in use and, thus, generates significantly lower costs for IT maintenance, according to Mr. Wilhelm.

Challenges of the CRM system rollout and strategies to overcome them

Mr. Wilhelm emphasises: *“The rollout of the new CRM system is a long-term task, which implies a number of organisational and technical challenges.”* Gaining user acceptance as well as implementing the system and embedding it in the IT environment of the company, while continuing business operations, were the two main challenges during implementation:

- **Gaining user acceptance:** User acceptance is central for the efficient use of the new CRM system. Otherwise, its potentials cannot be realised. In addition, the automation of process steps, which was a central goal for the implementation of the system, requires the reengineering of company workflows. In order to make employees familiar with the functionalities and opportunities of the new system as well as new workflows, Swisscom Mobile carried out special trainings. In addition, the company has qualified so-called ‘Super Users’, who act as contact persons to support other employees working with the system.
- **Technical implementation and integration:** Embedding the CRM system in the existing IT landscape and migrating customer data from legacy applications to the new system are complex tasks. It gets even more difficult as business operations had to be continued during the time of the implementation. Managing this transformation without large downtimes or trouble for the operational business requires a step-by-step strategy for the technical rollout, which includes sufficient time for testing and bug fixing.

CRM system today and in the future

In order to assure a smooth transformation, Swisscom Mobile first started to roll out the system in its call centres. Mr. Wilhelm explains the reason for this: *“Compared to employees in other customer touch points, call center agents have developed the best technical skills and thus are more likely to be able to deal with small bugs in the system.”* The rollout in call centers was completed by mid-2003. Before proceeding with the deployment in other customer touch points, the company took about 12 months for testing the system and fixing bugs.

The CRM system was subsequently rolled out in Swisscom shops (mid-2004). Later, franchise shops and retailers have also been connected. In autumn 2006, the company plans the rollout of the CRM system to the company sales force, which serves large business clients and, thus, will be equipped with some specific applications, according to Mr. Wilhelm. He adds: *“If it can be assured that applications work seamlessly, the internet platform will be extended by self services based on the CRM system. Customers, for example, could then update their contact data or order new services via the internet. This is going to happen in the close future. Swisscom Mobile already conducted a customer survey to find out which services are requested by the customers”.*

According to Mr. Wilhelm, the CRM project will most probably further continue in the future, in particular as a reaction to the trend towards converged products and services in the telecommunications market. He explains: *“In a converged world, the separate offer of mobile and fixed-line telecommunication services will no longer be feasible. For companies within the Swisscom Group, this means that marketing, sales and customer*

care activities have to be realigned under the Swisscom brand. A modular CRM system based on a modern and flexible IT architecture”, he concludes, “is an important basis to adapt company processes accordingly.”

Lessons learned

This case study illustrates typical IT-related challenges that customer care organisations at large telco companies are encountering today. In fact, many large telco companies are confronted with a growing number of heterogeneous and autonomous legacy applications within their IT landscape. Such IT architectures are not only major cost drivers, they are also inhibiting the rapid deployment of new products and competitive customer relationship management.

This was the main motivation for Swisscom Mobile to invest in a new CRM system, which integrates various applications needed to support customer care processes and sales activities into one modular platform. Thus, significant cost and time savings can be realised, customer services improved, and – probably most important – agility and flexibility needed to react to current market developments are increased.

However, the case study also illustrates that the implementation of new CRM systems in telco companies that serve thousands of clients via multiple channels is a complex and challenging project. This might explain why many large telco providers still lag behind their smaller competitors with regard to internet usage for the provision of customer services.

References

Research for this case study was conducted by Andreas Stiehler (Berlecon Research) on behalf of e-Business W@tch. Sources and references used:

- *Interview with Markus Wilhelm, Head of Customer Care Domain at Swisscom Mobile, August 2006.*
 - *Information material by Swisscom Mobile*
 - *Company website: <http://www.swisscom-mobile.ch/>*
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Summary and discussion of case-study-based analysis

Overall, the case studies indicate the high relevance of ICT for the provision of innovative customer services, which are considered as important competitive factors. In fact, all three companies interviewed reported increasing competition and a necessity to retain customer relationships by providing high quality and innovative customer services. They also commonly consider a modern and flexible ICT infrastructure as an important basis to meet these requirements.

Due to different business backgrounds, however, the ways in which e-business tools are used to support customer relationships differ. The case study on *Budget Telecom*, for instance, is exemplary for many small start-ups in the telco market that use the internet as their central channel for service provision and customer support. Thus, they are able to reach niche markets worldwide at relatively low marketing costs. Knowledge about the opportunities of the internet and skills to exploit them on the side of consumers are essential conditions for carrying out such business models. Quickly providing new and innovative processes is essential to stay competitive in the telco reseller market. Moreover, the company admits that the growth potential of purely internet-based telco providers is limited in the long run, since the business model attracts only consumers that are experienced in using the internet. Thus, a major future challenge for this type of companies is to attract people that are less familiar with the internet.

The cases of *Brut  l  * and *Swisscom Mobile* reflect the situation from the perspective of incumbent telco companies that support customers over more conventional sales channels like retail and call centres. ICT is used to provide service representatives with information and functionalities required for efficient high-quality customer services, e.g. technical support and business consulting. For this purpose, incumbent telco companies are already using numerous software applications. However, these applications have been initially designed to support traditional business models based on a limited number of telco services. In addition, they are often working autonomously using different databases and being integrated with each other only to a limited degree.

Legacy applications like these are often unable to fulfil the increased requirements in a converged market environment. In fact, today most telco companies provide a large range of services, including voice, internet and TV services. Often these services are combined with telco equipment and other services. In order to get a complete customer view as a basis for consulting or support services, a customer service representative needs access to a large amount of information coming from different sources. This requirement cannot be fulfilled with a heterogeneous IT landscape

Accordingly, the ability to integrate a large set of applications with each other and to embed them seamlessly in the company's IT infrastructure (e.g. ERP modules) is a key criterion for the selection of appropriate CRM and billing systems today. This also explains the complexity of many CRM projects. The primary purpose of these projects is an integrated infrastructure as a basis for customer-facing activities, rather than just to install a number of new applications.

Exhibit 4-18: Summary of the case studies on the use of ICT for marketing and sales support

Company	Budget Telecom (FR)	Brut�� (BE)	Swisscom Mobile (CH)
Business focus	Telco reseller	TV cable company	Mobile operator
Size	Small (33 employees)	Medium-sized (200 empl.)	Large (ca. 2.000 employees)
Number of customers	≈100,000	≈140,000	≈4 million customers
Main sales and support channels	<ul style="list-style-type: none"> Internet 	<ul style="list-style-type: none"> Business services centres Call centres 	<ul style="list-style-type: none"> Points of sales including Swisscom retail shops and independent resellers Call centers Sales force (B2B) Internet
Applications studied	Use of company websites and basic tools for the provision of customer services	Implementation of new CRM and billing system	Implementation and use of new CRM system
Vendor	Own developments	SAP: MySAP CRM and SAP IS-U	Siebel CRM (now Oracle)
Motivation for ICT use	<ul style="list-style-type: none"> Establishing niche markets worldwide Competitive advantage 	<ul style="list-style-type: none"> Need for integrated billing and CRM system to support an increasing range of products and services Outstanding customer services (as competitive factor) need optimal ICT support. 	<ul style="list-style-type: none"> Flexible and highly integrated IT-architecture needed for: Provision of customer services at high quality Streamlining processes and product development Supporting different sales and support channels
Benefits mentioned	<ul style="list-style-type: none"> Number of customers and revenue has increased Acquisition of customers worldwide at minimal costs 	<ul style="list-style-type: none"> Improved customer services by complete customer view Cost savings due to streamlined processes as a side effect 	<ul style="list-style-type: none"> Improved customer services by complete customer view Cost savings by process automation and centralised IT maintenance Time-to-market reduced
Challenges discussed	<ul style="list-style-type: none"> Necessity for Being fast in developing new and innovative services Combining online and offline marketing activities 	<ul style="list-style-type: none"> Provision of training and balancing employees' workload during brief implementation time Problems related to rollout of IT systems as 'Big Bang' 	<ul style="list-style-type: none"> Gaining user acceptance Technical complexity CRM implementation as long-term project

4.2.4 Links between customer services and supply chain management

The use of ICT to support customer-facing activities in the telco sector goes beyond the deployment of core applications in this field such as CRM and billing systems. As discussed in Section 4.2.1, it is also the capacity to streamline supply chain processes that impacts the marketing and sales success. First, many telco services are offered in combination with complementary products and services in order to increase their attractiveness for customers. However, the demand for telco equipment and content services (e.g. mobile devices or ring-tones) is characterised by fashion-dependence and relatively short product life cycles. Thus, the ability to react flexibly to recent market developments by instantaneously delivering the products demanded has a strong impact on telco companies' sales success.

Second, many telco companies cooperate with independent dealers and retail chains that resell their products to consumers. Providing dealers with requested information and ensuring fast and seamless delivery of demanded goods helps to retain positive relationships with this important customer group.

ICT and e-business technologies may help to support collaboration with suppliers and dealers as well as to optimise supply chain processes. The following examples provide some insights into how ICT and e-business technologies are embraced by telco companies for these purposes. The first business example illustrates how a software solution that enables dynamic Supply Chain Management (SCM) may help telco companies to optimise their logistics processes and, in this way, to reduce costs and improve service levels. The software package, SAP APO (Advanced Planning & Optimisation) includes applications for detailed planning, optimisation, and scheduling, allowing the supply chain to be closely and globally monitored even beyond enterprise boundaries. A success story regarding the implementation of this SCM tool is the Portuguese telco company *PT Comunicacoes* (see following box).

Business Example

PT Comunicacoes implements SCM software to improve delivery services

PT Comunicacoes S.A. belongs to the Portugal Telecom Group. The company, which was founded in September 2000, focuses on the management of Portugal Telecom Group's fixed-line business. It provides voice, data, and internet services for about 4 million customers of Portugal Telecom.

In order to optimise service levels and at the same time reduce costs, the company started to redesign its entire commercial logistics chain. Initially, the company applied a decentralised logistics model that comprised 10 suppliers, 60 delivery points and 600 points of sales. Service levels were rather poor with average delivery periods of seven days and a delivery frequency of about once a week. In addition, there were frequent stock shortages and the company had limited control over stocked articles. Thus, PT Comunicacoes decided to install a centralised model by applying a single warehouse for supplier deliveries and a logistics service provider making deliveries to stores.

For this purpose, the company needed to improve operational efficiency by increasing the information flow along the supply chain. Mr. Joao Valadares Ferreira, Logistics Manager at PT Comunicacoes explains: "Optimisation of service levels and cost reduction can only be obtained via the sharing of appropriate information along the supply chain".

In order to generate such a highly integrated supply network, the company implemented the specific software. The demand planning capabilities provided by the software help the provider to anticipate requirements based on sales. Another software module (called supply network planning) automatically triggers supply replenishment of the commercial network on the basis of stock forecasts and levels. The implementation activities started at January 2002 and were finished in June 2006.

With the new logistics model in place and supported by the SCM software, service levels were significantly improved. Deliveries are made with a delivery frequency of up to five times per week and a delivery period between 24 and 48 hours. In addition, PT Comunicacoes managed to reduce stock by 30%.

Source: SAP Customer Success Story Telecommunications (2003): "PT Comunicacoes uses SAP APO to create a closer connection with suppliers and reduce costs", <http://www.sap.com/industries/telecom/customersuccess> (August 2006).

The following case study illustrates the use of e-marketplace services by COSMOTE, a major Greek mobile operator. In this case, the internet trading platform *cosmoONE* turns out as a reliable tool to streamline information exchange with both buyers and suppliers of the telco company. Intensive information exchange with these groups is essential since "*COSMOTE buys mobile phones, adds airtime and packaging and resells it to dealers*", as the procurement manager interviewed for the case study explains. Accordingly, COSMOTE is an active buyer and supplier on this trading platform and, thus, supports the full business cycle. Dealers using the *cosmoONE* platform profit from reduced ordering cycles and from the opportunity to access the product catalogue and respective ordering functions over the internet.

CASE STUDY: USE OF E-MARKETPLACE SERVICES BY COSMOTE

COSMOTE, a leading mobile operator in Greece, is co-founder, stakeholder, and also one of the largest clients of the Greek e-marketplace operator and procurement services provider cosmoONE. The company uses cosmoONE's services both as a buyer and a supplier, supporting processes along the supply chain. The case study illustrates the potential of e-business technologies for process improvements in large and fast-growing telecommunications companies like COSMOTE and discusses challenges related to their implementation. As a result of the use of e-procurement tools, the mobile operator was able to streamline the entire procurement process, thus reducing time and costs related to the ordering process.

Case study fact sheet

Case study fact sheet

■ Company	COSMOTE Mobile Telecommunications SA
■ Location:	Athens, Greece
■ Main business activity:	Provision of mobile telecommunications services
■ Year of foundation:	1998
■ Number of employees:	more than 2,300
■ Turnover in last financial year:	€ 1.8 billion
■ Primary customers:	Users of mobile phones and related wireless services (B2B and B2C)
■ Most significant geographic market:	Operations in Greece and in four more South East European countries
■ Main e-business applications studied:	e-procurement and e-business integration
■ Key words:	e-procurement, e-sourcing, online auctions, SCM, ERP, integration

Background and objectives

COSMOTE Mobile Telecommunications S.A. is a subsidiary of the Greek telecom incumbent Hellenic Telecommunications Organisation (OTE). Having launched commercial operations in April 1998 – five years later than its competitors–, the mobile operator claims to be “*the only company of its sector in the world, which entered the market third and yet managed to become number one in only 3.5 years.*”¹⁰⁶ At the end of June 2006, COSMOTE's subscriber base reached 4.9 million customers, with an estimated market share of 37.4% in Greece.¹⁰⁷ Moreover, the Greek mobile telecommunications company expanded its business to South East Europe and now operates also in Albania, Bulgaria, FYROM¹⁰⁸ and Romania.

¹⁰⁶ See Corporate Profile on COSMOTE's website (www.cosmote.gr), August 2006.

¹⁰⁷ Source: official company announcements, (www.cosmote.gr), August 2006.

¹⁰⁸ Former Yugoslav Republic of Macedonia.

The company started early investing in e-business as a co-founder of cosmoONE, the first B2B e-marketplace in Greece, which entered the market in 2000. “cosmoONE’s *strategic goal*”, according to Mr. Dakos, sales director of cosmoONE, “*is the provision of all necessary infrastructure for electronic business activities of companies in Greece, irrespective of their size and sector. For this purpose, the company established and runs an internet trading platform and provides electronic sourcing and procurement tools in an ASP¹⁰⁹ model.*” Stakeholders of the platform operator and procurement service provider include COSMOTE (31%), OTE (ca. 31%), the National Bank of Greece (10%), Alpha Bank (15%), and Dienekis Informatics – a Greek distributor of the CommerceOne e-marketplace solutions (13%).

COSMOTE, as explained by its procurement director, Mr. Papapostolou, belongs also to cosmoONE’s largest clients: “*Due to the fast expansion of our company, procurement and sales activities have increased significantly. Thus, there was a need for managing supply chain procedures in a more efficient way. By automating procurement activities and conducting them over the internet, we aimed at reducing operating costs, speeding up the ordering process, and getting better control and full information about supply chain activities.*”

e-Procurement activities

Use of the e-procurement system

Mr. Papapostolou emphasises that COSMOTE is an active buyer and supplier on the trading platform and, thus, supports the full business cycle. He explains: “*Our company buys mobile phones, adds airtime and packaging, and resells it to dealers. Thus, there is a need to assure seamless order data exchange between us and equipment manufacturers, on the one hand and our points of sale, on the other*”.

On the buy-side, the company uses a rule-based e-procurement system provided and operated by cosmoONE, which integrates the catalogues of its 42 suppliers and is used by more than 200 company employees. Mr. Papapostolou explains a simple ordering process supported by the e-procurement system in more detail: “*In each of our departments, there is at least one person with access to the system. If there is demand for a certain good, for example some office material, this person can choose the required item from a tailored online catalogue displaying respective offers by suppliers.*” ‘Tailored’ means that COSMOTE’s procurement department makes a pre-selection of items, which can be ordered within a certain product or services’ category. “*Due to the more focused selection*”, Mr. Papapostolou explains, “*the entire procurement process is facilitated and can be better controlled.*”

He continues: “*Following the item selection, the request automatically goes through an approval process.*” Rules for approval, depending on the type and volume of the requested product, have been predetermined by COSMOTE and are implemented in the system. If the request is approved, an order is placed and sent to the supplier. The procurement system is fully integrated with the company’s Enterprise Resource Planning

¹⁰⁹ Application Service Provision, i.e. the provision of software applications via the Internet on a one-to-many basis

(ERP) system, Mr. Dakos adds: *“Each order placed in cosmoONE’s e-procurement system, is automatically forwarded to the ERP system with all the necessary data in the appropriate form”*.

COSMOTE uses e-procurement services as a channel for ordering mobile devices and accessories, pre-paid phone cards, SIM cards, PCs as well as MRO (Maintenance, Repair and Operation) materials and office equipment. In 2002, products and services needed by the construction department were also included. *“About 20,000 goods and services from approximately 5,000 product categories can thus be ordered via the procurement system”*, Mr. Dakos explains. *“Since the introduction of the e-procurement system by COSMOTE, more than 16,500 orders have been transferred via the platform – amounting to an ordering volume that exceeds €260 million.”* Mr. Dakos explains. *“An extension of the system to include marketing and educational products and services is already planned for the near future”*, Mr. Papapostolou adds.

The mobile operator also uses platform services to support the exchange of information between resellers and trade representatives. Sell-side trading partners have access to COSMOTE’s product catalogue and – based on it – may place orders that are directly transferred to the company. All major dealers of the company’s products, including independent resellers and own retail stores are connected to the platform. The mobile operator is continuously extending the system on the sell-side with approximately 30 smaller resellers connected in 2006.

Use of other services

COSMOTE also uses electronic sourcing tools, online auctions, and reporting tools made available via the trading platform, e.g. to carry out Requests For Quotations (RFQ), Requests for Proposals (RFP) and related procedures. In this way, more than 140 electronic tenders have been conducted by the company in a 12-month period, from July 2005 to June 2006. Online auctions are currently conducted via the firm’s mother company (OTE), which has used the service more than 400 times during the past five and a half years, according to Mr. Dakos.

Finally, COSMOTE also uses business intelligence reporting services related to the platform offer, which support the procurement procedures’ monitoring and controlling. As Mr. Dakos explains, *“spending data, including spending per category of goods, department, and location, are automatically retrieved from the system and translated into useful business knowledge”*. Mr. Papapostolou considers the compilation of benchmarking data to be of high value for the procurement department’s work. *“By comparing results with those from other platform users, we are in the position to identify potential further cost savings.”*

Opportunities and challenges

Benefits

Overall, Mr. Papapostolou considers the use of online trading services a success. As main benefits he particularly mentions cost and time savings, as well as improved control and monitoring.

- **Cost and time savings:** *“Indeed”, Mr. Papapostolou explains, “by means of the procurement processes’ automation, paper-based work processes are limited, and less people need to be involved. The entire communication process is sped up and more accurate”. Generally, the time needed between the request and the fulfilment of an order can be significantly reduced. “Overall, measuring time or cost savings is difficult, as direct savings depend on the specific issue”, he adds.*
- **Control and monitoring:** Mr. Papapostolou considers the opportunity to have the entire procurement processes under control to be equally important with direct cost savings. He elaborates: *“Having the procurement system in place contributes to ensuring that goods are purchased at the conditions agreed upon with suppliers and implemented in the system.”* He adds that the use of the system also helps to streamline internal procurement procedures and to keep them under control: *“Procurement procedures, including rules for approval and selection of goods, are pre-determined in the system and every user has a predefined role in implementing them”*

Based on the positive experiences with the e-procurement tools, Mr. Papapostolou already plans to extend the use of online tools for sourcing activities. *“The extended use of electronic tendering and auction tools might produce even more value than achieved up to date by the electronic support of ordering processes. Conventional tendering processes, for instance, are characterised by high human involvement for administrative work, such as sending faxes or answering telephone calls. Defining rules that are easy to understand and implementing them in the company’s IT system would not only help to cut costs, but also to standardise the entire process for all parties involved, including buyers and suppliers.”*

Challenges and success factors

“The transformation of a paper-based procedure into a rule-based e-procurement system requires significant efforts, especially during the implementation stage”, Mr. Papapostolou admits: *“Abandoning traditional methods and replacing them with a rule-based ordering system requires change management efforts to be implemented and to gain acceptance among employees. In addition, suppliers have to be convinced to adopt the new way of conducting business.”* This new way also includes the negotiation of framework agreements (as opposed to ad-hoc negotiations) in order to establish confirmed and approved pricelists to be used in the procurement system.

Mr. Papapostolou also explains how these challenges can be overcome: *“The most important factors for gaining the acceptance of users and suppliers are that the system functions seamlessly and that added value becomes visible.”* In this regard, he sees the

implementation of the e-procurement system as a significant opportunity for employees in the procurement department, especially in relatively new and fast-growing companies like COSMOTE. He gives an example: *“The integration of construction services in the procurement system requires a lot of effort at its first stages, when defining single services and negotiating prices. However, once this phase is completed, the procurement of such services causes much less conflicts and problems than their absence.”*

He adds that convincing suppliers to connect to the system is much easier today, as e-business systems are more mature than a few years ago. *“Operating a system that works seamlessly certainly facilitates convincing suppliers of the advantages deriving from its implementation”*. But he also admits: *“Our purchasing power certainly was the most important argument for suppliers to connect to the system.”*

Lessons learned

The case study on the use of e-procurement functionalities by COSMOTE provides some insights into potential of e-business tools for process improvements. As brought forward by Mr. Papapostolou, the implementation of an e-procurement system goes beyond time and cost savings. It provides the opportunity to set-up a streamlined procurement workflow that can be easily monitored and controlled. Especially large and fast growing companies like COSMOTE, where streamlined processes are a business necessity, may profit from such an investment.

However, the organisational efforts required to implement such systems should not be underestimated. On the one hand, management must be committed to enforce the adoption of the system and necessary process changes internally. Moreover, the integration of supply chain partners is crucial for the success of e-business projects like the implementation of procurement systems. As regards this issue, large telecommunications companies, like the one presented in this case study, might have an advantage as they have a strong purchasing power.

References

Research for this case study was conducted by Andreas Stiehler (Berlecon Research) on behalf of e-Business W@tch.

Sources and references used:

- *Interview with Mr. Stamatias Dakos, Sales Director at cosmoONE, August 2006.*
 - *Interview with Mr. Efthymios Papapostolou, Procurement Director at COSMOTE SA, August 2006.*
 - *Company websites: www.cosmote.gr; www.cosmo-one.gr*
 - *Information material provided by cosmoONE.*
-

4.2.5 Summary and discussion

This section illustrated the significant relevance of ICT and e-business technologies to support marketing, sales, and customer care in the telco industry. The results of the e-Business Survey 2006, as presented in Section 3.6 and summarised in Section 4.2.2, indicate that the telco industry has a forerunner position in this e-business application area. The diffusion of simple e-business tools (e.g. company websites and e-ordering activities with customers) as well as of advanced solutions (e.g. the use of CRM systems and specific ICT solutions) is clearly above the average of all sectors studied. Remarkable is that advanced e-business technologies in this field are even widespread among small companies in this sector. In fact, more 20% of micro companies in this sector reported the use of CRM systems.

The heavy use of e-business tools for marketing, sales, and customer care can be explained by the fact that customer relationship management is a complex task in this sector. Marketing and sales departments have to deal with an increasing range of products and services, heterogeneous needs of different target groups, and mass-market issues. ICT and e-business tools play a central role for the provision of customer service and to support marketing.

Case studies presented in Section 4.2.3 provide further insights into the practical use of customer-facing e-business applications. First, the case study on *Budget Telecom* illustrated, how particular small companies in this sector may use the internet as a channel to reach a worldwide audience at low costs. While the business model of *Budget Telecom* is almost entirely based on the internet, larger telco companies like *Brut  l  * or *Swisscom Mobile* support telco customers via different channels including call centres, own shops, and services centres and independent dealers. They need ICT primarily to provide customer sales agents with the information necessary to provide services at high quality levels.

CRM systems are suited to support this task by integrating various customer-facing applications and interacting with other enterprise systems that contain customer-relevant data (e.g. billing and ERP systems). Accordingly, the implementation of a CRM system, particularly in large telco companies, often turns out as complex integration project (see also the cases of *Brut  l  * and *Swisscom Mobile*).

The range of ICT tools to support marketing and sales activities is not limited to core applications like company websites and CRM systems. e-Business projects that help to optimise supply chain activities also impact telco companies' sales success as illustrated by the business examples in Section 4.2.4. SCM software, as illustrated by the business example on *PT Comunicacoes*, may help to optimise logistics processes and thus to improve service levels related to the delivery of products. internet trading platforms, as illustrated in the case study on *COSMOTE*, might be used to streamline the exchange of information between suppliers and customers, eventually reducing ordering times.

The main points discussed in this chapter are:

- **ICT and e-business tools have a strong impact on the success of sales and marketing activities.** Related to sales and marketing of telco companies, there are many application areas for the use of ICT and e-business technologies. e-Business tools can, for example, support the processing of mass data, collaboration with product partners, and interaction with worldwide customers.
- **Telco companies have a forerunner position in using ICT to support marketing and sales processes.** The diffusion of customer-facing e-business applications in the telco sector is significantly above the use of such tools across all sectors studied by *e-Business W@tch* in 2006.
- **ICT and e-business technologies also have a strong impact on activities of smaller companies in this sector.** The relatively high diffusion of customer-facing e-business tools among smaller companies distinguishes the telco sector from most other sectors studied. The case study on *Budget Telecom* illustrated that even simple e-business tools (e.g. product websites) may have a significant impact on the business activities of smaller telco companies.
- **The focus of recent CRM projects in larger telco companies is the integration of customer-facing applications and related enterprise systems.** A major concern of telco companies implementing a new CRM system is the exchange of autonomous applications by a modern, flexible, and highly integrated ICT infrastructure (see case studies on *Brut  l  * and *Swisscom Mobile*).
- **The use of ICT to support customer-related activities goes beyond the adoption of core applications like CRM systems.** Use of SCM software and e-marketplace services to optimise supply chain processes also impacts the sales success of telco companies.

5 Conclusions

5.1 Business impacts

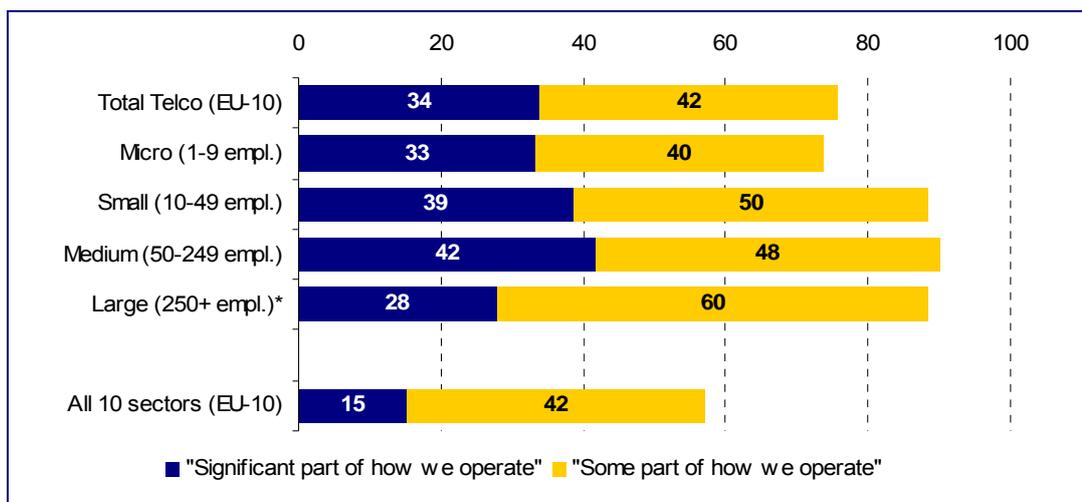
5.1.1 Implications for enterprises

ICT and e-business developments have an impact on the way business processes are organised in the telco industry – and it is reasonably expected that they will increasingly continue to do so.

Indeed, according to the results of the e-Business Survey 2006 (see Section 4.2.2), ICT and e-business technologies are intensively used in the telco industry. Compared to other sectors studied this year, telco companies have a forerunner position in almost all e-business application areas. They are well equipped with ICT infrastructure and make heavy use of ICT to support internal processes as well as activities on sell-side and supply-side. Accordingly, more than three out of four telco companies perceive e-business activities as a significant or some part of how the company operates - a share which is clearly above the all-sectors average (see Exhibit 5-1). This share is even higher (at about 90%) if only companies with 10 and more employees are regarded.

Moreover, the survey results displayed in Exhibit 5-2 show that ICT and e-business have an impact on almost all business functions within a telco company. According to the surveyed companies, positive ICT impacts are most pronounced for productivity, the quality of customer services, and business process efficiency. In contrast, only a marginal share of telco companies perceives a negative impact on business functions listed in Exhibit 5-2.

Exhibit 5-1: Perceived overall importance of e-business for company operations

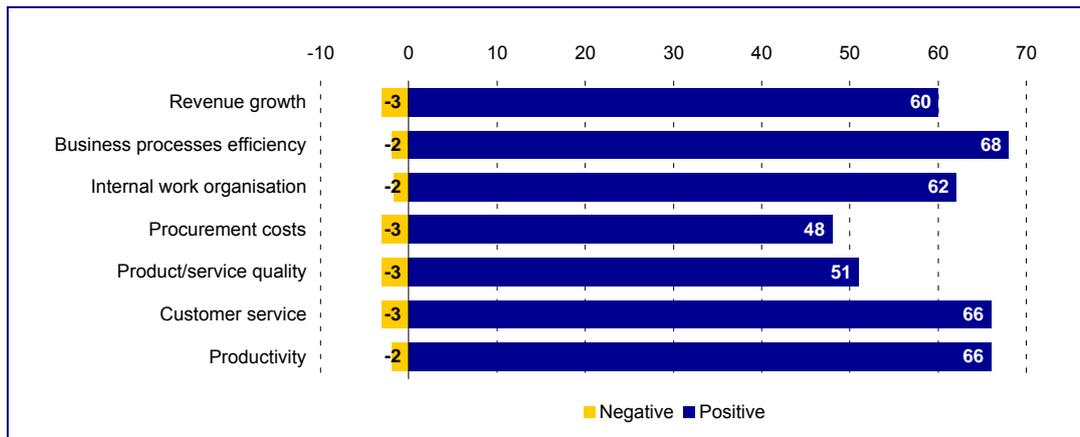


Base (100%): Companies using computers (excl. "don't know"). N (for sector, EU-10) = 819. Weighting: in % of firms. Questionnaire reference: H1.

* Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

Exhibit 5-2: Perceived ICT influence on the company's business



Base (100%): Companies using computers. N (for sector, EU-10) = 829. Weighting: in % of firms.
Questionnaire reference: H4

Source: e-Business W@tch (Survey 2006)

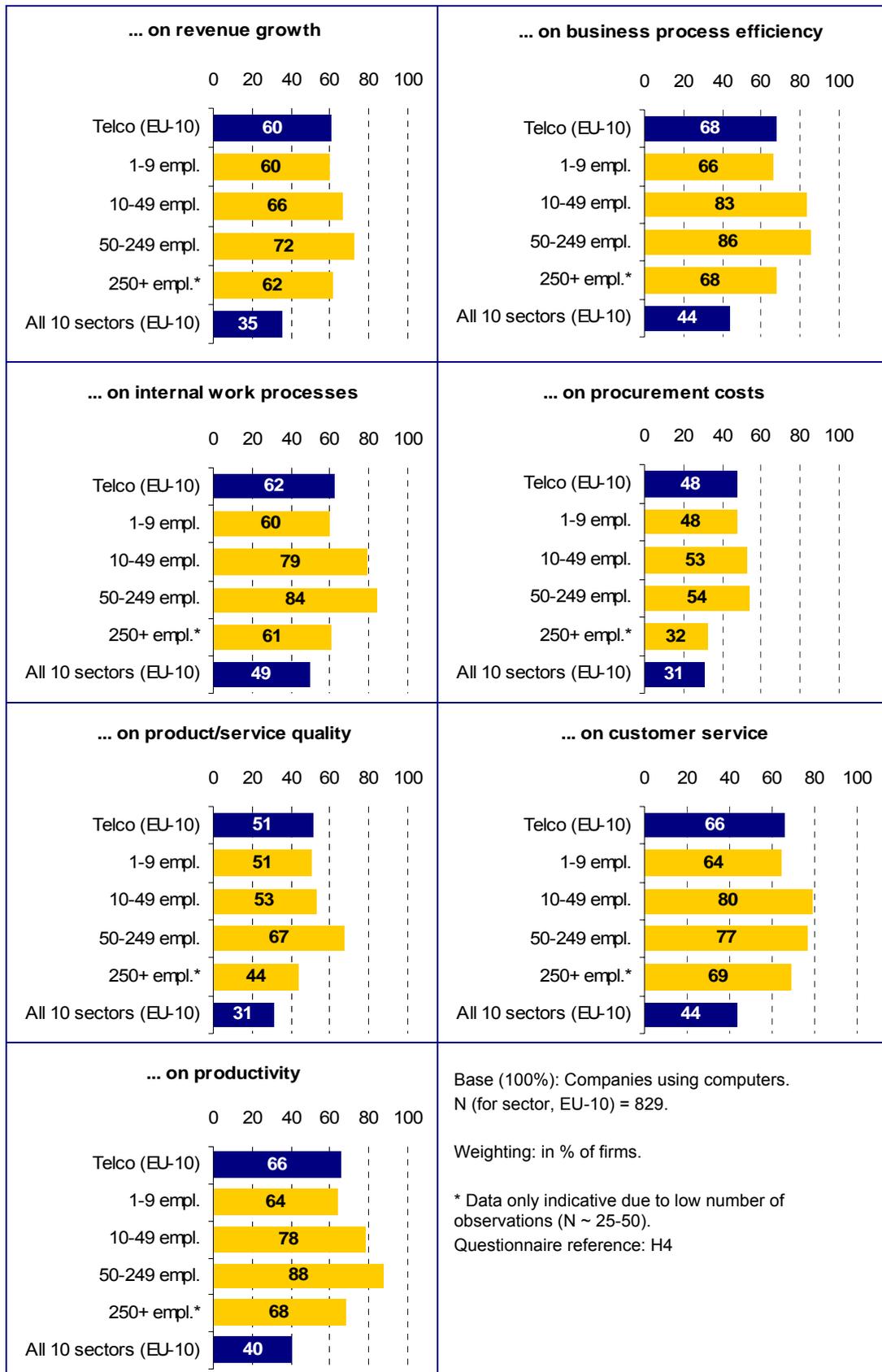
ICT impact on single business functions

Exhibit 5-3 presents the survey results about the perceived positive ICT impact on single business functions in closer detail. A first notable finding is that the share of companies experiencing a positive influence of ICT is significantly higher in the telco industry than on average in all sectors studied. This is relevant for all business functions. The result is primarily indicative for the central role of ICT for the way telco services are provided and promoted. Also, as a technology-driven industry, the telco sector may be in a more advanced stage of ICT adoption compared to other industries. Thus, companies already gather experiences with the technology, which makes it easier to realise the potential of ICT and adapt e-business technologies to the specific challenges of the industry.

Moreover, Exhibit 5-3 shows that the influence of ICT appears to increase with company size for most business functions (if results for micro small and medium-sized industries are examined). This pattern is most pronounced for the perceived influence of ICT on productivity growth, business process efficiency and internal work processes. Indeed, ICT's potential to increase productivity and business process efficiency is more pronounced in companies that have to manage a larger workforce.¹¹⁰ In this light, the relatively small percentages of large telco companies (250+ employees) perceiving a positive ICT impact are remarkable. At this stage and without further investigation, it would be difficult to provide any explanation for this pattern that can be observed for all business functions. However, particularly the values for large companies are based on a very small sample size. Thus, results are only indicative and should be interpreted with caution.

¹¹⁰ See also e-Business W@tch Special Study on the "Impact of ICT on corporate performance, productivity and employment dynamics" (2006), available at www.ebusiness-watch.org ('resources').

Exhibit 5-3: Companies observing a positive influence of ICT on ...



Source: e-Business W@tch (Survey 2006)

Interestingly, there are no pronounced size class-specific differences as regards the perceived impact of ICT on procurement costs: An almost equal percentage (around 50%) of companies across all size bands (with exception of large companies) stated that ICT has a positive impact on these business functions. This might be attributed to the potential of ICT to increase market transparency for all participants irrespective of their size or trade volume. Procurement costs may be decreased by worldwide sourcing of suppliers over the internet or with the help of internet-based services provided by e-marketplaces. Using these e-business tools does not necessarily require significant investments and generates advantages for all types of enterprises, irrespective of their size.

However, larger companies can be expected to profit even more from ICT usage in the field of procurement, as they might use ICT and e-business tools to reduce process costs related to procurement activities. The potential of ICT to support companies in streamlining their procurement processes is illustrated by the case study on *COSMOTE* in Chapter 4.2.4. The major Greek mobile operator uses a procurement system provided by an e-marketplace and benefits from time and cost savings as well as from improved control over procurement processes. In this light, the relatively low percentage for large companies should be regarded as a statistical outlier caused by the small sample size.

Influence of ICT on organisational aspects

Exhibit 5-4 presents survey results on the perception of the impact of ICT on organisational aspects. Overall, the share of companies experiencing a strong influence of ICT on organisational aspects is significantly higher in the telco sector than on average in all 10 sectors studied this year. More than 40% of telco enterprises, for example, are experiencing a high impact of ICT on their organisational structure. The relatively high percentage of micro and small companies perceiving a strong ICT impact in this field is also remarkable. A possible explanation for this finding might be that even simple e-business tools have a potential to facilitate the communication between employees and thus to support the design of efficient company workflows. Many companies, for example, use an intranet to file and share company information and data. As discussed in Section 3.1, such tools are also widespread among smaller telco companies.

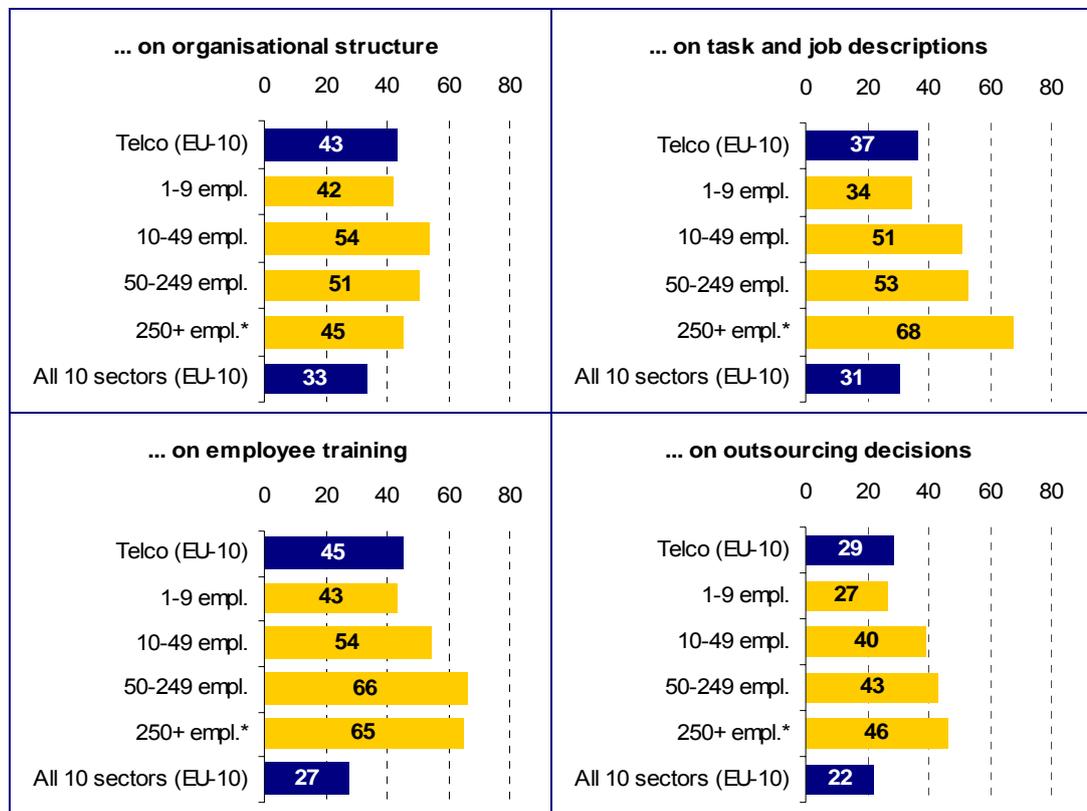
As would be expected, the perception of the impact of ICT on outsourcing decisions, job descriptions, and employee training partially depends on company size. Larger companies are typically more inclined to outsource IT services than micro firms (see Chapter 3.2). Due to increased availability of improved communication and collaboration technologies, it gets easier to coordinate activities between telco companies and their IT service providers. Accordingly, about 40% and more of the small, medium-sized and large companies in this sector reported important impacts of ICT on outsourcing decisions.

With ICT being part of daily work processes in the telco industry (as documented by the survey results presented in Sections 3.1 and 3.2), employee training as well as job descriptions must be accordingly adapted. Hence, it is not surprising that about two thirds of all telco companies with more than 50 employees reported an important influence of

ICT on training. This influence has also been illustrated in the case studies on *Brut el * and *Swisscom Mobile* in Chapter 4.2.1 where employee training has been identified as an important precondition for the successful implementation of new ICT systems.

Likewise, more than half of the telco enterprises with 10 or more employees stated that ICT affects tasks and job descriptions. Again, it is a rather intuitive result that larger companies are more affected than smaller ones, given that general ICT penetration is stronger compared to micro and small companies. Also, larger firms are more likely to use more sophisticated and complex technologies (requiring extensive training) than smaller companies¹¹¹. The observed patterns also correspond with the survey findings on ICT skill development. As discussed in Chapter 3.2, larger telco companies tend to employ IT professionals and to provide regular ICT training more than their smaller counterparts.

Exhibit 5-4: Perceived influence of ICT on organisational issues: Companies observing an important influence on ...



Base (100%): Companies using computers. N (for sector, EU-10) = 829.

Weighting: in % of firms. Questionnaire reference: H7.

* Data only indicative due to low number of observations (N ~ 25-50).

Source: *e-Business W@tch* (Survey 2006)

¹¹¹ Vile, Dale (2006): The SMB hype cycle. Channel Register, July 27, 2006.

ICT impact on single business fields

The impact of ICT and e-business on single business fields in the telco industry is illustrated in Exhibit 5-5. Due to the dual role of telco companies as suppliers and users of e-business technologies, all business fields listed in the graph are affected in some way. This has also been illustrated by survey findings on ICT impacts on single e-business functions and organisational aspects as presented in the paragraphs above.

Following survey results and core issues analysed, ICT and e-business are particularly relevant for the following three areas (numbers in parentheses relate to table lines in Exhibit 5-5):

- **Marketing, sales, and customer care (6, 7):** The support of marketing and sales activities is a key application area of e-business in this sector. In fact, the shares of telco companies using ICT tools in this field, including company websites, ordering tools, CRM systems and specific ICT solutions for marketing support, are clearly above those observed in all other sectors studied in 2006. Moreover the survey findings, as presented in Sections 3.6 and 4.2, reveal that the diffusion of these tools is also widespread among micro and small telco companies. Accordingly, about two thirds of all telco companies perceive a positive impact of ICT on customer services (see Exhibit 5-4).

The case studies and business examples presented in Chapter 4.2 illustrated the manifold opportunities provided by customer-facing e-business technologies to support sell-side activities of telco companies. The case study on *Budget Telecom*, for example, has illustrated that e-business tools, such as product websites (if applied in an innovative way), can help small companies to establish a visible brand and to build an extensive customer base. Moreover, the case studies on *Brut  l  * and *Swisscom Mobile* illustrated that quality of customer services – an important competitive factor – strongly depends on the capabilities of CRM and billing systems. Finally, this chapter’s analysis and business examples also illustrated that ICT solutions in the field of **logistics** and **supply chain management (3, 5)** have an impact on the sales success of telco companies.

- **Products and services supplied (4, 8, 9):** The capability to innovate products is an important competitive factor in this sector. Almost half of all telco companies reported that they carried out product innovations during the past year and, indeed, about three quarters of product innovations were ICT enabled (see Section 3.7). Accordingly, about half of the telco companies said that ICT has a positive impact on product and services quality (see Exhibit 5-4). New technologies based on the internet (e.g. VoIP and IPTV), for example, are likely to substitute traditional telco services and enhance the range of products and services supplied. Survey data presented in Section 4.1.2 revealed that convergence-driving technologies like new broadband access technologies and VoIP are already used by a significant share of European businesses.

The increased impact of these technologies places new challenges to both large and small players in this sector. The trend towards triple play, i.e. the combined offering of internet, telephony and TV services, seems to be a natural outcome of the increased importance of convergence-driving technology developments. The

case study on *Grupalia Internet* has illustrated that triple play strategies are not only an option for incumbents, but also for alternative players in the telco market.

- **Automation and streamlining of business processes (1, 2, 10):** Increased competition and saturation in traditional telco market segments have led to increased cost pressure in this sector. Thus, many larger telco companies are concerned about streamlining and automating internal processes in order to save on costs. ICT has a strong impact by supporting telco companies to overcome these challenges. In fact, almost 90% of telco companies reporting process improvements during the past year said that these process innovations were mainly ICT-enabled (see Section 3.7).

As a consequence, specific ICT solutions to support marketing and sales as well as sourcing and procurement processes are widespread in this sector, particularly among larger telco companies (see Sections 3.5 and 3.6). In the same line, about two thirds of telco companies reported a significant impact of ICT on business process efficiency and productivity (see Exhibit 5-4). ICT's potential to support business process automation is illustrated, for example, by the case study on *COSMOTE* in Section 4.2.4. Using functionalities provided by an e-marketplace, the mobile operator succeeded in reorganising its procurement processes and, thus, achieving cost savings and an improved process control. Similarly, *Swisscom Mobile* (cf. case study in Section 4.2.3) managed to reduce time to market for product development and to automate service provision tasks with the help of the new CRM system installed.

Exhibit 5-5: Impact of ICT and e-business on competition in the telecom industry

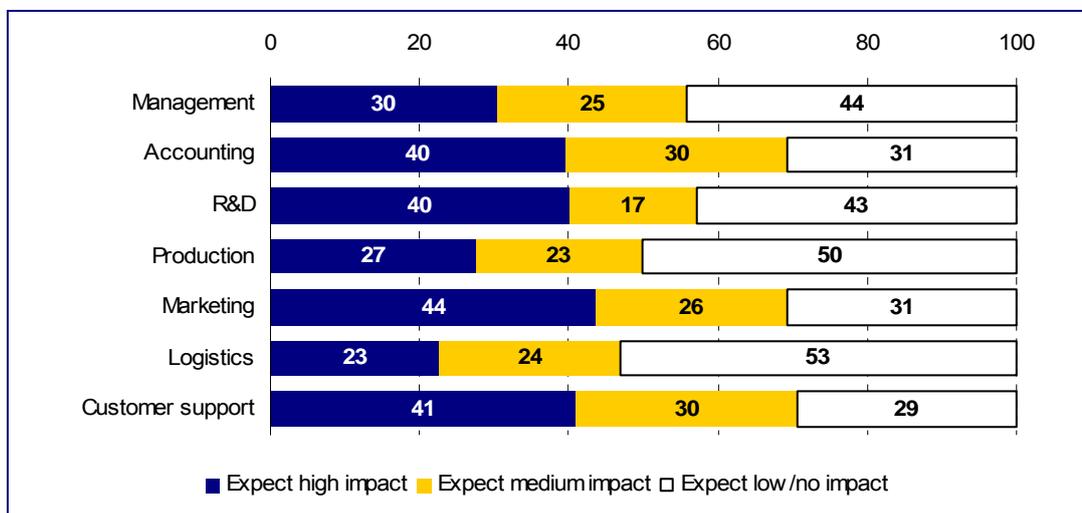
Business areas where ICT and e-business can have an impact		Observed impacts in large firms <i>low < > high</i>	Observed impacts in SMEs <i>low < > high</i>
1	Organisational structure		
2	Work-flows / operational organisation		
3	Sourcing and procurement		
4	Production / service provision		
5	Logistics		
6	Marketing / sales		
7	Customer support		
8	Research & development		
9	Product & service innovation		
10	Process innovation		
11	Skills requirements		

Source: *e-Business W@tch* (2006)

Anticipated future impact of ICT

The surveyed companies were asked in which business areas they expect a high, medium or low ICT impact. Overall, about 50% and more of all telco enterprises said that they anticipate medium or high impact of ICT in the future on all functions listed in Exhibit 5-6. According to the survey results, marketing and customer support as well as accounting and administration can be expected to be key e-business areas in the future. The increased importance of ICT for marketing and sales is also illustrated by case studies and business examples presented in Chapter 4.2. Driven by the increasing range of services and products, the mobile operator *Swisscom Mobile* (cf. case study in Section 4.2.3), for example, is going to update customer-facing IT systems in order to improve service provision.

Exhibit 5-6: Anticipated future impact of ICT



Base (100%): Companies using computers. N (for sector, EU-10) = 829. Weighting: in % of firms.
Questionnaire reference: H8

Source: *e-Business W@tch* (2006)

The fact that about 7 of 10 telco companies expect a medium or high impact of ICT on accounting and administration seems to be rather surprising at the first glance. One possible explanation for this finding is that there is still need to automate accounting and administration processes by respective software applications, particularly among smaller telco enterprises. As reported in Section 3.4, about 40% of telco companies are not yet using any accounting software (other than MS Excel or Word sheets), neither as part of the ERP system nor as any specific accounting solution. The increasing range of services in the supply portfolio of telco companies should also increase the need to adopt software tools for the support of administration and accounting processes.

5.1.2 Implications for industry structure

This chapter assesses the implications of ICT and e-business adoption on the structure of this industry. As in 2005, the 'five-forces-model' developed by Michael E. Porter (1980) is used to discuss and assess e-business implications on the industry's structure.

Background information:

Michael E. Porter's Five-Forces Model

The 'Five Competitive Forces' model was developed by Michael E. Porter in his book „Competitive Strategy: Techniques for Analysing Industries and Competitors“ in 1980. Since that time it has become an important tool for analysing industrial structure, competition and strategic options of players. Porters model is based on the insight that a corporate strategy should meet the opportunities and threats in the organisations external environment.

Porter has identified five competitive forces that shape every industry and every market. These forces determine the intensity of competition and, hence, the profitability and attractiveness of an industry. The objective of corporate strategy should be to modify these competitive forces in a way that improves the position of the organisation. Porter's model helps to identify the main driving forces in an industry. Based on the information derived from the Five Forces Analysis, companies can decide how to influence or to exploit particular characteristics of their industry.

The instrument has been applied by e-Business W@tch since 2004/05 to assess the influence of ICT and e-business on competition in a sector.

Michael E. Porter is the Bishop William Lawrence University Professor at Harvard Business School.

As discussed in Section 2.2.2, the market environment of the telco industry has become increasingly turbulent. Regulatory measures accompanied by the liberalisation of the telco market, saturation in traditional segments and new technological developments have accelerated the competition within this sector. As a consequence of these developments, the telco industry as it appears today is characterised by relatively low entry barriers, blurring lines between traditional telco segments and fierce competition. The following table summarises this assessment.

Exhibit 5-7: Impact of ICT and e-business on competition in the telecom industry

Competitive forces		General importance in the sector (currently) <i>low < > high</i>	Impacts of ICT and e-business <i>low < > high</i>
1	Threat of new entrants		
2	Substitution of products / services		
3	Bargaining power of suppliers		
4	Bargaining power of customers		
5	Rivalry in the market		

"New entrants" in the sense of new companies being founded. New entrants in the sense of companies from a different geographic area entering the European market is considered under "rivalry in the market".

Source: e-Business W@tch (2006), developed from Michael E. Porter

Threat of new entrants

The provision of telco services was characterised by high market barriers in the past. In fact, about 20 years ago state monopolies have dominated the European telco market. However, the liberalisation of the telco industry in most European countries during the 1990s and the rising importance of new communication technologies such as the internet and mobile phone networks have significantly changed the market environment. First, alternative carriers entered the market as operators of internet and mobile phone networks. In addition, many new players established as resellers or virtual network operators.

ICT and e-business technologies have a strong impact on this development. First, results of the e-Business Survey 2006 revealed that ICT enabled product innovations are of high relevance in this sector (see Section 3.7). In this light, the increased impact of new technologies opens opportunities for the market entry of new players. In fact, the survey results confirmed that new convergence-driving technologies like broadband access technologies or VoIP are already used by a significant share of companies of different sectors. The examples of *WiMax Telecom*, *Upnet* and *Grupalia Internet* (see respective case studies in Section 4.1) illustrate that by early adoption of such new technologies a market entry is possible.

Second, e-business technologies are likely to help new entrants to develop niche markets. Company websites, for example, may be used as cheap sales and marketing channels to build up a global customer base. In fact, more than three quarters of telco companies said that they have a company website. The case study on *Budget Telecom* (see Section 4.2) provides an example for the practical use of company websites as central tool for winning customers worldwide.

Substitution of products and services

Substitution of telco offerings by products from other industry sectors depends on the market definition, i.e. whether single telco segments or the entire sector are considered. In any case, there is a trend towards product substitution between different telco segments. As reported frequently throughout this report, services based on new technologies like VoIP and IPTV are going to substitute conventional telco services and lead to blurring lines between traditional telco segments. Thus, the number of competitors in each market segment has significantly increased.

Indeed, ICT play an important role for this development. As discussed in Section 3.7, more than three quarters of all product innovations carried out by telco companies during the past year were ICT-enabled. Analyses and case studies, presented in Section 4.1, illustrated how the telco landscape is changing – enforced by these technology developments. TV access, for example, is no longer the sole domain of cable TV companies. It is also offered by various incumbents and (former) ISPs like *Grupalia Internet* (see case study in Section 4.1.5) as IPTV services. Moreover, start-ups like *Skype* (see business example in section 4.1.3) and *Upnet*, which are offering VoIP connection services over the internet, are challenging incumbents in their original domain, voice telephony. Finally, providers of new wireless access technologies (e.g. *WiMAX*

Telecom – see case study in Section 4.1.2) may establish themselves as competitors to DSL providers.

Bargaining power of suppliers

The bargaining power of suppliers in the telco market is rather low compared to other industries. Suppliers of complementary products, e.g. telco equipment manufacturers and content services, rely on telco companies as a channel to the mass market. In addition, major telco companies have considerable purchasing power. However, collaboration between telco companies and suppliers is important for the sales success of telco services. The combination of services with innovative devices and attractive content services, for instance, is an important factor to differentiate from competitors.

Overall, ICT and e-business tools have only limited impact on the bargaining relationships between telco companies and suppliers. Indeed, one can argue that the internet increases market transparency and, thus, helps to find new suppliers in the market. In this way, ICT would contribute to an increasing market power of telco companies. However, a majority of companies from the telco industry (66%), as in most sectors, reported that e-procurement has no effect on the number of suppliers (see Section 3.5).

Nevertheless, e-business tools have an impact on collaboration between telco companies and suppliers. More than three quarters of all telco companies, for example, said that they place orders online (see Section 3.7). Making use of e-ordering, however, requires that suppliers accept electronic orders. This may explain why almost half of the telco companies reported that supplier expectations are an important reason for doing e-business (see Section 3.8). Nevertheless, compared to other potential e-business drivers (e.g. customer expectations and competitive reasons) this share is rather low.

The role of e-business tools to support collaboration with suppliers has been illustrated by case studies presented in chapter 4.2. Internet trading platforms like *cosmoONE*, for example, may facilitate data exchange and thus support seamless delivery of complementary products. Interestingly, the respective case study (see Section 4.2.4) provided an example of a telco company that uses its purchasing power to urge the participation of their suppliers.

Bargaining power of customers

One may argue that customers' bargaining power in the telco market is relatively low, as single private users usually do not have the power to influence services supplied by telco companies. However, the power of customers has certainly increased in the course of the past years due to the competitive environment in the telco sector. Customers that need a broadband or phone connection, for instance, have the choice between a large number of suppliers. Thus, retaining customers becomes increasingly important in the telco industry.

ICT and e-business contributed to an increase in power for customers, as they lead to more transparency in the telco market. Results of the e-Business Survey 2006 confirmed the important role of the internet and of e-business tools to support marketing and sales activities in this sector (see Sections 3.6 and 4.2). Since almost all telco companies are

publishing their offers on the web, services by different suppliers can be compared at relatively low costs.

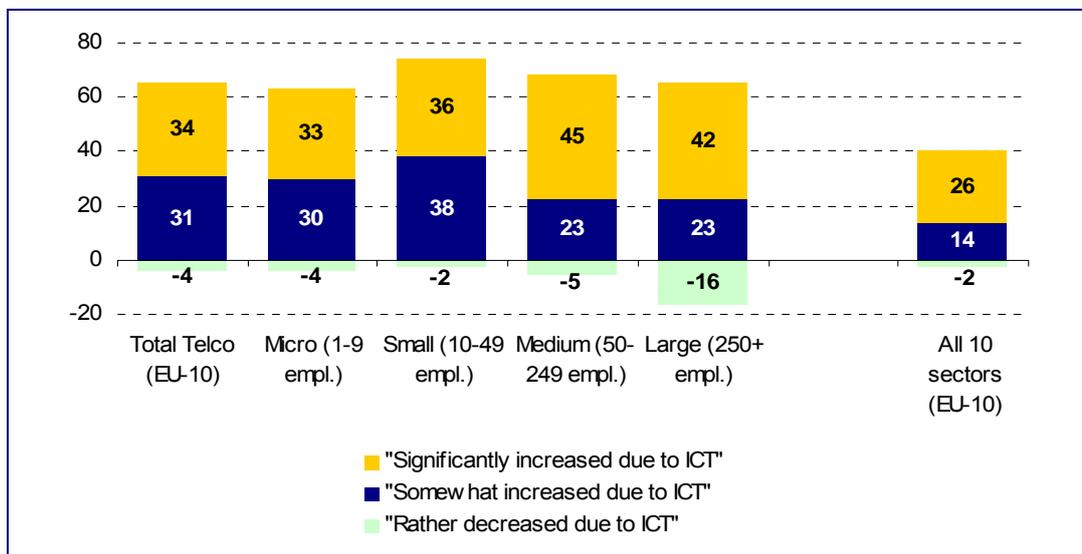
Vice versa, customers' expectations are a main driver for the adoption of e-business tools. In fact, about 70% of telco companies said that expectations of customers are a main reason for doing e-business. The case studies on *Brut  l  * and *Swisscom Mobile* (see Section 4.2.3) illustrated the importance of a modern ICT infrastructure for ensuring an optimal customer support.

Rivalry in the market

As growth prospects in traditional telco segments are limited due to market saturation and the entry of new players, rivalry in the telco market is increasing. ICT plays an important role in this development. In fact, about two thirds of telco companies, irrespective of their size, perceive increased competition due to ICT (see Exhibit 5-8). New convergence-driving technologies, for example, facilitated the market entry of new players and led to shrinking barriers between single telco segments.

On the other hand, competition is also a main driver for ICT adoption: More than 70% of telco companies said that they are engaging in e-business "because competitors are doing it" (see Section 3.8.1). Due to the central role of ICT for the provision and promotion of telco services, the proper use of ICT and e-business technologies helps to differentiate from competitors. Examples are ICT usage for the provision of new and innovative customer services or for reducing time-to-market as regards the development of new products (see case studies and business examples in Section 4.2).

Exhibit 5-8: Perceived impact of ICT on competition in the industry



Base (100%): Companies using computers. N (for sector, EU-10) = 829,

Weighting: in % of firms. Questionnaire reference: H6.

* Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

5.2 Policy implications

e-Business developments can have implications for several policy areas. Relevant considerations made in this context can be grouped around two main overall objectives¹¹²:

- **Promote ICT adoption:** Policies aiming at accelerating the adoption of ICT and e-business activity among companies, particularly among SMEs. This is based on the assumption that ICT is a key driver of productivity and competitiveness.
- **Counteract ICT induced 'flaws' or market failure:** Policy interventions to counteract undesirable effects on the aggregate level caused by the deployment of ICT in businesses.

Based on the analysis of the use of e-business technologies by telco companies in this report and discussions with industry representatives, neither a need for promoting ICT adoption in this sector nor for counteracting ICT-induced market failure was identified. The experiences of the telco sector can rather be taken as a role model for e-business adoption in other industries.

There is no need to further promote e-business adoption

Based on the recent survey results presented in Chapter 3, there is no need to promote ICT adoption to telco companies. Rather, the telco sector appears as a **forerunner** in almost all e-business application areas with adoption ratios strongly above those in other sectors surveyed. Accordingly, a large majority of telco enterprises (76%) perceives e-business as important for their company operations.

Indeed, there are size-specific differences in the adoption of single e-business technologies. However, pronounced differences mostly appear for the use of rather complex systems like ERP or CRM systems that are typically not designed for the needs of micro and small enterprises in this sector. In contrast, the relatively high usage rates of e-business technologies by micro and small companies distinguish the telco sector from other sectors surveyed. Admittedly, SME-specific obstacles like “company too small” and “technology too expensive” turned out as major barriers, cited by e-business-sceptical companies (see Section 3.8.2). But in light of the large share of smaller telco companies doing e-business and perceiving e-business as important for their company operations, these barriers seem to be of less importance.

The analysis of e-business key issues (and the illustrative examples from case studies) in Chapter 4 support this argumentation. Of course, the companies interviewed reported problems that surfaced during the implementation of ICT systems. Major challenges, for example, are to gain the acceptance of employees and to manage the (technical) transformation from legacy applications towards new IT systems. However, these problems have to be solved by companies and their IT partners themselves, not by policy.

¹¹² European Commission (2005). "More Research and Innovation - Investing for Growth and Employment: A Common Approach". Communication from the Commission, COM(2005) 488 final.

Nevertheless, as indicated by the survey results on the general perception of e-business (see Chapter 3.8), there is still a significant share of micro companies in the telco sector that do not subscribe an important role to e-business. Therefore, initiatives raising the awareness of e-business potential among SMEs (see, for example, the member list of the European e-Business Support Network, www.e-bsn.org) should not exclude telco companies as target group.

Telco sector as role model

Market failures due to ICT usage have not been detected, either. On the contrary, the telco industry may rather serve as a role model for the successful combination of liberalisation efforts and the use of opportunities derived from e-business technologies.

The combination of market liberalisation and increasing importance of e-business was a main driver of competition in this sector. Decreasing price levels and an increasing variety and quality of telco services (that may also accelerate the diffusion of e-business technologies in other sectors) are consequences of this development. This is also confirmed by the survey results: The share of telco companies that reported experiencing increased competition due to ICT (65%) is significantly above the average (40%) for all sectors studied this year by *e-Business W@tch* (see Section 5.1.2).

The example of *Budget Telecom* (see Section 4.2.3) is a case-in-point for illustrating the interplay of market liberalisation and ICT. In fact, the liberalisation of the telco market in Europe was a precondition for the market entry of this French reseller of telco services. The company has been using the internet as the main channel to reach global niche markets at relatively lower costs compared to alternative marketing channels. By exploiting e-business opportunities in an innovative way, *Budget Telecom* established a successful and competitive business. In this sense, this example illustrates the strategies of many start-up companies having entered the telco market in the course of the past years.

The experiences of companies in the telco sector might, therefore, provide a helpful input for the discussion of liberalisation efforts in other sectors, e.g. other utility services. In addition, examples for the innovative use of e-business technologies by telco companies might serve as an input for promoting e-business technologies to SMEs of less e-business-intensive sectors.

Of course, when discussing the telco industry as role model, specific characteristics of the sector such as the familiarity of telco companies with the internet and the high relevance of regulatory measures have to be taken into account.

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José Caballero, Marketing Manager at Budget Telecom, Mai 2006.

Jean-Michel Adant, General Manager, Brutélé

Markus Wilhelm, Head of Customer Care Domain at Swisscom Mobile, August 2006.

Stamatis Dakos, Sales Director at cosmoONE, August 2006.

Efthymios Papapostolou, Procurement Director at COSMOTE SA, August 2006.

Annex I: The e-Business Survey 2006 – Methodology Report

Background and scope

e-Business W@tch collects data relating to the use of ICT and e-business in European enterprises by means of representative surveys. The e-Business Survey 2006, which was the fourth survey after those of 2002, 2003 and 2005, had a scope of 14,081 telephone interviews with decision-makers in enterprises from 29 countries, including the 25 EU Member States, EEA and Acceding / Candidate Countries.¹¹³ Interviews were carried out in March and April 2006, using computer-aided telephone interview (CATI) technology.

Questionnaire

The questionnaire is similar to those used in the previous surveys from 2002 to 2005 in order to ensure a basic continuity of the research approach. The module on ICT impact was substantially extended compared to 2005, in response to current policy interest, in exchange for some questions from other modules.

Some questions which were also used in previous surveys were slightly modified. The most important change in this context concerns questions on e-commerce: up to 2005, companies were asked whether they "purchase / sell online"; in 2006, companies were asked whether they "place / accept orders online". This is a more precise question, since the terms "purchasing" and "selling" leave it open whether ordered goods also have to be paid online in order to qualify for "online purchasing / selling".

Some specific topics were added or expanded in the questionnaire in order to reflect the latest e-business developments; examples are the new questions on the use of RFID and Voice-over-IP.

The questionnaires of all four surveys (2002, 2003, 2005, 2006) can be downloaded from the *e-Business W@tch* website (www.ebusiness-watch.org/about/methodology.htm).

Population

As in 2005, the survey considered only **companies that used computers**. Thus, the highest level of the population was the set of all computer-using enterprises which were active within the national territory of one of the 29 countries covered, and which had their primary business activity in one of the 10 sectors specified on the basis of NACE Rev. 1.1.

Evidence from previous surveys shows that computer use can be expected to be 99% or more in all sectors among medium-sized and large firms. Differences are more relevant, however, for micro and small enterprises, in particular in the food and beverages industry, the textile and footwear industries, construction and tourism. In these four sectors, 10-30% of micro enterprises and 4-15% of small firms (depending on the country and sector)

¹¹³ The EEA (European Economic Area) includes, in addition to EU Member States, Iceland, Liechtenstein and Norway. Acceding Countries with whom an Accession Treaty has been signed are Bulgaria and Romania; Candidate Countries, which are candidates for accession into the EU, are (as of September 2006) Croatia, the former Yugoslav Republic of Macedonia, and Turkey. In most of these countries, interviews and/or case studies were conducted.

do not use a computer.¹¹⁴ This should be considered when comparing figures over the years, as figures either represent a percentage of "all companies" (as in 2002 and 2003) or a percentage of "companies using computers" (as in 2005 and 2006). Differences are minimal, though, when figures have been weighted by employment.

The 10 sectors which were selected for the 2006 survey are extremely heterogeneous in terms of their size. Construction and tourism are by far the largest with about 1.5 million enterprises in each of the EU-25.¹¹⁵ At the other end of the range is the consumer electronics industry with about 5,400 enterprises; this is a factor of about 280 between the largest and smallest sector. This imbalance has inevitably a substantial impact on weighting and thus on aggregate results, which are dominated by figures from construction and tourism.

Table 1: Population coverage of the e-Business Survey 2006

No.	NACE Rev. 1.1	Sectors covered	No. of enterprises in EU-25 *	No. of interviews conducted
1	DA 15 (most groups)	Food and beverages	282,000	1,709
2	DC 19.3	Footwear	13,700	980
3	DE 21	Pulp, paper and paper products	18,400	1,158
4	DL 30, 32.1+2	ICT manufacturing	31,800	1,687
5	DL 32.3	Consumer electronics	5,400	665
6	DM 35.11	Shipbuilding and repair	7,200	150
7	F 45.2+3 (selected classes)	Construction	1,546,000	2,655
8	H 55.1/3, I 63.3, O 92.33/52	Tourism	1,500,000	2,663
9	I 64.2	Telecommunication services	12,900	1,580
10	N 85.11	Hospital activities	(e) 13,000	834

* mostly based on Eurostat SBS, latest available figures

(e) = estimated on the basis of figures for the former EU-15 (no figures available for EU-25)

Sampling frame and method

No cut-off was made in terms of minimum size of firms. The sample drawn was a random sample of companies from the respective sector population in each of the countries, with the objective of fulfilling minimum strata with respect to company size class per country-sector cell. Strata were to include a 10% share of large companies (250+ employees), 30% of medium sized enterprises (50-249 employees), 25% of small enterprises (10-49 employees) and up to 35% of micro enterprises with less than 10 employees.

Samples were drawn locally by fieldwork organisations based on official statistical records and widely recognised business directories such as Dun & Bradstreet or Heins und Partner Business Pool (both used in several countries).

The survey was carried out as an enterprise survey: data collection and reporting focus on the enterprise, defined as a business organisation (legal unit) with one or more establishments.

Due to the rather small population of enterprises in some of the sectors, target quota, particularly in the larger enterprise size-bands, could not be accomplished in each of the countries. In these cases, interviews were shifted to the next largest size-band (from large to medium-sized, from medium-sized to small), or to other sectors.

¹¹⁴ Non-computer users include typically small craft firms (textile, construction), bars, restaurants or pensions (in tourism), and small food producing companies.

¹¹⁵ Construction (NACE Rev. 1.1 F 45) in total has about 2.3 million enterprises. The sub-sectors covered in 2006 (see Table 1) account for about 1.5 million out of these.

Fieldwork

Fieldwork was coordinated by the German branch of Ipsos GmbH (www.ipsos.de) and conducted in cooperation with its local partner organisations (see Table 2) on behalf of e-Business W@tch.¹¹⁶

The survey had a scope of 14,081 interviews, spread across the 29 countries and 10 industries covered. In 10 countries ("EU-10"), all 10 sectors were covered; in the other countries, selected industries were surveyed. In most countries, between 400 and 750 interviews were conducted. Pilot interviews prior to the regular fieldwork were conducted with 23 companies in Germany in February 2006, in order to test the questionnaire (structure, comprehensibility of questions).

Table 2: Institutes that conducted the fieldwork of the e-Business Survey 2006 and no. of interviews per country (#)

	Institute	# Int.		Institute	# Int.
BE	Ipsos Belgium, 1050 Brussels	400	MT	Misco International Ltd., Valetta VLT 04	101
CZ	Ipsos Czech Republic, Skolska 32/694, 110 00 Praha 1	750	NL	Ipsos Belgium, 1050 Brussels	400
DK	Vilstrup Research AS, 1360 Copenhagen	403	AT	Spectra Marktforschungs-gesellschaft m.b.H., 4020 Linz	400
DE	Ipsos GmbH, 23879 Mölln	800	PL	Ipsos Poland, 02-508 Warszawa	752
EE	Marketing and Public Opinion Research Centre SKDS, Riga LV-1010	314	PT	Ipsos Portugal, 1070-15 Lisbon	400
EL	Synovate Hellas, 15451 Athens	407	SI	GfK Gral-Iteo trazne raziskave d.o.o., 1000 Ljubljana	400
ES	Ipsos Eco Consulting, 28036 Madrid	754	SK	GfK Slovakia Ltd., 813 41 Bratislava 1	400
FR	Ipsos France, 75739 Paris	751	FI	Taloustutkimus Oy, 00510 Helsinki	752
IE	Landsdowne Market Research, Dublin 1	400	SE	GfK Sverige AB, 22100 Lund	400
IT	Demoskopea S.p.A., 00199 Roma	756	UK	Continental Research, London EC1V 7DY	750
CY	Synovate Cyprus, 2107 Nicosia	209		EEA and Acceding/Candidate countries	
LV	Marketing and Public Opinion Research Centre SKDS, Riga LV-1010	432	NO	Norstat Norway, 0159 Oslo	401
LT	Marketing and Public Opinion Research Centre SKDS, Riga LV-1010	404	BG	TNS BBSS Gallup Interbational, 1164 Sofia	400
LU	Ipsos GmbH, 23879 Mölln/20097 Hamburg	117	RO	Field Insights, Bucharest 2	440
HU	Szonda Ipsos, 1096 Budapest	772	TR	Bilesim International Research & Consultancy Inc. Turkey, 34676 Istanbul	400

¹¹⁶ The survey was carried out under two different contracts. The survey in the six largest EU countries (DE, ES, FR, IT, PL, UK) was carried out as part of the e-Business W@tch contract between the European Commission and empirica GmbH; the survey in the other countries was carried out in parallel, but under a different contract (following an open call for tender for the "extended e-Business W@tch survey", issued in 2005).

Non response: In a voluntary telephone survey, in order to achieve the targeted interview totals, it is always necessary to contact more companies than just the number equal to the target. In addition to refusals, or eligible respondents being unavailable, any sample contains a proportion of "wrong" businesses (e.g., from another sector), and wrong and/or unobtainable telephone numbers. Table 3 shows the completion rate by country (completed interviews as percentage of contacts made) and reasons for non-completion of interviews. Higher refusal rates in some countries, sectors or size bands (especially among large businesses) inevitably raises questions about a possible refusal bias. That is, the possibility that respondents differ in their characteristics from those that refuse to participate. However, this effect cannot be avoided in any voluntary survey (be it telephone- or paper-based).

Table 3: Interview contact protocols: completion rates and non-response reasons (2006, examples)

		CZ	DE	ES	FR	HU	IT	NL	PL	FI	UK
1	Sample (gross)	5595	7763	7730	8686	21540	8533	4576	11054	3016	11821
1.1	Telephone number does not exist	283	1055	0	186	5545	717	349	2282	139	2663
1.2	Not a company (e.g. private household)	79	80	356	66	2076	89	219	681	34	324
1.3	Fax machine / modem	56	48	0	79	1120	61	28	53	4	130
1.4	Quota completed -> address not used	43	124	660	1939	1665	2154	1002	877	66	158
1.5	No target person in company	17	359	730	142	9	178	232	959	319	736
1.6	Language problems	9	18	0	25	0	1	36	0	41	20
1.7	No answer on no. of employees	2	1	10	13	6	8	1	19	1	0
1.8	Company does not use computers	48	47	158	250	279	314	235	460	28	51
1.9	Company does not qualify	134	330	103	156	0	113	47	813	49	215
	Sum 1.1 – 1.9	671	2062	2017	2856	10700	3635	2149	6144	681	4297
2	Sample (net)	4924	5701	5713	5830	10840	4898	2427	4910	2335	7524
2.1	Nobody picks up phone	1071	582	1645	6	1023	647	82	513	22	1898
2.2	Line busy, engaged	83	122	57	46	89	0	3	73	1	1
2.3	Answering machine	143	145	121	1315	1200	0	9	127	1	145
2.4	Contact person refuses	2080	1125	2553	131	2011	729	1653	2009	578	2523
2.5	Target person refuses	450	1865	202	1475	2776	642	113	280	405	1618
2.6	No appointment during fieldwork period	3	11	70	182	2571	384	112	150	50	376
2.7	Open appointment	295	953	35	1896	258	1041	21	763	459	51
2.8	Target person is ill / unavailable	2	31	0	0	0	13	0	29	2	32
2.9	Interview abandoned	43	67	271	29	108	686	34	176	15	130
2.10	Interview error, cannot be used	4	0	5	5	32	0	0	38	50	0
	Sum 2.1 – 2.10	4174	4901	4959	5085	10068	4142	2027	4158	1583	6774
3	Successful interviews	750	800	754	751	772	756	400	752	752	750
	Completion rate (= [3] / [2])	15%	14%	13%	13%	7,12%	15%	16,48%	15%	32%	10%
	Average interview time (min:sec)	19:19	18:46	17:29	19:39	17:14	16:43	19:00	23:44	20:19	20:16

Feedback from interviewers

No major problems were reported from the fieldwork with respect to interviewing (comprehensibility of the questionnaire, logical structure). The overall feedback from the survey organisations was that fieldwork ran smoothly and that the questionnaire was well understood by most respondents. The main challenge was the fulfilment of the quotas, which was difficult or impossible in some of the sectors, in particular among the larger size-bands. Some of the more specific remarks from fieldwork organisations, which point at difficulties encountered in the local situation, are summarised in Table 4.

Table 4: Comments by national fieldwork companies on their experience (2006, examples)

Country	Comments
Belgium	<ul style="list-style-type: none"> The questionnaire was very clear. Business-to-business (B2B) research (i.e. surveys on behalf of companies or authorities amongst companies) is often difficult when the questionnaire length is longer than 15 minutes; target persons often complained that they have no time for an interview during their normal work. Positive reaction from respondents that the results can be found on the website.
Bulgaria	<ul style="list-style-type: none"> Many companies (especially within the tourism sector) have outsourced their ICT operations. Therefore, it was sometimes difficult for respondents to understand the questions.
Czech Republic	<ul style="list-style-type: none"> It was difficult to fulfil quotas in several sectors which are mainly represented by very small companies, often by one-person-companies (self-employed), many of which are not willing to do a relatively long interview. There was a high percentage of refusals among micro-companies.
Denmark	<ul style="list-style-type: none"> Some technical terms (such as internet protocol, LAN, W-LAN, VPN, RFID, and EDI) were hard for interviewers and respondents to understand.
Finland	<ul style="list-style-type: none"> The questionnaire was quite long and that is why there were more refusals than normal. Smaller companies often refused to answer or interrupted the interview because they thought that they did not know enough about e-business. Respondents in the pulp and paper sector were especially not interested in this topic due to comparably low ICT usage.
Germany	<ul style="list-style-type: none"> As with previous e-Business surveys carried out, fieldwork ran relative smoothly overall and the questionnaire was easy to understand and interesting for most of respondents. Respondents from small companies often had difficulty when answering questions related to specific technical terms and applications. Respondents reacted positively to the fact that the survey was carried out on behalf of the European Commission.
Greece	<ul style="list-style-type: none"> There were several cases where companies have outsourced the IT support and thus there was no person to interview. Respondents who were not IT specialists found some of the IT terminology difficult to understand.
Spain	<ul style="list-style-type: none"> Fieldwork did not run as smoothly as expected due to several bank holidays occurring during the period, therefore it was difficult to reach the target persons. IT professionals in large companies were the most available.
France	<ul style="list-style-type: none"> In general, the fieldwork went without any problems and the questionnaire was understood by the respondents. For some sectors, the lack of contact addresses was a serious problem. For future surveys, the case concerning new companies which cannot answer the financial questions should be considered.
Hungary	<ul style="list-style-type: none"> The cooperation level in this survey was similar to other telephone surveys among companies; but a problem was that many small companies use only one computer, and only for basic functions.
Ireland	<ul style="list-style-type: none"> The B2B sector (not general population or household surveys) is very over researched in Ireland; hence there was a high level of refusals. In Ireland more than 90% of businesses employ less than 9 employees so many companies do not have the need nor use for ICT.

Italy	<ul style="list-style-type: none"> • Many refusals among the smallest and/or family owned business, where only one PC is available and used more for personal reasons than for business. • Respondents often lost their patience because considering the low use of the PC in their business, they had to spend time on the phone always giving the same answers ("no, do not use ...").
Latvia	<ul style="list-style-type: none"> • The main problem was the length of the questionnaire. Although the average interview length was 16 minutes and thus the shortest of all participating countries, surveys among companies with interviews lasting more than 15 minutes are generally not recommended in Latvia. • It was rather hard for IT managers to answer about budget, market shares and so on.
The Netherlands	<ul style="list-style-type: none"> • The questionnaire was very clear, so positive. • Business-to-business surveys are often difficult when the questionnaire length is longer than 15 minutes. • Secretaries/receptionists in the Netherlands are very well trained in refusing the transferring of a call.
Norway	<ul style="list-style-type: none"> • Interviewers experienced that many respondents / businesses did not wish to participate due to the topic of the survey. Main reason was that they did not feel competent, although they qualified from the results of the screening.
Poland	<ul style="list-style-type: none"> • There were some difficulties in getting an interview with computer/IT specialists. In many big companies they refuse to take time for an interview. • Many small companies did not understand some of the more technical terms.
Sweden	<ul style="list-style-type: none"> • The questionnaire was understood by most of the respondents.
UK	<ul style="list-style-type: none"> • Although some of the questions do appear to be quite technical, this did not prove a particular problem for respondents. • There was a very low universe of companies in certain quota cells. Given the limited sample available in some sectors, and the need to target a high proportion of large companies, a longer field period would probably have helped to maximize the number of complete interviews. • It is becoming increasingly difficult to secure interviews with IT/DP professionals, and we suspect that this situation will only worsen in the future.

Weighting schemes

Due to stratified sampling, the sample size in each size-band is not proportional to the population numbers. If proportional allocation had been used, the sample sizes in the 250+ size-band would have been extremely small, not allowing any reasonable presentation of results. Thus, weighting is required so that results adequately reflect the structure and distribution of enterprises in the population of the respective sector or geographic area. *e-Business W@tch* applies two different weighting schemes: weighting by employment and by the number of enterprises.¹¹⁷

- **Weighting by employment:** Values that are reported as employment-weighted figures should be read as "enterprises comprising x% of employees" (in the respective sector or country). The reason for using employment weighting is that there are many more micro-enterprises than any other firms. If the weights did not take into account the economic importance of businesses of different sizes in some way, the results would be dominated by the percentages observed in the micro size-band.
- **Weighting by the number of enterprises:** Values that are reported as "x% of enterprises" show the share of firms irrespective of their size, i.e. a micro-company with a few employees and a large company with thousands of employees both count equally.

¹¹⁷ In the tables of this report, data are normally presented in both ways, except for data by size-bands. These are shown in % of firms within a size-band, where employment-weighting is implicit.

The use of filter questions in interviews

In the interviews, not all questions were asked to all companies. The use of filter questions is a common method in standardised questionnaire surveys to make the interview more efficient. For example, questions on the type of internet access used were only asked to those companies that had replied to have internet access. Thus, the question whether a company has Internet access or not serves as a filter for follow-up questions.

The results for filtered questions can be computed on the base of only those enterprises that were actually asked the question (e.g. "in % of enterprises with internet access"), but can also be computed on the base of "all companies". In this report, both methods are used, depending on the indicator. The base (as specified in footnotes of tables and charts) is therefore not necessarily identical to the set of companies that were actually asked the underlying question.

Statistical accuracy of the survey: confidence intervals

Statistics vary in their accuracy, depending on the kind of data and sources. A 'confidence interval' is a measure that helps to assess the accuracy that can be expected from data. The confidence interval is the estimated range of values on a certain level of significance. Confidence intervals for estimates of a population fraction (percentages) depend on the sample size, the probability of error, and the survey result (value of the percentage) itself. Further to this, variance of the weighting factors has negative effects on confidence intervals.

Table 7 gives some indication about the level of accuracy that can be expected for industry totals for the EU-10¹¹⁸ (based on all respondents) depending on the weighting scheme applied. For totals of all-sectors (in the EU-10), an accuracy of about +/- 3 percentage points can be expected for most values that are expressed as "% of firms", and of about +/- 2 percentage points for values that are weighted by employment.

The confidence intervals for industry totals (EU-10) differ considerably depending on the industry and the respective value; on average, it is about +/- 5 percentage points (in both weighting schemes). Confidence intervals are highest for the shipbuilding and repair industry, due to the small number of observations, and because this sector is more sensitive to weights due to its structure (i.e. the dominance of large firms in a comparatively small population). Data for this industry are therefore indicative and cannot claim to have statistical accuracy.

The calculation of confidence intervals is based on the assumption of (quasi-) infinite population universes. In practice, however, in some industries and in some countries the complete population of businesses consists of only several hundred or even a few dozen enterprises. In some cases, literally each and every enterprise within a country-industry and size-band cell was contacted and asked to participate in the survey. This means that it is practically impossible to achieve a higher confidence interval through representative enterprise surveys in which participation is not obligatory. This should be borne in mind when comparing the confidence intervals of *e-Business W@tch* surveys to those commonly found in general population surveys.

¹¹⁸ The EU-10 are composed of those countries in which all 10 sectors were covered by the survey. To ensure data comparability, only interviews from these countries are included in the aggregated "total" values. The EU-10 are: CZ, DE, ES, FR, IT, HU, NL, PL, FI, UK. These 10 countries represent more than 80% of the population and GDP of the EU.

Table5: Confidence intervals for all-sector and sector totals (EU-10)

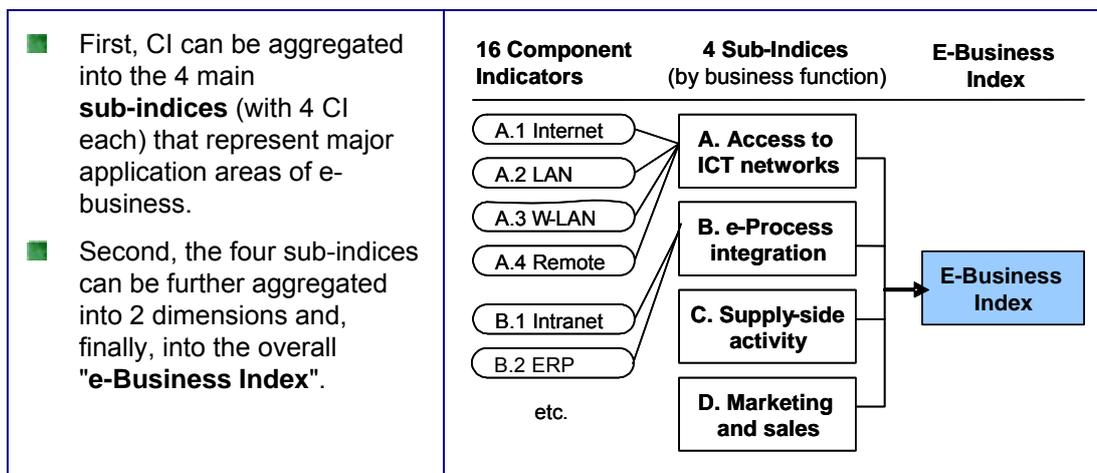
	Survey result	Confidence interval								
		Weighted as "% of firms"			Weighted by employment			Unweighted		
All sectors (aggregate), EU-10	10%	8.1%	-	12.3%	8.7%	-	11.5%	9.4%	-	10.6%
Food and beverages	10%	6.6%	-	14.8%	7.3%	-	13.6%	8.4%	-	11.9%
Footwear	10%	7.5%	-	13.2%	7.6%	-	13.1%	8.4%	-	11.9%
Pulp and paper	10%	7.8%	-	12.7%	7.5%	-	13.3%	8.5%	-	11.7%
ICT manufacturing	10%	7.9%	-	12.6%	7.6%	-	13.0%	8.7%	-	11.5%
Consumer electronics	10%	7.4%	-	13.4%	6.0%	-	16.2%	8.0%	-	12.4%
Shipbuilding and repair	10%	4.8%	-	19.7%	4.6%	-	20.4%	6.0%	-	16.1%
Construction	10%	6.9%	-	14.3%	7.6%	-	13.1%	8.3%	-	11.9%
Tourism	10%	6.6%	-	14.8%	6.8%	-	14.4%	8.3%	-	12.0%
Telecommunication services	10%	7.6%	-	13.1%	6.6%	-	14.8%	8.4%	-	11.9%
Hospital activities	10%	7.2%	-	13.7%	7.2%	-	13.8%	8.1%	-	12.3%
All sectors (aggregate), EU-10	30%	26.8%	-	33.4%	27.9%	-	32.2%	29.1%	-	30.9%
Food and beverages	30%	24.2%	-	36.6%	25.4%	-	35.0%	27.4%	-	32.8%
Footwear	30%	25.9%	-	34.5%	26.0%	-	34.3%	27.3%	-	32.8%
Pulp and paper	30%	26.4%	-	33.9%	25.8%	-	34.6%	27.6%	-	32.5%
ICT manufacturing	30%	26.5%	-	33.8%	26.1%	-	34.2%	27.9%	-	32.2%
Consumer electronics	30%	25.6%	-	34.8%	22.9%	-	38.1%	26.8%	-	33.5%
Shipbuilding and repair	30%	20.2%	-	42.0%	19.7%	-	42.8%	23.0%	-	38.1%
Construction	30%	24.7%	-	35.9%	25.9%	-	34.4%	27.3%	-	32.8%
Tourism	30%	24.2%	-	36.5%	24.6%	-	36.1%	27.3%	-	32.9%
Telecommunication services	30%	25.9%	-	34.4%	24.2%	-	36.5%	27.4%	-	32.7%
Hospital activities	30%	25.3%	-	35.2%	25.3%	-	35.2%	26.9%	-	33.4%
All sectors (aggregate), EU-10	50%	46.4%	-	53.6%	47.6%	-	52.4%	49.0%	-	51.0%
Food and beverages	50%	43.2%	-	56.8%	44.7%	-	55.3%	47.0%	-	53.0%
Footwear	50%	45.3%	-	54.7%	45.5%	-	54.5%	47.0%	-	53.0%
Pulp and paper	50%	45.9%	-	54.1%	45.2%	-	54.8%	47.3%	-	52.7%
ICT manufacturing	50%	46.0%	-	54.0%	45.5%	-	54.5%	47.7%	-	52.3%
Consumer electronics	50%	45.0%	-	55.0%	41.7%	-	58.3%	46.3%	-	53.7%
Shipbuilding and repair	50%	38.2%	-	61.8%	37.5%	-	62.5%	41.8%	-	58.2%
Construction	50%	43.9%	-	56.1%	45.4%	-	54.6%	47.0%	-	53.0%
Tourism	50%	43.3%	-	56.7%	43.7%	-	56.3%	46.9%	-	53.1%
Telecommunication services	50%	45.4%	-	54.6%	43.3%	-	56.7%	47.1%	-	52.9%
Hospital activities	50%	44.6%	-	55.4%	44.6%	-	55.4%	46.5%	-	53.5%
All sectors (aggregate), EU-7	70%	66.6%	-	73.2%	67.8%	-	72.1%	69.1%	-	70.9%
Food and beverages	70%	63.4%	-	75.8%	65.0%	-	74.6%	67.2%	-	72.6%
Footwear	70%	65.5%	-	74.1%	65.7%	-	74.0%	67.2%	-	72.7%
Pulp and paper	70%	66.1%	-	73.6%	65.4%	-	74.2%	67.5%	-	72.4%
ICT manufacturing	70%	66.2%	-	73.5%	65.8%	-	73.9%	67.8%	-	72.1%
Consumer electronics	70%	65.2%	-	74.4%	61.9%	-	77.1%	66.5%	-	73.2%
Shipbuilding and repair	70%	58.0%	-	79.8%	57.2%	-	80.3%	61.9%	-	77.0%
Construction	70%	64.1%	-	75.3%	65.6%	-	74.1%	67.2%	-	72.7%
Tourism	70%	63.5%	-	75.8%	63.9%	-	75.4%	67.1%	-	72.7%
Telecommunication services	70%	65.6%	-	74.1%	63.5%	-	75.8%	67.3%	-	72.6%
Hospital activities	70%	64.8%	-	74.7%	64.8%	-	74.7%	66.6%	-	73.1%
All sectors (aggregate), EU-7	90%	87.7%	-	91.9%	88.5%	-	91.3%	89.4%	-	90.6%
Food and beverages	90%	85.2%	-	93.4%	86.4%	-	92.7%	88.1%	-	91.6%
Footwear	90%	86.8%	-	92.5%	86.9%	-	92.4%	88.1%	-	91.6%
Pulp and paper	90%	87.3%	-	92.2%	86.7%	-	92.5%	88.3%	-	91.5%
ICT manufacturing	90%	87.4%	-	92.1%	87.0%	-	92.4%	88.5%	-	91.3%
Consumer electronics	90%	86.6%	-	92.6%	83.8%	-	94.0%	87.6%	-	92.0%
Shipbuilding and repair	90%	80.3%	-	95.2%	79.6%	-	95.4%	83.9%	-	94.0%
Construction	90%	85.7%	-	93.1%	86.9%	-	92.4%	88.1%	-	91.7%
Tourism	90%	85.2%	-	93.4%	85.6%	-	93.2%	88.0%	-	91.7%
Telecommunication services	90%	86.9%	-	92.4%	85.2%	-	93.4%	88.1%	-	91.6%
Hospital activities	90%	86.3%	-	92.8%	86.2%	-	92.8%	87.7%	-	91.9%

confidence intervals at $\alpha=.90$

The e-Business Scoreboard 2006

The e-Business Scoreboard approach was developed by *e-Business W@tch* in 2004. It is a compound index that condenses data on ICT adoption and e-business activity, enabling comparisons across different sectors, countries or size-bands.

Conceptually, the e-Business Scoreboard owes a debt to the Balanced Scorecard (BSC) approach, which suggests that an organisation should be viewed from four perspectives, and that metrics (and targets) are to be defined for each perspective. Similarly, the e-Business Scoreboard looks at ICT use by enterprises from four (inter-related) perspectives. The Scoreboard consists of **16 component indicators** (see next page), which represent the metrics for these perspectives. Component indicators (CI) can be aggregated on several levels.



The e-Business Scoreboard takes into account the percentages (diffusion rates) from all sectors (size-bands, ...) and show how a specific sector (size-band, ...) differs from the all-sector-average. An index value is based on mean values and standard deviations. Thus, index values express the multiple of the standard deviation (1 or (-1)) for a specific sector and the selected indicator. 0 equals the mean value for all sectors (size-bands, ...).

Indexes simplify multi-dimensional concepts. To correctly assess the validity and shortcomings of the Scoreboard and its overall index, the following notes should be taken into account:

- **Weighting:** Results are influenced by the selection of the underlying weighting scheme for component indicators. If employment-weighted figures are used, e-business activity in large firms is emphasized. If indicators are weighted by the number of enterprises (irrespective of their size), the situation in smaller firms is emphasized.
- **Component indicators:** The selection of component indicators may have a bias towards manufacturing activities, as some indicators can be more relevant for manufacturing than for service sectors (e.g. ERP use).
- **Relative comparison:** The Scoreboard results do not represent absolute measures of e-business activity, but depend on the respective set of sectors (or countries, ...) that are compared to each other, because figures express standard deviations from the *average* of the respective set.

Component indicators of the e-Business Scoreboard 2006

(Definitions for indicators weighted by employment)

A. ICT infrastructure and basic connectivity		
A.1	Internet connectivity	= the percentage of employees working in enterprises that are connected to the internet, with a supplementary indicator for the type of internet connection in terms of bandwidth. Enterprises that are connected with broadband (via DSL, cable, direct fibre or wireless broadband) are computed with a factor of 1.0, enterprises connected via analogue dial-up modem or ISDN with a factor of 0.5. The maximum value of 100 would be returned if all employees work in enterprises with broadband connections.
A.2	Use of LAN	= the percentage of employees from a sector working in enterprises that have connected computers with a Local Area Network (LAN).
A.3	Use of a Wireless LAN	= the percentage of employees working in enterprises which use a Wireless LAN.
A.4	Remote access to the company's computer network	= the percentage of employees from a sector working in enterprises where it is possible to access data from the company's computer system from a remote location.
B. Internal business process automation		
B.1	Use of an intranet	= the percentage of employees working in enterprises that use an intranet.
B.2	Use of an ERP system	= the percentage of employees working in enterprises that have implemented an ERP (enterprise resource planning) system.
B.3	Use of online technology to track working hours and/or production time	= the percentage of employees working in enterprises that use online technologies (other than e-mail) to track working hours and/or production times.
B.4	Companies sending or receiving e-invoices	= the percentage of employees working in enterprises that send and/or receive e-invoices.
C. Procurement and supply chain integration		
C.1	Companies placing >5% of their orders to suppliers online	= the percentage of employees working in enterprises saying that they place orders to suppliers online on the web or via other computer-mediated networks, for example via EDI based connections to their suppliers, and that these online orders account for at least 5% of their total orders.
C.2	Use of specific ICT solutions for e-procurement	= the percentage of employees working in enterprises that use specific IT solutions to support the selection of their suppliers and/or procurement processes.
C.3	Companies linking their ICT system with suppliers	= the percentage of employees that work in enterprises whose ICT system is linked with those of suppliers.
C.4	Companies managing capacity and inventory online	= the percentage of employees working in enterprises that that use technologies to manage capacity and inventory online.
D. Marketing and sales processes		
D.1	Use of CRM software systems	= the percentage of employees working in enterprises that use a CRM (customer relationship management) software to organise data about their customers electronically.
D.2	Companies receiving >5% of orders from customers online	= the percentage of employees working in enterprises saying that they accept orders from customers online on the web or via other computer-mediated networks, and that these online orders account for at least 5% of their total orders received.
D.3	Use of specific ICT solutions to support marketing and sales processes	= the percentage of employees working in enterprises that uses specific IT solutions to support marketing and sales processes.
D.4	Companies linking their ICT system with customers	= the percentage of employees that work in enterprises whose ICT system is linked with those of customers.

Annex II: Expanded Tables – Data by Country

General remarks on country data break-downs

The studies of *e-Business W@tch* have a sectoral perspective and focus, within sectors, on small and medium-sized enterprises; the analysis of geographic differences is not in the foreground. This decision on the study focus recognises that the e-business activities of a company are mainly determined by its business activity, the configuration of its value system and its size, rather than by the location of a firm.

For several reasons, country data on e-business adoption must be taken with a pinch of salt. They can reflect, at least to some extent, the structure of the economy rather than the overall e-maturity of firms. In Italy, for example, sectors dominated by small firms are much more prevalent than in other countries. Since large firms are more advanced in electronic business, aggregated data may point at a lower level of e-business activity in Italy. In contrast to Italy, the relative performance of French and Dutch companies is significantly better if the emphasis is on larger firms. These benchmarking results suggest that the digital divide between small and large firms could be quite pronounced in these countries.

It should also be considered that the average size of the companies interviewed in a sector can differ by country, depending on industry structure and the available business directories used for sampling. It cannot be excluded that some directories may have a bias towards smaller / larger firms. Although this effect is counteracted by weighting the answers (according to the representation of various company sizes in the population), it cannot be excluded that structural differences in the sample have an impact on results. Ideally, comparisons between different countries should only be made within the same size-band of firms, rather than on the aggregate level. However, at least within a given sector, the number of observations available does not allow a break-down by country *and* size-band.

Exhibit A:2-1 Internet access and remote access to company network

	Companies with internet access		Companies with broadband internet access		Average share of employees with internet access		Remote access to company network	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecoms (EU-10)	100	99	88	85		90	74	46
Micro (1-9 empl.)		99		85		90		41
Small (10-49 empl.)		100		87		87		70
Medium (50-249 empl.)		100		85		79		83
Large (250+ empl.)		100*		79*		74*		93*
Belgium	100	98	80	91		88	86	36
Czech Republic	100	100	73	85		89	67	59
Denmark	100	100	86	89		96	94	67
Germany	100	96	82	79		91	68	44
Estonia	100*	100*	89*	95*		94*	67*	68*
Spain	100	100	100	92		85	77	57
France	100	97	100	88		93	71	30
Italy	100	100	100	94		95	68	44
Latvia	100	100	80	78		85	47	40
Lithuania	100	100	89	83		85	56	39
Hungary	100	97	88	86		90	66	56
Netherlands	100	100	95	91		99	88	49
Poland	100	100	90	78		93	59	52
Slovakia	100*	94*	70*	58*		81*	44*	24*
Finland	100	100	100	96		96	94	70
Sweden	94	95	90	91		92	74	59
UK	100	100	78	83		86	81	45
Romania	94	91	81	68		67	39	25
Turkey	100	100	74	84		55	81	49
All 10 sectors (EU-10)	95	93	76	69		43	35	16
Micro (1-9 empl.)		89		62		51		12
Small (10-49 empl.)		98		75		29		22
Medium (50-249 empl.)		99		83		33		43
Large (250+ empl.)		99		84		44		60
Base (100%)	firms using computers		firms using computers		firms with internet access		firms using computers	
N (for sector, EU-10)	829		829		817		829	
Questionnaire reference	A1		A3		A2		A5	
* Data only indicative due to low number of observations (N ~ 25-50).								

Source: e-Business W@tch (Survey 2006)

Exhibit A2-2: Demand for ICT skills and skills development

	Companies employing ICT practitioners		Regular ICT training of employees		Companies with hard-to-fill vacancies for ICT jobs in 2005		Companies using e-learning	
	Weighting:	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.
Telecoms (EU-10)	63	33	52	21	12	5	41	28
Micro (1-9 empl.)		30		17		4		26
Small (10-49 empl.)		48		36		14		40
Medium (50-249 empl.)		63		55		13		34
Large (250+ empl.)		83*		65*		15*		57*
Belgium	69	25	41	17	8	2	33	23
Czech Republic	43	22	47	29	16	8	32	29
Denmark	99	87	79	34	28	7	74	32
Germany	68	43	50	35	14	5	36	21
Estonia	66*	58*	33*	26*	32*	16*	43*	34*
Spain	46	25	51	33	13	8	55	45
France	64	30	50	14	7	7	28	17
Italy	63	43	73	52	5	0	47	40
Latvia	74	59	57	37	22	11	22	24
Lithuania	33	19	46	31	26	15	42	34
Hungary	60	35	36	14	6	7	52	22
Netherlands	72	38	41	21	24	7	49	27
Poland	80	53	52	21	18	9	19	23
Slovakia	59*	37*	45*	36*	30*	12*	30*	13*
Finland	94	75	88	44	23	10	47	34
Sweden	74	69	45	36	3	3	16	18
UK	49	27	45	14	10	4	50	29
Romania	55	27	54	39	26	19	46	40
Turkey	53	45	51	57	20	16	78	53
All 10 sectors (EU-10)	27	14	22	13	2	1	21	11
Micro (1-9 empl.)		12		9		2		12
Small (10-49 empl.)		15		16		0		11
Medium (50-249 empl.)		29		28		2		19
Large (250+ empl.)		59		41		6		35
Base (100%)		firms using computers		firms using computers		firms using computers		firms using computers
N (for sector, EU-10)		829		829		829		829
Questionnaire reference		B1		B4		B2		B5

* Data only indicative due to low number of observations (N ~ 25-50).

Source: e-Business W@tch (Survey 2006)

Exhibit A2-3 Companies ordering supply goods online

	Place orders online		Place 25% and less of orders online		Place more than 25% of orders online		Use specific ICT solutions for e-sourcing	
	Weighting:	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.
Telecom (EU-10)	78	77	54	49	46	51	26	12
Micro (1-9 empl.)		77		49		51		11
Small (10-49 empl.)		80		47		53		23
Medium (50-249 empl.)		77		60		40		24
Large (250+ empl.)		84*		45*		55*		29*
Belgium	87	56	44*	53*	56*	47*	12	8
Czech Republic	80	77	21*	20*	79*	80*	19	9
Denmark	99	94	38	37	62	63	33	25
Germany	91	90	53	45	47	55	27	16
Estonia	67*	73*	40*	42*	60*	58*	21*	13*
Spain	70	69	65	47	35	53	47	43
France	78	70	64	56	36	44	7	8
Italy	68	75	54*	69*	46*	31*	36	2
Latvia	53	57	87*	60*	13*	40*	14	20
Lithuania	70	63	49	40	51	60	24	20
Hungary	53	59	47*	73*	53*	27*	17	10
Netherlands	87	81	46	46	54	54	8	4
Poland	69	84	40	23	60	77	9	12
Slovakia	40*	27*	99*	61*	1*	39*	15*	9*
Finland	91	90	28	32	72	68	20	21
Sweden	81	82	68	58	32	42	10	7
UK	72	78	54	51	46	49	36	12
Romania	71	70	43	50	57	50	23	23
Turkey	63	61	69	65	31	35	64	36
All 10 sectors (EU-10)	57	48	74	75	26	25	16	9
Micro (1-9 empl.)		44		73		27		7
Small (10-49 empl.)		54		80		20		10
Medium (50-249 empl.)		60		76		24		16
Large (250+ empl.)		68		75		25		29
Base (100%)	firms using computers	firms placing orders online		firms placing orders online		firms using computers		
N (for sector, EU-10)	829	617		617		829		
Questionnaire reference	E1	E3		E3		E7		
* Data only indicative due to low number of observations (N ~ 25-50).								

Source: e-Business W@tch (Survey 2006)

Exhibit A2-4: Companies receiving orders from customers online

	Accept orders from customers online		Receive 25% and less of orders online		Receive more than 25% of orders online		Use specific ICT solutions for e-selling	
	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms	% of empl.	% of firms
Telecoms (EU-10)	36	40	66	63	34	37	37	21
Micro (1-9 empl.)		40		63		37		19
Small (10-49 empl.)		37		62		38		28
Medium (50-249 empl.)		35		68*		32*		35
Large (250+ empl.)		63*		(**)		(**)		62*
Belgium	45	21	45*	63*	55*	37*	41	22
Czech Republic	48	45	50*	55*	50*	45*	31	13
Denmark	80	60	(**)	(**)	(**)	(**)	65	46
Germany	32	41	(**)	(**)	(**)	(**)	45	28
Estonia	43*	34*	(**)	(**)	(**)	(**)	31*	13*
Spain	15	35	36*	50*	64*	50*	31	44
France	29	29	100*	89*	0*	11*	21	24
Italy	31	28	(**)	(**)	(**)	(**)	36	19
Latvia	36	26	(**)	(**)	(**)	(**)	14	13
Lithuania	54	35	76*	63*	24*	37*	31	22
Hungary	60	40	(**)	(**)	(**)	(**)	23	14
Netherlands	54	42	37*	31*	63*	69*	33	18
Poland	30	57	59*	60*	41*	40*	31	20
Slovakia	30*	22*	(**)	(**)	(**)	(**)	25*	15*
Finland	66	60	74*	59*	26*	41*	55	31
Sweden	48	37	46*	50*	54*	50*	19	19
UK	47	40	48	65	52	35*	45	17
Romania	38	36	39*	60*	61*	40*	39	25
Turkey	36	33	44*	46*	56*	54*	64	37
All 10 sectors (EU-10)	35	25	73	75	27	25	18	9
Micro (1-9 empl.)		23		79		21		6
Small (10-49 empl.)		26		76		24		12
Medium (50-249 empl.)		29		75		25		16
Large (250+ empl.)		26		74		26		27
Base (100%)	firms using computers	firms accepting orders online	firms accepting orders online	firms using computers				
N (for sector, EU-10)	829	323	323	829				
Questionnaire reference	F4	F6	F6	F10				
*Data only indicative due to low number of observations (N ~ 25-50).								
** Values not displayed because number of observations (N) is <25.								

Source: e-Business W@tch (Survey 2006)

Annex III: VoIP - Usage, Opportunities and Risks

The following paragraphs explain usage scenarios, value propositions, and risks related to Voice over IP (VoIP).

VoIP usage scenarios

The following discussion of VoIP usage scenarios refers to Exhibit 4-9 in Chapter 4.1.3.

Corporate users can generally follow **two paths** if they want to benefit from VoIP. They can use either **hybrid solutions** or pure **IP-based networks**. Regarding **'hybrid' solutions**, which combine legacy telephony with IP-based infrastructure, companies have three **opportunities** to set them up:

- **Routing via internet-based network services:** Companies may use software to connect to network services based on the internet. The most prominent service in this regard is Skype, which is often considered to be a service limited to private usage. However, the company claims that 30% of its (then) 75 million customers use the application for their businesses. Most of these users work at small and medium sized companies.¹¹⁹ (For more details on Skype and its business development see box in chapter 3.2.3)
- **Pre-selection services by telephony providers:** Several telephony providers offer so-called pre-selection services to companies (as well as to private users). The main value proposition of these services is calls at competitive prices. This type of service does not require new infrastructure on the side of the companies, as the service provider simply routes traditional phone calls over its own IP-based network (the so-called "IP backbone").
- **Gateway solution:** Larger companies that operate an own telephony infrastructure (including a "private branch exchange" - PBX) can also opt for a gateway solution. In this case, calls that are initiated and terminated via PSTN (Public Switched Telephone Network, i.e. traditional fixed line telephony) are routed over the internet or other broadband connection using a VoIP gateway (also called 'router').

Particularly companies with various branches and subsidiaries may implement **pure VoIP solutions**. From there, they basically have two choices:

- **Installing an IP-based PBX (IP PBX) on own premises:** In case the company wants to retain full control over their telephony infrastructure, they can do so with a so-called IP PBX. In that case, the company abandons its traditional PSTN system and runs a single converged IP-based network. IP PBXs are offered, for example, by IT network infrastructure suppliers such as Alcatel (France) or Cisco (USA).
- **Hosted services:** Businesses can also choose to have their IP-based telephony infrastructure run on the service provider's premises. The advantage of this

¹¹⁹ Corner, Stuart (2006): Skype enhances services for small businesses. IT Wire, March 12, 2006.

solution is that it avoids the costly and capital-intensive task of installing and maintaining an own telephony system. At the same time, companies can benefit from the value propositions of VoIP. Avaya (USA) for instance offers a subscription-based on demand service targeted at mid-size and large businesses¹²⁰.

Value propositions

Enterprises could derive a business case from one or more of the following value propositions. It should be noted that these cases are mostly relevant for a pure VoIP telephony infrastructure, although other solutions can offer similar opportunities to some extent.

- **Cost savings derived from a converged data and voice infrastructure:** Traditionally, enterprises maintain one telephony infrastructure, and one for data (e.g. DSL). This is costly and more complex to set up and maintain than a single installation that is required by a merged voice/data structure based on the Internet Protocol.
- **Streamlined processes by integrated solutions:** Rather than just cheap calls, VoIP is more likely to be driven by integrated communications applications, according to some market observers¹²¹. This seems also to be one of the motivations behind deals like Microsoft's purchase of media-streams.com AG, a Swiss VoIP technology developer. The acquisition is supposed to accelerate the delivery of so-called "unified messaging" solutions, i.e. the combination of e-mail, instant messaging, voice and video conferencing within a single application¹²². A further example is Salesforce.com, the on-demand CRM software. It has integrated Skype's technology so that customers can initiate calls and instant messaging sessions from within the CRM application¹²³.

Call centres in particular have been forerunners in the application of VoIP. They use the technology to make their processes more efficient, consolidate multiple sites and better supervise employees¹²⁴.

- **Increased flexibility:** Changing workplaces of employees, building new teams or integrating branches and subsidiaries are typical challenges for larger companies in order to retain their competitiveness. These tasks are easier and cheaper to be accomplished with VoIP compared to conventional telephony solutions, as no further hardware needs to be installed and connections can be managed over a web interface. Jonathan Earp, CTO at T&F Informa – a British media company with

¹²⁰ Musich, Paula (2006): Avaya targets midmarket with IP telephony services. eWeek, May 4, 2006.

¹²¹ Hines, Matt (2005): Experts say applications will drive VoIP growth. eWeek, September 20, 2005.

¹²² Regan, Keith (2005): With latest purchase, Microsoft eyes VoIP in Office applications. E-Commerce Times, November 3, 2005.

¹²³ Spooner, John G. (2006): Salesforce.com's AppExchange brokers software. January 17, 2006.

¹²⁴ Ritchel, Matt (2006): The long-distance journey of a fast-food order. New York Times, April 11, 2006.

150 worldwide offices and approximately 7,400 staff – confirms: “Once VoIP is established, new sites can be added with a switch and a few phones, at a fraction of the cost and labour of a new [private branch exchange] at each new site.”¹²⁵

Risks of VoIP

The adoption of VoIP services and solutions, however, might also lead to additional risks. First, **cost savings might be overvalued**, particularly by enterprises building the business case mainly on cost savings from lower telephony charges. In the first place, long distance rates for traditional telephony have been continually declining¹²⁶. As a consequence, it is questionable whether additional cost savings can justify the costs for the implementation of a VoIP solution. In addition, especially large corporations with lots of voice traffic might already get discounts from their legacy voice service providers.

Moreover, **quality of service can be worse than with traditional telephony**. There are particular challenges related to voice quality. First, VoIP as a technology has not yet reached maturity status. Second, in case voice traffic is routed over the public internet, there might be bottlenecks or lack of capacity that are beyond the provider’s control¹²⁷. This may hinder use of VoIP services especially for companies that need to interact with their customers that are not within their corporate network. In that case, connectivity must be stable and of good quality. Third, voice traffic competes with data traffic within IP networks. In case voice information is not prioritised, packets can be lost or stalled, resulting in so-called ‘jitter’ or ‘latency’, which can harm the quality of a voice connection. Quality of service as a critical issue in the developing VoIP provider market is illustrated by the case study on Upnet in Section 4.1.3.

Finally, companies implementing VoIP solutions also have to consider **security aspects**: IP-based voice connections necessitate similar security measures as data transfer. Although these security concerns per se are not new, they are now also relevant for voice. First, if voice is not encrypted when travelling over public networks such as the internet, calls can be wiretapped. Second, an IP PBX technically is a server and as such connected to the internet. This exposes it to remote server attacks, e.g. hacking or denial-of-service attacks, where the volume of request directed at the server is so massive that it causes the server to collapse. However, the actual relevance of these issues is still under discussion. In fact, the same security measures that are used for traditional data traffic can be used for voice traffic as well.

¹²⁵ Mathews, Carrie (2005): The ROI of VoIP. CIO Magazine, June 1, 2005.

¹²⁶ Alexander, Steve (2006): Forecast 2006 – VoIP. Computerworld, January 2, 2006.

¹²⁷ Carr, Sylvia (2004): Does Skype make sense for business? Silicon.com, November 10, 2004.

Annex IV: Glossary of Technical Terms

Term	Definition ¹²⁸
Access	The ability to retrieve information and to communicate online through the use of digital information and communication technologies.
ADSL	Cf. DSL
B2B	Business to Business. Electronic transactions between companies.
B2B e-marketplace	Electronic trading platforms on the internet where companies can sell and/or buy goods or services to/from other companies. They can be operated by a single buyer or seller or by a third party. Many marketplaces are industry-specific. Some marketplaces require registration and membership fees from companies that want to conduct trade on them.
B2C	Business to Consumer. Electronic transactions, between companies and consumers.
Bandwidth	The physical characteristic of a telecommunications system that indicates the speed at which information can be transferred. In analogue systems, it is measured in cycles per second (Hertz), and in digital systems in binary bits per second. (Bit/s).
Broadband	High bandwidth internet access. In <i>e-Business W@tch</i> reports, broadband is defined as the capacity to transfer data at rates of 2 Mbit/s (megabits per second) or greater.
Cable	Cable TV
CDMA	Code Division Multiplex Access
Channel	In communications, a physical or logical path allowing the transmission of information; the path connecting a data source and a receiver.
CRM	Customer Relationship Management. Software systems that promise the ability to synthesize data on customers' behaviour and needs and thus to provide a universal view of the customer.
Dial-up	The process of establishing a temporary connection (to the internet) via the switched telephone network.
Digital signature	An electronic signature that can be used to authenticate the identity of the sender of a message or the signer of a document, and to ensure that the original content of the message or document that has been sent is unchanged. Digital signature usually refers specifically to a cryptographic signature, either on a document, or on a lower-level data structure.
DRM	Digital rights management. DRM is a system of IT components and services, along with corresponding law, policies and business models, which strive to distribute and control intellectual property and its rights. Product authenticity, user charges, terms-of-use and expiration of rights are typical concerns of DRM.
DSL	Digital Subscriber Line. A family of technologies generically referred to as DSL, or xDSL, capable of transforming ordinary phone lines (also known as "twisted copper pairs") into high-speed digital lines, capable of supporting advanced services. ADSL (Asymmetric Digital Subscriber Line), HDSL (High data rate Digital Subscriber Line) and VDSL (Very high data rate Digital Subscriber Line) are all variants of xDSL
e-Business	Electronic business. The <i>e-Business W@tch</i> uses the term "e-business" in the broad sense, relating both to external and to company internal processes. This includes external communication and transaction functions, but also ICT supported flows of information within the company, for example, between departments and subsidiaries.
ebXML	Electronic business using XML. A proven framework and unified set of internationally agreed upon technical specifications and common XML semantics designed to facilitate global trade.
e-Commerce	Electronic commerce. As distinct from the broader concept of e-business, e-commerce refers to external transactions in goods and services between companies (B2B), between companies and consumers (B2C), or between companies and governments (B2G) and may therefore be seen as a subgroup or component of e-business activities.

¹²⁸ Some of the definitions in this glossary are derived from or based on definitions suggested by Whatis?com, a leading online ICT encyclopaedia and learning centre. See <http://whatis.techtarget.com>.

Term	Definition ¹²⁸
EDGE	Enhanced Data Rates for GSM Evolution
EDI	Electronic Data Interchange. A way for unaffiliated companies to use networks to link their businesses by using a common technical standard for exchanging business data. While electronic mail between companies is common, electronic data interchange passes bigger bundles that replace large paper documents such as bills and contracts.
EDM	Electronic Document Management. The management of different kinds of documents in an enterprise using computer programmes and storage devices. An EDM system allows an enterprise and its users to create a document or capture a hard copy in electronic form, store, edit, print, process, and otherwise manage documents.
e-Invoicing	Electronic invoicing. A business-to-business transaction in which invoices are generated, delivered (and normally paid) electronically, replacing the equivalent traditional paper-based invoicing processes.
e-Learning	e-Learning means supporting training with learning material in electronic format, for example material that is available on the intranet or the internet. e-Learning applications can be used for ICT-related training, but also for sector-specific or even company-specific training content.
ERP	Enterprise Resource Planning. A software system that helps to integrate and cover all major business activities within a company, including product planning, parts purchasing, inventory management, order tracking, human resources and finance.
Extranet	A network using internet protocols that allows external organisations (for example customers or suppliers) access to selected internal data. Essentially it is an Intranet which gives external users restricted access (often password protected) to information through the firewall.
Firewall	A firewall is a set of related programmes that protects the resources of a private network from users from other networks. The term also refers to the security policy that is used with the programmes.
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HSDPA	High-Speed Downlink Packet Access
ICT	Information and communication technology. ICT includes networks, computers, other data processing and transmitting equipment, and software. The application of ICT in business processes leads to e-business.
Information security	Measures taken to protect information systems against unauthorised use and attacks
Internet	The world's largest computer communication system, with an estimated 700 million users worldwide. ¹²⁹ The internet is a loose confederation of principally academic and research computer networks. It is not a network but rather the interconnection of thousands of separate networks using a common language.
Interoperability	The technical features of a group of interconnected systems (includes equipment owned and operated by the customer which is attached to the public telecommunication network) which ensure end-to-end provision of a given service in a consistent and predictable way.
Intranet	An internal internet, that is an internal network running using TCP/IP, which makes information available within the company. Most Intranets are connected to the internet, and use firewalls to prevent unauthorised access.
IPTV	TV / video transfer via Internet Protocol
ISDN	Integrated Services Digital Network. An international telecommunications standard for transmission of voice and data over dial-up lines running at 64 Kbit/s (kilobits per second). It allows sharing of multiple devices on a single line (for example, phone, computer, fax).
IT	Information technology. IT includes hardware (computers, other data processing and transmitting equipment) and software.
KM	Knowledge Management. ICT solutions that support enterprises in systematically gathering, organising, sharing, and analysing their knowledge in terms of resources, documents, and people skills. Knowledge management software typically involves data mining and some method of operation to push information to users.

¹²⁹ Cf. Global Internet Statistics by Global Reach, www.greach.com

Term	Definition ¹²⁸
LAN	Local Area Network. The most common way of connecting computers in a small area (typically inside a building or organisation) for sharing databases and communication facilities. The two most common versions are Ethernet and Token Ring. Implementation is based on coaxial cables or plain wires. Speed achieved ranges from 10 Mbps to 100 Mbps.
Leased line	A private communication channel leased from the common carrier. It is usually a dedicated fixed-route link (e.g. point-to-point frame relay).
LMDS	Local Multipoint Distribution Service
m-Commerce	Mobile commerce. E-commerce that takes place using mobile connection devices and through data transmission via technical standards for mobile communication.
Micro enterprise	A company with fewer than 10 employees.
Modem	Modulator/Demodulator. A device that modulates outgoing digital signals from a computer or other digital device to analogue signals suitable to be transmitted through a conventional telephone line (copper twisted pair telephone). The reverse procedure takes place for incoming signals.
MRO goods	Maintenance, repair and operating goods. Supplies which companies need to maintain their operations, for example office supplies, in contrast to "direct production goods" which are components of the goods and services the company produces.
OFDM	Orthogonal Frequency-Division Multiplexing
OOS	Open source software refers to computer software under an open source license. An open-source license is a copyright license for software that makes the source code available and allows for modification and redistribution without having to pay the original author.
P2P network	Peer-to-Peer network
Processes	Business processes are operations that transform the state of an object or a person. This can, for example, be an order placed via the internet. Ordering an object or a service creates a liability for the supplier to deliver, and initiates the transfer of property rights from one entity to another. The electronic handling of processes is likely to speed them up and to introduce new processes in the realisation of the same transaction.
PLM	Product lifecycle management. The process of managing the entire lifecycle of a product from its conception, through design and manufacture, to service and disposal. PLM software helps companies effectively and efficiently innovate, for example by managing descriptions and properties of a product starting from conception and development.
Remote access	The ability of a company computer network's transmission points to gain access to a computer at a different location.
RFID	Radio Frequency Identification. A wireless technology which is used to uniquely identify an object, animal, or person. RFID is coming into increasing use in industry as an alternative to the bar code. The advantage of RFID is that it does not require direct contact or line-of-sight scanning.
SCM	Supply Chain Management. Software that helps businesses to match supply and demand through integrated and collaborative planning tools.
Sector	Sectors of the economy with comparable business activities. These constitute the main research unit of the <i>e-Business W@tch</i> . Aggregated information at the industry level is used to document the diffusion of activities within the industries as well as the overall importance of the observed phenomena for changes in the economy as a whole. The definition of sectors follows NACE Rev.1.1 classifications.
Secure server technology	Secure server technology means that data exchange between computers is based on certain technical standards or protocols, for example "Secure Sockets Layer" (SSL).
SME	Small and medium-sized enterprises with 0-249 employees. To be classified as an SME, an enterprise has to satisfy the criteria for the number of employees and one of the two financial criteria, i.e. either the turnover total or the balance sheet total. In addition, it must be independent, which means less than 25% owned by one enterprise (or jointly by several enterprises) falling outside the definition of an SME or a micro-enterprise, whichever may apply. The thresholds for the turnover and the balance sheet total will be adjusted regularly, to take account of changing economic circumstances in Europe.
SSL	Secure Sockets Layer. A commonly-used protocol for managing the security of a message transmission on the internet. SSL has recently been succeeded by Transport Layer Security (TLS), which is based on SSL.

Term	Definition ¹²⁸
Standard	A standard is a technical specification approved by a recognised standardisation body for repeated or continuous application, with which compliance is not compulsory.
Telco	Telecommunications
Transaction	Electronic transactions can be subdivided into several steps, each of which initiates a process. There are pre-sale (or pre-purchase) phases, sale and after-sale phases. Typically a transaction starts with information gathering, price and quality comparisons and possibly pre-sale negotiations. During the sale phase contracting and delivery are the core processes, and payment is the final stage of this phase. After-purchase transaction stages comprise customer service, the administration of credit payments and the handling of returns as well as marketing activities preparing for the next purchase.
UMTS	Universal Mobile Telecommunications Service. A third-generation (3G) digital standard for mobile communication, enabling packet-based transmission of voice, text and video at data rates up to 2 megabits per second (Mbps).
Value added	Gross output minus intermediate inputs. It is valued at producers' prices and includes all indirect taxes, but excludes VAT and subsidies.
VDSL	Very-high-bit-rate Digital Subscriber Line
VoIP	Voice over Internet Protocol (IP). The use of telephony services over internet networks, by means of digitised voice transfer technology.
VPN	Virtual Private Network. A way to use a public telecommunication infrastructure, such as the internet, to provide remote offices or individual users with secure access to their organisation's network.
WAN	Wide Area Network. A network allowing the interconnection and intercommunication of a group of computers over a long distance.
WAP	Wireless Application Protocol. A communication protocol for delivering data over mobile telephone systems, allowing cellular phone sets and other mobile hand-set systems to access WWW pages and other wireless services.
W-CDMA	Wideband Code Division Multiple Access
Website	A related collection of World Wide Web files that includes a beginning file called a home page.
Wi-Fi	Wireless fidelity. A popular term for a high-frequency wireless local area network (W-LAN). Wi-Fi technology is rapidly gaining acceptance as an alternative or complementary infrastructure to a wired LAN.
WIMAX	Worldwide Interoperability Standard for Microwave Access
W-LAN	Wireless Local Area Network. An implementation of a LAN with no physical wires, using wireless transmitters and receivers. It allows a mobile user to connect to a LAN or WAN through a wireless (radio) connection. A standard, IEEE 802.11, specifies the technologies for wireless LANs.
WWW	World Wide Web. The collection of pages in HTML format which reside on web-servers. Although WWW and the internet are different, the terms are increasingly becoming interchangeably used.
XML	Extensible Mark-up Language. A standard to describe the contents of a page or file. XML is a way to create common information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere.

Contact information:



European
Commission

Enterprise and Industry Directorate-General
Unit D4 "Technology for Innovation /
ICT industries and e-Business"
1040 Brussels, Belgium
Fax: (32-2) 2967019
e-Mail: entr-innov-ict-ebiz@ec.europa.eu
Web: http://ec.europa.eu/enterprise/index_en.htm

e-Business W@tch
c/o empirica GmbH
Oxfordstr. 2
53111 Bonn, Germany
e-Mail: info@ebusiness-watch.org
Web: www.ebusiness-watch.org