

Market Business

The European e-Business Report

A portrait of e-business
in 10 sectors of the EU economy

2004 edition

e-business
w@tch



European
Commission



Enterprise publications

The European *e-Business W@tch* 2003/04



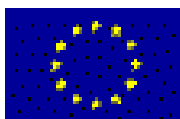
The European e-Business Report

2004 edition

A portrait of e-business
in 10 sectors of the EU economy

3rd Synthesis Report of the *e-Business W@tch*

September 2004



European Commission
Enterprise Directorate General

The e-Business W@tch

The European Commission, Enterprise 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 and in EEA countries. Since late 2001 the *e-Business W@tch* has analysed e-business developments and impacts in 17 manufacturing, financial and service sectors. All publications of the *e-Business W@tch* – including this report – are available in electronic format on the Internet either via the Europa server or directly at the *e-Business W@tch* website (www.europa.eu.int/comm/enterprise/ict/policy/watch/index.htm, www.ebusiness-watch.org).

Acknowledgements

This report was prepared by empirica GmbH on behalf of the European Commission, Enterprise Directorate General, in co-operation with Berlecon Research, Databank Consulting, DIW Berlin, IDATE, RAMBØLL Management and Saatchi & Saatchi Business Communications on behalf of the European Commission based on a service contract running from July 2003 to September 2004.

Editor: Hannes Selhofer, empirica GmbH

Cover design, layout of the colour section and production: Saatchi & Saatchi Business Communications

Disclaimer

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the following information. The views expressed in this report are those of the authors and do not necessarily reflect those of the European Commission. Nothing in this report implies or expresses a warranty of any kind. Results from this report should only be used as guidelines as part of an overall strategy. For detailed advice on corporate planning, business processes and management, technology integration and legal or tax issues, the services of a professional should be obtained.

For further information, contact:

 empirica Gesellschaft für Kommunikations- und Technologieforschung mbH Oxfordstr. 2, DE-53111 Bonn Fax: (49-228) 98530-12 info@empirica.com	 e-Business W@tch c/o empirica GmbH Oxfordstr. 2, DE-53111 Bonn Germany Fax: (49-228) 98530-12 info@ebusiness-watch.org	 European Commission Enterprise Directorate-General e-Business, ICT Industries and Services Fax: (32-2) 2967019 entr-ict-e-commerce@cec.eu.int
---	---	---

Copies can be requested, free of charge, directly from the *e-Business W@tch* from the following e-mail address: info@ebusiness-watch.org. The report is also available in electronic format and can be downloaded from the "Publications" section of the *e-Business W@tch* website (www.ebusiness-watch.org).

A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (<http://europa.eu.int>).

Luxembourg: Office for Official Publications of the European Communities, 2004

ISBN 92-894-7952-3

© European Communities, 2004. Reproduction is authorised provided the source is acknowledged.

Printed in Belgium

Table of contents

Foreword	5
<i>by Olli Rehn, Commissioner of the European Commission</i>	
Introduction to the <i>e-Business W@tch</i>	6
Executive Summary	9
Part 1: Synopsis of Main Findings	14
1.1 <i>Deployment of ICT infrastructure</i>	15
1.2 <i>Automation of internal business processes</i>	18
1.3 <i>Online purchasing and supply chain integration</i>	22
1.4 <i>Electronic marketing and sales</i>	26
1.5 <i>Special trend analysis: The use of electronic standards in 2003/04</i>	32
1.6 <i>IT still matters: New evidence on Internet-enabled innovation</i>	37
1.7 <i>Case studies on electronic business: Conclusions and lessons learned</i>	61
1.8 <i>Policy challenges</i>	66
1.9 <i>International outlook: Worldwide trends in e-business</i>	71
 Chart Report: E-Business in 2003/04	 41
Part 2: Summaries of 10 e-Business Sector Studies (2004)	77
2.1 <i>The textile industries</i>	77
2.2 <i>The chemical industries</i>	88
2.3 <i>The manufacture of electrical machinery and electronics</i>	99
2.4 <i>The transport equipment industries</i>	110
2.5 <i>Craft and trade sectors</i>	122
2.6 <i>The retail industry</i>	131
2.7 <i>The tourism industry</i>	141
2.8 <i>ICT services</i>	152
2.9 <i>The business services sector</i>	162
2.10 <i>Health and social services</i>	174
 Part 3: Contributions	 187
3.1 <i>E-Business and Labour Productivity Across the Economy</i>	189
<i>by Tony Clayton and Peter Goodridge, UK Office for National Statistics</i>	
3.2 <i>What Drives E-Business Diffusion among Firms?</i> <i>Evidence from European Companies</i>	195
<i>by Kenneth L. Kraemer, Kevin Zhu & Sean Xu, University of California, Irvine, and Werner B. Korte and Karsten Gareis, empirica GmbH</i>	
3.3 <i>Measuring e-Business in Canada</i>	204
<i>by George Sciadas, Statistics Canada</i>	

3.4	<i>B2B Metrics: Measuring Forms, Content, Strategy and Impacts of B2B E-Commerce</i>	208
	by Hans Schedl, ifo Institute for Economic Research	
3.5	<i>The E-Alignment of the New EU Member States: An Assessment Within the eEurope 2005 Framework</i>	212
	by Soumitra Dutta and Amit Jain, INSEAD	
3.6	<i>A New Generic Statistical Measure in Dynamic Gap Analysis</i>	220
	by Pavle Sicherl, SICENTER	
3.7	<i>E-Business W@tch Reports as a Resource in Student Projects – a Slovenian Case Study</i>	223
	by Jože Gričar, Gregor Lenart & Andreja Puciharn, University of Maribor	

Annexes

Annex I:	Glossary of Technical Terms	227
Annex II:	The <i>e-Business W@tch</i> 2003/04 – Activity Report	230
Annex III:	Methodology	234

Foreword



Increasing the productivity and competitiveness of European enterprises is a key objective of the Lisbon agenda. However, in its report to the 2004 Spring European Council on "Delivering Lisbon"¹, the Commission has warned that productivity levels in the EU are still not rising as originally envisaged. A major factor is that the impact of information and communication technologies (ICT) on enterprise productivity appears to be significantly lower in Europe than in the United States.

ICT are important in improving the efficiency of business processes and promoting innovation in European enterprises. However, mere investment in these technologies is not enough, as technology by itself does not automatically lead to substantial efficiency gains. Electronic business practices will only achieve their potential when accompanied by a high level of managerial understanding and the commitment to re-engineer working and business processes in a changing competitive environment. Moreover, there is no single "recipe" for all firms. As clearly demonstrated by *e-Business W@tch* during the last couple of years, opportunities and related requirements differ considerably between sectors and companies of different sizes.

e-Business W@tch results are helping policy-makers better understand the different dynamics and implications of ICT usage in various sectors of the European economy. The combination of representative surveys, case studies and networking with experts from industry and statistical research has created a valuable knowledge base. *e-Business W@tch* is a powerful policy instrument alongside the e-Business Support Network, the European eSkills Forum, the eMarketservices portal, initiatives regarding the legal aspects of doing business electronically and the eEurope 2005 Standardisation Action Plan. Together these activities make a significant contribution to creating a favourable environment that will improve the effectiveness of European companies' investments in ICT and, consequently, enhance their competitiveness.



Olli Rehn
Commissioner
of the European Commission

Olli.Rehn@cec.eu.int

¹ COM(2004) 29 final

Introduction to the *e-Business W@tch*

The *e-Business W@tch* – observatory and intermediary since late 2001

The *e-Business W@tch* monitors the adoption, development and impact of electronic business practices in different sectors of the European economy. The eEurope 2002 Action Plan provided the basis for targeted actions to stimulate the use of the Internet for accelerating e-commerce. The eEurope 2005 Action Plan, endorsed by the Seville European Council in June 2002, confirmed 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".

Against this background, the European Commission, Enterprise Directorate General, launched in late 2001 the *e-Business W@tch* initiative to analyse e-business impacts at the sectoral level, placing special emphasis on the implications for SMEs. Since its launch, *e-Business W@tch* has published Impact Studies on 17 different sectors of the European economy, two comprehensive synthesis reports, statistical pocketbooks and other resources (all available under 'Publications' at www.ebusiness-watch.org).² The quantitative analysis about the diffusion of ICT and e-business is based to a large extent on annual, representative surveys among decision-makers of European enterprises.³

The large demand for the various publications and statistics provided by the *e-Business W@tch*, and their exploitation by other research institutions (for example, in the EITO Yearbook 2003 and in the OECD Information Technology Outlook 2004), confirms the demand for sectoral e-business analysis. Facilitated by positive responses and the growing interest in its results, the *e-Business W@tch* is increasingly developing from an observatory into a think-tank, stimulating the debate about the economic and policy implications of e-business among relevant stakeholders at an international level.

The wide-angle perspective: the *e-Business W@tch* provides the "big picture" as a basis for further research

Over the past 10 years, "electronic business" has increased from a very specific to a very broad topic to be studied. In 2004, the OECD concisely defines e-business as "*automated business processes (both intra-and inter-firm) over computer mediated networks*". This definition makes clear that e-business is more than e-commerce (which focuses on commercial transactions between companies and their customers, be it consumers or other companies), as well as that it includes processes both within a company and between companies. The OECD definition implicitly indicates that the main objective and focus of e-business is in business process automation and integration – and the impacts thereof.

This implies that the potential scope for e-business analyses has also broadened. The measurement of e-commerce transactions (the volume of goods and services traded online) can and should be complemented by studies analysing the degree to which business processes, including intra-firm transactions, are electronically linked to each other and have become digitally integrated. In such a context, however, it becomes practically impossible to cover in depth all areas and facets of e-business in one study. Hence, the scope of such a study needs to be carefully defined and, as in photography, it must be decided whether to "zoom in" or to use a "wide-angle" perspective.

The mission of the *e-Business W@tch* is to present a "wide-angle" perspective on e-business developments and practices in the sectors covered. This has important implications regarding the level

² For further details, see Annex II.

³ For further details, see Annex III.

of detail in which various issues can be explored, both in terms of the quantitative picture (survey) and in terms of the qualitative assessment and background research.

The role of economic analysis in the Sector Reports

The first chapter of each *e-Business W@tch* Sector Study provides background information on the respective sector. This overview includes the definition of the sector (on the basis of NACE Rev. 1 classification), some basic industry statistics⁴, as well as information about the latest trends and challenges concerning the specific sector. In the context of its principal assignment, the *e-Business W@tch* cannot go beyond the presentation of this consistent set of statistics.

It appears that this practice, combined with the growing interest in the *e-Business W@tch* analysis, has caused some confusion: Some readers mistakenly consider that an *e-Business W@tch* "sector report" is a piece of economic research on the sector itself, and not a report focussing on the use of e-business in that particular sector. It is, therefore, necessary to underline that, while some background information is provided in order to better understand the context and the economic impact of e-business, the *e-Business W@tch* reports are neither intended to nor could be substitutes for more detailed and specific industrial analysis and statistics on each particular industry.

The mission of *e-Business W@tch* is to monitor, analyse and compare the development 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 would trigger the interest of policy-makers, researchers, and other e-business stakeholders for more in depth analyses (or statistical surveys). The *e-Business W@tch* observatory has adopted a "wide-angle" perspective in its approach and the necessary trade-offs are transparently depicted in all its deliverables.

The definition of sectors and the adequate level of aggregation

Economic sectors constitute the main level of analysis for the *e-Business W@tch*. In 2003/04, the sample consists of ten sectors. Their configuration and definition are based on the NACE Rev. 1 classification of business activities. The aggregation of various NACE divisions and groups into a "sector" was guided by the aim to produce results which are relevant for the dynamics of the economy as a whole, as well as with the intention of covering the most important features of e-business provision and adoption in Europe. The configuration of sectors partly followed aggregations that are used in the "Panorama of European Businesses" published by Eurostat.

In the context of its "wide-angle" perspective, the *e-Business W@tch* analysis is covering a large part of the European economy rather than focusing on very specific (sub-)sectors. Therefore, the statistics presented in these reports need to be carefully treated when making comparisons between countries and, occasionally, companies' size-classes. Against the previously described background, some generalisation and approximation has to be accepted, while the definition of sectors could be revisited during the implementation of the *e-Business W@tch*.

The 10 sectors which have been studied in 2003/04 include eight sectors that were already covered in 2002/03 (thus allowing the continuous monitoring of changes and progress), as well as two new ones (namely the textile, clothing and footwear industries and the craft and trade sector).⁵

⁴ For further details, see Annex II ('Industry statistics from secondary sources')

⁵ For further details on the rationale for the selection of sectors, see www.ebusiness-watch.org ('About' / 'Sectors Covered')

Exhibit: Sectors covered by the e-Business W@tch in 2003/04

Title	NACE categories	Short Description
Textile, clothing and footwear industries	17, 18, 19	The textile, clothing and footwear industries account for about 5% of total value added in manufacturing in the former EU-15 and about 9% of employment. SMEs and co-operative SME networks play a vital role.
The chemical industries	24,25	ICT and the Internet in particular have fuelled the globalisation of markets for chemical products. E-business may have considerable future impact on this sector which accounts for ~15% of the production value of EU manufacturing.
The electrical machinery and electronics industries	30, 31, 32	The electronics industry is very suitable for e-business because of the high degree of standardisation of products, globalisation of production, and specialisation of firms along the value chain. Its dynamic development calls for continuous monitoring.
The manufacture of transport equipment	34, 35	The transport equipment industries are precursors for economic development in Europe. Large companies are forerunners in using e-business, with considerable implications for all stakeholders in the value chain.
Craft & trade	(17-19), 20, (30-32), (34-35), 36, 45	The craft sector, which includes firms with less than 50 employees from a number of business activities, is vast, in terms of number of enterprises, employment and value added. E-business may become crucial in order for many craft firms to stay competitive with industrial production.
Retail	52	The retail sector represents a cornerstone of economic activity within Europe, with around 3 million retail enterprises currently in the EU, employing nearly 14 million people. As there is still untapped potential, ICT may eventually have major implications for the retail value chain.
Tourism	55.1+2, 62.1, 63.3, 70.31.30, 92.33, 2.52+53	Hotels, restaurants, travel agencies and tour operators (NACE 55 and 63.3) employ about 2.2 million people in the EU. SMEs play a very important role. In some respects, the tourism sector has always been a forerunner in using ICT. E-commerce is exerting a huge impact, challenging intermediaries.
ICT services	64.2, 72	The ICT services sector in many respects is the leading sector and a kind of benchmark with respect to e-business application. E-business can change the nature of ICT services, which has important implications for other sectors which use them.
Business services	74	Business services are a huge sector, involving more than two million enterprises – 99% of which are SMEs – and employing close to 13 million people. ICT and e-business have significant implications for those areas of the business services sector that are based on information and knowledge.
Health and social work	85.1, 85.3	As national health systems suffer from increasing costs and political pressures to constrain these, it is hoped that strategies for the development of an e-health and e-business infrastructure will become key drivers of change.

Executive Summary

Electronic business is gradually coming of age. The business implications of information and communication technologies (ICT) were commonly over-hyped during the boom-phase of the Internet economy, but possibly under-hyped during the subsequent bust-phase. Having experienced the extremes, it appears that the time has come for a clearer, more realistic perspective and assessment. With the growing maturity and diffusion of ICT based applications, a new challenge emerges for firms. Doing business electronically, once an option for innovation and strategic positioning, is about to become a "must" to stay in business. However, the underlying concepts are still changing fast, which translates into a constant "adopt and adapt" for many firms. This report shows empirical evidence of practices and business implications in 10 sectors of the EU economy in 2003/04.

The statistics – trends in 2003/04

- ▶ **ICT infrastructure:** Migration towards broadband Internet connections continues. More than a quarter of firms* had broadband in late 2003
- ▶ **Increase in B2B online trading:** Almost half of all firms* buy supplies online. Many of those, however, say that online purchases are less than 5% of total.
- ▶ **B2C electronic commerce** gains momentum in specific markets. The current boom market is e-tourism, where about a third of firms declare they sell their services online.
- ▶ **Business process integration** is still the big issue, but related software suites are not yet widely diffused. ERP systems are used by about one in five medium-sized firms and one in three large ones.

*in % of employment

W@tch out: potential challenges ahead

- ▶ **E-procurement and e-sourcing:** Win-win or zero-sum game? Saving procurement costs is an opportunity for buyers, but equally puts pressure on suppliers. Efficiency gains (for both sides) compete with pressure on margins.
- ▶ **Unequal gains** from e-business due to high fixed costs: Although e-business solutions are gradually being adapted towards the needs of SMEs, large firms are still in a better position to benefit. Economies of scope are evident.
- ▶ **Vanishing advantage?** As many applications become a commonplace, ICT are increasingly a "must" for companies, but possibly no longer an opportunity for the individual firm to gain strategic advantage.

The relevance of ICT and e-business in 10 sectors in 2003/04

(Note: Condensed presentation based on quantitative statistics, desk research and case studies)

Sector	Function	Internet connectivity	Use of e-standards	ERP / SCM	Sourcing & procurement	Marketing and sales	Overall significance
Textile		~ ~	~ ~ TM	~ ~ TM	~ TM	~	~
Chemical		~ ~ ~	~ ~ TM	~ ~ ~ ~	~ ~ ~	~ TM	~ ~ TM
Electronics		~ ~ ~	~ ~ ~ TM	~ ~ ~ ~	~ ~ ~	~ ~ TM	~ ~ ~
Transport equipm.		~ ~ ~ TM	~ ~ TM	~ ~ ~ TM	~ ~ ~ ~	~ ~ TM	~ ~ ~
Craft' & trade		~ TM	~ TM	~	~ TM	~	~
Retail		~ ~	~ ~	~ ~ TM	~ ~	~ TMTM	~ TM
Tourism		~ ~	~ ~	TM	~ TM	~ ~ ~ ~	~ ~ TM
ICT services		~ ~ ~ ~	~ ~ ~ TM	~ ~	~ ~ ~ ~	~ ~ ~ TM	~ ~ ~ TM
Business services		~ ~ TM	~ TM	~ TM	~ ~	~ ~	~ ~ TM
Health		~ TM	~ TM	~	~ TM	TM	~ TM

~ = low relevance / diffusion; ~ ~ = average relevance / diffusion; ~ ~ ~ = above average relevance / diffusion
 ~ ~ ~ ~ = high relevance / diffusion; TM = in some sub-sectors only

Source: e-Business W@tch (2004) – based on analysis from the respective Sector Studies

Sectoral e-business profiles: manufacturing and services are different

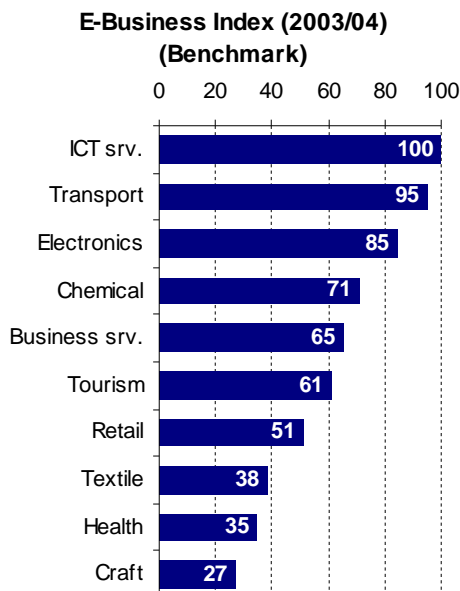
ICT have different functions for enterprises depending on the nature of their business activity. It depends, for example, on whether firms are dealing with large numbers of consumers or mainly with smaller numbers of other businesses, on the kinds of goods or services they produce, and on the specifics of the industry value chain.⁶

For firms from **manufacturing sectors**, increasing the efficiency of supply chain processes has been a key objective for many e-business projects in 2003/04. Moreover, large manufacturers have set up or use sophisticated e-procurement platforms to cut down on procurement costs. **Services** are even less homogeneous than manufacturing sectors. Retail companies, for instance, focus on procurement and logistics related opportunities. Tourism, on the other hand, is experiencing the power of the Internet as a new channel for marketing and sales, with significant impacts on the value chain.

Exhibit 1.1-1:

*The e-Business Index for 10 sectors
(eEurope 2005 benchmarking indicator⁷)*

	A) ICT Infrastructure	B) E-Business Activity
Textile	47	23
Chemical	82	54
Electronics	91	74
Transport	98	91
Craft & trade	29	24
Retail	50	53
Tourism	59	64
ICT srv.	100	100
Business srv.	75	51
Health	38	29



Source: e-Business W@tch (2004)

Among the 10 sectors studied by the e-Business W@tch in 2003/04, the most intensive use of ICT and e-business is made by companies from the ICT services sector (which includes telecommunications and computer related services), manufacturers of transport equipment and of electronics and electrical machinery. There is a caveat with respect to the automotive industries, though, as it is mainly the large players that drive e-business in this sector. Many of the small firms are much less advanced in their ICT use.

The chemical industries and firms offering business related services are also rather intensive e-business users. Again, there are differences between large and small companies and by sub-sector. Knowledge-intensive and operational business service companies, for example, have different profiles regarding the role of ICT.

Tourism and retail are "e-specific" sectors which use ICT for very specific purposes. Tourism is the leader in e-commerce with one third of all companies selling services online. In the retail sector, different business models have emerged, mainly combining traditional channels with online. Pure online retailers are the exception and are concentrated in a few niche markets that lend themselves to e-commerce.

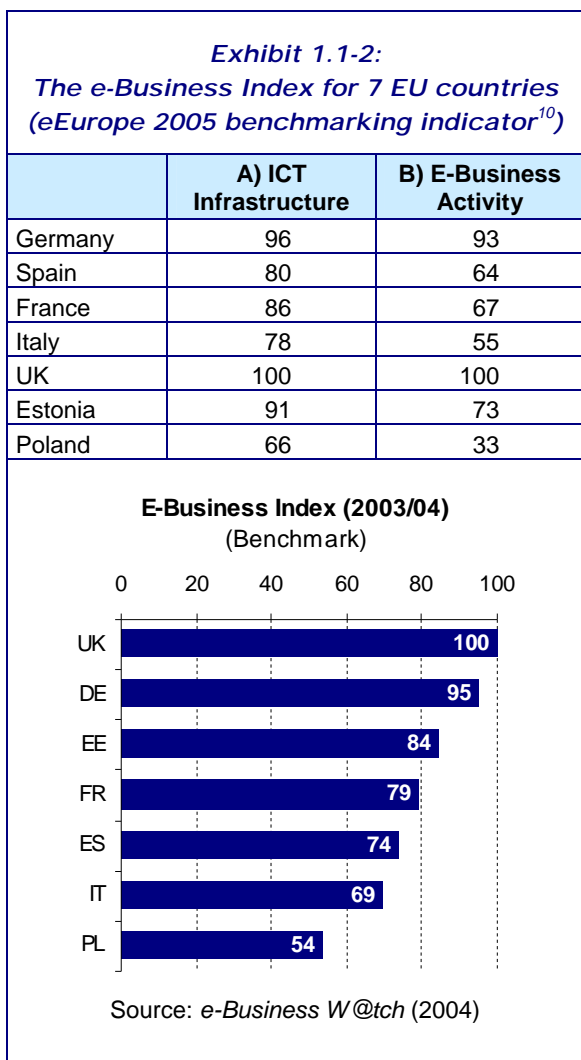
The textile industries (among the manufacturing sectors) and the health & social services sector are among the late adopters of e-business. Although this is partly explained by the dominance of SMEs in these sectors, there is still untapped potential. The health sector, one of the largest in economic terms, is believed to have substantial cost saving potentials through e-business.

⁶ Evidence on the differences in e-business impacts for manufacturing and services is presented in the contribution from Tony Clayton and Peter Goodridge, UK Office for National Statistics (see Chapter 3).

⁷ Cf. Methodological Annex, Specific Notes, No. 1

The e-business alignment of the new EU Member States: a complex picture

In November 2003 the *e-Business W@tch* interviewed decision-makers from more than 2,600 firms in the new EU Member States about the use of ICT and e-business in their firms. The results suggest that the geographic digital divide in business may be smaller than expected. It is definitely smaller than in households.⁸ Firms from Slovenia and Estonia in particular, but also from the Czech Republic, were found to be the "e-leaders" among the new members of the EU.⁹



However, the picture is rather complex. The situation is not consistent across sectors, and location is in no way a reliable predictor for the e-business activity of a company. As a rule of thumb, there tends to be a gap in the diffusion of more advanced e-business technologies and regarding the integration of applications within the company.

Basic connectivity such as Internet access is in place in most of the companies from all Member States. Even broadband access is well deployed. Estonia is head to head with Germany, France and the UK when it comes to the share of firms that report being connected to the Internet with a bandwidth of 2 Mbit/s or more. Companies from other countries, for example from Poland, Hungary or Latvia, are trailing behind in that respect, but not far from the level of lower-tech regions in the current Member States.

Differences still exist particularly with respect to online procurement and supply chain integration. For example, only 19% of companies (in terms of their share of employment) in Poland say they order at least some of their supply goods online, while 46% of companies from the current Member States do. The ratio is similar for related activities and IT supported supply chain integration. E-procurement related activities may thus present a potential concern for e-business policies in the new Member States.

W@tchlist – this will be important:

- ▶ **Improved telecommunication markets:** In some of the new EU Member States, the market structure is still underdeveloped. This is a barrier for efficient use of e-business.

- ▶ **Exchanging good practices** across the EU, including e-business policy practice and good e-business practice in firms.
- ▶ **Focus on productivity:** E-business driven productivity growth is likely to remain an important factor in global competition over the next few years.

⁸ General population surveys on the use of ICT, for example by Eurostat, normally report a different situation and a still significant digital divide between most of the new EU Member States and the EU average.

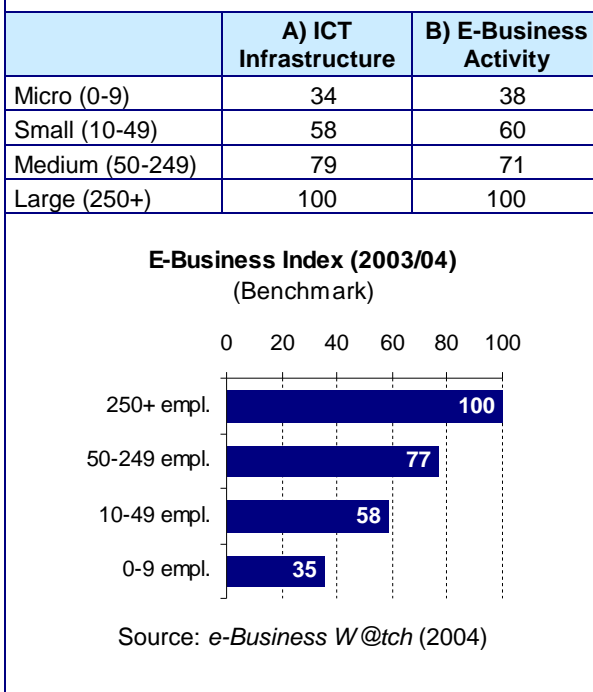
⁹ This evidence is supported by research from INSEAD. Cf. contribution from Soumitra Dutta and Amit Jain, Chapter 3.

¹⁰ Cf. Methodological Annex, Specific Notes, No. 1

Large firms continue to drive the development – but SMEs catch up

Increasing the efficiency of business processes, for example reducing processing costs related to commercial transactions, is a major objective driving companies to implement e-business. This applies to companies from all size-bands, but fixed costs for technology implementation and maintenance tend to be relatively higher for small companies. Larger firms, which can afford more powerful solutions, are more likely to benefit from efficiency gains. In fact, the diffusion of ICT infrastructure and of advanced e-business software solutions for automating business processes (such as ERP solutions and SCM software) increases steadily by company size.

Exhibit 1.1-3:
The e-Business Index by firm size
(eEurope 2005 benchmarking indicator¹¹)



The ICT systems of large companies obviously tend to be more complex and sophisticated than those of small firms. This translates into more intensive and advanced electronic business practices. Good examples are companies in the transport equipment manufacturing sector and the chemical industries. In these sectors in particular, there is a significant digital divide between the large, often multinational firms, which are international leaders in e-business adoption, and the many small supply companies which often adhere to much more traditional forms of trading.

On the other hand, there are many SMEs that have specialised in trading online, mostly over the Internet, particularly in the retail and tourism sectors. The share of firms conducting more than 5% of their transactions online is, in fact, highest among the small enterprises (10-49 employees), both for selling and for procuring online. In retail, the percentage of companies that makes online sales is consistent across size-bands with the exception of micro-firms.

Many "e-traders" among small companies ...

- ▶ Some SMEs try to specialise in trading online, mostly over the Internet, particularly in the retail and tourism sectors.
- ▶ The share of firms conducting more than 5% of their transactions online is quite consistent across size-bands. Only micro-enterprises (with <10 employees) are lagging behind both for selling and for procuring online.
- ▶ In retail, pure online players create immense pressure for shop-retailers in special markets such as electronics.

... but higher degree of system integration in large firms

- ▶ Intra-firm links of e-commerce sales systems to other business functions (accounting, stock management) are a domain of large firms.
- ▶ In retail, one in four SMEs that makes online sales has integrated its sales system, while nearly 60% of large retailers that sell online have done so.
- ▶ Close to 50% of all firms (and 75% of large ones) that sell goods online offer secure transaction capability (SSL, TLS).

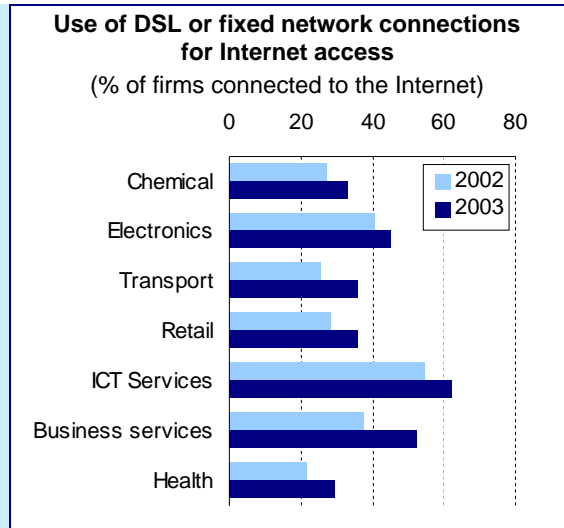
¹¹ Cf. Methodological Annex, Specific Notes, No. 1

Important trends from 2002 – 2003/04

Continuous upgrading to broadband Internet connections

As pointed out in the 2003 edition of this report, "an incipient migration towards DSL connections among small and medium-sized enterprises" was already observable, but "this promising trend (...) needs to be confirmed by future research". In fact, this trend has been consolidated in 2003/04.

While the diffusion of Internet access appears to have reached a first level of saturation, the percentage of firms with a DSL and/or fixed network connection (out of those with Internet access) has further increased in all sectors monitored by the *e-Business W@tch*. The rapid deployment of broadband connections is an objective that is backed by the eEurope 2005 Action Plan.



Increasing maturity of e-procurement and e-sourcing techniques

Sector	Make online purchases	
	2002	2003/04
Chemical	37	51
Electronics	58	59
Transport equipment	40	65
Retail	36	38
ICT Services	78	74
Business services	48	50
Health	37	34

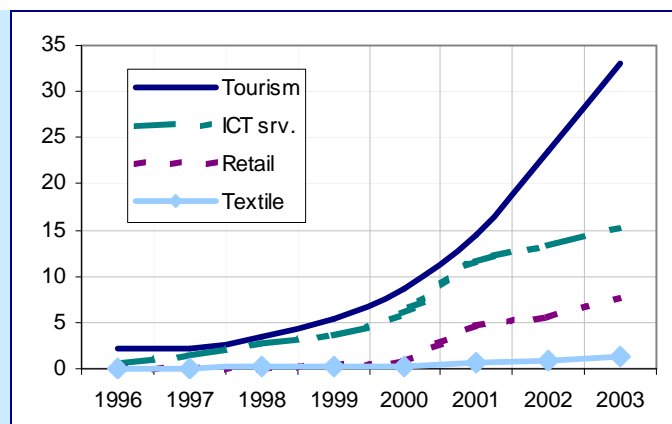
Firms representing ...% of employment.
 Data for 2002: DMS 6/2002, EU-4 (DE, FR, IT, UK).
 Data for 2003: DMS 3/2003 & 11/2003, EU-5 (DE, ES, FR, IT, UK).
 Source: *e-Business W@tch* (2004)

Statistical figures do not tell the whole story: Companies have discovered the cost saving opportunities of e-procurement and e-sourcing. In most sectors, more than 50% of firms (in % of their employment share) are purchasing supply goods and/or MRO goods online, through their suppliers' websites, Internet trading platforms and/or dedicated firm-to-firm connections (EDI, extranet). The *e-Business W@tch* estimates that in 2003, across the 10 sectors studied, firms purchased about 6% of their total supply goods online. The share of electronic purchases appears to be highest in ICT services (close to 15%) and certain manufacturing sectors, such as electronics and transport equipment (about 7% each).

Boom in e-tourism: Almost one in every three firms allows for online ordering

Percentage of firms making online sales (selected sectors): 1996-2003

The Internet has become an indispensable communication and transaction channel for the tourism industry. About one in three companies from the sector allows customers to make online orders (for example reservations for hotel rooms or flight tickets). About two thirds of those firms say that online orders account for at least 5% of their total sales, and about one fifth report that they make already more than 25% of their business online.



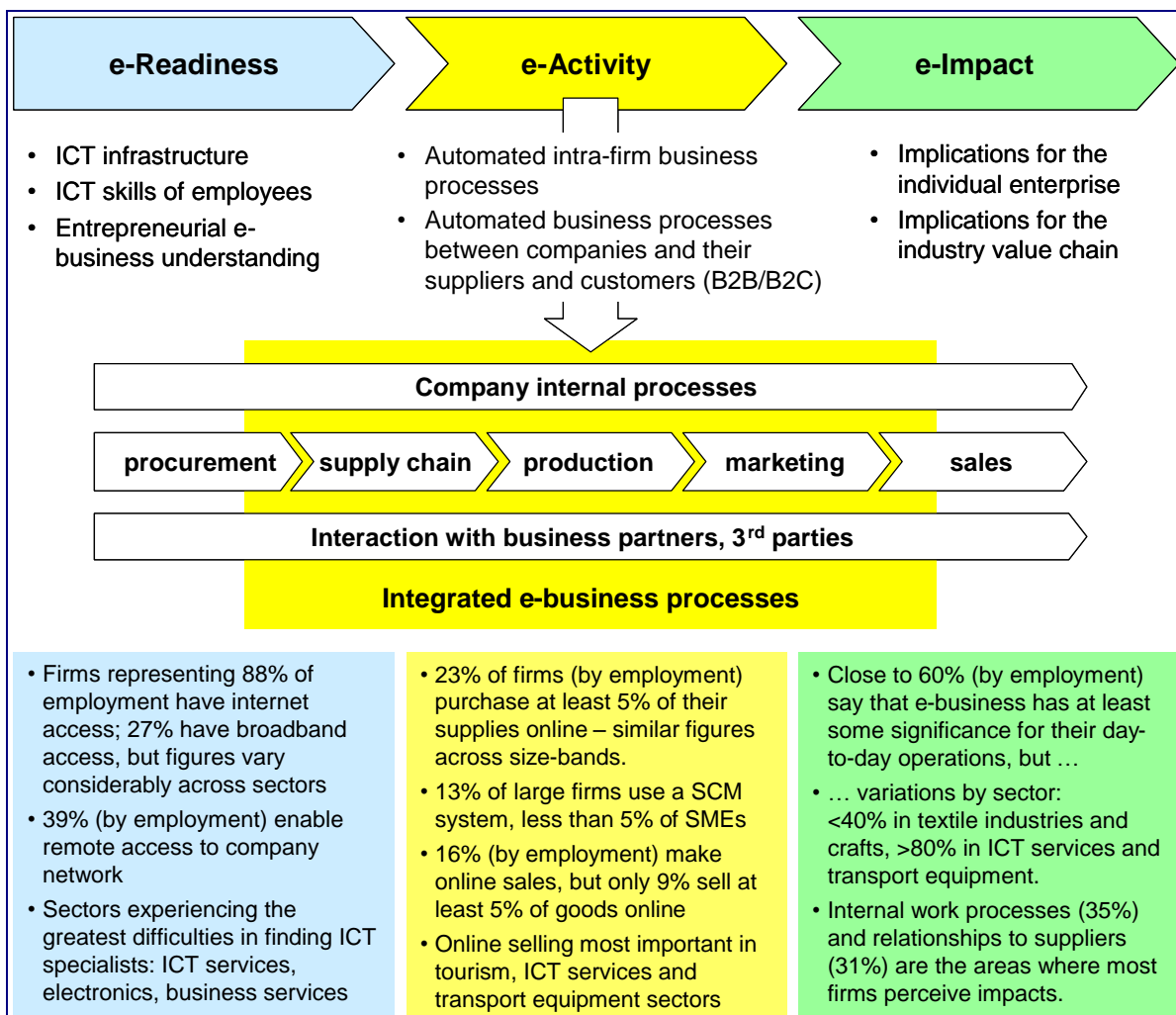
Part 1: Synopsis of Main Findings

Introduction

This chapter features an overview of the state of adoption of electronic business in enterprises from 10 sectors of the EU economy. It is largely based on e-business decision-maker surveys (2003, 2002) carried out by the *e-Business W@tch*, and on related research for the Sector Studies of 2003/04. "Electronic business" is hereby defined – in full accordance with the definition proposed by the OECD – as "automated business processes (both intra-firm and inter-firm) over computer mediated networks". The conceptual framework, which focuses on business functions and related processes, leans on the extended enterprise architecture framework developed by Michael E. Porter.

The synthesis of results presented in this chapter updates and elaborates the analysis featured in previous editions of the European E-Business Report (2002, 2003). As it includes new sectors previously not covered (textile industries, craft and trade), the configuration of sectors in the "total" values is different to that in the previous reports. Simple comparisons of totals to those published in the 2002 and 2003 editions are therefore not to be made. The main trends that can be observed from the statistics are nevertheless highlighted in the executive summary and in this chapter.

Exhibit: Framework of the e-Business Survey 2003 and key results at a glance



Source: *e-Business W@tch* (2004)

1.1 Deployment of ICT infrastructure

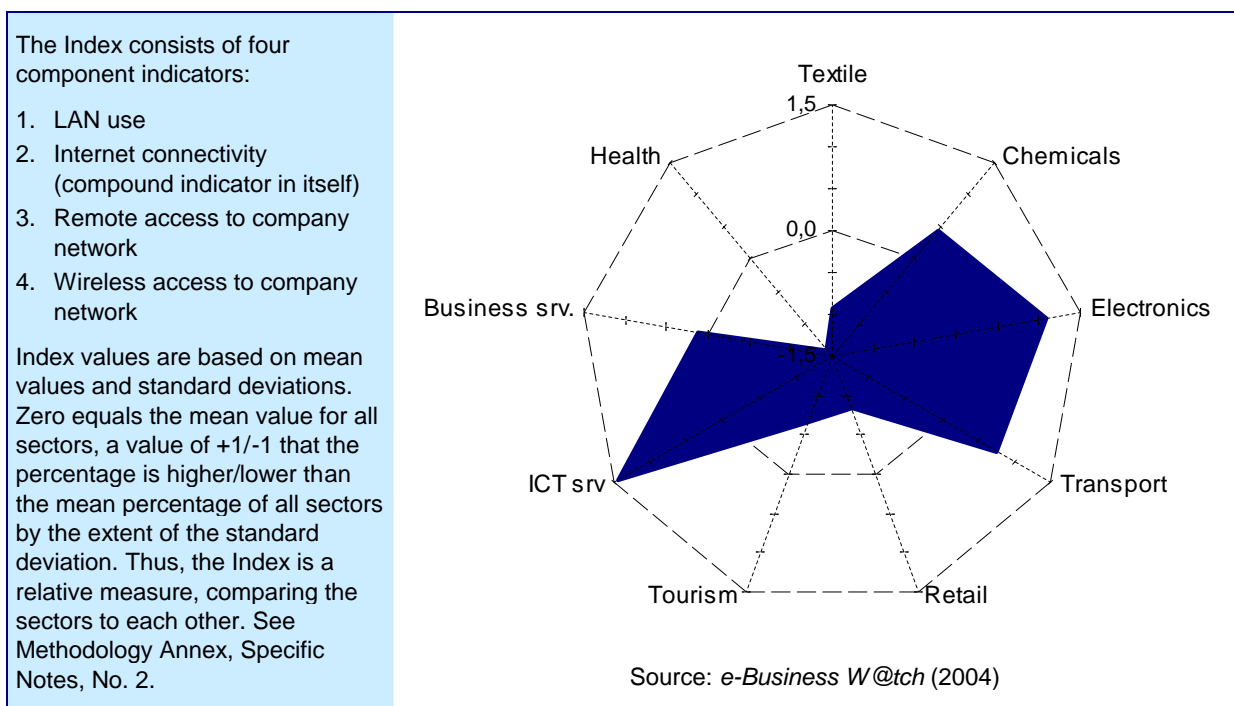
Does ICT infrastructure still matter?

In May 2003, an article published by Nicholas Carr in the Harvard Business¹² review triggered a torrent of debate on the strategic importance of information and communication technologies (ICT) for businesses. More than a year later, the issue is still topical. Carr made the important assertion that it was no longer possible to gain strategic advantages from ICT, since their use has become a commonplace. The underlying argument is hard to defy: innovations have a certain life-time, which means that they become commodities if they prove to be successful and lose their innovative status. The question is whether ICT have already reached this "commodity" status or not. In this context, two general remarks are critical as they may not have been sufficiently considered in the recent debate:

- Firstly, it appears that much of the international discussion is entirely focused on the large companies and global players. At least there was rarely a differentiation between SMEs and large firms in the assessment whether ICT infrastructure has already reached the "commodity" status. A differentiation is important, however, as at least in many smaller firms ICT infrastructure has not yet reached full maturity.
- Secondly, the debate revealed that there is still a lack of commonly accepted definitions of what constitutes "ICT infrastructure" and/or related applications. Should "infrastructure" be used in the narrow sense (hardware and networks), or does it include all the possible additional functionalities and applications for conducting business electronically – i.e. the processes?

For the purpose of the analysis presented in this chapter, the term "ICT infrastructure" is used in a narrow sense, mainly referring to the basic hardware and network architecture of a company. This includes the use of computers, the methods of how computers of a firm are connected to each other and to other networks, and possibilities of remote access to company networks.

Exhibit 1.1-1: ICT Infrastructure Index 2003/04



¹² Carr, Nicholas G.: "IT Doesn't Matter", in: Harvard Business Review, May 2003. See also chapter 1.6 in this report on "IT still matters".

The *e-Business W@tch* has computed several indicators of this type into a compound Index on ICT infrastructure (cf. Exhibit 1.1-1). This Index can be used to compare the adoption status of basic ICT infrastructure in companies, for instance between sectors.

In general, companies from manufacturing sectors tend to be equipped with more powerful ICT architectures than businesses from service sectors. The textile industries and the ICT services sector are the exceptions to this rule among the sample of sectors analysed by the *e-Business W@tch* in 2003/04. Results reflect the dominance of large enterprises with complex and sophisticated networking architectures in some manufacturing sectors (for instance in transport equipment manufacturing), compared to sectors such as business services, retail or tourism, where large players are less dominant. If only SMEs were considered, the gap would be much less pronounced.

ICT infrastructure in figures: the situation in 2003/04

The *e-Business W@tch* already concluded in previous editions of this report that the basic ICT infrastructure prerequisites for using e-business can be considered as quite good in all sectors and countries that were surveyed. In 2003/04, 95% of employees from the 10 sectors studied work in companies that use computers, and 88% in firms that are connected to the Internet. Thus, about 90% of the economic activity depends at least to some extent on processing and exchanging information digitally.

Exhibit 1.1-2: Basic ICT infrastructure: Computer use and Internet access in 2003/04

	Computer		Internet access		... of those							
					Analogue modem		ISDN		DSL		other fixed connection	
	firms	empl.	firms	empl.	firms	empl.	firms	empl.	firms	empl.	firms	empl.
By sector (EU-5)												
Textile, footwear, clothing	74	91	58	82	41	23	25	27	27	41	1	9
Chemical industries	96	100	86	98	31	13	37	26	23	30	10	37
Electronics	99	100	97	98	18	7	38	24	36	33	9	43
Transport equipment	91	100	83	99	31	10	35	24	26	42	10	32
Craft & trade	86	91	67	77	34	28	34	36	29	34	2	2
Retail	81	90	64	80	31	17	31	35	33	32	3	23
Tourism	90	94	84	90	22	22	30	33	42	37	4	13
ICT services	99	99	97	98	25	15	26	21	47	40	15	45
Business services	97	99	93	97	21	13	27	24	48	47	4	24
Health & social services	87	93	63	72	36	28	33	31	26	31	3	7
By firm size (EU-5)												
Micro (0-9 empl.)	88		75		27		29		39		4	
Small (10-49 empl.)	98		91		20		35		41		10	
Medium (50-249 empl.)	99		97		14		33		44		21	
Large (250+ empl.)	100		97		8		23		37		41	
Total (EU-5)	89	95	76	88	27	16	30	29	39	38	4	23
By country (9 sectors)												
DE Germany	93	98	80	91	9	5	55	38	35	36	5	29
ES Spain	91	96	74	87	21	13	13	20	59	57	1	6
FR France	82	93	61	83	44	26	11	21	44	40	6	30
IT Italy	93	95	85	90	27	21	37	32	33	41	2	7
UK United Kingdom	80	94	75	88	36	20	22	27	27	29	9	30
EE Estonia	93	97	89	95	24	10	11	5	54	64	11	18
PL Poland	77	86	66	78	42	33	20	21	13	12	28	38

Base (100%): all enterprises / enterprises with Internet access. EU-5 = DE, ES, FR, IT, UK. N=4516 for EU-5 total and ~500 per sector. Weighting: "firms" = % of firms; "empl." = enterprises comprising ...% of employees (in the respective sector / country). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2004)

However, a closer look at figures reveals that there are still areas and niches where connectivity is low and should be improved. In some sectors, a significant share of (mostly small) firms is not yet connected to the Internet, notably in the textile industries (42% unconnected), in health and social services (37%), in retail (36%) and in craft and trade firms (33%). Although Internet access is not a necessity for each and every firm, it stands to reason that it could be useful for some of the firms not yet connected. For example, even small retailers or craft firms may gain advantage simply from having access to web-based information resources.

In the health sector, the high non-connection rate is to some extent alarming, since knowledge-intensive professions could be expected to make better use of the Internet. From a health policy point of view it is important that more general practitioners get connected so that, for example, they can be reached by e-mail (by patients, but also by authorities in case of an emergency or epidemic).

In the textile, clothing and footwear industries, a high percentage of micro-enterprises do not connect to the Internet. This is quite unusual for a manufacturing sector, even if many small companies from the textile industry have the characteristics of handcraft workshops rather than of companies active on the market. Considering the intense competition in this sector from production in low-wage countries, a higher degree of ICT based networking among European firms could become even more important in the near future.

Spotlight on the new EU Member States: Basic ICT infrastructure in place

- ▶ There is no evident digital divide among businesses from the EU with respect to the basics (computers, basic Internet access).
- ▶ Companies from Slovenia, Estonia and from the Czech Republic appear to be generally well equipped with ICT infrastructure, reaching or surpassing the EU average.
- ▶ Some infrastructural gaps between "old" and new Member States still exist. They appear to be more pronounced in manufacturing, but there is no clear pattern across all sectors and countries.
- ▶ Broadband Internet connections tend to be less diffused among firms from Poland, Hungary, Slovakia, Latvia and Lithuania. In the electrical machinery and electronics industry, for example, 14% of companies from Slovakia, 22% from Poland and 23% from Hungary have broadband connections (employment-weighted), compared to 36% on average in firms from the EU-5 (DE, ES, FR, IT, UK).
- ▶ The same applies – by and large – to the deployment of remote access technologies.

Remote access: integrating field workers with the firm's network

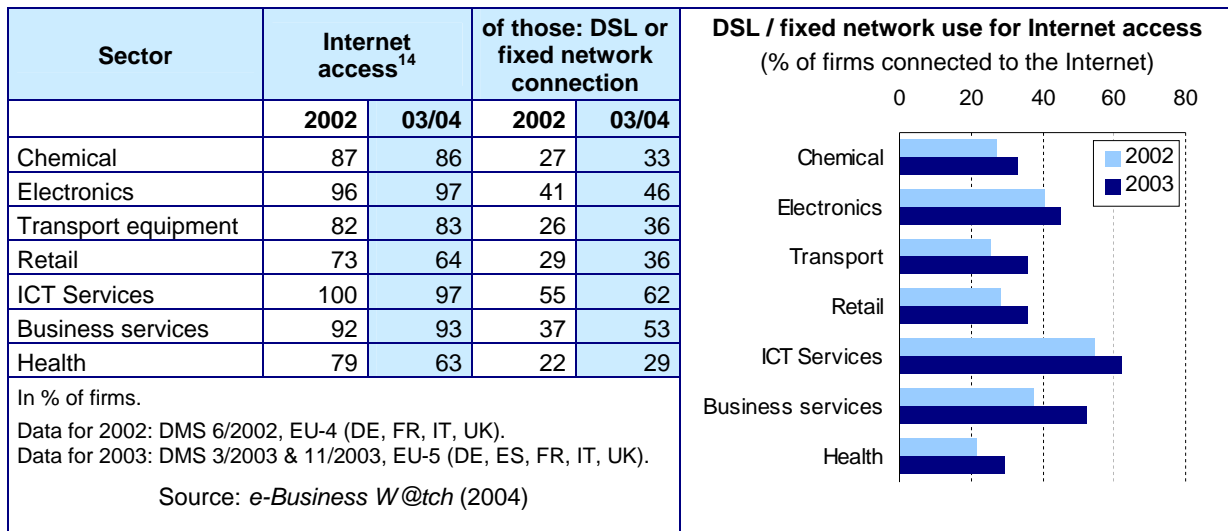
Remote access solutions are more prevalent in manufacturing sectors than in services, with the exception of the ICT services sector. 55-70% of employees in the chemical, electronics and transport equipment manufacturing sectors work in enterprises that offer their staff remote access to the company's computer system, compared to 37% on average (in nine sectors). This outcome is, however, strongly influenced by the dominance of large enterprises in these industries.

In services, remote access plays an important role in larger firms and in specific subsectors which have high numbers of customer care employees and fieldworkers. In many business services companies, for example, the use of ICT to integrate mobile workers is becoming a key factor for the optimisation of business processes. This holds true for knowledge-intensive business services (such as consulting), but also for cleaning or security services, as all these services are typically provided at clients' sites.

The use of company internal Wireless LANs has already reached a higher level, at least in the EU Member States of 2003 and the technologically more advanced new Member States. It appears that WLAN use could be a good indicator for the e-readiness of companies in general in the future.

Main trend in 2003/04: Upgrading to broadband

The previous edition of this report (2003) pointed at a trend regarding infrastructure upgrading that was already observed in early 2003, namely "an incipient migration towards DSL connections among small and medium-sized enterprises." The report concluded that this was "a promising trend, although it needs to be confirmed and consolidated by future research." In fact, this trend has been continued since. While the diffusion of Internet access appears to have reached a first level of saturation in most sectors, the percentage of firms with a DSL and/or fixed network connection (out of those with Internet access) has increased in all sectors. This trend is to be observed in most industrialised economies, not only in Europe. International reports about the development of e-business indicated an ongoing migration to DSL connections among companies.¹³



1.2 Automation of internal business processes

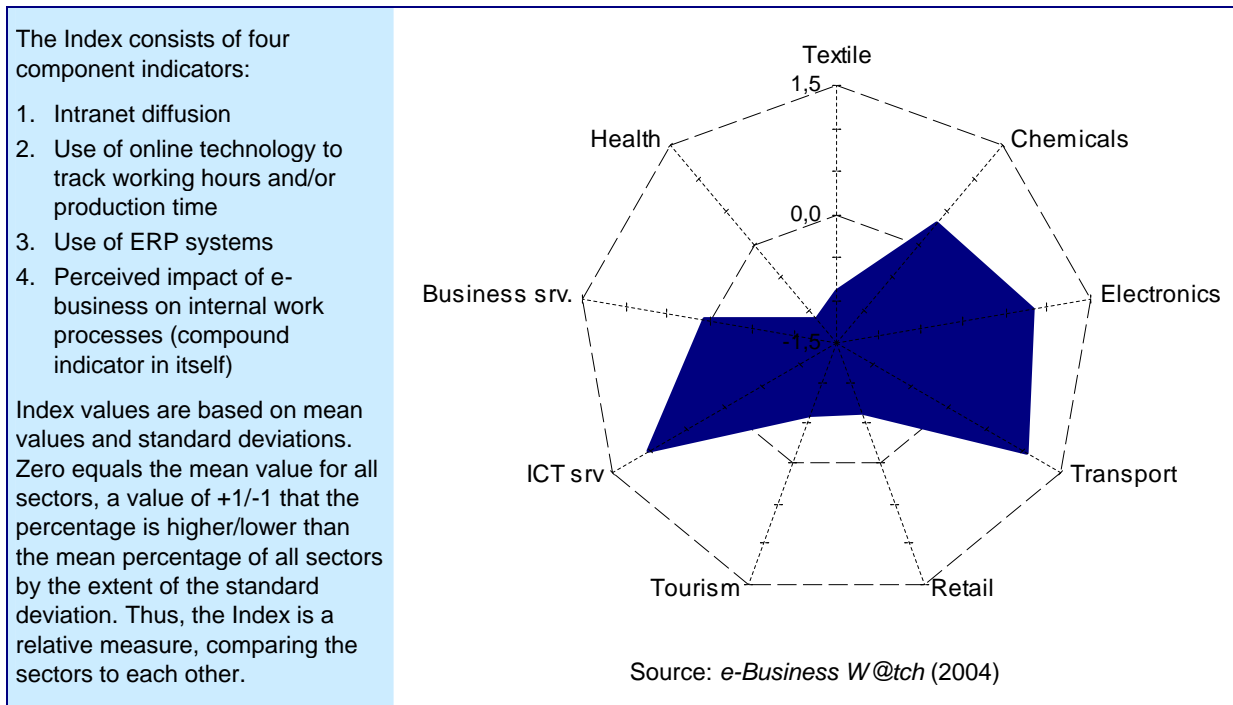
The use of ICT and e-business to support and optimise intra-firm processes has become increasingly important, both in manufacturing and in services. Applications areas include information sharing among employees (for example by use of an Intranet or Knowledge Management software), integrated planning and controlling processes (for example with online project management tools), and human resources management. Most of these applications are predominantly used by large companies and eventually by medium-sized firms.

The E-Business Scoreboard includes an Index on the use of ICT to support such internal processes (cf. Exhibit 1.2-1). Results are largely in line with the ICT Infrastructure Index. Again, companies from manufacturing sectors where large enterprises are particularly dominant tend to be most advanced in linking and automating internal business processes. Some applications, such as ERP systems, are clearly more relevant for manufacturers and for large companies. However, service companies also use applications to link their internal processes, most of all the ICT services and the business services sectors. In contrast, companies from the health sector and the textile industries are less advanced in automating their internal business processes.

¹³ See Chapter 1.9 (International Outlook). Similar results are reported, for example, for Australia (Australian Bureau of Statistics: Newsletters Innovation and Technology Statistics Update, Bulletin No. 10, June 2004) and for Canada (Statistics Canada, Survey of Electronic Commerce and Technology 2003).

¹⁴ In the retail and health sectors, the Internet access adoption rate has decreased according to the surveys 2002 / 2003. However, these large sectors are particularly diverse, comprising very different types of firms and organisations. This has possible impacts on sampling and on the comparability of survey results. Cf. Methodology Annex, Specific Notes, No. 3.

Exhibit 1.2-1: Index for automation of internal business processes 2003/04



From sharing information to managing knowledge

In many companies, an Intranet is a platform for the exchange and management of company information and possibly for the implementation of internal training programmes. Company policies and procedures ("how things are done here"), company news, or project plans, for example, can be provided on the Intranet. Thus, Intranets are often understood as internal websites that contain the collective company knowledge and can be accessed by the entire internal staff.

Knowledge Management (KM) describes the process through which organizations generate value from their intellectual and knowledge-based assets. While knowledge is often shared through informal networks, the intention of formal knowledge management systems is the *systematic* gathering and compilation of information. Knowledge-intensive sub-sectors of business services are an example for a sector where KM is important. For instance, large consulting companies use databases describing the expertise and project experience of individual consultants. If a new project comes up, managers can use these knowledge databases to set up the optimal project team. This sector exhibits one of the highest diffusion rates of KM software systems.

The efficient management of knowledge is important for companies of all sizes, but special tools to support this function are most valuable for large enterprises with a complex and often dispersed knowledge base where files have to be accessed by many different parties in the workflow. In particular the sharing of tacit knowledge (the know-how contained in people's heads), which is done face-to-face in smaller companies, can pose a problem for large, dispersed companies.

As a result, the use of all applications for information sharing increases by company size (cf. Exhibit 1.2-2). More than 70% of large firms had an Intranet in 2003, compared to 55% of medium-sized firms and 31% of small companies. Large firms are twice as likely to use Knowledge Management software as SMEs (16% versus 8%) and to employ e-learning applications (20% versus 10%).

E-learning applications are predominantly used in sectors which have a high affinity to information technology due to their main business activity. Manufacturers of electronics, telecommunication companies and computer services firms are prime adopters. This reflects that digital learning environments are particularly suited for contents of a technical nature, where opportunities of 3D visualization and hyperlinked cross-references make them superior to paper-based documentation.

Exhibit 1.2-2: Applications for internal information sharing, planning and controlling in 2003/04

	Information sharing								Planning / controlling			
	Intranet		KM system		Use e-learning		Share documents		Track work hours		ERP	
	firms	empl.	firms	empl.	firms	empl.	firms	empl.	firms	empl.	firms	empl.
By sector (EU-5)												
Textile, footwear, clothing	10	32	1	5	1	3	7	30	3	15	2	18
Chemical industries	22	62	4	12	4	8	24	55	11	33	13	48
Electronics	39	77	8	11	9	26	25	54	8	36	13	45
Transport equipment	29	81	3	11	5	19	20	50	9	42	10	72
Craft & trade	11	16	3	3	2	2	11	16	5	8	4	5
Retail	22	37	5	9	5	10	13	30	3	11	7	13
Tourism	16	34	6	5	6	12	18	35	3	10	5	7
ICT services	41	77	7	27	17	33	47	67	20	43	4	21
Business services	27	49	5	12	3	10	36	46	6	25	2	12
Health & social services	11	25	2	5	6	14	16	28	3	9	4	9
By firm size (EU-5)												
Micro (0-9 empl.)	20		5		5		21		4		4	
Small (10-49 empl.)	31		8		9		27		12		12	
Medium (50-249 empl.)	55		8		10		47		26		21	
Large (250+ empl.)	72		16		20		60		36		35	
Total (EU-5)	21	45	5	10	5	13	22	40	5	20	5	19
By country (9 sectors)												
DE Germany	18	42	3	9	11	15	13	30	5	20	8	30
ES Spain	17	39	11	15	7	10	29	39	4	17	1	10
FR France	18	50	1	4	1	5	19	46	3	19	3	23
IT Italy	27	41	6	8	2	7	21	30	3	14	8	17
UK United Kingdom	21	51	2	12	7	21	27	51	9	25	1	10
EE Estonia	11	37	8	14	12	18	18	45	14	34	3	14
PL Poland	25	37	1	3	2	4	26	37	2	5	1	5

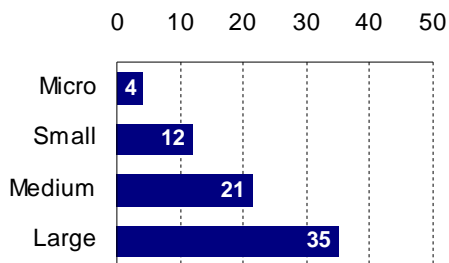
Base (100%): all enterprises / enterprises with Internet access. EU-5 = DE, ES, FR, IT, UK. N=4516 for EU-5 total and ~500 per sector. Weighting: "firms" = % of firms; "empl." = enterprises comprising ...% of employees (in the respective sector / country). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Digital tools for management: improved planning and controlling

Another internal application area for electronic business is to support planning and controlling processes. The most important software packages in this context are Enterprise Resource Planning (ERP) systems. These are modular software solutions for the planning, management and controlling of enterprise resources. They were originally developed for use mainly by large companies in manufacturing, wholesale or retail. However, as the large company markets are starting to reach saturation, many ERP software manufacturers are increasingly targeting small and midsize businesses as customers. Moreover, an increasing number of standardised software packages specified for certain industries such as engineering are reaching the market.

The ERP software market is dominated by a few large software companies (including, for instance, SAP, Peoplesoft und Oracle), but there are also many regional solution providers which have specialised on niche markets (for instance by offering solutions that are optimised for specific industries). Recently, Microsoft Business Solutions (MBS) has announced strategic plans to increase its market share in business software by developing ERP solutions for SMEs, in co-operation with its worldwide software partners.

Exhibit 1.2-3: Use of ERP systems by firm size (EU-5, 2003)

Source: e-Business W@tch (2004)

ERP systems are primarily used by large firms (35%) and by medium-sized companies (21%). In total, 5% of companies accounting for 19% of employment in the 10 sectors compared have implemented an ERP system. ERP systems are, for example, among the most commonly adopted systems in transport equipment manufacturing, where 72% of employees work in firms that are ERP users. Diffusion is also high in the other manufacturing sectors with large players dominating, notably in the chemical industries (48%) and in electrical machinery and electronics (45%). There was no significant increase in the diffusion of ERP systems between 6/2002 and 11/2003, though (see "main trends" next chapter).

ERP systems also play an important role in supporting the connectivity between enterprises. Improving the ERP-to-ERP connectivity between enterprises is still one of the main aims of many e-business activities in the chemical industries. Some of the major electronic marketplaces and interconnection hubs of the industry (Elemica, for instance) address this issue and help to realise this connectivity.

Firms make also use of online technologies for specific controlling functions. 20% (by employment) use tools to track working hours and/or production time. 21% employ online tools to support the human resources management, and 11% to automate the travel reimbursement of employees. All of these applications are predominantly used by medium-sized and large companies, typically with a factor of 3-4 between the diffusion in small and large firms.

Spotlight on the new EU Member States: Lagging behind in ERP use

- ▶ The diffusion of ERP systems is a good indicator to show that there is still a gap between firms from the former EU-15 and from the new Member States when it comes to the use of more sophisticated e-business software architectures.
- ▶ In the electronics industry – an important ERP user – adoption rates are much lower in all new Member States surveyed (EE: 15%, HU: 13%, PL: 8%, SI: 22%, SK: 21%) than in the former EU-15 (45%).
- ▶ Similarly, adoption among transport equipment manufacturing companies is much lower (CZ: 35%, HU: 35%, PL: 20%, EU-5: 72%). This holds true for the chemical industries as well.
- ▶ In sectors where ERP systems are less important, the gap is much less pronounced, but the pattern varies by country and sector.
- ▶ In retail, the level of ERP adoption is generally rather low in the EU. In some of the new Member States, ERP systems are hardly diffused or virtually non-existent in this sector (according to statistics for Latvia, Poland and Slovakia).
- ▶ In other service sectors, firms from Slovenia and Estonia are most advanced in the use of planning and controlling software, including ERP.

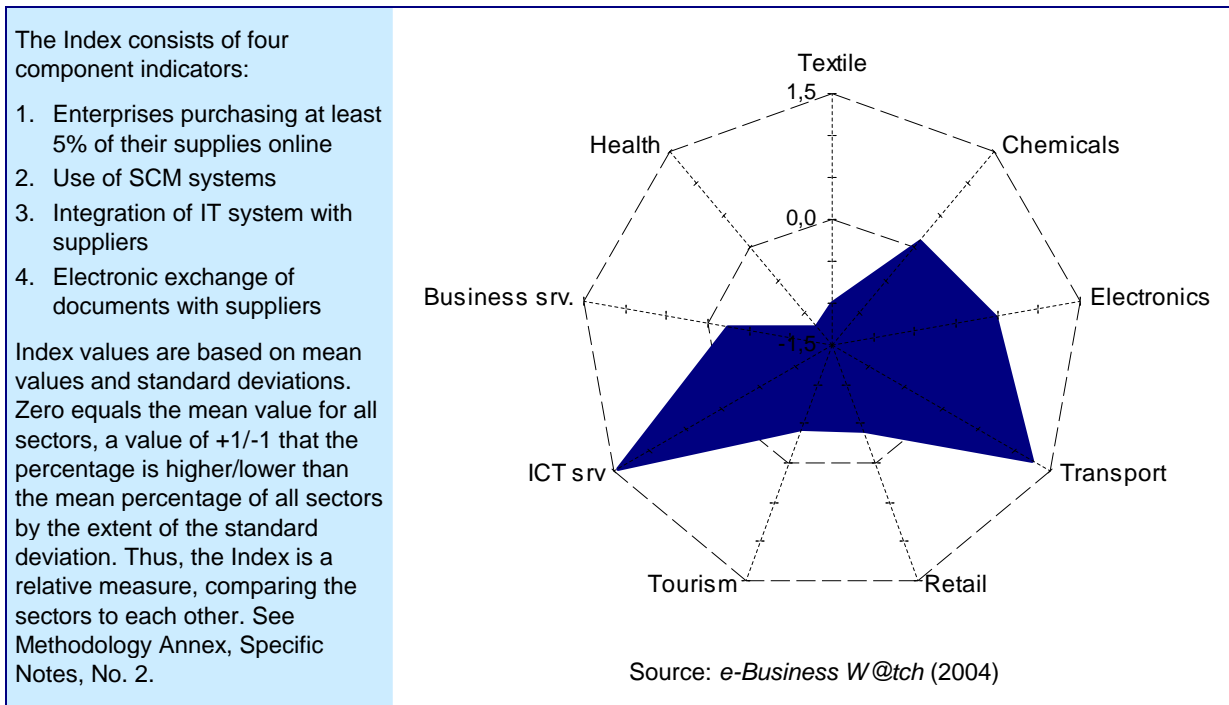
1.3 Online purchasing and supply chain integration

The drivers: saving direct procurement costs, increasing process efficiency

Using electronic business to decrease costs for supplies and to make the related processes more efficient is a major driver for e-business in most sectors, and in manufacturing in particular. As many firms have to manage a large number of transactions with their supply firms on a day-to-day basis, even fractional improvements in these processes can aggregate to quite substantial savings. This applies, for instance, to the chemical industries, to the manufacture of transport equipment, electrical machinery and electronics, and to retail.

The Index for e-purchasing and supply chain integration (see Exhibit 1.3-1) compares sectors with respect to supplier facing e-business activities and supply chain management. Results suggest that two sectors are outstanding in this regard: the ICT services sector and the transport equipment manufacturing industries. Of the other sectors, only electronics and the chemical industries have indexed scores above average. Retail and tourism are closer to the all-sectors average (= 0 in the spider diagram) than in other areas. Electronic purchasing activities in the textile industries appear to be at a surprisingly low level for a manufacturing sector.

Exhibit 1.3-1: Online purchasing and supply chain integration Index 2003/04



Key figures on electronic purchasing and supply chain management in 2003/04

31% of all companies from the 10 sectors studied, which account for more than 46% of employment, said in 2003 that they ordered direct supply goods and/or MRO goods online from suppliers. However, leaving aside companies which say that online purchases account for less than 5% of their total purchases, figures fall to about half that level. Thus, as a rule of thumb, electronic purchasing is likely to play a significant role in companies that represent about 20-25% of economic activity.

There is not much difference between companies of different size-bands if only firms are compared with a minimum of 5% online purchasing volume. Adoption rates are nearly identical among small, medium-sized and large firms. In contrast to other applications whose adoption rates depend largely on firm size, online purchasing activities differ mostly by sector as well as by country. Firms from the new EU Member States tend to make less use of online purchasing than those from the former EU-15, particularly those from the generally more advanced information economies.

Exhibit 1.3-2: Online purchasing, B2B connectivity and supply chain management in 2003/04

	Online procurement / sourcing						B2B connectivity / SCM					
	Make online purchases		Online purchases >5%		Buy on B2B trading platforms		Exchange documents online with suppliers*		IT system integrated with supplier		Use SCM system	
	firms	empl.	firms	empl.	firms	empl.	firms	empl.	firms	empl.	firms	empl.
By sector (EU-5)												
Textile, footwear, clothing	14	23	5	6	2	4	23	37	1	2	1	7
Chemical industries	32	51	13	23	7	12	39	44	4	6	4	13
Electronics	51	59	28	30	15	28	41	46	5	12	2	10
Transport equipment	30	65	12	31	8	32	40	56	5	14	3	19
Craft & trade	21	24	10	10	5	5	36	39	5	6	2	3
Retail	23	38	12	16	8	9	34	42	9	11	5	5
Tourism	39	47	23	28	10	10	33	39	8	7	2	3
ICT services	75	74	58	54	18	22	53	51	8	19	2	11
Business services	35	50	22	23	4	7	29	45	1	6	1	6
Health & social services	24	34	11	20	2	5	27	30	4	3	0	1
By firm size (EU-5)												
Micro (0-9 empl.)	30		18		6		31		5		2	
Small (10-49 empl.)	46		26		11		41		6		3	
Medium (50-249 empl.)	51		23		11		42		6		7	
Large (250+ empl.)	56		25		14		49		12		13	
Total (EU-5)	31	46	18	23	7	11	32	42	6	8	2	6
By country (9 sectors)												
DE Germany	39	56	27	30	12	20	25	33	5	8	2	7
ES Spain	20	28	11	15	8	9	38	46	6	8	6	13
FR France	27	37	14	16	6	7	35	50	2	7	1	4
IT Italy	27	30	17	15	4	6	25	30	9	8	1	3
UK United Kingdom	48	58	25	29	5	8	46	52	2	9	1	5
EE Estonia	28	35	6	11	2	3	47	56	3	12	1	4
PL Poland	12	19	5	9	2	4	40	44	2	3	0	2
Base (100%): all enterprises / *enterprises with Internet access. EU-5 = DE, ES, FR, IT, UK. N=4516 for EU-5 total and ~500 per sector. Weighting: "firms" = % of firms; "empl." = enterprises comprising ...% of employees (in the respective sector / country). Reporting period: March/November 2003.												

Source: e-Business W@tch (2004)

Spotlight on sectors: specific contexts for online purchasing

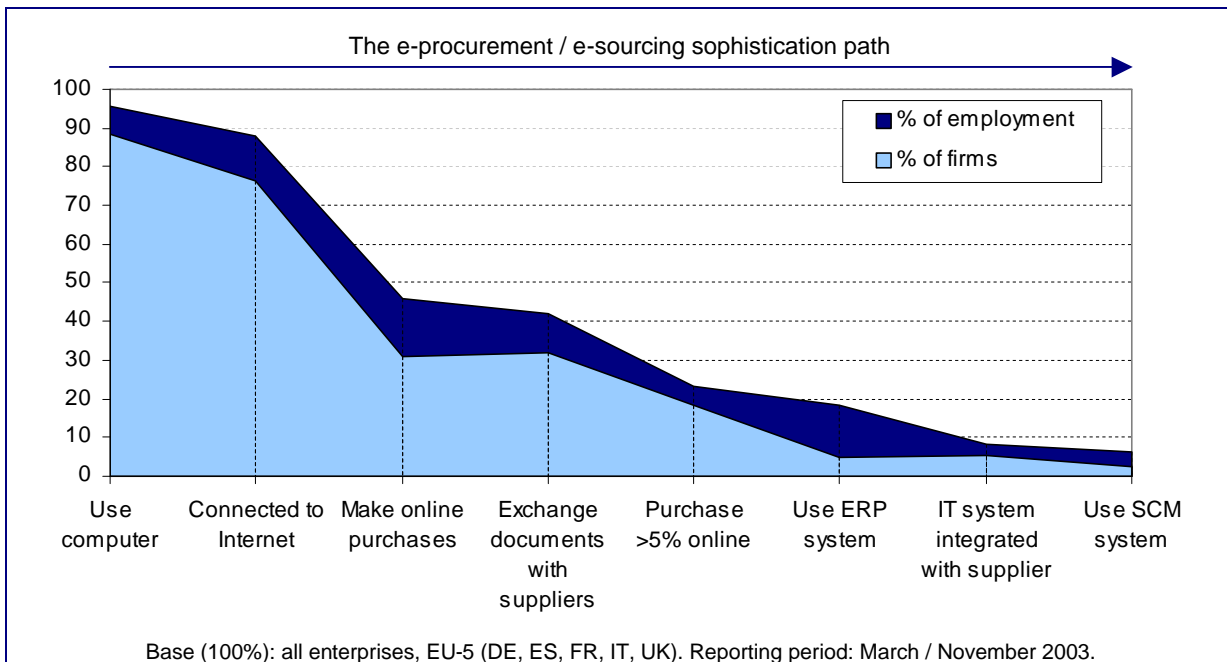
- ▶ In the **chemical sector**, the basic chemicals industry relies heavily on commodity inputs and is a supplier to highly competitive output markets. As the industry is producing commodities with rather narrow margins, its major potential to increase profit margins lies in the reduction of internal costs. E-procurement is important in this context.
- ▶ In **retail**, e-purchasing drives the vertical integration of players in the supply chain. Firms use it in order to reduce the quantity of goods to be stocked under the same sales conditions, and to accelerate supply flows for improving customer service.
- ▶ Importance of legacy systems: The **automotive industry** in Europe had already begun to introduce efficient supply-chain management tools in the early 1990s, mostly based on EDI. These systems required substantial investment and resulted in a complex re-organisation of customer-supplier relationship. This causes some reluctance to change from EDI to new standards.
- ▶ **ICT services** companies can exploit their broadband Internet connections for direct online purchasing, as many of their supplies are digital and can be directly delivered online (e.g., software, hosting services).

The level of B2B connectivity in Europe (2003/04)

There are many options of how to use ICT for conducting supplier facing business processes electronically. These options can be described as a path of increasing sophistication and complexity. The opportunity to benefit from cost saving potentials will normally increase with the sophistication of the system. However, at the same time, the investment and maintenance costs for the systems will also increase. Thus, each firm is challenged to identify its own optimal level of supply side e-business integration, that is the point of maximum return on investment (ROI).

In late 2003, enterprises representing close to 90% of employment in the 10 sectors studied were connected to the Internet. About half of those made at least some of their purchases online (that is on the Internet and/or other online networks), and again about half of those said that they ordered at least 5% of their total supplies online. Only a small percentage of this online purchasing activity, however, appears to be based on a systematic exchange of structured data between companies: less than 10% of firms reported that they had integrated their IT system with that of a supplier, and less than 10% said they used a Supply Chain Management (SCM) system.

Exhibit 1.3-3: The evolution of online purchasing – sophistication levels (2003/04)



Source: e-Business W@tch (2004)

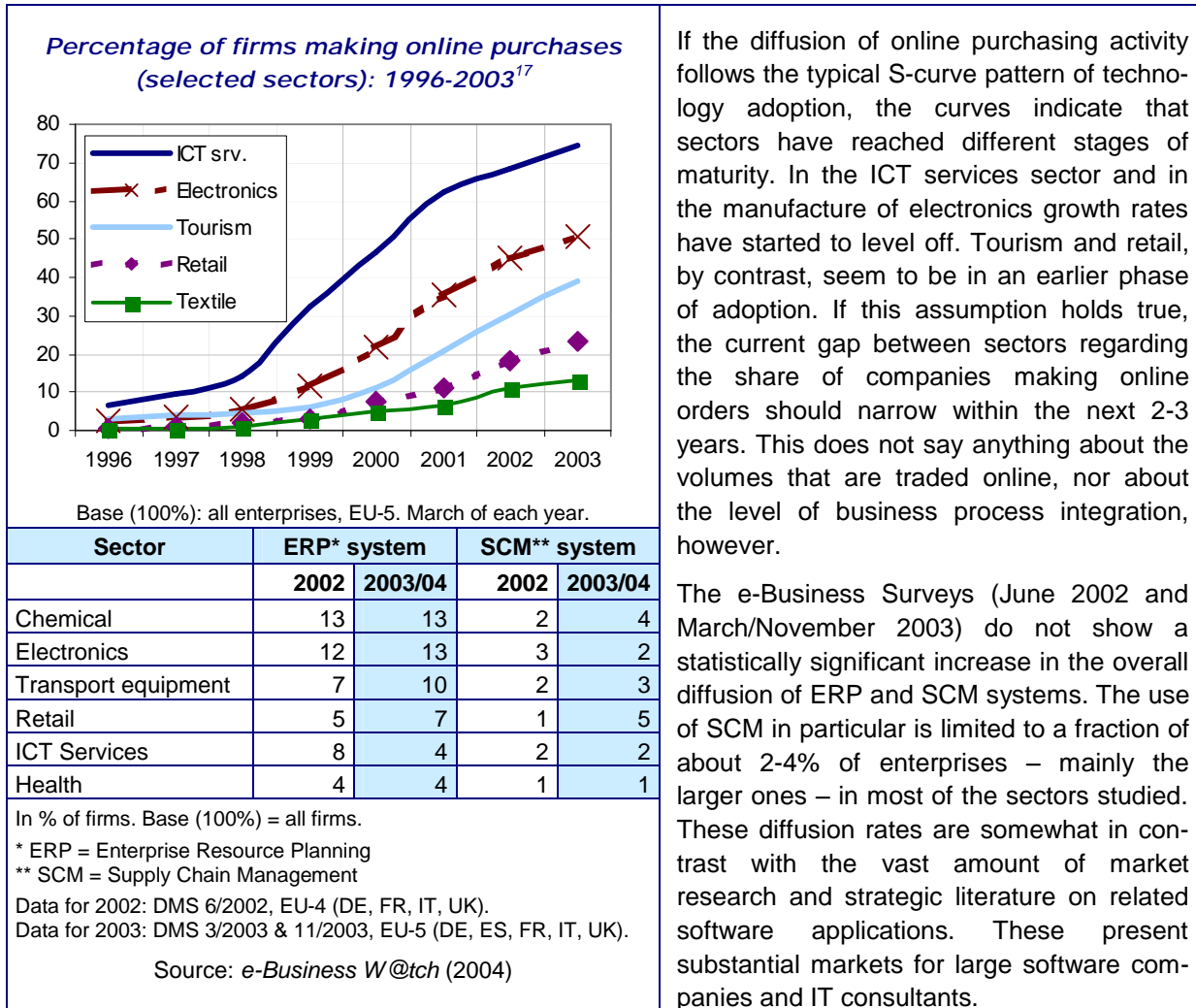
The share of online purchases

e-Business W@tch does not collect data on absolute (online) purchasing volumes, but asked companies to estimate the percentage of their total purchasing volume that is actually conducted online, including orders from websites, Internet trading portals, via extranet connections and through EDI. A simple computation of the answers, assuming that the average share tend to be towards the lower end in each of the ranges offered as options for their answer,¹⁵ suggests that EU companies made about 6% of their total purchases online in 2003/04. This includes MRO goods¹⁶ and direct production goods. The most intensive users of e-purchasing are firms from the ICT services sector (close to 15%) and from manufacturing sectors (the electrical machinery and electronics industry and transport equipment, about 7% each).

¹⁵ Companies were given five options for their answer: "less than 5% of total sales", "5-10%", "11-25%", "26-50%" and "more than 50% of total sales". To adjust for the larger purchasing volumes of large companies, employment-weighted figures were used. This is, of course, a crude approximation only.

¹⁶ Maintenance, repair and operating goods. See glossary.

Main trends in managing supply chains



If the diffusion of online purchasing activity follows the typical S-curve pattern of technology adoption, the curves indicate that sectors have reached different stages of maturity. In the ICT services sector and in the manufacture of electronics growth rates have started to level off. Tourism and retail, by contrast, seem to be in an earlier phase of adoption. If this assumption holds true, the current gap between sectors regarding the share of companies making online orders should narrow within the next 2-3 years. This does not say anything about the volumes that are traded online, nor about the level of business process integration, however.

The e-Business Surveys (June 2002 and March/November 2003) do not show a statistically significant increase in the overall diffusion of ERP and SCM systems. The use of SCM in particular is limited to a fraction of about 2-4% of enterprises – mainly the larger ones – in most of the sectors studied. These diffusion rates are somewhat in contrast with the vast amount of market research and strategic literature on related software applications. These present substantial markets for large software companies and IT consultants.

Spotlight on the new EU Member States: Different patterns

- ▶ On the whole, online ordering and supply chain integration are e-business areas where differences between the old and new Member States are still quite pronounced.
- ▶ About 30% of firms (in terms of their share of employment) from Germany and the UK, for example, order at least 5% of their supply goods online, while only about 10% of companies from Estonia and Poland do so.
- ▶ The level of B2B IT integration (between buyers and suppliers) is normally below EU average in the new Member States. There are exceptions, though, notably among firms from the Czech Republic and Estonia.
- ▶ Different patterns emerge across sectors and countries. In transport equipment manufacturing, for example, firms from the new EU Member States were not found to systematically lag behind their EU counterparts in e-procurement activities.
- ▶ In the chemical industries, firms from the Czech Republic reported extraordinarily high levels of online trading, and companies from Latvia and Estonia stood at about the EU average levels.
- ▶ Case studies from the new Member States show that companies are using electronic business for introducing process innovation.

¹⁷ Based on a survey question about the year and month when a company started to make online purchases, asked in the e-Business Survey 2003.

1.4 Electronic marketing and sales

The e-commerce paradox – a boom that is hard to track in statistics

A recent special report and cover story of The Economist concluded that "e-commerce takes off".¹⁸ While a vast majority of observers agree that e-commerce is booming in special markets such as tourism and retail, a paradox appears when it comes to tracking this boom statistically. The percentage of companies that allow customers to order products and services online appears to be stagnating. 17% of SMEs and 19% of large companies from the 10 sectors studied in 2003/04 said that they made online sales. Figures are similar to those from 2002. Even the relative shares of online sales (as % of total sales) have not significantly changed. In brief, there is no clear evidence of where exactly the boom occurs.

There are, however, some reasonable explanations for this apparent paradox. The quoted article of The Economist rightly points out that official statistics on volumes traded online are only "the tip of the iceberg", as they fail to cover some of the very important markets for e-commerce. For instance, they do not include goods traded on Internet auction sites. More importantly, transaction oriented statistics fail to acknowledge the rapidly increasing importance of the Internet for making purchasing decisions. This confirms the assessment of the e-Business Report 2003¹⁹ regarding the importance of e-commerce in the retail industry: "A key to understanding the real impact of the net on consumer sales may in fact be to shift the focus from measuring mere transactions to the broader concept of 'net-influenced' sales. This approach considers the important role of the Internet during the pre-purchase stages, for instance for browsing the offer and comparing prices" (p. 30). In fact, there are two contrasting trends in consumers' browsing and purchasing behaviour which have developed in parallel (see Exhibit 1.4-1), and which have implications for the retail industry.

*Exhibit 1.4-1: B2C electronic commerce in retail:
Contrary consumer behaviour trends and resulting challenges*

Window-shopping, online buying	Online browsing, offline buying
<p>Consumer behaviour: Consumers visit the retail shops to see and test the products they are inclined to buy. Once they have taken a decision on a certain model, they go back to the Internet to find the lowest price and buy the model online.</p> <p>Business challenge: To some extent, pure online retailers are trying to exploit a "parasitic" situation. They let traditional retail shops perform pre-sales customer service for them, save the respective costs and can thus offer better prices.</p>	<p>Consumer behaviour: Consumers use the Internet intensively to inform themselves about product features and for decision-making (using product tests, peer reviews, price finders). However, for reasons of loyalty, security concerns or customer service (after sales service, guarantee issues), they finally purchase the product or service locally at the shop.</p> <p>Business challenge: The black sheep among online retailers have somewhat damaged the reputation of the family (for instance by selling products that are out of stock without informing customers prior to payment). For conventional retailers, the main challenge is how to maintain and strengthen customer loyalty.</p>

Source: e-Business W@tch (2004)

Retail is one of the sectors where B2C electronic commerce is playing an important role. Tourism is another. Here, the Internet has already exerted a huge impact on the sector. New, powerful online intermediaries have emerged, exploiting the convenience of the Internet for travellers to browse the offers of tour operators, hotels and flight airlines. These new intermediaries compete with their conventional counterparts, namely the travel agents.²⁰ In the USA, travel alone is estimated to account

¹⁸ "A perfect market. A survey of e-commerce", in: The Economist, May 15-21 2004. 14-page special report.

¹⁹ e-Business W@tch (2003): The European E-Business Report. 2003 edition. Luxembourg: Office for Official Publications at the European Communities. ISBN 92-894-5119-X.

²⁰ For a more detailed discussion of the intermediation issue in tourism, see e-Business W@tch Sector Studies on Tourism, May 2004 (No. I) and August 2004 (No. II).

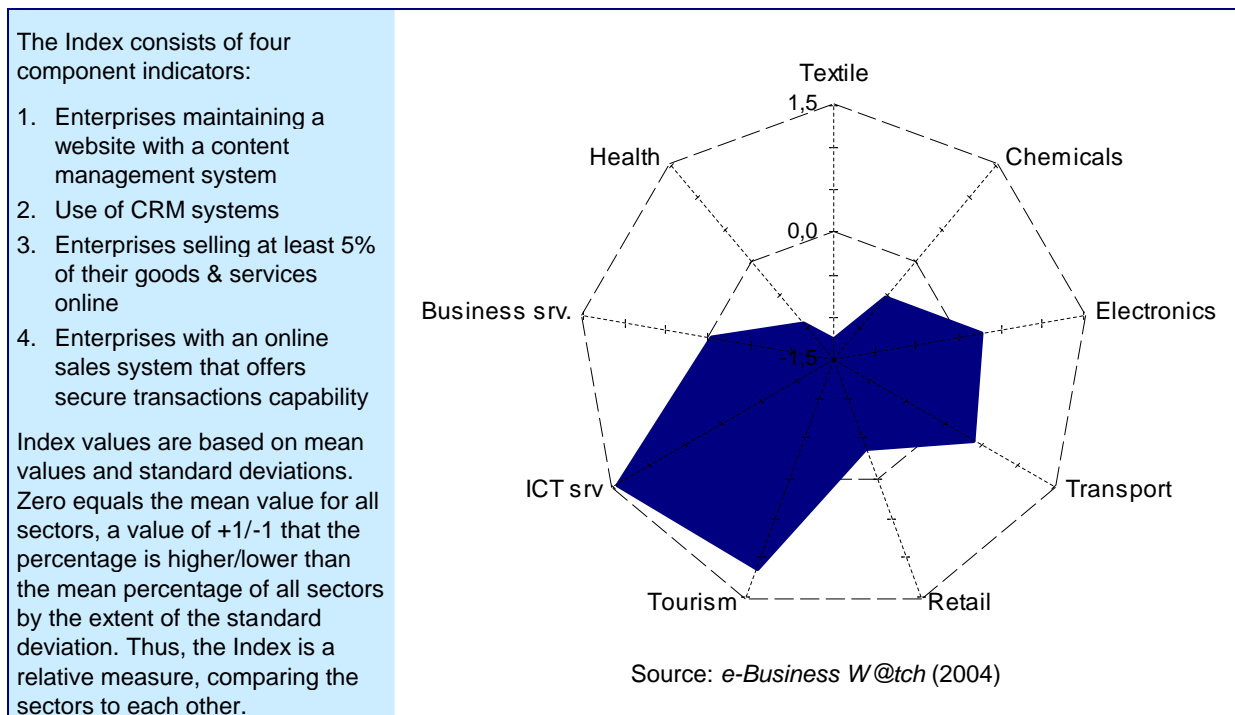
for about one third of business-to-consumer e-commerce spending. 35 million Americans made online reservations in 2003, an increase of 17% since 2002, according to PhoCusWright.²¹

However, the situation is more complex when it comes to assessing the implications for firms. The same, contrasting consumer behaviour patterns outlined in Exhibit 1.4-1 for the retail industry, equally apply for tourism. Moreover, players involved in the tourism value chain are tied to each other in rather complex arrangements. Thus, while it is safe to forecast that a substantial share of the actual bookings will migrate to online travel services within the next few years, it is more difficult to forecast which players will ultimately benefit. Although it need not be a zero-sum game, it is unlikely that it will only see winners.

Electronic marketing and selling: key figures in 2003/04

The e-Marketing and Sales Index of the E-Business Scoreboard 2004²² compares sectors in their use of the Internet and other online networks for customer facing processes, including electronic marketing and e-commerce. Results are quite different from the other Indices. Tourism is a leader and forerunner in the use of customer facing e-business applications. The sector is topped only by companies from ICT services which manage a large deal of their customer relationship electronically. Although retail scores higher than in the other business areas, it still comes below the all-sectors average, which is quite astonishing considering the e-commerce boom in specific retail markets (see introduction).

Exhibit 1.4-2: Electronic marketing and sales Index 2003/04



Source: e-Business W@tch (2004)

A majority of firms from the 10 sectors studied had a website on the Internet, except for micro-enterprises (with up to 9 employees). About 80% of medium-sized and 90% of large companies are represented on the Internet. However, these statistics do not tell us much about the use which a company makes of its website. Figures include on the one hand the most simple, basic websites which may consist of only one or two pages with company information, and, on the other, highly developed sites with sophisticated interactive features, including high level e-commerce functionalities such as secure ordering and online payment systems.

²¹ PhoCusWright Consumer Travel Trends Survey, quoted in The Economist, May 15-21 2004 issue, p. 7 of the special report on e-commerce. Cf. <http://store.phocuswright.com/phcottrrsusi.html>

²² See Methodological Annex, Special Notes, No. 2

A good indicator as to whether websites consist of more than just a few pages and whether they are regularly updated is the use of Content Management Systems (CMS). Currently, about one in four firms that have a website say that they use a CMS. Among large firms, the share is about 40%.

The use of CMS also indicates the strategic importance and the role of websites in various sectors. In ICT services, business services and tourism, where the website is an important interface for communication with customers, the diffusion of CMS is relatively high. In contrast, CMS are used to a lesser extent by firms from manufacturing sectors such as the textile and chemical industries, but also transport equipment manufacturing. In general, the use of content management systems has increased over the past 2-3 years (see also "main trends" at the end of this chapter). The implementation of CMS is in many cases linked to the relaunch of a website.

Exhibit 1.4-3: Electronic marketing and sales in 2003/04

	e-Marketing				Online selling							
	Have a website		... of those:		Accept online orders		Online sales >5% of total		% of firms selling online:			
			Use a CMS*						Use secure server		Enable online payment	
	firms	empl.	firms	empl.	firms	empl.	firms	empl.	firms	empl.	firms	empl.
By sector (EU-5)												
Textile, footwear, clothing	22	47	15	15	3	5	1	1	42	68	38	38
Chemical industries	50	84	18	20	8	9	3	2	42	63	37	35
Electronics	61	87	26	33	8	14	4	8	54	59	37	31
Transport equipment	49	89	22	26	8	17	4	13	50	50	31	25
Retail	26	52	35	33	8	17	3	9	40	52	20	32
Craft & trade	25	32	15	18	3	3	1	1	34	30	31	17
Tourism	63	76	29	34	33	37	22	24	45	49	43	44
ICT services	69	88	34	43	15	24	11	11	61	69	65	54
Business services	35	72	19	39	3	11	2	6	62	73	39	46
Health & social services	21	41	15	28	2	7	1	3	49	87	42	81
By firm size (EU-5)												
Micro (0-9 empl.)	33		27		9		5		47		39	
Small (10-49 empl.)	66		22		17		10		42		32	
Medium (50-249 empl.)	78		25		16		6		55		26	
Large (250+ empl.)	91		41		19		10		74		53	
Total (EU-5)	35	66	26	33	9	16	6	9	46	59	38	42
By country (9 sectors)												
DE Germany	45	73	17	23	13	18	7	9	35	52	24	20
ES Spain	30	54	42	45	9	15	4	9	62	59	67	47
FR France	29	63	14	30	5	12	3	5	46	54	42	54
IT Italy	34	51	39	37	10	11	7	7	49	54	28	36
UK United Kingdom	43	72	16	39	10	19	6	11	43	69	45	61
EE Estonia	49	67	34	44	7	12	4	7	29	59	56	42
PL Poland	45	62	21	26	10	9	7	6	33	33	31	27
*CMS = Content Management System Base (100%): all enterprises / enterprises selling online. EU-5 = DE, ES, FR, IT, UK. N=4516 for EU-5 total and ~500 per sector. Weighting: "firms" = % of firms; "empl." = enterprises comprising ...% of employees (in the respective sector / country). Reporting period: March/November 2003.												

Source: e-Business W@tch (2004)

About one in ten companies (altogether accounting for 16% of employment) say that customers can order their products online, and less than 5% of firms allow online payment for products ordered online. Also, only about 5% have implemented an online sales system with capability for secure transactions (for example based on the SSL standard²³). If micro-enterprises are not considered, figures are somewhat higher – about 17% of SMEs and 19% of large companies make online sales. The share of firms using more advanced systems (for instance secure server technology, and systems allowing online payment of goods) is also higher among the larger firms.

These observations lead to a frequently cited paradox. If e-procurement activities have gained momentum, and if a significant number of enterprises report buying supply goods online, who is the seller on the other side of the line? In fact, there is no straight forward simple answer, although two possible explanations are plausible:

- Firstly, it appears that there are only a limited number of companies in many sectors which have specialised in selling their products online (either through their own website, on B2B marketplaces or via dedicated proprietary networks), while there are many more companies in the respective value chains that make use of this offer without selling their own products online. In other words, online selling could be – to some extent – a one-to-many activity. The situation can be structurally compared to the retail market, where a few online selling companies sell to a large number of customers (who buy online but do not sell online themselves).
- Secondly, some companies make only rudimentary use of e-procurement, for instance for rather insignificant purchases of office material or other MRO goods, but do not sell anything online themselves. This assumption is backed by the relatively high percentage of companies that report buying less than 5% of their total purchases online.

It has already been mentioned in the introduction that online selling activity is focused in specific sectors and sub-sectors, predominantly in the tourism and retail industry. This is confirmed by statistics when looking at the percentage of firms that say that they make at least 5% of their total sales (volume) online. Tourism is leading in this statistics (about a quarter of all firms), ICT services and retail are among the intensive users of e-commerce (about one in ten companies each). From the manufacturing sectors, transport equipment (13%) and electronics (8%) have a high share of firms with significant e-commerce activity. This reflects the advanced status of B2B trade in these sectors, which has obviously become more bi-directional than in other sectors such as the textile industries.

The level of system integration for conducting electronic commerce (2003/04)

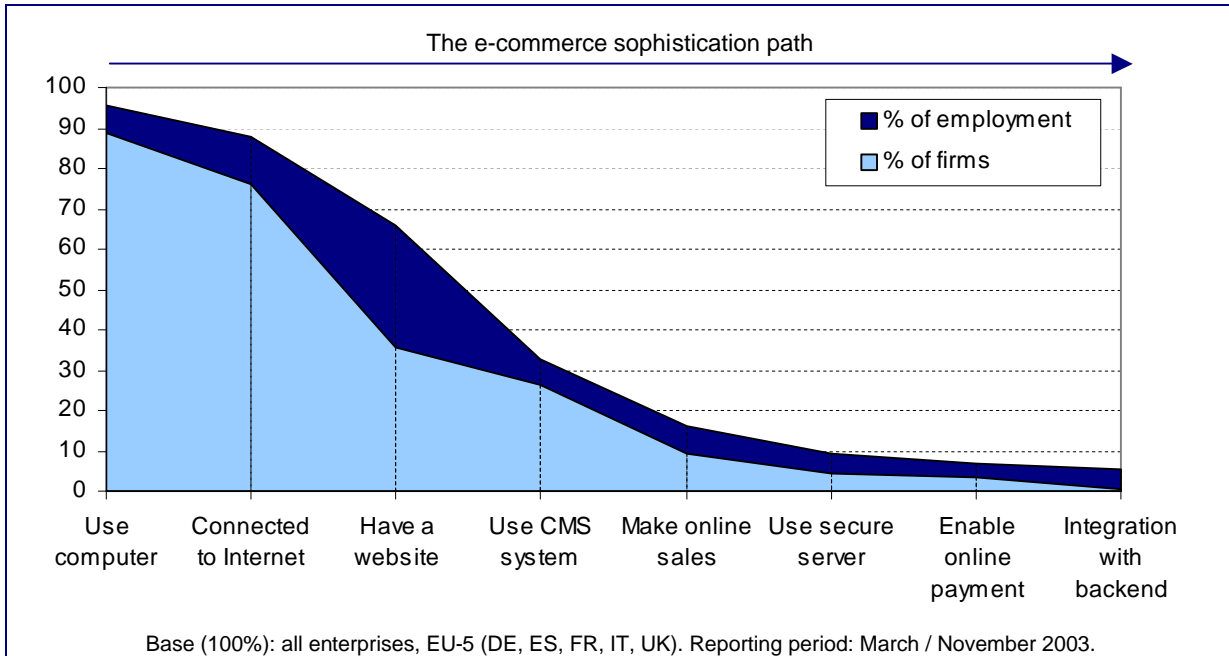
The e-commerce systems used for making online sales have different sophistication levels and can be linked (or not) to invoicing, accounting or stock management systems. The development of making online sales, from simply receiving orders by e-mail toward integrating the system with the back-end IT system, can be described as a path of increasing sophistication.

While a majority of firms that conducts online sales say that they receive information about orders by e-mail, still only a small fraction of companies (firms accounting for about 5% of employment) that use e-commerce *and* have connected their system for receiving orders with the back-end IT applications. Only among large enterprises, and here mainly from manufacturing (electronics, transport equipment), is back-end integration of e-commerce already a standard.

Similarly, only about one in two companies that makes online sales say that they use secure server technology for the transmission of orders from customers. Even less than 50% of all online sellers allow customers to pay online for the goods ordered. In brief, it can be argued that many companies make occasional online sales, for instance by accepting orders through simple plain text e-mail, without having implemented an e-commerce system.

²³ Secure Sockets Layer (SSL), a commonly-used technical protocol for managing the security of a message to be transmitted on the Internet. SSL was succeeded by the Transport Layer Security (TLS) standard, but is still widely used.

Exhibit 1.4-4: E-commerce evolution – sophistication levels

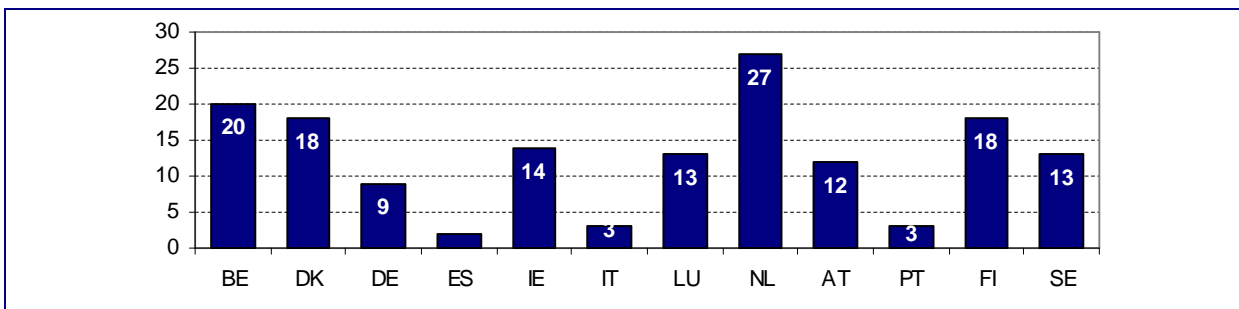


Source: e-Business W@tch (2004)

Geographic differences in e-commerce activity

As the e-Business W@tch is focusing on sectors, it cannot collect at the same time comparable datasets for all countries of the European Union. Preliminary results of the European Community Enterprise Survey 2003 by Eurostat show that the percentage of firms that have received online orders via Internet, EDI or other networks varies considerably across Member States. In particular, there appears to be a large gap between the Southern European countries and the other Member States (see Exhibit 1.4-5).

Exhibit 1.4-5: % of firms that have received orders via Internet, EDI or other networks (sectors included: industry and services, excluding banking)



Source: European Community enterprise survey 2003 (Eurostat). Intermediate results.

Eurostat figures are not fully comparable to those from the e-Business W@tch, due to differences in the sector configuration and because Eurostat does not include micro-enterprises with less than 10 employees in its survey. Aggregate data from the e-Business W@tch for the 10 sectors studied also indicate some national disparities, but not to such an extent. Adjusted by firm-size (by means of employment-weighting), the share of firms that make online sales varies between 10-20% according to the e-Business W@tch.²⁴ Firms from the UK and Germany appear to have a higher propensity toward online selling (close to 20% each) than those from France, Italy, Estonia or Poland. Results are influenced by the industry structure of the respective countries and, thus, reflect sectoral differences.

²⁴ among the seven EU countries for which comparable data are available: DE, EE, ES, FR, IT, PL, UK.

The share of online sales as % of total

e-Business W@tch does not collect data on absolute (online) sales volumes, but asked companies that allow customers to order online to estimate the percentage of their total sales volume that actually stems from online orders. This includes orders placed on their website, through Internet trading platforms, extranet connections with customers and via EDI. A simple computation of the answers, assuming that the average share will rather be towards the lower end in each of the ranges offered as options for their answer,²⁵ suggests that EU companies from the ten sectors studied made about 2% of their total sales online in 2003/04. Electronic commerce appears to be relatively most important (if measured as the share of volumes sold online) in tourism and in transport equipment manufacturing (5-8% e-commerce shares) and ICT services (about 3%). It is remarkably low in retail (less than 2%), which is part of the paradox outlined in the introduction to this chapter.

Main trends: powering up the website, e-tourism boom

**Percentage of firms making online sales
(selected sectors): 1996-2003²⁶**

Base (100%): all enterprises, EU-5. March of each year.

Sector	Use a CMS* to update their website		Use a CRM** system	
	2002	2003/04	2002	2003/04
Chemical	13	18	7	7
Electronics	17	26	10	7
Transport equipment	9	22	3	4
Retail	12	35	7	3
ICT Services	27	34	22	15
Health	16	19	6	4

* CMS = Content Management System
** CRM = Customer Relationship Management
In % of firms. Base (100%): *% of firms with a website / **all firms
Data for 2002: DMS 6/2002, EU-4 (DE, FR, IT, UK).
Data for 2003: DMS 3/2003 & 11/2003, EU-5 (DE, ES, FR, IT, UK).
Source: e-Business W@tch (2004)

If the diffusion of online selling activity follows the typical S-curve pattern of technology adoption, the curves indicate that sectors have reached different stages of maturity. In contrast to e-purchasing, however, the leading sector (tourism) still shows high growth rates, while curves for other sectors appear to have already flattened out since 2001. If this development holds true, the current gap between sectors, which is already substantial, could even increase within the next 2-3 years. This does not say anything, however, about the volumes that are sold online, nor about the level of business process integration.

It appears that many companies have already taken a strategic "stop or go" decision on whether they should sell their products and services online or not. Those that have decided to do so seem to be focusing now on upgrading their e-marketing and sales systems. An indication for this assumption is that the share of companies which said that they used a CMS to update and maintain their website (among those companies that have a website) was significantly higher in the 2003 than in the 2002 survey, although the overall share of firms with a website was lower. In contrast, the diffusion of (quite sophisticated and expensive) CRM systems appears not to have increased since 2002.

²⁵ Companies were given five options for their answer: "less than 5% of total sales", "5-10%", "11-25%", "26-50%" and "more than 50% of total sales". To adjust for the larger sales volumes of large companies, employment-weighted figures were used. This is, of course, a crude approximation only.

²⁶ Based on a survey question about the year and month when a company started to make online sales, asked in the e-Business Survey 2003.

1.5 Special trend analysis: The use of electronic standards in 2003/04

The exchange of standardised data is increasingly recognised as an important indicator for e-business activity. To allow for automatic processing, the information exchanged between trading partners has to be digitised in structured, consistent form rather than being transmitted as simple, unstructured digital information. E-business standards help in organising and exchanging information in a way that is consistent across enterprises and IT systems.

Standardisation is also one of the main five key actions managed by the DG Enterprise in the framework of the eEurope 2005 Action Plan. In the eEurope 2005 Standards Action Plan, DG Enterprise actively encourages standardisation in domains of public interest via the works of various organisations (ETSI, CEN Workshop Agreements and other forms of consensus documents).

Similar diffusion of EDI and XML based standards

In the second part of the e-Business Survey 2003 (November), the *e-Business W@tch* asked companies whether they exchange standardised data with buyers or sellers, and which standards they used for doing so. Although results are only available for specific countries in each of the sectors which makes cross-sector comparisons difficult²⁷, some general trends can be identified:

- The share of companies that exchange standardised data increases with the size of the firm. Among the large firms interviewed, more than 60% said that they did so.
- Within sectors, data vary widely across different countries. In the chemical industries, for example, the exchange of standardised data appears to be more prevalent among firms from Belgium, Sweden and the Czech Republic than among companies from Poland and Latvia.
- EDI based standards are mainly used in manufacturing sectors and in retail. Sectors with a strong EDI legacy may be reluctant to switch to other standards (cf. Sector Study on Transport Equipment Manufacturing).
- XML based standards appear to be widely used by firms from the business services sector. It is possible that the awareness for XML is particularly high among the knowledge-intensive sub-sectors of business services, where web-based services play a very important role in delivering services and information to customers. More predictably, XML based standards (including, for example, RosettaNet) are also used more than on average in high-tech sectors (electronics, ICT services).
- The STEP standard is only used by a minority of firms. The share was less than 10% in all of the 10 sectors surveyed, even among the large companies.

An interesting phenomenon is that many companies could not answer the question about which standards they actually use. In most sectors, the different options given in the follow-up question (including the final option "other standards") does not add up to at least 100%, which should be the case in a follow-up multi-response question. It is difficult to assess whether firms did not correctly understand the concept of "exchanging standardised data"²⁸ or whether they really did not know the standard used. This result indicates that at the very least there is still some uncertainty of what constitutes a "technical standard" from a company's point of view. A lesson to be learned for future surveys is that a general introductory question comprising all standards does not lead to fully satisfactory results.

²⁷ Since this question was not part of the first phase of the survey in March 2003, results are only available for specific countries. Cross-sector comparisons are therefore based on different country configurations and should be regarded as trends rather than as exact statistics in terms of percentages.

²⁸ The survey question was: "Are you exchanging standardised data with your buyers or sellers electronically? With standardised data we mean electronic product catalogues, orders, invoices, delivery notes and similar business documents. We do not mean plain e-mails."

Some sectors are likely to differ significantly by sub-sector in their use of e-standards. In tourism, for example, standards are important for those players that are connected to the large online networks of the sector (for instance travel agents), while they are less important for hotels and restaurants. The electrical machinery and electronics industry, which is more strongly developed in the North of Europe, requires more standardised components for data processing automation than the electrical machinery industry, which is largely represented in Southern Europe.

Exhibit 1.5-1: Exchange of standardized data with buyers or sellers

	Exchange standardised data with buyers or sellers	... of those use: **			
		EDI based	XML based	STEP	Proprietary
By sector *					
Textile industries	32	31	10	5	36
Chemical industries	37	34	17	4	28
Electronics	46	28	21	6	31
Transport equipment	38	29	10	4	25
Craft & trade	26	11	7	6	30
Retail	46	25	15	4	41
Tourism	43	19	17	3	29
ICT services	41	17	20	4	39
Business services	54	23	54	7	51
Health & social services	34	23	17	3	33
Total	39	23	20	5	36
By firm size					
Micro (0-9 empl.)	29	12	13	5	29
Small (10-49 empl.)	37	17	17	4	33
Medium (50-249 empl.)	46	28	23	5	38
Large (250+ empl.)	61	45	30	5	47
* Note: Different country configurations by sector. Percentages are therefore not fully comparable across sectors and should be regarded as trends or indications only!					
** Note: Multi-response question, Base: firms using computers and exchanging standardized data.					
Base (100%): firms using computers / firms exchanging standardized data. N ~ 500-1100 per sector, with the exception of craft & trade (N = 1247). All data in % of firms of the sample interviewed (unweighted). Time: November 2003.					

Source: e-Business W@tch (2004)

Success factors for the implementation of e-standards

At the Workshop on Electronic Standards²⁹, participants agreed that there may be real or perceived conflicts between the benefits of implementing standards for the industry as a whole and the possible impact (and risk) for individual enterprises in the short run. If companies perceive risks, it will be difficult to implement standards. Vice versa, the lack of standards may also be a barrier to the efficient use of e-business.

Experts pointed at a number of important requirements for the successful implementation of e-standards. Success factors include community consensus on essential details and the successful implementation among early adopters, which normally results in a faster and broader adoption process. In general interoperability was identified as a key issue both for facilitating business processes and for the general business context of an enterprise. Progress in the interoperability between systems and components should promote better integration of front office and back office data information systems. However, it will be crucial to take into account sector-specific issues in technical aspects, organisational issues and semantics. Adopting a sectoral standardisation approach could ease development, but may lead to difficulties in cross-sectoral data exchanges.

²⁹ e-Business W@tch Workshop at the IDATE Annual Conference, Montpellier, 19th November 2003.

The role of e-standards in specific sectors

In the **chemical industries**, voluntary expert work by leading chemical companies and their system partners since 2000 has resulted in the availability of the CIDX³⁰ Chem eStandards v4.0 (May 2004) and its accompanying suite of Implementation Accelerator, and Business Process Guidelines. This mature work and the ongoing CIDX plans provide the solid foundation needed for chemical industry players of all sizes to implement and utilize integrated supply chains within their own sector.³¹ The Chem eStandards is a complete set, including documentation, UML (Unified Modelling Language) activity diagrams, and XML Schemas. One of the changes introduced in Version 4 was from the XML DTDs (Document Type Definition) to the more powerful XML schema approach. This means that, in future, compliant systems will be able to parse and interpret data more easily allowing for easier application level enhancements.

Interoperability and standardisation issues are of particular importance to the **craft and trade** sector. A lack of standards and interoperability problems with systems from other companies or even within one firm may put high cost strains on small firms. Interoperability problems can lead to severe administrative efforts in small firms. The requirement to re-enter data can amount to 20-40% additional administrative time.³² In the **food and beverages industry**, which includes a number of craft sectors such as bakeries, wineries and breweries, many small companies will be confronted with new administrative efforts in order to fulfil new legislations and standards on traceability, hygiene maintenance and labelling. The amount of work will only be manageable in a cost efficient way by use of computers.

Most **manufacturers of electronics** use e-business applications via Electronic Data Interchange (EDI), a standards-based mechanism for trading partners to electronically communicate with each other despite disparate systems, software and architectures installed. In the past, EDI was considered expensive and difficult to implement. Much of the expense was attributed directly to transaction fees charged by value added networks (VANs). Today, EDI is growing in popularity because transaction fees can be avoided by leveraging the Internet as the communications transport mechanism. On the other hand, new XML based standards (ebXML or RosettaNet for instance) allow an optimized integration of components within a system, not only for marketplace purchase and supply but also for Content Management and Document Management (such as workflows) of technical information in electronics and electrical systems. Although RosettaNet has achieved relatively widespread adoption in large companies, the cost of implementing RosettaNet solutions has slowed adoption among small and medium-sized businesses. With the exception of SMEs with customers that require RosettaNet to conduct business, SMEs are reluctant to make a significant investment if the number of transactions is low, and they cannot justify the return on investment³³.

Obstacles stemming from the lack of technical standards

The *e-Business W@tch* asked companies whether they see obstacles to electronic business stemming from a lack of technical standards.

- A majority (about 3 in 4 companies) said that they did not see any obstacles, leaving less than 20% of firms that perceive obstacles. 7% of the sample interviewed was undecided.
- There are hardly any differences by sector. Comparing size-bands, the awareness for obstacles stemming from the lack of technical standards is slightly higher among medium-sized and large enterprises than among small firms.

³⁰ CIDX (Chemical Industry Data Exchange) - www.cidx.org - is a global trade association and standards body focused on improving mutual electronic connectivity between chemical companies and their trading partners.

³¹ Cf. Sector Report No. 02-II on the Chemical Industries, August 2004 (www.ebusiness-watch.org)

³² Cf. Sector Report No. 05-II on Craft and trade, August 2004 (www.ebusiness-watch.org), interview with Frederik Posthumus, who is in charge of e-business, ICT and eEurope at the European Office of Crafts, Trades and Small and Medium-sized Enterprises for Standardisation (NORMAPME) in Brussels.

³³ B2B Integration over the Internet with XML – RosettaNet Successes and Challenges - Suresh Damodaran Chief Technologist, RosettaNet (<http://www.rosettanet.org>), May 17–22, 2004, New York, USA.

- Security and data protection are regarded as more critical in this respect than issues related to cataloguing or transaction processing. Cataloguing is regarded as more important by large firms. On the same issue, it can be shown that sectors that have made good progress in cataloguing their products consequently express low concern: the chemical industries and the electronics industry are those with the lowest level of concern about this item.

Exhibit 1.5-2: Perceived obstacles stemming from the lack of technical standards

	Companies seeing obstacles to electronic business stemming from lack of technical standards			... of those that see obstacles regard as critical: **			
	yes	no	Don't know	Security	Data protection / privacy	Cataloguing issues	Transaction processing
By sector *							
Textile industries	16	77	7	95	89	75	83
Chemical industries	18	74	8	82	61	38	55
Electronics	21	73	7	72	62	44	47
Transport equipment	13	81	6	76	70	58	60
Craft & trade	14	78	8	92	86	67	73
Retail	20	74	6	74	66	60	51
Tourism	16	73	11	85	72	55	54
Business services	17	77	6	79	77	55	56
ICT services	19	76	5	87	76	47	52
Health & social services	17	76	7	88	87	54	60
Total	17	76	7	83	76	56	58
By firm size							
Micro (0-9 empl.)	14	79	8	81	77	54	55
Small (10-49 empl.)	17	76	8	86	75	48	58
Medium (50-249 empl.)	21	73	7	83	74	57	58
Large (250+ empl.)	21	74	5	82	81	70	63
* Note: Different country configurations by sector. Percentages are therefore not fully comparable across sectors and should be regarded as trends or indications only!							
** Note: Multi-response question, base: firms using computers and seeing obstacles to electronic business stemming from lack of technical standards.							
Base (100%): firms using computers / firms seeing obstacles to electronic business stemming from lack of technical standards data. N ~ 500-1100 per sector, with the exception of craft & trade (N = 1247). All data in % of firms of the sample interviewed (unweighted). Time: November 2003.							

Source: e-Business W@tch (2004)

Outlook: What companies regard as important for the future

In the November section of the e-Business Survey 2003, the e-Business W@tch introduced a question about emerging e-business technologies and standards. Companies were asked to assess whether they considered the following developments to be important for their own business:

- Mobile solutions to connect fieldworkers with the company
- Integration of IT components through web services
- New XML based standards will be important for our company
- Virtual Private Networks (VPNs) to connect companies securely via the Internet

As for the question on the use of electronic standards, results are only available for specific countries, and cross-sector comparisons should therefore be regarded as trends rather than as exact statistics. Some patterns can, however, be observed. The perceived importance of the emerging technologies increases almost linearly with firm-size, with large companies standing out. However, this finding is not consistent across all sectors and countries. In the chemical industries, for example, it was found that the perception does not differ much between size-bands in the new Member States.

XML based standards do not enjoy a high level of awareness. While figures for the other items are very similar across sectors and size-bands, XML based standards are perceived as less important. A possible explanation is that many firms are not directly confronted with XML as an issue, since this has to be dealt with by solution providers. Similarly, "HTML" as such may not be an "issue" for most firms, even if they have a website and thus actually use this standard. In contrast, implementing mobile solutions or VPNs are issues that need to be explicitly addressed by companies themselves. Thus, the perceived importance is comparably higher.

However, the same assessment could be made to some extent for web services; the level of awareness is nevertheless higher than the one for XML in all sectors. It is difficult to assess whether companies factually attribute such high importance to the technical concept of web services, or whether the term in itself is not well understood. Some micro and small firms in particular may possibly confuse the underlying concept with existing web-based offers.

Although cross-sector comparisons are problematic for the reasons explained, the level of importance which firms attributed to the items they were questioned about is extremely similar in most of the sectors studied. 40%-50% of the firms which used computers (data not weighted, i.e. % of firms interviewed) believed that the technical solutions they were asked about would be important for them in the future, with the exception of XML based standards. ICT services companies attribute the highest importance to all four items, which is plausible considering the significance of communication networks in this sector.

Exhibit 1.5-3: Perceived importance of various technological developments

Sector *	Companies saying that the following will be important for them:			
	Mobile solutions to connect fieldworkers with the company	Integration or IT components by means of web services	New XML based standards for e-business	VPNs to connect companies securely via the Internet
By sector *				
Textile industries	39	35	17	46
Chemical industries	49	47	26	51
Electronics	50	47	33	55
Transport equipment	48	44	20	48
Craft & trade	41	32	15	38
Retail	50	56	30	57
Tourism	43	47	22	54
Business services	54	52	27	56
ICT services	61	72	54	75
Health & social services	36	42	18	47
Total	47	48	26	53
By firm size				
Micro (0-9 empl.)	42	40	18	44
Small (10-49 empl.)	44	44	22	47
Medium (50-249 empl.)	51	52	33	61
Large (250+ empl.)	61	69	45	71
<p>* Note: Different country configurations by sector. Percentages are therefore not fully comparable across sectors and should be regarded as trends or indications only!</p> <p>Base (100%): firms using computers and saying that e-business already constitutes a significant or some part of the way the company operates today. N ~ 500-1100 per sector, with the exception of craft & trade (N = 614).</p> <p>All data in % of firms of the sample interviewed (unweighted). Time: November 2003.</p>				

Source: e-Business W@tch (2004)

1.6 IT still matters: New evidence on Internet-enabled innovation and financial performance of enterprises³⁴

In a much debated article, Nicholas Carr (2003) argued that IT doesn't matter anymore as a strategic device for companies to gain competitive advantage. His reasoning was both simple and convincing: As IT becomes ubiquitous, it turns into an infrastructure technology (just like electricity or telephones) possessed by everyone, instead of a resource that is only available to few. Therefore IT loses its potential for creating sustained competitive advantage because it is scarcity, not ubiquity, that enables a company to gain an edge over rivals. Carr concludes that IT should be viewed and managed as a commodity and not as a strategic asset.

In this chapter, it is argued that Carr's argument is not correct because it overlooks an essential property of information technology: IT creates numerous, company-specific opportunities to improve processes and to generate new products and services for customers that did not previously exist. Hence, IT is inherently strategic because it enables innovation and is therefore a medium to competitive advantage.

It was pointed out in various reports of the *e-Business W@tch* that it is not information technology *per se* that determines the economic impact of IT investment, but rather what companies decide to do with the new technology. It is argued that it is necessary to combine technology adoption with process or product or service innovations to realise economic gains from the investment into the new technology. Hardware and software tools offer a set of technologically feasible opportunities. Its potential will most likely keep increasing due to constant further developments and technological improvements. However, technology is flexible and the extent to which it is implemented and used to change existing procedures and product or service offers depends on the strategic decision of firms and their ability to successfully manage and complete change processes. In other words, two companies that invest the same amount into the same information technology might end up with two very different outcomes depending on how successfully they managed to re-invent business processes, organisational design, or service offers for their customers. It is the process of technology-enabled change and innovation that makes IT a valuable strategic asset rather than a pure commodity or infrastructure.

But just how much innovative activity can be attributed to IT? And does IT-enabled innovation really translate into the financial success of a company? This chapter presents some new evidence from the *e-Business W@tch* in response to these questions.

Electronic business and innovation

The November part of the e-Business Survey 2003 contained questions regarding the innovative activities of firms. Two introductory questions that were put to every subject elicited whether a company had introduced substantially improved products or services to its customers during the past 12 months. It was also asked if the company had introduced new internal processes during the past 12 months. These introductory questions were adopted from the Community Innovation Survey (CIS, cf. www.cordis.lu/eims/src/cis.htm) to determine the share of companies in the sector that had recently introduced product or process innovations. The advantage of adopting the questions from CIS was that it allowed the *e-Business W@tch* team to use a well accepted and mature survey instrument.

In addition to the introductory questions on innovation, a particular goal of the survey was to find out the share of innovative activity that is directly related to or enabled by Internet-based technology. Therefore, companies that indicated in the introductory questions that they had conducted innovations in the past 12 months were asked follow up questions. The aggregate results for more than 7,000 companies interviewed in November 2003³⁵ are shown in Exhibit 1.6-1.

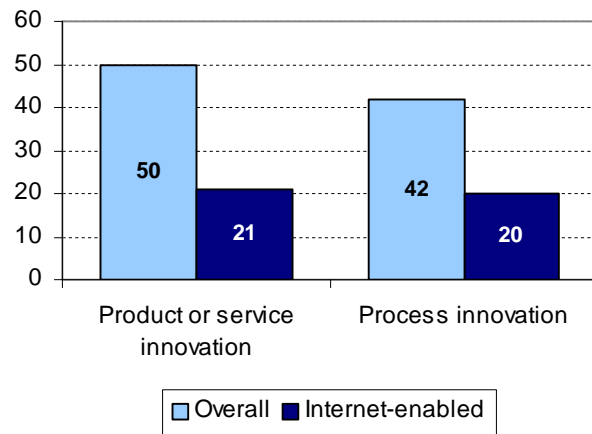
³⁴ This chapter was authored by Philipp Koellinger, DIW Berlin. Contact: pkoellinger@diw.de

³⁵ For detailed information about the sample, see Annex III (Methodology)

50% of enterprises in the sample introduced substantially improved products or services to their customers in 2003. More than one third of these product or service innovations has been directly related to or enabled by Internet-based technology. This corresponds to 21% of enterprises in the sample that have introduced Internet-based product or service innovations in 2004. The importance of the Internet is even more pronounced for process innovations: 42% of enterprises introduced new internal processes in 2003. About one half of these process innovations were directly related to or enabled by Internet-based technology.

It can, thus, be concluded that IT and the Internet are currently important enablers of innovation in the European Union. Many firms actually make use of IT to conduct process innovations or to offer new products or services to their customers.

Exhibit 1.6-1: Innovative activities in 10 sectors and 25 countries in the European Union, 2003*



Base: all enterprises without missing values, unweighted. Reporting period: November 2003. N = 7,046 for product innovations, N = 7,079 for process innovations.

Source: e-Business W@tch (2004)

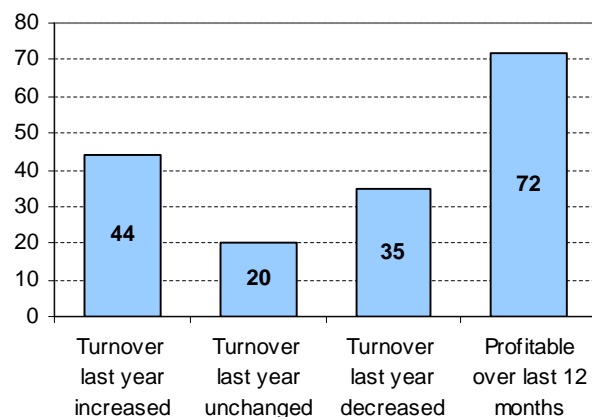
Innovation and financial performance

The adoption of new technologies such as e-business can result in business success in two basic ways: (1) efficiency gains via process innovations – this corresponds to an outward shift of an existing supply function; (2) the creation of new products or services – this corresponds to the creation of a new supply function (Kamien and Schwartz, 1982, p. 2). In both cases, firms that succeed in these endeavours should experience increasing turnovers, profits, and market shares, ceteris paribus.

The joint occurrence of innovations, increasing turnovers and profitability can be tested on the basis of data from the November part of the e-Business Survey 2003. The question of interest in this context is what specific kind of innovation is most frequently used by the more successful companies in the European Union.

Exhibit 1.6-2 shows the financial performance of enterprises in Europe in 2002/2003. 44% of firms in the sample experienced increasing turnover in 2003 compared to 2002. 20% report unchanged turnover in 2003, and 35% report decreasing revenues. A very high share of companies (72%) state that they have been profitable over the last 12 months prior to the survey (November 2003).

Exhibit 1.6-2: Financial performance of firms from 10 sectors and 25 countries in the EU (2002/2003)



Base: all enterprises without missing values, unweighted. Reporting period: November 2003. N = 6,253 for turnover development, N = 6,443 for profitability.

Source: e-Business W@tch (2004)

Exhibit 1.6-3 shows how these financial performance parameters correspond to the six types of innovative activities that were captured by the *e-Business W@tch* survey in November 2003:

- Product or service innovations – any kind
 - Product or service innovations – general (not Internet related)
 - Product or service innovations – Internet-enabled
- Internal process innovations – any kind
 - Internal process innovations – general (not Internet related)
 - Internal process innovations – Internet-enabled

The variables in the dataset were recoded as dummies and Kendall-Tau-b³⁶ correlation coefficients (Sheskin, 2004, pp. 1079-1091) were calculated using unweighted individual level data.

Increasing turnover and profitability are strongly positively correlated. Vice versa, decreasing turnovers are negatively associated with profitability at the 99% confidence level.

At the most general level, without differentiating between Internet-enabled and non-Internet-enabled innovations, it turns out that both product and process innovations are positively correlated with increasing turnovers. This is as expected and shows that growing companies are more innovative than companies with stagnating or decreasing turnovers. One should keep in mind that the direction of causality is not easy to determine, primarily because the data from the survey compare innovative activities and financial performance for the same time period (the questions in the survey refer to developments in the last 12 months prior to the poll). Thus, it is not possible to conduct a rigorous empirical causality test. Theoretically, it could be that companies are growing faster *because* they conducted successful innovations, or that companies innovate *because* they have better liquidity and access to financial resources due to previous growth. In any case, results clearly show that companies with increasing turnover are significantly more innovative than enterprises with stagnating or decreasing turnover.

Exhibit 1.6-3: Correlation of innovative activities and financial performance

	Turnover increased last year	Turnover same last year	Turnover decreased last year	Profit in last 12 months	Product innovations – general	Product innovations – Internet related
Profit in last 12 months	0.221**	0.007	-0.282**			
Product innovations – any kind	0.140**	-0.087**	-0.069**	0.069**		
Product innovations – general	0.061**	-0.044**	-0.023	0.024		
Product innovations – Internet related	0.104**	-0.059**	-0.060**	0.059**		
Internal innovation – any kind	0.164**	-0.102**	-0.083**	0.033**		
Internal innovation – general	0.072**	-0.042**	-0.039**	0.005	0.275**	-0.122**
Internal innovation – Internet related	0.128**	-0.082**	-0.062**	0.036**	-0.171**	0.480**

Kendall-Tau-b correlation coefficients; * significant at 95%, ** significant at 99%.
N = 5,887. Base: all enterprises without missing values (unweighted).
Reporting period: November 2003

Source: *e-Business W@tch* (2004)

³⁶ Kendall's Tau is a measure of correlation between two variables. It can take values between -1 and 1. If two variables are totally independent, Kendall's Tau takes a value of 0. If two variables are identical (always occur together), Kendall's Tau takes a value of 1 and a value of -1, if they always occur together but with reversed signs. For more information, see Special Note No. 4 in Annex III (Methodology).

At a more detailed level, differentiating between Internet-enabled and non-Internet-related types of innovation, Exhibit 1.6-3 shows that all four differentiated innovation dummies are positively and significantly associated with increasing turnovers, and negatively with steady or decreasing turnovers. They are also positively correlated with increasing profitability. Thus, all kinds of innovations are significantly associated with financial success of companies. Interestingly, it turns out that Internet-related innovations are more strongly correlated with financial success than non-Internet-related innovation. However, the value of the correlation coefficients is sensitive to the specific sector being analysed (see *e-Business W@tch* sector reports on the textile and transport equipment industries, Aug 2004). On the aggregate level, we can conclude that Internet-based innovations are at the very least not inferior to other kinds of innovations.

Another interesting pattern becomes visible in Exhibit 1.6-3: There is a strong significant positive correlation between non-Internet-enabled product innovations and non-Internet-enabled process innovations. Similarly, Internet-enabled product and Internet-enabled process innovations are also positively correlated at a high level of significance. On the other hand, Internet-enabled innovations are negatively associated with non-Internet-related innovations. Hence, it appears that there are three clusters of firms: Those that use the Internet extensively to conduct both product/service and internal innovations, and those that also innovate in both domains, but without using the Internet. The third cluster of firms comprises of firms that do not innovate. This is quite interesting and demonstrates that companies have various strategic options to gain competitive advantages. Judging only by the absolute size of the other correlation coefficients in Exhibit 1.6-3, it could be that the cluster that innovates intensively using Internet technologies outperforms the non-IT-savvy innovation cluster. However, no strong conclusion should be drawn since the effects could be influenced by other factors, such as sector membership, size class, or market power of a firm. Also, it would be desirable to analyse firm-level time series data to test for the direction of causality between innovation and financial performance. Thus, further research is desirable on these issues.

Summary

The research presented in this chapter shows that the Internet is currently an important enabler of innovation in the European economy. Many firms actually make use of ICT to conduct process innovations or to offer new products or services to their customers. In fact, about one half of all process innovations in 2003 appear to be directly related to or enabled by Internet-based technology. Furthermore, we found evidence for the existence of two major innovation strategies. It appears that there are two distinct clusters of innovative firms: those that use the Internet extensively to conduct both product/service and internal process innovations, and those that also innovate in both domains, but without using the Internet.

The analysis reveals that all types of innovation are positively associated with increasing turnover and profitability. Hence, innovative firms exhibit much better financial performance than non-innovative firms. Thus we can conclude that IT matters as a strategic device for companies to gain competitive advantage because it offers numerous, firm-specific opportunities to innovate.

References

- Carr, N.G. (2003): "IT doesn't matter", *Harvard Business Review*, May 2003.
- Kamien, M.I. and Schwartz, N.L. (1982): *Market structure and innovation*, Cambridge et. al.: Cambridge University Press.
- Sheskin, D.J. (2004): *Handbook of parametric and nonparametric statistical procedures*, 3rd edition, Boca Raton et. al.: Chapman & Hall/CRC.

Market Business

Chart Report

Electronic Business in 10 Sectors of the European Union

e-business
w@tch

Section 1: The e-Business Index – a proxy to the eEurope 2005 Benchmarking Index

p. 43

The eEurope 2005 Action Plan includes as a target that, “by 2005, Europe should have (...) a dynamic e-business environment”. In order to track the progress achieved, an “E-Business Index” was developed for benchmarking purposes. It considers ICT infrastructure aspects and ICT use for e-business. Based on data from its own surveys, the e-Business W@tch has calculated a proxy to this e-Europe benchmarking index for sectors, firm size-bands and countries.

- Chart 1-1: Sectors
- Chart 1-2: Size-Bands
- Chart 1-3: Countries

Section 2: The European e-Business Scoreboard 2004

p. 44

The Scoreboard was developed by the e-Business W@tch in 2004 in order to compare the importance of ICT and e-business applications in different sectors. It is based on 16 component indicators which are grouped into four dimensions of e-business. For reasons of consistency and comparability, all data have been taken from the e-Business Survey 2003 of the e-Business W@tch.

- Chart 2-1: Textile industries
- Chart 2-2: The chemical industries
- Chart 2-3: Electrical machinery and electronics
- Chart 2-4: Transport equipment
- Chart 2-5: Craft and trade
- Chart 2-6: Retail
- Chart 2-7: Tourism
- Chart 2-8: ICT services
- Chart 2-9: Business services
- Chart 2-10: Health and social services

Section 3: 20 Indicators on ICT and e-Business

p. 50

Charts in this section summarise the current state of ICT and e-business diffusion among enterprises. 18 indicators from the e-Business Survey 2003 have been selected. Data are broken down by sector, by size-band and by country. Data for sectors and countries are weighted by employment (read: “firms representing ...% of employment in a sector / country”); data for size-bands are in % of firms.

A. ICT infrastructure

- Chart 3-1: LAN use
- Chart 3-2: Internet access
- Chart 3-3: Broadband internet access
- Chart 3-4: Remote access
- Chart 3-5: Wireless access

B. Automation of internal business processes

- Chart 3-6: Intranet
- Chart 3-7: Track working hours online
- Chart 3-8: E-design of products
- Chart 3-9: ERP systems
- Chart 3-10: Impact on work processes

C. E-procurement and supply chain integration

- Chart 3-11: Online purchasing
- Chart 3-12: E-procurement on marketplaces
- Chart 3-13: IT integration with suppliers
- Chart 3-14: Document exchange
- Chart 3-15: SCM systems

D. Electronic marketing and sales

- Chart 3-16: CRM systems
- Chart 3-17: Website and CMS use
- Chart 3-18: Online selling
- Chart 3-19: Secure transaction capability
- Chart 3-20: Integration of online sales system

Section 4: Diffusion of e-commerce activity since 1993: online purchasing and online selling

p. 50

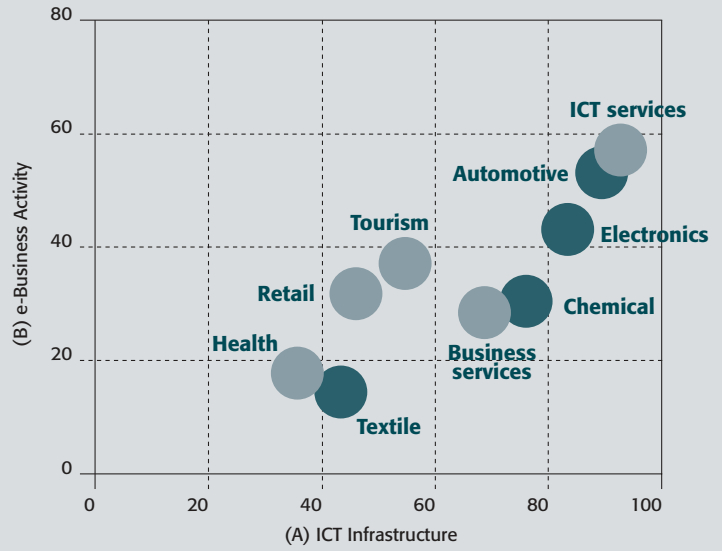
In late 2003, about 10% of all enterprises from the sectors monitored by the e-Business W@tch made online sales and 31% made online purchases themselves. The two charts in this section compare the S-curve diffusion of e-commerce since 1993 by sector.

- Chart 4-1: Diffusion of online purchasing (1993 – 2003)
- Chart 4-2: Diffusion of online selling (1993 – 2003)

Section I: The e-Business Index (a proxy to the eEurope 2005 Benchmarking Index)

Chart 1-1:
e-Business Index by sector

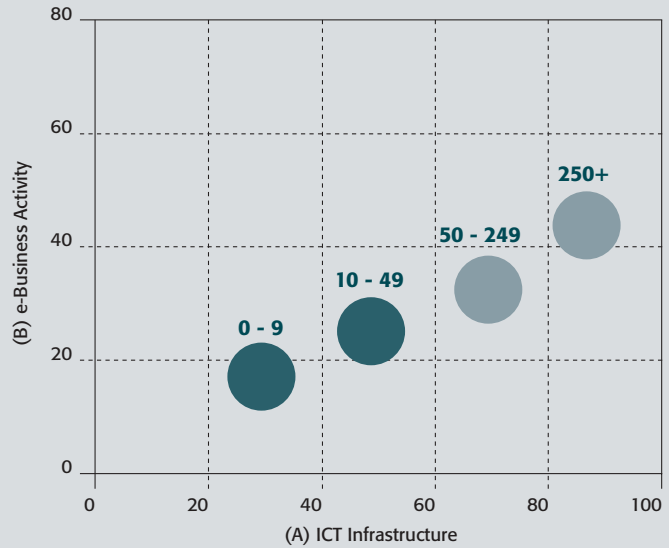
firms from 9 sectors
EU-5 data - DE, ES, FR, IT, UK



Source: e-Business W@tch (Survey 2003)

Chart 1-2:
e-Business Index by company size-band

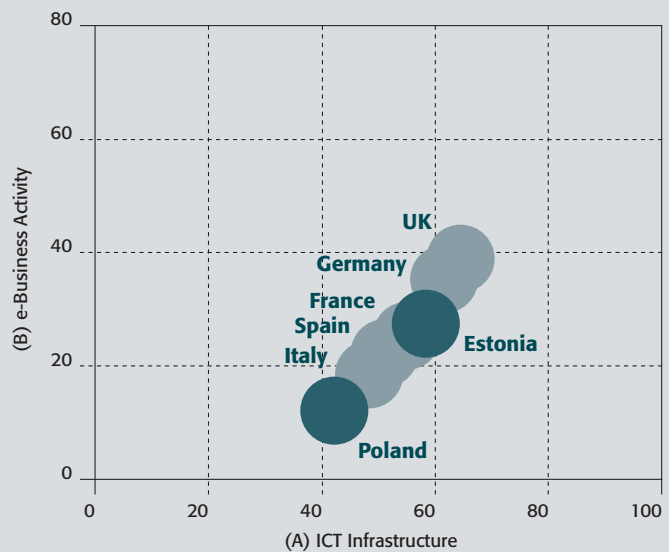
firms from 4 size-bands
EU-5 data - DE, ES, FR, IT, UK



Source: e-Business W@tch (Survey 2003)

Chart 1-3:
e-Business Index by country

firms from 7 EU Member States
identical configuration of sectors in each country



Source: e-Business W@tch (Survey 2003)

Proxy to the eEurope 2005 benchmarking index ("E-Business Index"), based on employment-weighted survey data from the e-Business Survey 2003 (cf. Methodological Annex, specific notes, No. 1).

Introduction

The spider and diamond diagrams of the E-Business Scoreboard visualise the importance of ICT and e-business applications for 9 sectors of the European economy, based on 16 component indicators. For reasons of consistency and comparability, all data are derived from the e-Business Survey 2003 of the e-Business W@tch. Normally, benchmarking activities of this type imply that a higher score stands for a better performance. In this context, however, the main objective of the Scoreboard is not to make a statement about e-business performance. Rather, the Scoreboard is intended to show the different importance which information and communication technologies can have for various sectors of the economy.

The component indicators

The Scoreboard is composed of 16 component indicators for ICT and e-business which are grouped into four categories (according to business functions). Spider diagrams show the results for each indicator. Diamond diagrams show the compound results for the four categories. The categories and component indicators are:

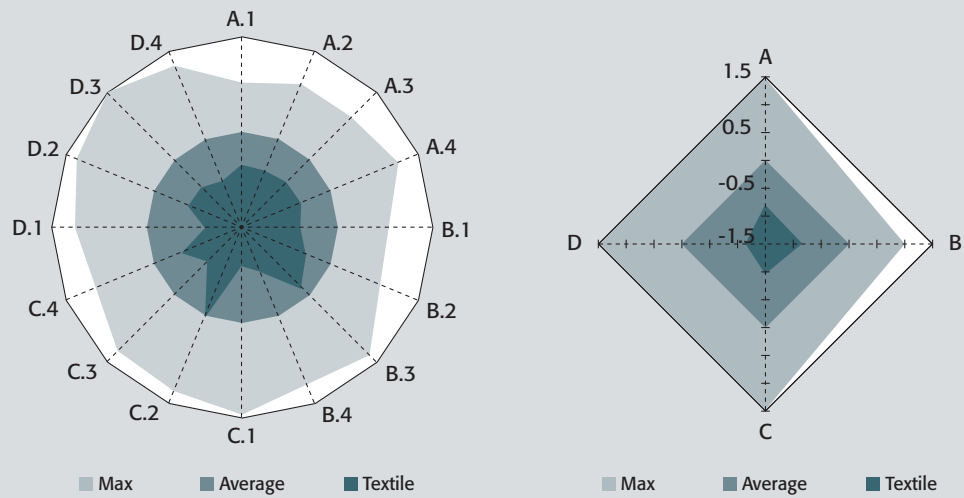
Category	Component Indicator
A. ICT infrastructure of the enterprise	A.1 Enterprises connecting computers with a LAN
	A.2 Internet connectivity index
	A.3 Remote access to the company network
	A.4 Wireless access to the company network
B. Internal business process automation	B.1 Use of an intranet
	B.2 Use of online technology to track working hours / production time
	B.3 Use of ERP systems
	B.4 Impact of e-business on internal work processes (index)
C. Procurement and supply chain integration	C.1 Enterprises purchasing at least 5% of their supplies online
	C.2 Use of SCM systems
	C.3 Integration of the IT system with that of a supplier
	C.4 Electronic exchange of documents with suppliers
D. Electronic marketing and sales	D.1 Enterprises maintaining a website with a content management system
	D.2 Use of CRM software systems
	D.3 Enterprises selling at least 5% of their goods & services online
	D.4 Enterprises with an online sales system offering the capability of secure transactions

The scale

The Scoreboard uses indexed values. These take into account the percentages from all sectors and show how a specific sector differs from the all-sector-average. An index value is based on mean values and standard deviations (cf. Methodological Annex, specific notes, No. 2).

Chart 2-1:
Textile, clothing and footwear industries

NACE Rev. 1: 17, 18, 19

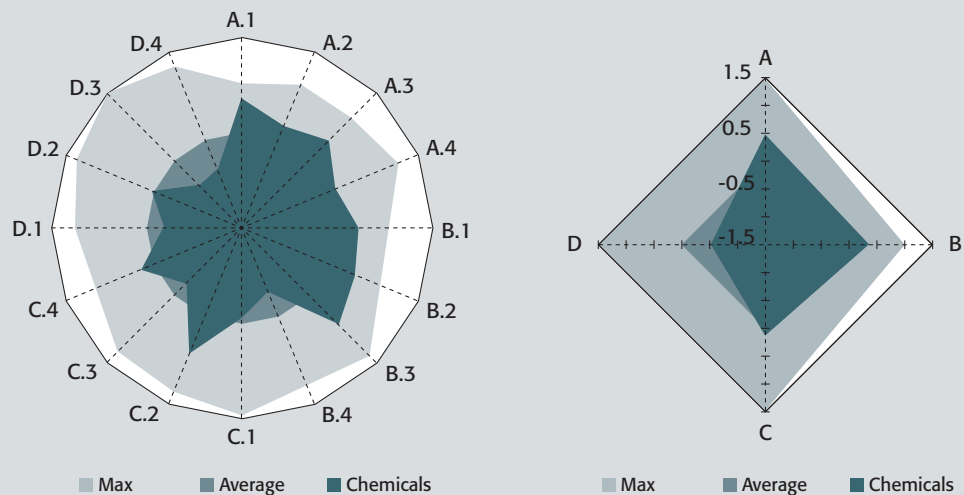


The sector is dominated by small enterprises, a large share of which is concentrated in regional clusters. There is a clear digital divide between these industries and the rest of manufacturing and service sectors analysed by the e-Business W@tch. Nevertheless, ICT and e-business will be essential to speed up information flows along the value chain, even if adoption rates are still low.

Source: e-Business W@tch (Survey 2003)

Chart 2-2:
The chemical industries

NACE Rev. 1: 24, 25



Saving costs by improving supply chain processes is a key priority of many e-business projects in the chemical industries. The sector shows the highest diffusion of ERP systems among all 10 sectors benchmarked and ranks above average in terms of ICT infrastructure and internal business process automation. Customer facing e-commerce activities (D) are less common.

Source: e-Business W@tch (Survey 2003)

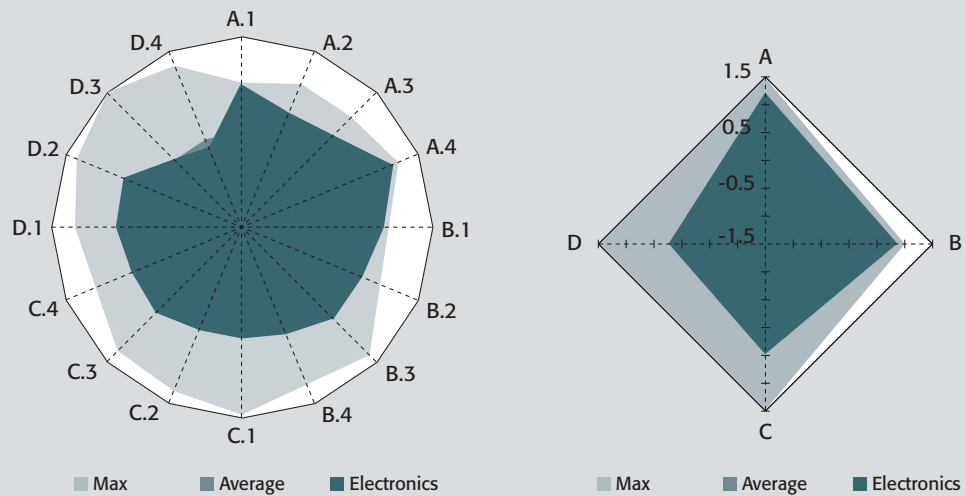
Scoreboard dimensions: (A.1 – A.4) ICT infrastructure in the firm, (B.1 – B.4) Internal business process automation, (C.1 – C.4) Electronic procurement and supply chain integration, (D.1 – D.4) Electronic marketing and sales.

Charts are based on figures from the e-Business Survey 2003 (EU-5), weighted by employment.

Max = maximum indexed value for one of the 10 sectors benchmarked.
Average = mean value for all 10 sectors. 1 = standard deviation, (+/-)

Chart 2-3:
The electrical machinery and electronics industries

NACE Rev. 1: 30, 31, 32
(except 31.3 - 31.6)

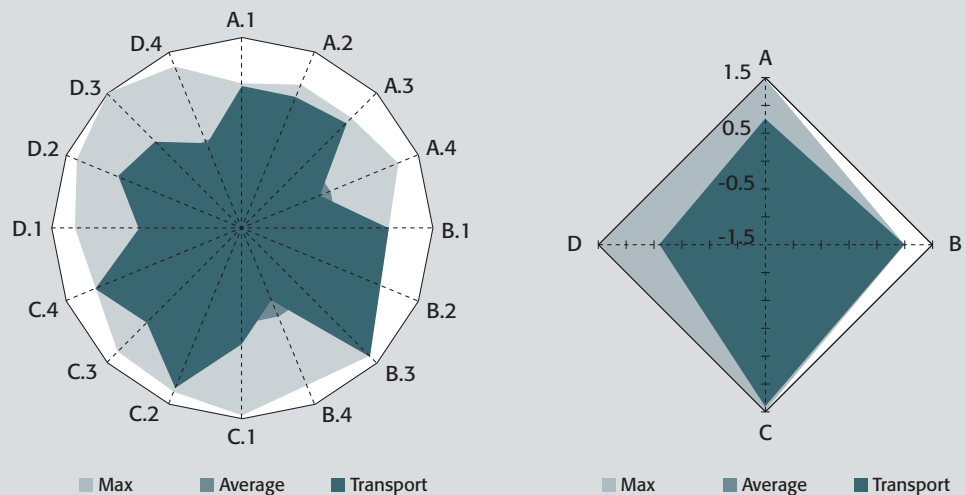


Companies from this sector are leading adopters of e-business. They tend to be intensive users, clearly above the average use rates of all nine sectors benchmarked. Business process automation and supply chain integration are important objectives. Small enterprises, however, are not as advanced as their larger counterparts.

Source: e-Business W@tch (Survey 2003)

Chart 2-4:
The manufacture of transport equipment

NACE Rev. 1: 34, 35



The sector is characterised by a huge dichotomy between large and small companies. Large firms (> 250 employees) account for less than 6% of all enterprises, but more than 80% of employment and value added. This is reflected by the use of e-business, which is driven by large players. E-procurement and Increasing the efficiency of business processes are the main objectives.

Source: e-Business W@tch (Survey 2003)

Scoreboard dimensions: (A.1 – A.4) ICT infrastructure in the firm, (B.1 – B.4) Internal business process automation, (C.1 – C.4) Electronic procurement and supply chain integration, (D.1 – D.4) Electronic marketing and sales.

Charts are based on figures from the e-Business Survey 2003 (EU-5), weighted by employment.

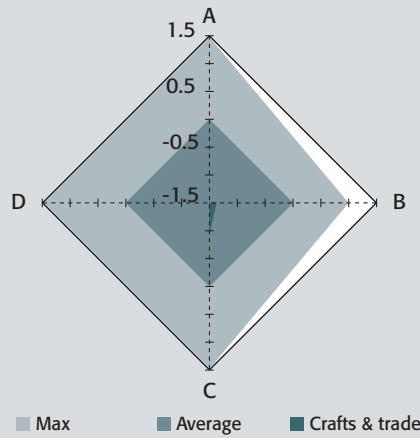
Max = maximum indexed value for one of the 10 sectors benchmarked.

Average = mean value for all 10 sectors. 1 = standard deviation, (+/-)

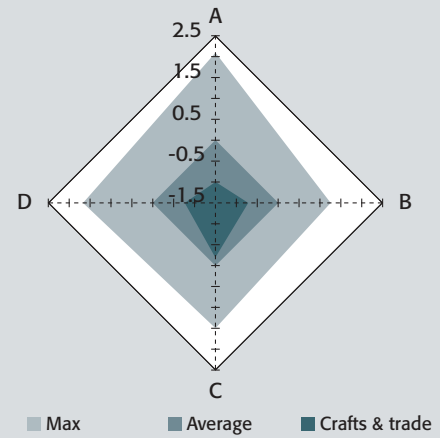
Chart 2-5:
Craft and trade sectors

NACE Rev. 1:
parts of 17-20, 30-32, 34-36, 45
only firms with 0-49 employees

Scoreboard based on figures weighted by employment
(compares crafts to other sectors irrespectively of the different size of companies)



Scoreboard based on figures in % of enterprises
(effectively compares crafts to other small companies from other sectors)

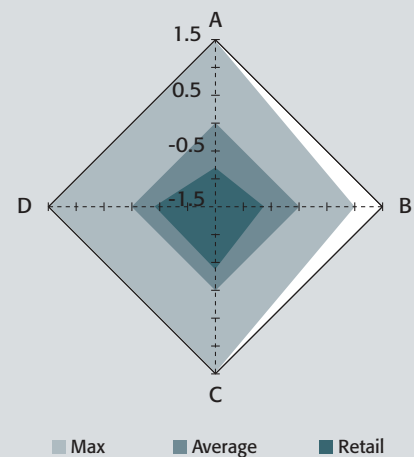
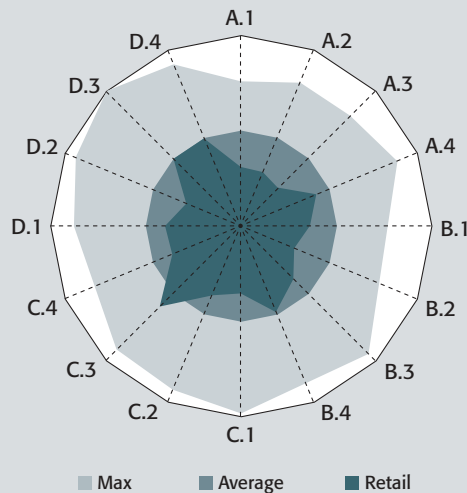


Many craft firms lack critical size and investment power for comprehensive e-business use. As this "sector" was by definition restricted to micro and small firms (with 0-49 employees), it should be benchmarked against small firms from other sectors only (see right diagram). In this case, the gap is much smaller, but still exists.

Source: e-Business Watch (Survey 2003)

Chart 2-6:
Retail

NACE Rev. 1: 52.11, 52.12, 52.4



Retail is a huge sector, employing about 14 million people in the EU, with a remarkable dichotomy: 40% of those work in micro-enterprises – and 40% in large firms. The use of e-business also differs between sub-sectors, such as the food and non-food retailers. Improving supply chain processes ranks high as an e-business objective.

Source: e-Business Watch (Survey 2003)

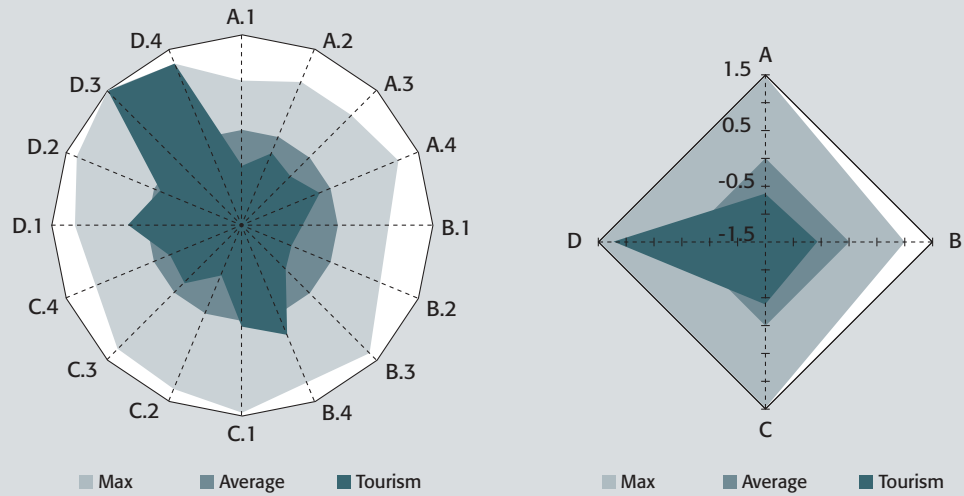
Scoreboard dimensions: (A.1 – A.4) ICT infrastructure in the firm, (B.1 – B.4) Internal business process automation, (C.1 – C.4) Electronic procurement and supply chain integration, (D.1 – D.4) Electronic marketing and sales.

Charts are based on figures from the e-Business Survey 2003 (EU-5), weighted by employment.

Max = maximum indexed value for one of the 10 sectors benchmarked.
Average = mean value for all 10 sectors. 1 = standard deviation, (+/-)

Chart 2-7:
Tourism

NACE Rev. 1: 55.1+2, 62.1, 63.3, 92.33, 92.52+53

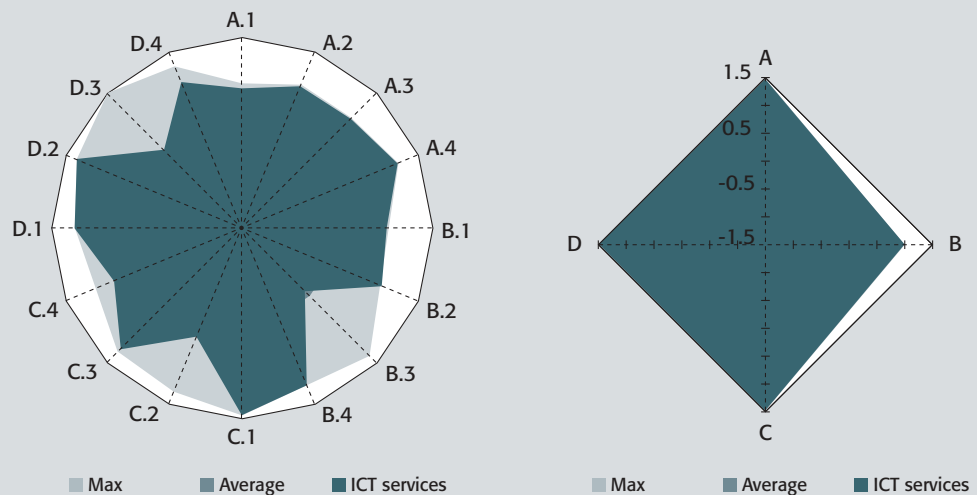


Tourism is among those sectors that have experienced the strongest impact of the Internet. Marketing and sales, which typically means "online reservations" in this sector, constitute the main focus of e-business activity. This has led to a complex restructuring of the value chain, with disintermediation and re-intermediation through new entrants occurring in parallel.

Source: e-Business W@tch (Survey 2003)

Chart 2-8:
ICT services

NACE Rev. 1: 64.2, 72



The ICT services sector is predestined to practise e-business, since the sector is not only a user, but also a key provider of IT related services. It includes the telecommunications sector, software development and computer related services. More than 80% of companies from the sector say that e-business constitutes a significant or some part of the way their company operates.

Source: e-Business W@tch (Survey 2003)

Scoreboard dimensions: (A.1 – A.4) ICT infrastructure in the firm, (B.1 – B.4) Internal business process automation, (C.1 – C.4) Electronic procurement and supply chain integration, (D.1 – D.4) Electronic marketing and sales.

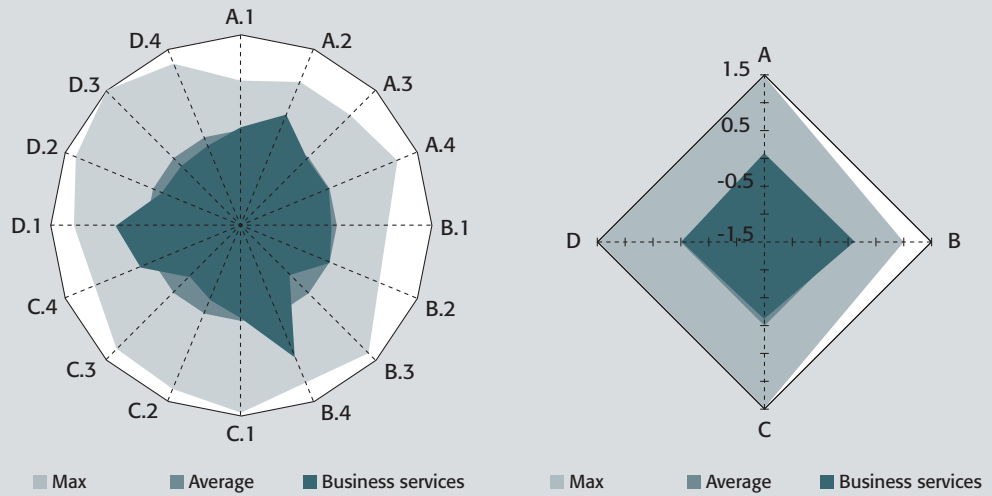
Charts are based on figures from the e-Business Survey 2003 (EU-5), weighted by employment.

Max = maximum indexed value for one of the 10 sectors benchmarked.

Average = mean value for all 10 sectors. 1 = standard deviation, (+/-)

Chart 2-9:
Business services

NACE Rev. 1: 74

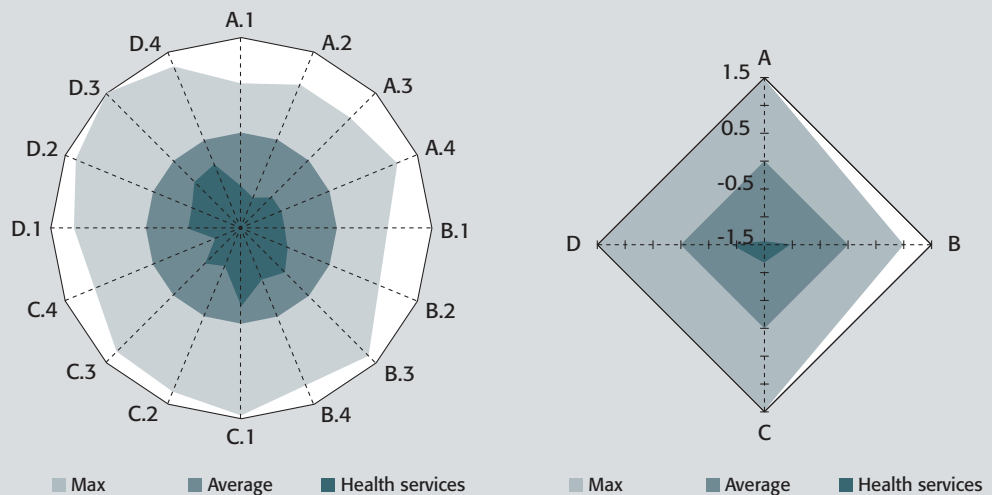


The business services sector is a good proxy to the average diffusion of ICT and e-business across the economy in many respects. Firms from the sector possess a comparatively modern ICT infrastructure. The deployment of complex software systems such as ERP or SCM systems is less likely among the predominantly small companies from the sector.

Source: e-Business W@tch (Survey 2003)

Chart 2-10:
Health and social services

NACE Rev. 1: 85.11+12, 85.3



As in 2001/2002, the health and social services sector again shows the lowest summary scores of all economic sectors as measured by the e-Business W@tch. The gap between perceptions of relevance and importance, as well as with respect to applications and usage between small and large organisations, remains very high.

Source: e-Business W@tch (Survey 2003)

Scoreboard dimensions: (A.1 – A.4) ICT infrastructure in the firm, (B.1 – B.4) Internal business process automation, (C.1 – C.4) Electronic procurement and supply chain integration, (D.1 – D.4) Electronic marketing and sales.

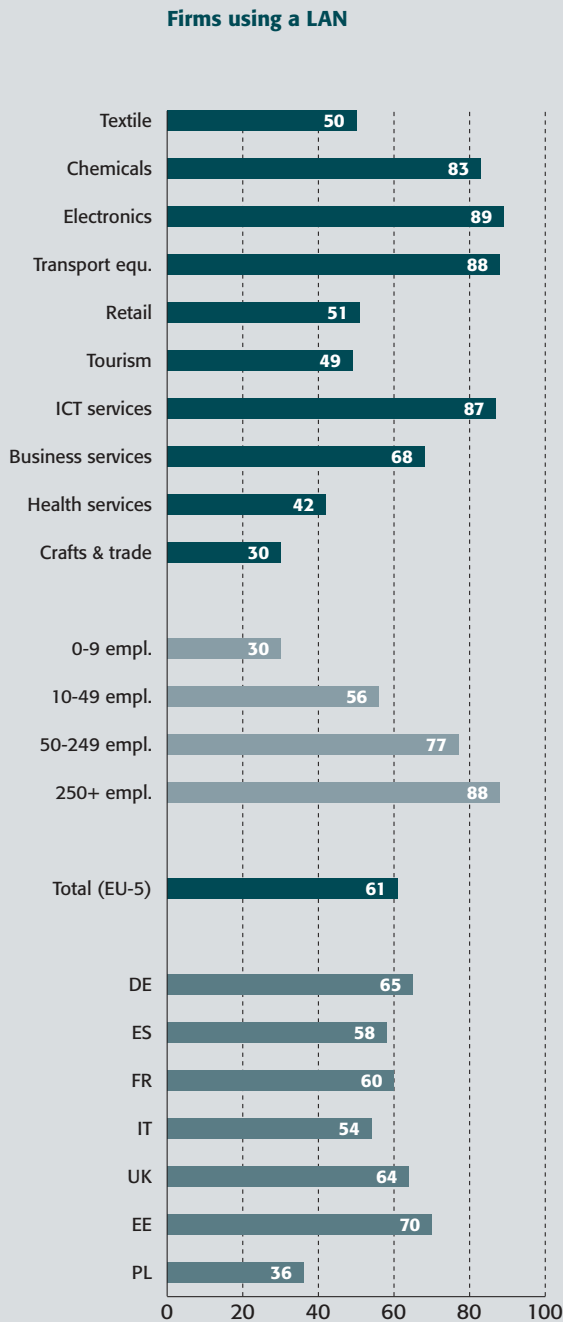
Charts are based on figures from the e-Business Survey 2003 (EU-5), weighted by employment.

Max = maximum indexed value for one of the 10 sectors benchmarked.

Average = mean value for all 10 sectors. 1 = standard deviation, (+/-)

Section III: 20 indicators on ICT and e-business

Chart 3-1:



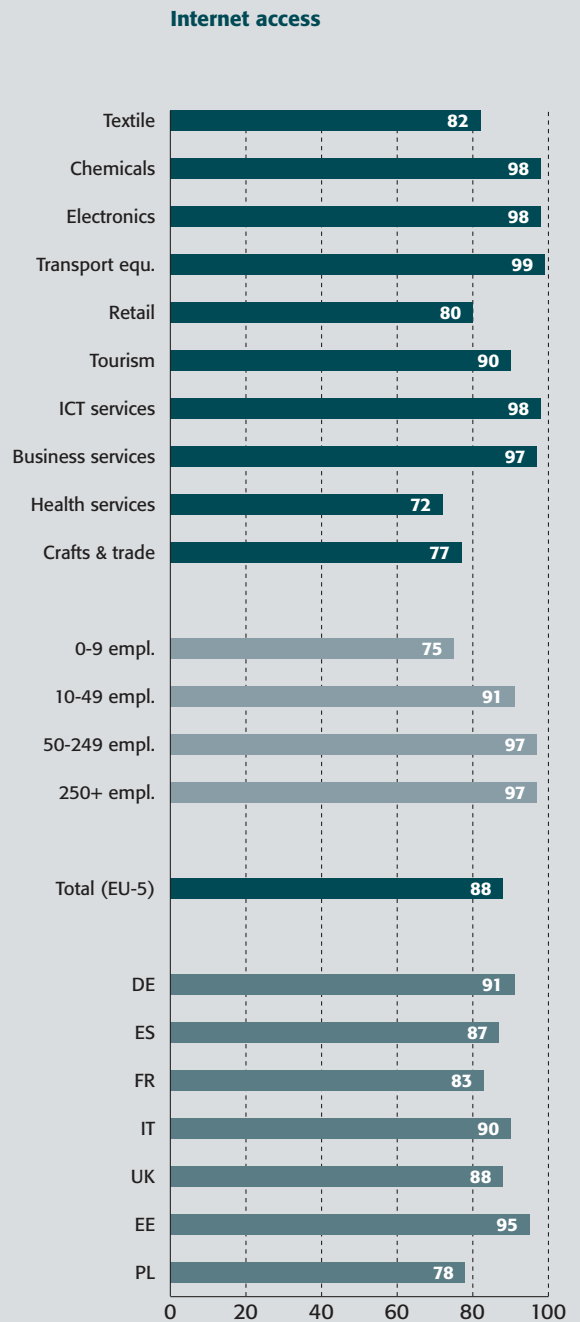
Source: e-Business W@tch (2004)

Based on survey question A6e: "... Please tell me if your company uses this application or not: (e) a Local Area Network, that is a LAN. A LAN is a network connecting computers in one building or site."

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-2:



Source: e-Business W@tch (2004)

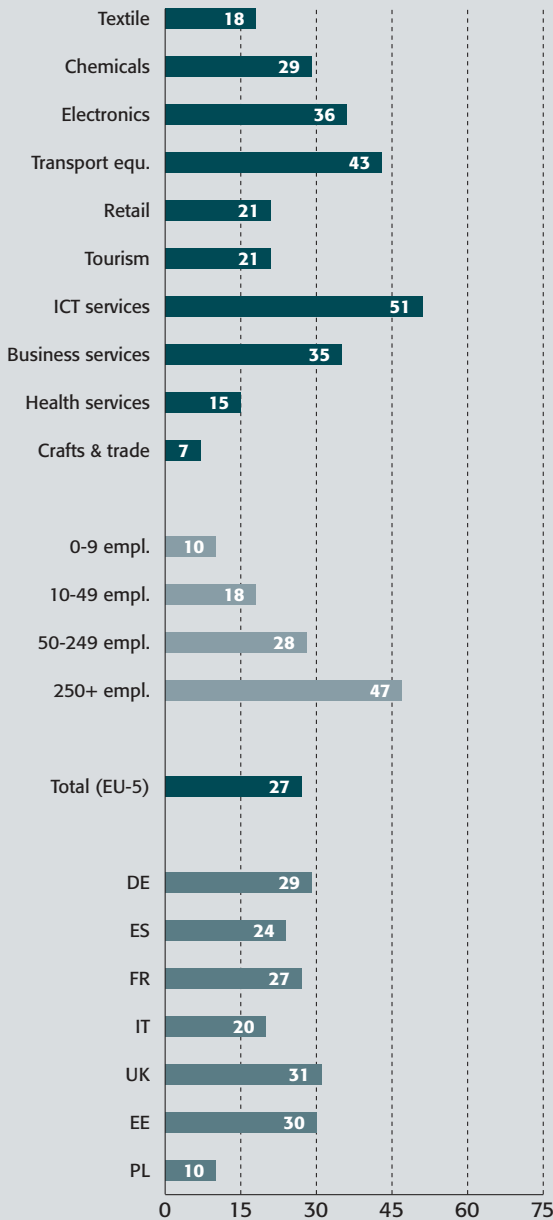
Based on survey question A2: "Does your company have access to the Internet?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-3:

Broadband internet access



Source: e-Business W@tch (2004)

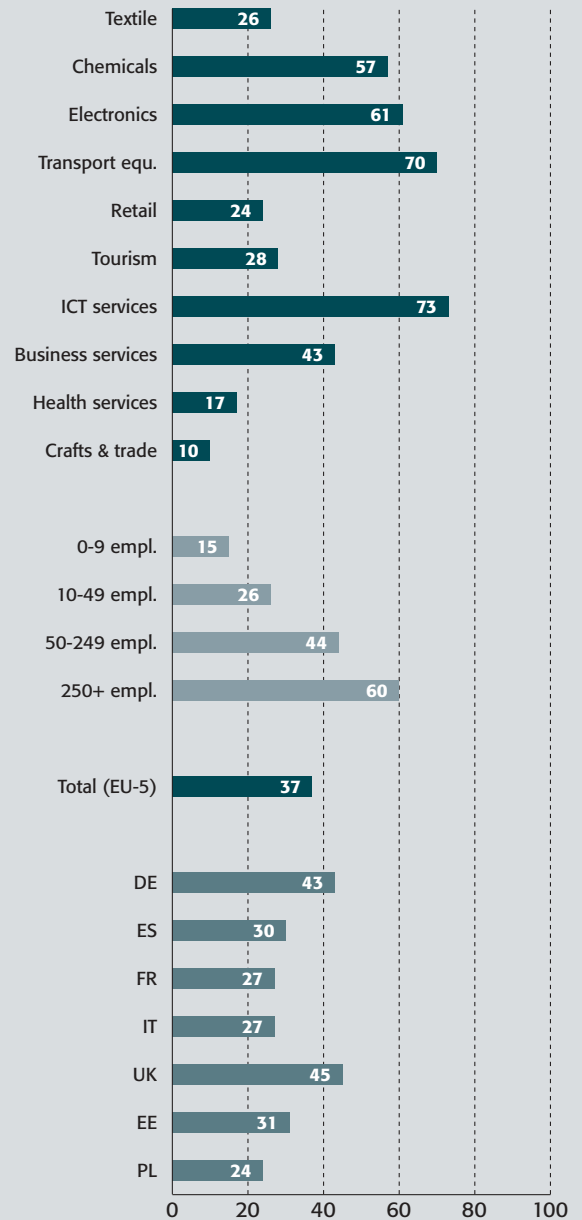
Based on survey question A5: "What is the maximum bandwidth of your company's connection to the Internet?", adding answers of categories 2 Mbit/s or more.

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-4:

Remote access to the company's computer network



Source: e-Business W@tch (2004)

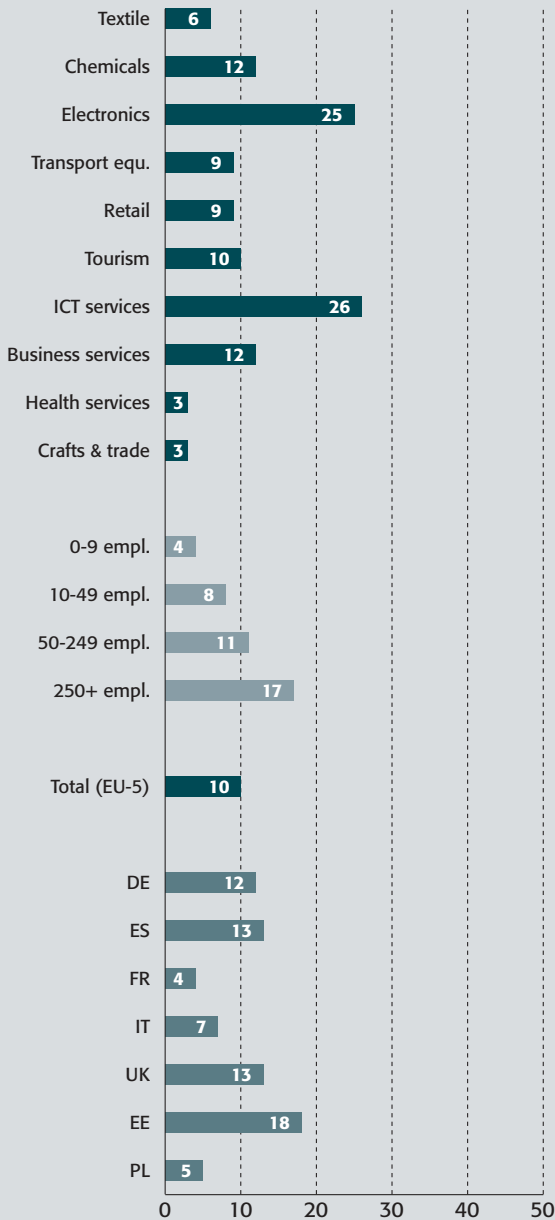
Based on survey question A30: "Can employees of your company access your computer system remotely from a non-business location, for instance from home or from a hotel?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-5:

Wireless access to the company's computer network



Source: e-Business W@tch (2004)

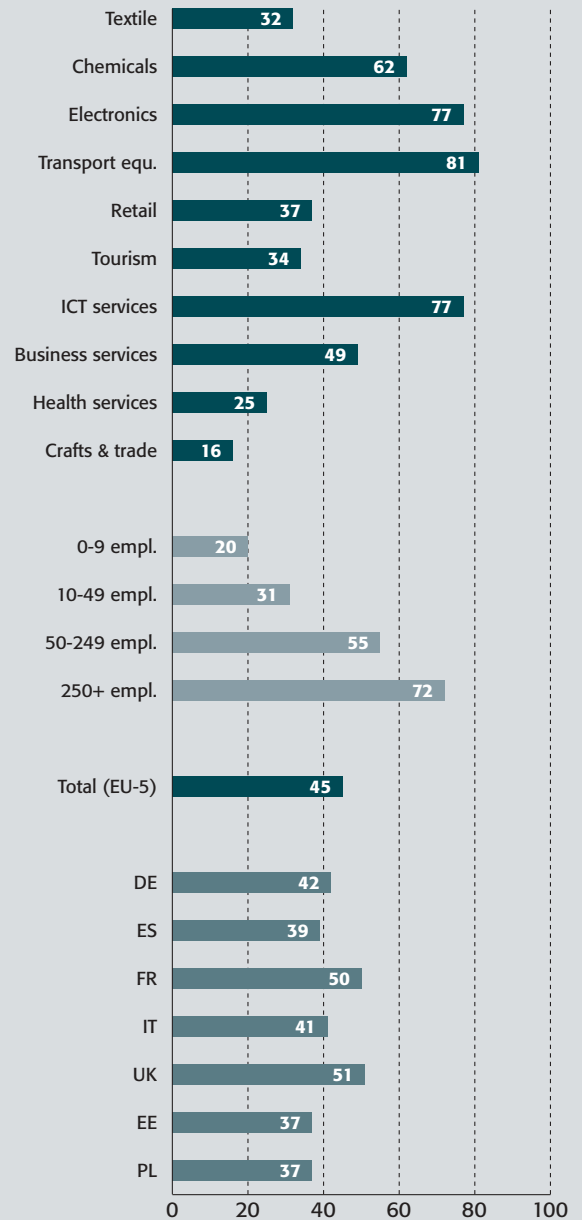
Based on survey question A31: "Can employees of your company access the computer system remotely via wireless devices?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-6:

Firms with an intranet



Source: e-Business W@tch (2004)

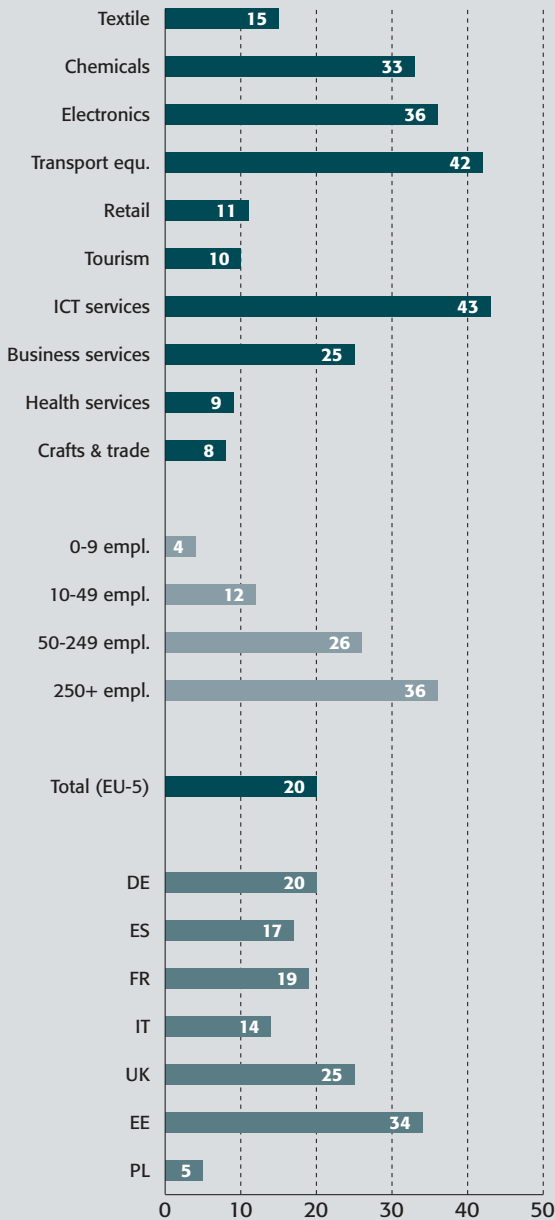
Based on survey question A6c: "Does your company use an Intranet, that is an internal company network using Internet protocol to enable communications within an organisation?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-7:

Firms tracking working hours and/or production time online



Source: e-Business W@tch (2004)

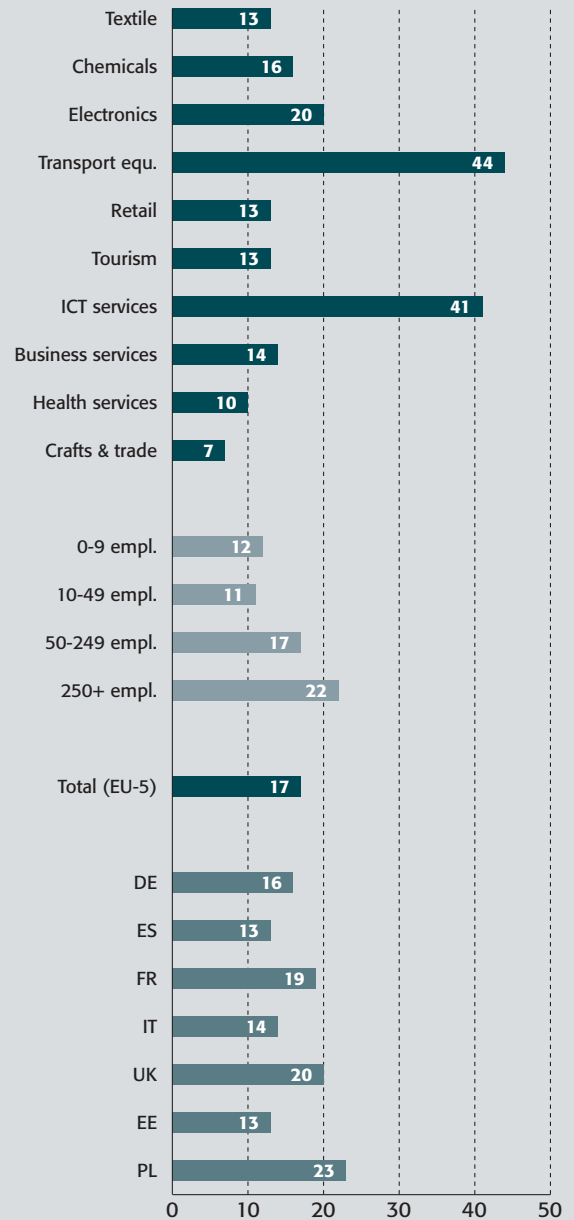
Based on survey question B70c: "Do you use online technologies to support the following internal business processes: (c) to track working hours and production time?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-8:

Online collaboration with business partners in designing products



Source: e-Business W@tch (2004)

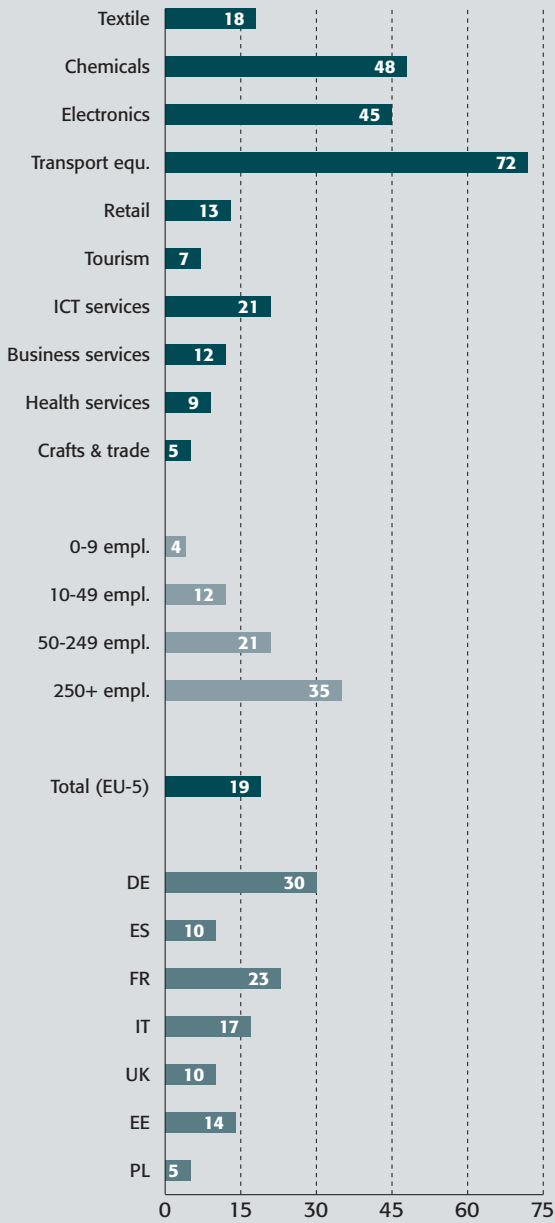
Based on survey question B41a: "Does your company use online technologies other than e-mail, like for example the Internet or an extranet, to collaborate with business partners in the design of new products?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-9:

Use of ERP systems



Source: e-Business Watch (2004)

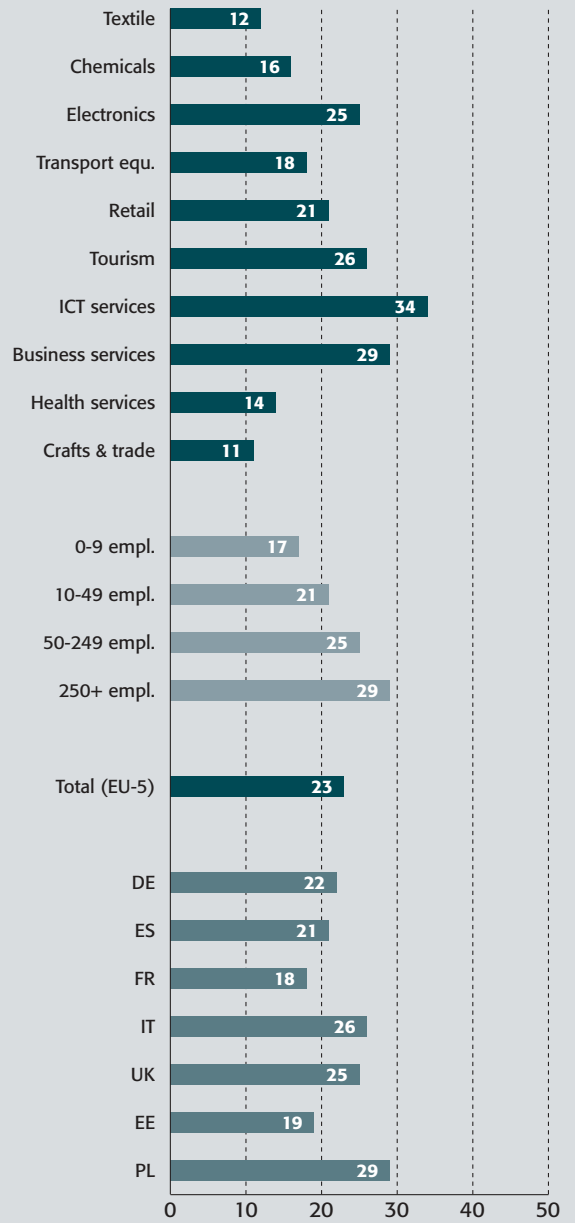
Based on survey question B60d: "Has your company implemented an ERP, that is an Enterprise Resource Planning System?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-10:

Perceived effects of e-business on work processes (indexed)



Source: e-Business Watch (2004)

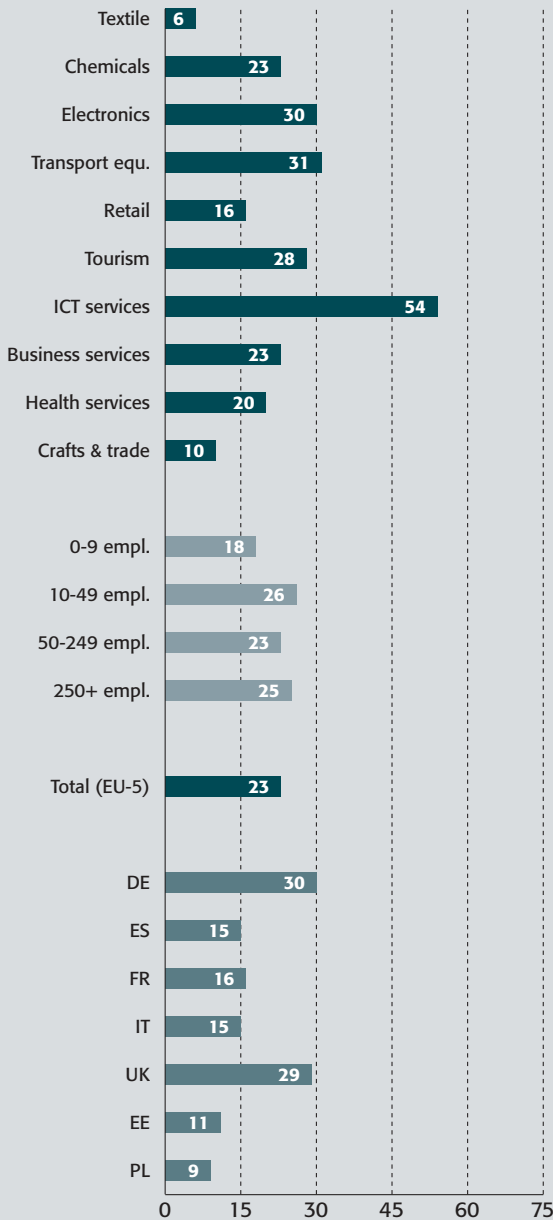
Based on survey question C22b: "According to your experience, how would you rate the impact of the Internet or of e-business technologies in your company on internal work processes?" – Index computes following answers: "significant", "somewhat" (factor 0.5).

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-11:

Firms buying at least 5% of their supplies online



Source: e-Business W@tch (2004)

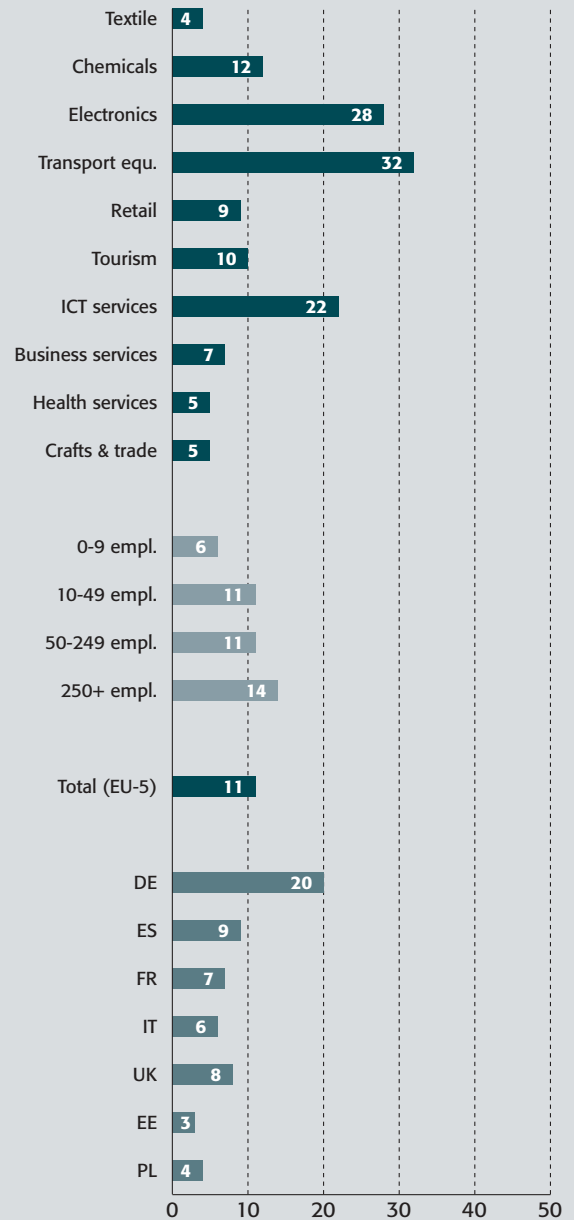
Based on survey questions B34: "Does your company use the Internet or other online services to purchase goods or services?" and B40: "Please estimate how large a share of your total purchases is conducted online."

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-12:

Use electronic marketplaces for e-procurement



Source: e-Business W@tch (2004)

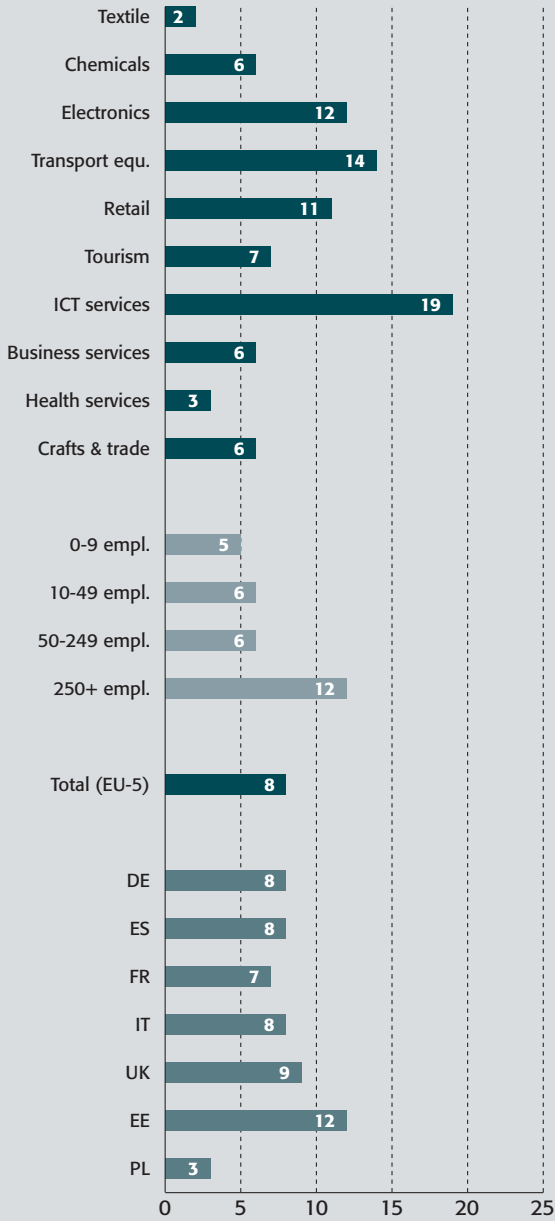
Based on survey question B38: "Which of the following platforms and channels does your company use for making online purchases: (b) Do you place orders on special electronic marketplaces on the Internet? I mean a business-to-business Internet trading forum in which buyers and sellers exchange goods and services."

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-13:

Firms having integrated their IT system with that of a supplier



Source: e-Business W@tch (2004)

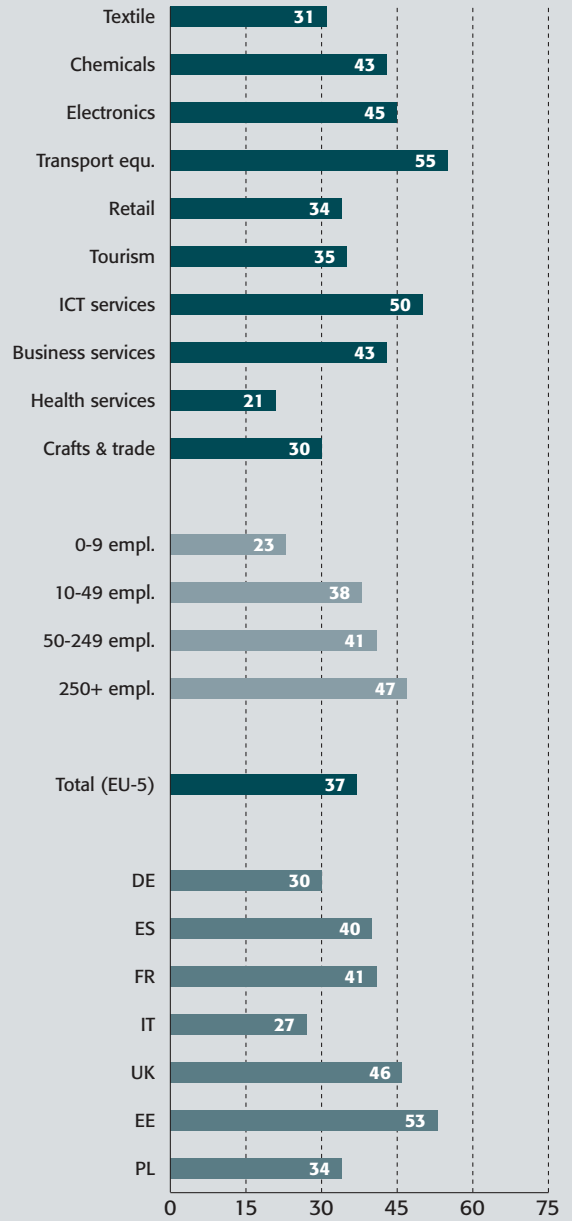
Based on survey question B39: "Is your IT system integrated with that of a supplier for placing orders?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-14:

Online exchange of documents with suppliers



Source: e-Business W@tch (2004)

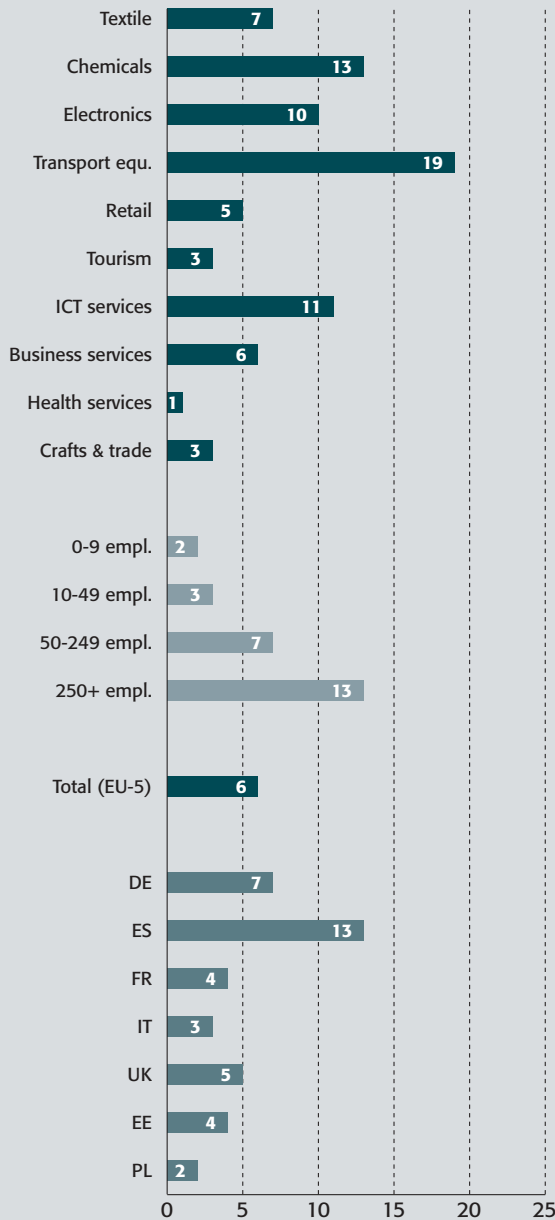
Based on survey question B41d: "Does your company use online technologies other than e-mail, like for example the Internet or an extranet to exchange documents electronically with your suppliers, for instance orders?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-15:

Use of SCM systems



Source: e-Business W@tch (2004)

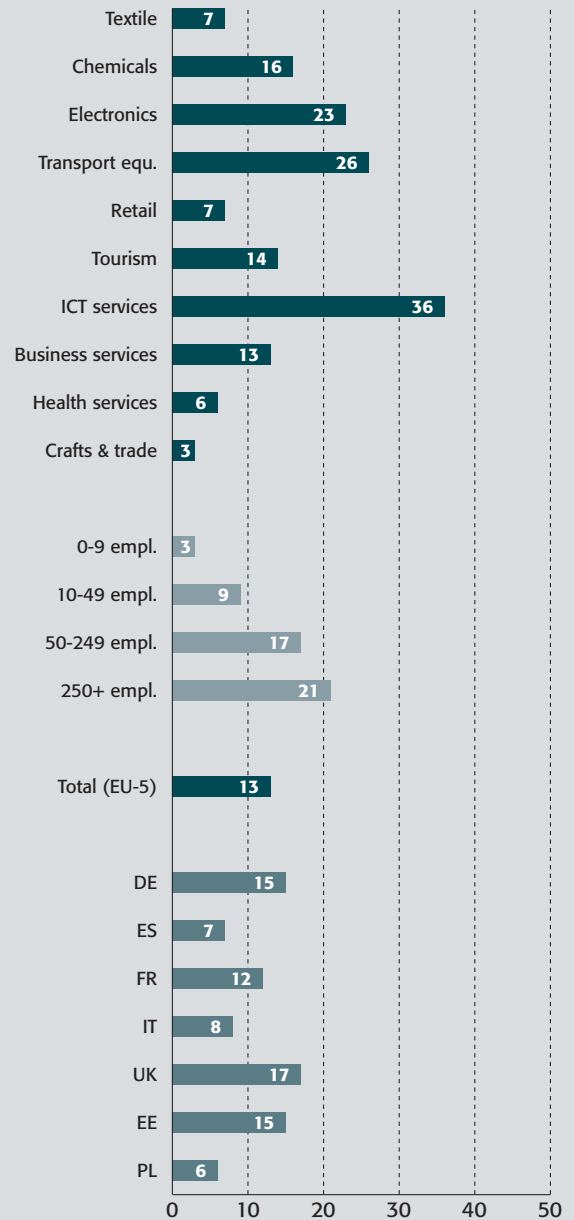
Based on survey question B60a: "Has your company implemented an SCM, that is a Supply Chain Management system?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-16:

Use of CRM systems



Source: e-Business W@tch (2004)

Based on survey question B60b: "Has your company implemented a CRM, that is a Customer Relationship Management system?"

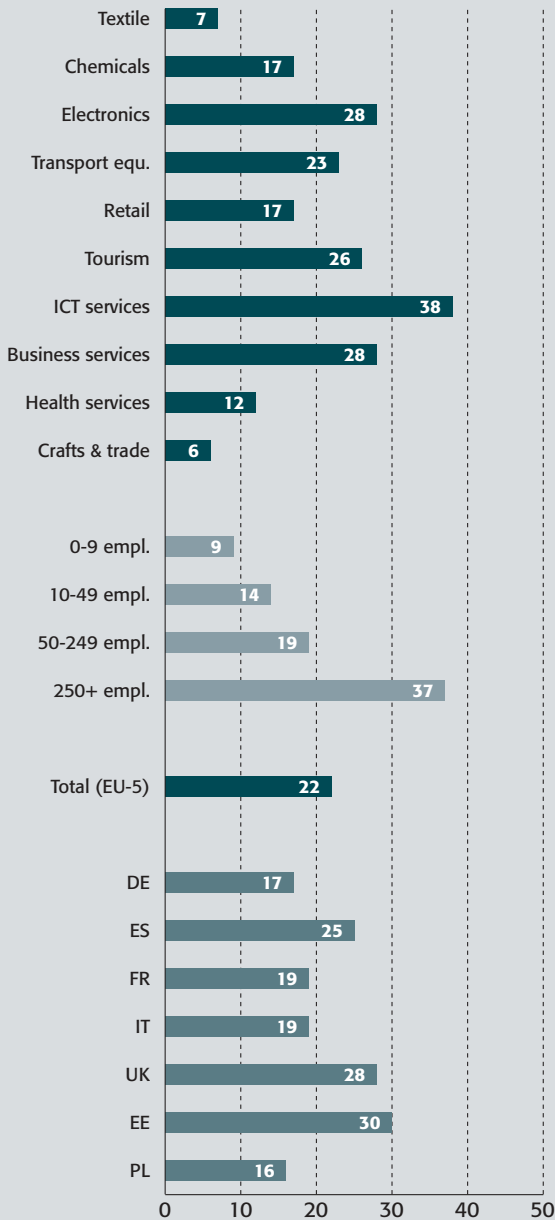
Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Section III: 20 indicators on ICT and e-business

Chart 3-17:

Have a website and use a content management system to maintain it



Source: e-Business W@tch (2004)

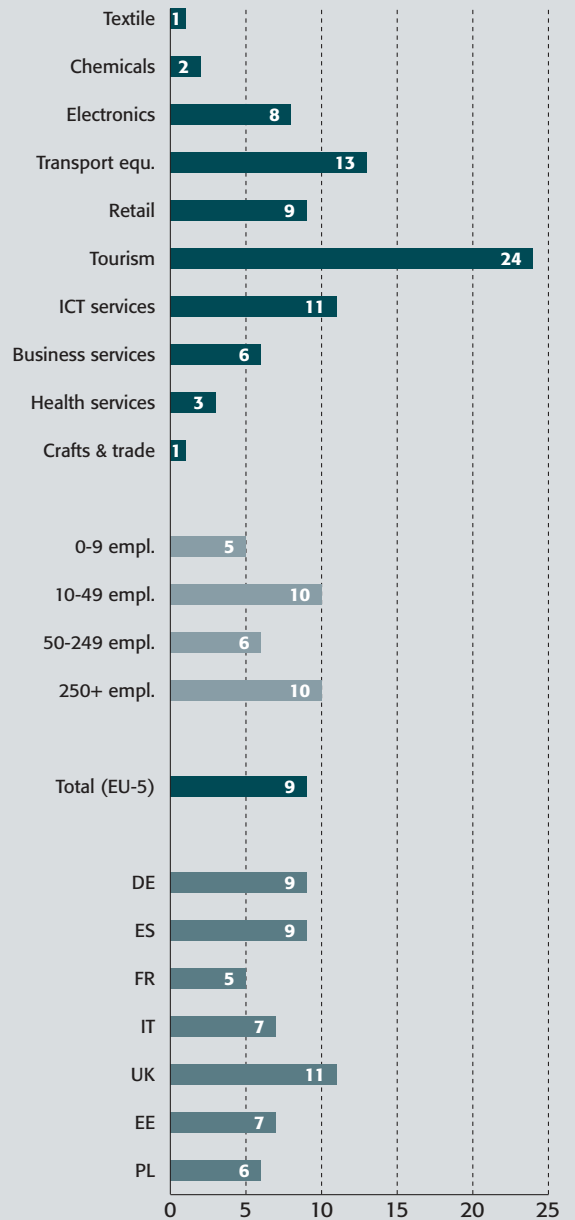
Based on survey questions B1: "Does your company have a website on the Internet?" and B3: "Does your company make use of a content management system, which allows different departments to access the website and update information?"

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-18:

Firms selling at least 5% of their products or services online



Source: e-Business W@tch (2004)

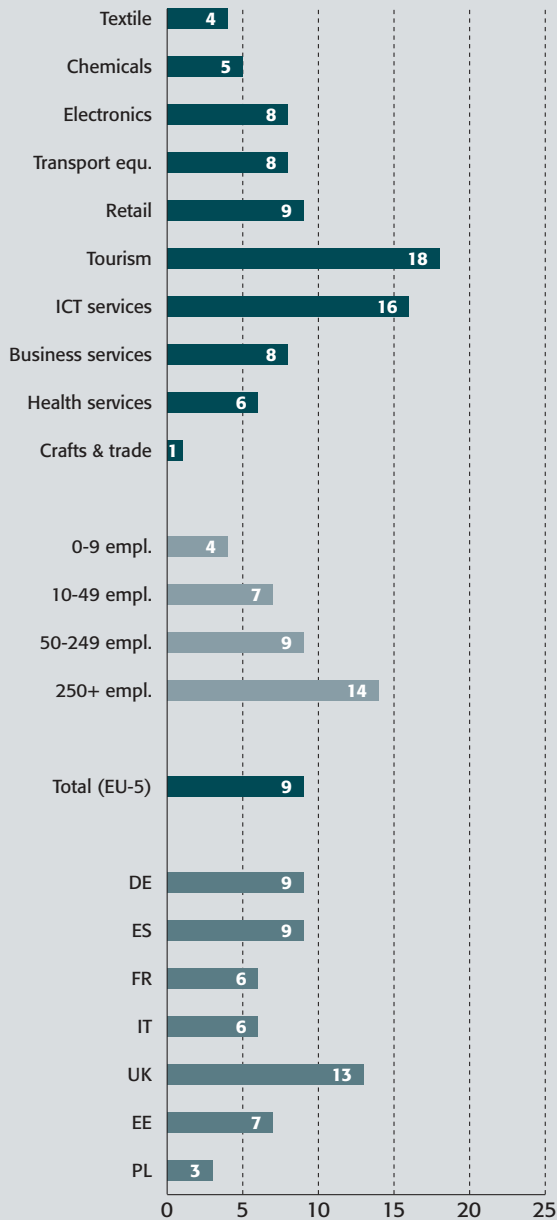
Based on survey questions B21: "Does your company sell goods or services on the Internet or through other online distribution channels?" and B26: "Please estimate how large a share of your total sales is conducted online."

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-19:

Use an online sales system with secure transaction capability



Source: e-Business W@tch (2004)

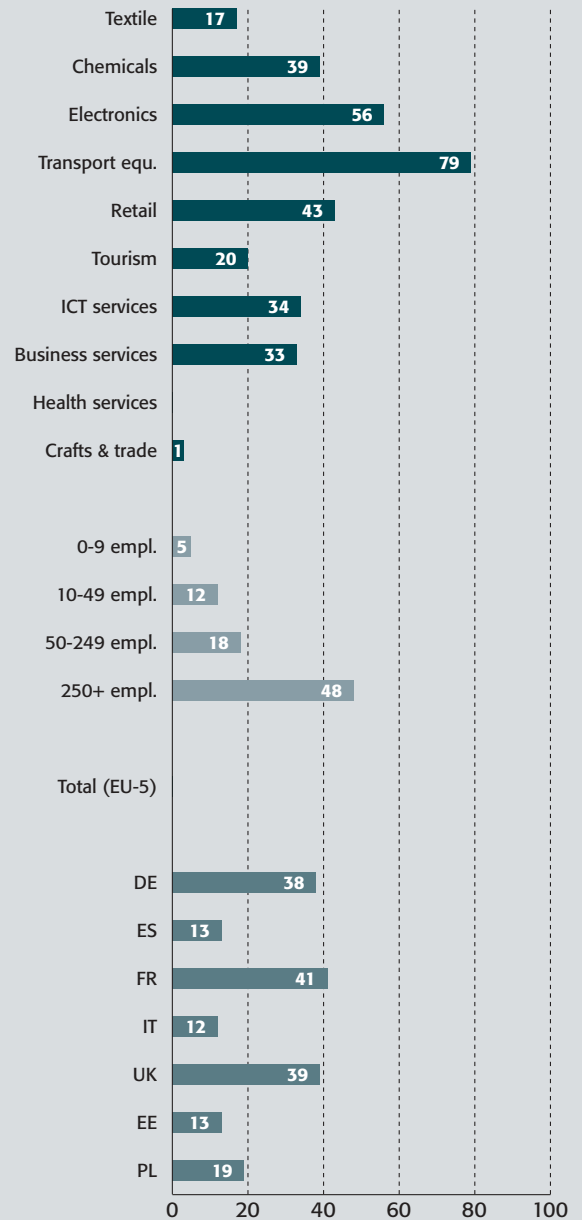
Based on survey question B30: "Does your online sales system offer the capability of secure transactions by means of a secure server? We mean for example using SSL, TLS or a comparable technical standard."

Base (100%): all enterprises

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Chart 3-20:

Processing online orders is integrated with back-end IT system



Source: e-Business W@tch (2004)

Based on survey question B28: "Imagine an online order comes in: how is your company informed about the order? – (1) the order is fully integrated with the back-end system."

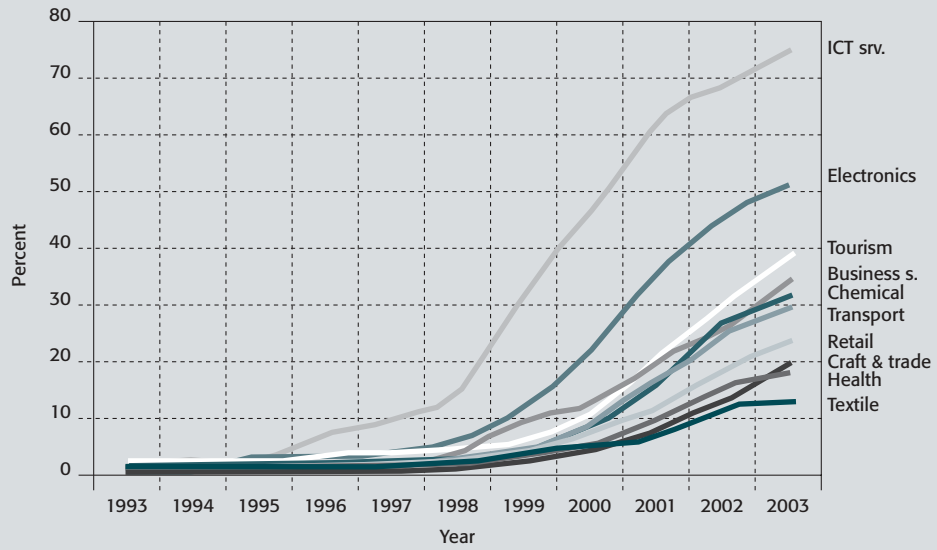
Base (100%): enterprises making online sales

Weighting: Figures for sectors, countries and total are weighted by employment; figures for size-bands in % of firms.

Section IV: Diffusion of e-commerce activity since 1993

Chart 4-1:
Diffusion of online purchasing among firms (1993 – 2003)

- Textile
- Chemical
- Electronics
- Transport
- Retail
- Tourism
- ICT srv.
- Business s.
- Health
- Craft & trade



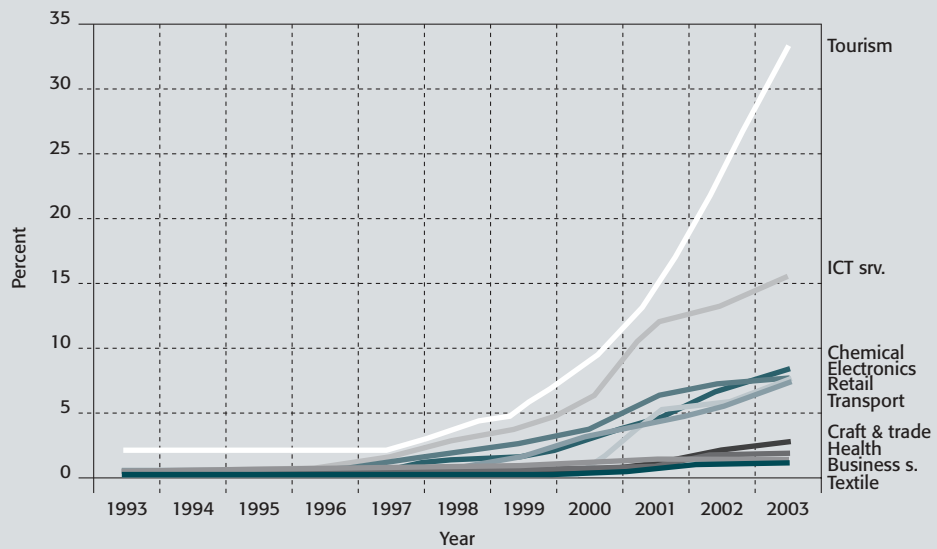
Based on survey questions B34: "Does your company use the Internet or other online services to purchase goods or services?" and B37: "When did your company purchase goods or services online for the first time? Please tell me the year and the month."

Base (100%): all enterprises. Weighting: In % of firms.

Source: e-Business W@tch (2004)

Chart 4-2:
Diffusion of online selling among firms (1993 – 2003)

- Textile
- Chemical
- Electronics
- Transport
- Retail
- Tourism
- ICT srv.
- Business s.
- Health
- Craft & trade



Based on survey questions B21: "Does your company sell goods or services on the Internet or through other online distribution channels?" and B23: "When did your company offer goods or services for sale online for the first time? Please tell me the year and the month."

Base (100%): all enterprises. Weighting: In % of firms.

Source: e-Business W@tch (2004)

1.7 Case studies on electronic business: Conclusions and lessons learned³⁷

In order to complement the statistical picture from the e-Business Survey 2003 with a more in-depth analysis on the use of specific e-business applications, the *e-Business W@tch* edited about 40 case studies based on interviews and desk research. These case studies were presented in the second issue of Sector Reports (August 2004) which are summarised in Chapter 2 of this report. This section presents a brief overview of the cases analysed in the various Sector Reports and summarises their most significant conclusions. The focus will be on the lessons that can be learned and shared from the various experiences analysed.

1.7.1 Selection of case studies and methods of analysis

The *e-Business W@tch* case studies aim to illustrate the findings of the quantitative analysis with real life examples and to provide useful input for further analysis and policy recommendations.

The case studies were mainly selected on the basis of their relevance for the e-business issues analysed in the various Sector Reports and are intended to consolidate and contextualise the results. As an example, in the chemical sector where e-business is predominantly an instrument for improving business process efficiency and saving costs, the selected examples are of companies that have implemented innovative e-procurement strategy or a SCM (Supply Chain Management) solution. In the tourism sector, which is a pioneer in the usage of e-business for marketing and sales purpose, the examples are of companies implementing such activities with an innovative approach. In other cases, the selected examples are of pioneers in a particular area (such as *H&M* –Textile, Clothing and Footwear Sector– in the integration of the supply chain) or meaningful in terms of success or failure of the e-business strategy (like *Covisint* in Transport Equipment Manufacturing).

Information was collected through face-to-face and telephone interviews and by exploiting available desk sources. Interviews were carried out through open questionnaires. Despite the variety of situations analysed and of means of research, the results have been organised in such a way as to provide consistent information about activities carried out and lessons learned for each of the “stories”.

Scope of the case studies

Most of the case studies concern enterprises' experiences in practicing e-business. Coherently with the overall objectives of *e-Business W@tch*, SMEs are largely represented, especially in service sectors such as tourism and business services. In these sectors, in fact, there are several examples of smaller firms which have addressed e-business through innovative business models. From the size perspective, quite an interesting case is *Geox* (Textile) that, thanks to technology-supported innovation, has recorded significant growth and within only ten years has turned from a micro into a large company.

In the manufacturing sectors, medium and large enterprises prevail as they exert a leading role and implement innovative solutions for issues like supply chain integration and e-standards (for extensive analyses on these issues, see the respective sector reports). There are nevertheless exceptions to this rule, e.g. *Masterform* (in Transport Equipment Manufacturing) which, despite being a small family-owned firm, has invested heavily in ICT and gathered relevant experience.

³⁷ This chapter was authored by Elena Gaboardi, Databank Consulting. Contact: Gaboardi@databank.it

Exhibit 1.7-1: Scope of e-Business W@tch case studies

Sectors	Firm oriented e-business case studies	Marketplaces / other intermediaries	Other issues
Textile industries	Geox (IT); H&M (SE)	Textilebusiness.it (IT)	
Chemicals	BASF (DE); Slovnaft (SK)	Specialchem (FR)	
Electronics	Lake Comm (IE); ST Microelectronics (World)	Voltimum (EU)	
Transport equipment	Blaupunkt (DE); Masterform (PL); Wix-Filtron (PL)	Covisint (World)	
Craft and trade	Aksel Kjersgaard (DK)	AIR-CRAFT (DE)	Greece, IT standards
Retail	Argos (UK)	Centralia (IT)	Trust and security (Eurolabel)
Tourism	Accor Hotels (FR); London Eye (UK); RUN21 Travel (IT); Trysilfjellet (NO)		
ICT services	VeriSign (USA, World) Business Object (FR, USA); Vodafone (EL)		
Business services	Advo24 (DE); HSG (DE); Tempore (AT)	Synergy-VCG (SK; WorkXL (DE); Elance (USA); LanguageWire (EU); DWS (DE)	
Health and social services		NHS Purchasing and Supply Agency (UK); HON (World); EMR (BE, DE, NL); Medcom (DK)	

Exhibit 1.7-2: Main e-business application areas analysed in the case studies

Sector	Electronic procurement	Supply chain management	Business process efficiency	e-business standards	Vendor Inventory	EDI
Textile industries		ü	ü	ü		
Chemicals	ü		ü	ü	ü	
Electronics		ü		ü		ü
Transport equipment				ü		
Craft and trade	ü	ü		ü		
Retail	ü	ü				
Tourism		ü				
ICT services			ü			
Business services			ü			
Health	ü	ü	ü	ü		
Sector	Electronic marketing	Electronic commerce	CRM / Customer service	Internet portals / community building	Information management	Trust and security
Textile industries						
Chemicals	ü			ü		
Electronics	ü			ü		
Transport equipment		ü	ü	ü	ü	
Craft and trade	ü					
Retail						ü
Tourism	ü	ü	ü			
ICT services			ü			ü
Business services	ü			ü		
Health				ü	ü	ü

1.7.2 Overview of the results

Electronic procurement: not only a matter of costs

Goals pursued by enterprises through e-procurement include decreasing direct costs and streamlining the selection of suppliers, making the process more efficient. The objective of decreasing the costs related to commercial business transactions, for example processing and exchanging orders, and at the same time reducing error rates, is also a major driver of electronic business in most of the sectors.

Case studies focussing on e-procurement include: An enterprise implementing an innovative e-procurement strategy (*Slovnaft*, Chemicals); a project (*AIR-CRAFT*) supporting overall business relations between a large enterprise and small local construction enterprises; *Centralia*, an initiative supporting e-procurement for small retailers addressing the HORECA (Hotel, Restaurant, Café) sector and the *NHS*, Purchasing and Supply Agency in the Health sector. All these cases highlight interesting results in quantitative terms (whenever data on savings are available) and as regards the impacts that were achieved. Despite the diversity of situations some common lessons can be learned:

- **Acceptance by users** is a key success factor for this kind of initiatives. This involves both internal resources and external players to which clear objectives and targets should be communicated and agreed upon. Overcoming internal and external resistance is essential. According to the responsible managers at *Slovnaft*, for example, the e-procurement initiative would not have worked without a proper incentive system and the acceptance of users. The example of *Covisint* in transport confirms that an effective e-procurement strategy cannot aim solely at reducing cost at the expense of one section.
- From a technical point of view, the issue of **standardisation** proves to be very critical in e-procurement. This is particularly true in fragmented sectors – like in craft and trade or in textile, clothing and footwear – where many and diverse players need to be involved.
- An important indirect result from the successful implementation of e-procurement is the possibility of **creating free capacity for** so-called **value added activities** of professional purchasers, such as market research, quality negotiation and relationships with suppliers. In the medium to long run these savings are expected to positively influence the economic results.

These considerations lead to the conclusion that a clear and shared strategy, information to suppliers about the plans and accompanying training in how to use the new systems should be part of e-procurement initiatives.

Supply chain integration: large players lead

The issue of supply chain integration was addressed in both manufacturing and service sectors. Examples from various sectors mainly concern larger enterprises seeking efficiency at value chain level through the integration of suppliers/sub-contractors and, less frequently, customers. The *ST Microelectronics* case study, for example, presents the concept of “the virtual factory” - i.e. the way to view and manage multiple manufacturing plants, processes and companies as a “single factory”, which is a sophisticated and advanced degree of supply chain collaboration. Enablers of the virtual factory are linked to standardisation issues: Open standards (TCP/IP protocols), XML based standards (RosettaNet in this case) and other data standardisation initiatives.

The *e-Business W@tch* case studies tried to capture also the point of view of smaller players involved in such initiatives. For example, the *Lake* case study (Electronics) shows how a medium sized enterprise has been constrained to implement a new solution in order to stay competitive: The demand of Lake’s most prestigious customer, BT, became the driving force in initiating their e-business migration path. BT, which accounts for over 30% of Lake’s business, requested a tighter control of the supply chain process. Similarly, within the *Textilebusiness.it* initiative, a medium sized company forced its suppliers to manage transactions entirely online.

An important lesson learned from the case studies is that the success of supply chain integration is closely linked to the bargaining power of the company taking a leading role and its capability to

develop a commonly shared strategy. At the same time, users' acceptance is necessary for the success of the initiative. If this latter condition is matched, companies involved state that relationships with the other players along the chain also improve.

Business process efficiency: a common issue

Efficiency of internal processes is one of the main drivers for e-business adoption in all sectors. Several examples from the *e-Business W@tch* case studies demonstrate the benefits of improved internal process efficiency, by simplifying processes and reducing time and costs. An interesting example in this area, where relevant impacts have already been achieved, is the case study on *ST Microelectronics*. This example demonstrates that optimisation of processes within the four walls of the enterprise is becoming an ever-smaller factor in enterprise success. New opportunities for electronics companies rely in the creation of a solid collaboration strategy, leveraging the strength of their partners as well as their own, in a broader e-business vision.

Exploiting the potential of e-standards: the sectoral issue

Definition and usage of e-standards are the condition for any integration strategy. The *e-Business W@tch* case studies address the issue of standardisation from the different perspectives of large and medium to small players, in differing sectors.

In the chemical industries, the long-standing compliance with eChem standards is the basis for *BASF's* successful e-business strategy, focussing on total supply chain integration. In Electronics, *ST Microelectronics* integrated its supply chain with that of subcontractors by imposing its own standards.

In transport, *Masterform*, a small company that has successfully adopted a number of ICT tools to optimise internal processes, hesitates to adopt any system for external communication and data exchange. The lack of a common system suitable for all customers across diverse industries, together with considerable costs of investment, hinder the implementation of data exchange standards by the small firms.

In textile, both survey data and the interviews with organisations, pointed out the lack of standards as one of the main constraints to integration in the sector. The *AIR-CRAFT* projects also highlighted what has been defined as "a dramatic lack of industry standards on service processes". The same applies to the business services sector.

The leading role of large companies in the process of standardisation is, not surprisingly, confirmed by the case studies. Furthermore, these examples highlight the importance of the sectoral perspective in approaching this issue. The variety of standards, developments and requirements within the most fragmented sectors and across the various industries pose strategic challenges in the choice for standards, especially for SMEs.

Electronic marketing: a way of building a brand

Data from the e-Business Survey indicate that marketing and sales activities are not yet widely developed but could gain importance in the future. The *e-Business W@tch* collected interesting stories of businesses which use the net for marketing and information purposes rather than for trading.

The case studies on *Danish Furniture On-line* and the *Aksel Kjersgaard* cabinetmaker factory demonstrate how to exploit the information and marketing potential of the Internet. These case studies show that, even in a sector where a complete online transaction is not always suitable, the Internet can be an important medium for product presentation, as well as for initiating contacts with customers and suppliers.

Voltimum (Electronics) is a B2B portal website fulfilling the specific needs and requirements of electrical installation professionals. *Voltimum* is not a trading portal. It offers to manufacturers and other industry partners a shared platform for marketing and communication and a single entry point for marketing information. It is a rich product database for the electrical installation industry. From a

strategic point of view, *Voltimum* does not alter existing trading relationships in the industry, but amplifies the overall market value by making the supply chain more effective.

SpecialChem (Chemicals) is a gateway for portals active in the chemical sector. Online services are delivered free of charge to the communities of chemical products users. The company then sells targeted marketing and sales services on behalf of its clients.

The interest of this case study lies in the underlying business model. Although with different approaches, each of the firms featured in these cases uses the net firstly for building trust and reputation about their “brand” and only subsequently (or through a different activity) makes money directly out of it.

SMEs joining forces in successful e-commerce initiatives

Interesting examples of e-commerce initiatives have been analysed in the Tourism sector. This sector has been a pioneer in exploring the new possibilities provided by the Internet to improve customer relations, marketing and sales. The Sector Report on tourism presents three case studies which provide examples of successful initiatives in e-commerce.

The *London Eye* (UK), one of London's main attractions, is perceived by customers as a once-off attraction: Customers rarely go back after experiencing it once. To break this reaction, the Eye has joined forces with various partners in the area to provide customers with a wider range of products and introduced e-partnering as a part of their strategy to improve sales and optimise revenues.

Trysilfjellet (NO) is a consortium organisation that created an “umbrella” brand for managing and promoting a ski area in Norway. The brand is communicated to the market as a single entity for the whole area. The players find it more beneficial to be represented as one large enterprise instead of individual partners, and this approach makes it easier to reach customers in an effective way.

Accor Hotels (F) have implemented an electronic revenue management system tying their hotel chain's operations into a common network.

In the Retail sector, the *Centralia* (I) initiative highlights the advantages that a commonly shared e-procurement system may bring to independent small retailers. The latter can, in fact, take advantage of an integrated supply chain system without having to plan the implementation and related investments themselves.

These diverse experiences lead to a common conclusion: It is important for SMEs to join forces in network partnerships in order to make best use of their available resources, and to invest in ICT and e-business solutions which would otherwise be inaccessible to them. A collective strategy is undoubtedly a major challenge for players who normally control their own business. The requisite for such a strategy is the agreement upon a common approach for objectives, communication and pricing.

Conclusions

Case studies proved to be a valuable addition to the quantitative analysis. Their validity rests on their providing “flesh” to the statistical picture by illustrating real life experiences. Some of the lessons learned, moreover, can be considered of general interest for enterprises or other institutions that may carry out similar initiatives. Issues such as the users' acceptance in determining the success of e-business initiatives, the importance of a commonly shared vision whenever initiatives involve various players, or problems related to the standardisation and the establishment of a common vocabulary for interactions, go beyond the specific experience and can be taken as general recommendations.

1.8 Policy challenges

1.8.1 ICT and electronic business as a policy challenge – general considerations

Independent from the situation in particular sectors, there are a number of areas where electronic business developments could coincide with European or national policies. These are in particular the following areas:

Policy areas which are relevant for guiding the development of ICT and electronic business	• The regulatory environment for telecommunication services
	• Innovation and technology policy
	• Education and labour market policy
	• The role model of the public sector
	• Other policy areas which have possibly some overlap with electronic business developments (e.g. patenting law, trade regulations)

This chapter discusses how these policy areas relate to ICT use by enterprises and for electronic business development. It points out some concrete policy challenges as well as some caveats with respect to possible policy actions. The focus is on the first four issues named above, which are the most obvious and direct ones, placed at the intersection of technological development, policy and regulatory environment.

Regulation of telecommunication services

The regulatory environment for telecommunication services and goods provides an important basis for the provision of ICT access in the European Union, for both enterprises and private households. A well-developed infrastructure, enabling high quality services, easy access for anyone from anywhere, at affordable prices, is a precondition for the fast take-off of Internet usage. As a matter of fact, Internet access in European households started to boom only after the massive tariff reductions for online connections (compared to voice telephony), which were introduced mostly after the liberalisation of the EU telecommunication markets in 1998.

The European Commission is currently working on the timely and effective transition to the new EU framework for electronic communications networks and services, which was adopted by the Parliament and the Council in March 2002. The new framework is designed to ensure that ex ante regulation is applied only where the level of competition in defined markets is considered to be insufficient on the basis of an analysis consistent with competition law methodology³⁸.

Although a favourable regulatory environment is not in itself a sufficient condition to increase the usage of the Internet and associated technologies and services within a region, it is definitely an enabler and an important requirement. Positive examples of such framework conditions within Europe are the Scandinavian countries, Ireland, Italy, Austria, Estonia, and the UK, which are usually also among the early adopters of ICT.

However, not all EU countries have yet realized a regulatory environment that enables them to develop a modern, competitive telecommunication infrastructure. Among some of the new Member States in particular, both the regulatory framework and the de facto market structure are still underdeveloped in terms of competition and offer, comparable to the pre-1998 markets in the former

³⁸ http://europa.eu.int/information_society/topics/ecommm/all_about/implementation_enforcement/index_en.htm;
Further information on the current initiatives of the European Commission can be found at
http://europa.eu.int/information_society/topics/ecommm/index_en.htm.

EU-15. Moreover, six of the old Member States currently (summer 2004) face court action for failing to put in place the new rules on electronic communications.

Innovation and technology policy

The adoption of e-business technology often coincides with innovation. Research shows that all sorts of innovations, whether based on the Internet or not, are in most cases positively associated with business success. This indicates that policy should focus on stimulating a climate that is generally favourable to innovation, but not exclusively focusing on Internet-based technology investments. An important aspect of such a policy is to reduce the ambiguity and risk faced by potential investors.

The adoption of e-business technologies at the firm level is essentially an investment decision which carries uncertainty and risk for the business owners and is subject to a multitude of relevant conditions. These include the sector and type of business, the market structure, endowment and resources of the firm, the behaviour of competitors, suppliers or customers, as well as the availability of alternative technologies to carry out a specific task. Furthermore, individually optimal investment decisions or company external network effects³⁹ could also lead to sub-optimal outcomes on the aggregate level (market failure).

Policy intervention would be desirable both in the case of a market failure and in the case of sub-optimal investment decisions by firms. The latter could occur, for example, if a lot of complex information has to be gathered and evaluated, which is very time consuming and therefore costly. In such a case, it could be argued that large enterprises with strong economies of scale have an incentive to gather this information, while small companies do not. The objective of policy action in such a case could be to improve the availability of objective and reliable technology information for all market players.

Due to the complexity of the investment decision framework of each enterprise, the lower diffusion among SMEs of certain e-business applications (like ERP or SCM systems) does not necessarily imply that SMEs under-invest in these tools. As pointed out in many of the *e-Business W@tch* sector studies, there can be many good reasons behind these adoption patterns. A small company, supplying specific parts to a small number of firms for example, will hardly gain any advantage by implementing a CRM system.

It is extremely difficult (if not impossible) to identify actual over- or under-investments in many technologies. This applies, in particular, to technologies that are highly specific in their purpose and do not exhibit strong firm external network effects. Consequently, there are good reasons to argue that policy should be cautious about promoting the adoption of non-general purpose technologies in enterprises, especially if there is no unambiguous indication of a market failure.

Education and labour market policy

Information and communication technologies need complementary inputs in the form of specialised human capital in order to function properly and to generate economic value. Since basic schooling and higher education systems are to a large extent public responsibilities in the European Union, this could be a starting point for policy-makers to develop and induce the implementation of educational schemes that are favourable for an economy that is "tech-savvy" and innovative. In addition, the realisation of life long learning in the Member States could probably be supported by a further deployment of public-private partnerships, for example training initiatives carried out in co-operation with e-business technology providers, training organisations and the public sector.

Role model of the public sector

The active use of ICT, the Internet, and e-business applications in the public sector can spur an active use of these technologies in the private sector, for example via the creation of positive network

³⁹ In the case, for example, when the individual decision to adopt a new technology will be largely influenced by expectations about the behaviour of others.

externalities. Thus, the European Union and its Member States can help to support the development and usage of ICT in the private sector by making intensive use of the new technologies themselves. This includes active use in providing services to their "customers" (citizens and businesses), but also for improving and optimising their own internal routines (Government-to-Government).

Government institutions with their experience in handling public calls can also serve as a role model by increasingly using public electronic tendering procedures, provided that this would lead to cost advantages for all parties involved. For governments, cost advantages can stem from cheaper procurement prices or from more efficient procurement processes. A cost advantage for companies that participate in public tendering procedures via the Internet will mainly result from reduced efforts, both for getting access to calls and for submitting tenders. A potential caveat, however, is that the implementation of electronic tendering procedures by the public sector could – to some extent – compete with already existing solutions and services from the private sector. A case-by-case assessment would, therefore, be required to carefully weigh the aggregate gains and losses of either way from an economic point of view.

1.8.2 Policy challenges at the sectoral level

Following these considerations (and caveats) on the policy relevance of electronic business developments in general, the question is which instruments policy could use to intervene in this development, in order to counteract undesirable outcomes on the aggregate level. This chapter presents a synthesis of policy challenges which have been identified in the 20 Sector Impact Studies published in 2004.

Since 2001, the Enterprise Directorate General has undertaken a substantial effort to systematize e-business policies with respect to their objectives, targets and contents. The "Go Digital" campaign can be regarded as the starting point and initial background of this activity. In March 2003, the Commission issued the Communication "Adapting e-business policies in a changing environment: The lessons of the Go Digital initiative and the challenges ahead"⁴⁰, to stimulate a target-oriented policy-making process and debate in this area. The Communication outlines a framework for SME specific e-business policies that consists of three main challenges and nine objectives related.

The policy challenges which the *e-Business W@tch* has identified and outlined in its Sector Impact Studies (May/August 2004) on a sector-by-sector basis can – to a large extent – be mapped into the framework developed by the EC Communication. Exhibit 1.8-1 indicates the relevance of the three main e-business policy challenges identified in the above mentioned Communication. This mapping reflects the perspective of small and medium-sized enterprises, and not a large firm's point of view.

In summary, the following conclusions can be drawn from this overview, backed up by the analysis and recommendations from the various Sector Studies presented by the *e-Business W@tch*:

- The policy objective "to improve the availability of e-business solutions for SMEs" has some relevance for all sectors. It holds true for all sectors that the major (positive) impacts of e-business stem from rather powerful applications that are mainly adapted to the needs of large enterprises. However, the objective to stimulate the development of useful applications for small business is even more relevant for manufacturing than for service sectors, as handling the supply chain of physical materials is a major application area.
- The policy objective "to improve managerial understanding and skills for e-business among SMEs", which includes awareness raising activities, appears to be the most important for those sectors which are dominated by a huge number of micro (and very small) enterprises, such as the textile and the craft and trade industries. There are two main arguments in support of this position: firstly, small enterprises cannot employ specialised staff in the way larger enterprises do.

⁴⁰ COM(2003) 148 final

Secondly, it has frequently been experienced that the adherence to traditional, established business cultures can be very strong among small firms, particularly in craft and trade sectors.

- A certain degree of reluctance among many small firms to abandon traditional business cultures and models, even if for the benefit of doing things more efficiently, can also be an obstacle to co-operation among themselves. In some sectors, however, new ways of co-operation among SMEs have already proved to be successful and necessary, for example in the furniture industry.⁴¹ Policy measures to stimulate the participation of SMEs in business networks are therefore particularly relevant in these sectors where such co-operations appear to have the highest potential and impact.

Exhibit 1.8-1: Relevance of SME e-business policy objectives by sector

	To improve managerial understanding and skills for e-business among SMEs	To improve the availability of e-business solutions for SMEs	To promote participation of SMEs in business networks and e-marketplaces	Other measures (sector specific)
Textile industries	~ ~	~ ~ ~	~ ~	~
Chemical industries	~ ~	~ ~	~	™
Electronics	~ ~	~ ~ ~	~ ~	~
Transport equipment	~ ~ ~	~	~	~
Craft and trade	~ ~ ~	~ ~	~ ~ ~	~ ~ ~
Retail	~ ~ ~	~ ~	~ ~	~ ~
Tourism	~ ~ ~	~ ~	~ ~ ~	~
ICT services	~	~ ~	~ ~	~ ~
Business services	~ ~ ~	~ ~	~	~
Health services	~ ~ ~	~ ~	~ ~	~ ~ ~

™ = not relevant; ~ = some relevance; ~ ~ = rather relevant; ~ ~ ~ = highly relevant

Source: *e-Business W@tch* (2004)

The grouping of policy challenges identified in the *e-Business W@tch* Sector Studies under the three objectives of the EC framework is a useful but rather crude simplification. Furthermore, the framework does not indicate whether the challenges must or should rather be dealt with at a European, national or regional level. Some policy approaches require the co-ordination of different governmental levels, for example RTD oriented policies, while others need to be implemented predominantly on a specific geographical level. The support of standardisation developments, for example, which has been recommended in several of the reports, can best be addressed by the European Commission or European industry groups, if at all (considering that standardisation is mostly a voluntary process). Awareness raising targeted at SMEs, on the other hand, can only be effectively achieved through intermediaries at the regional level.

Exhibit 1.8-2 groups suggestions for possible policy initiatives that were raised in the Sector Studies according to the underlying objective and the policy level (from regional to European) on which the suggested action should probably be addressed, acknowledging that many of the policies could of course be addressed at different levels. Thus, it can be considered as an extension of the SME e-business policy framework proposed by the EC which can be further developed at the national, regional, local or sectoral level depending on the specific conditions. It is a main objective of the e-Business Support Network (eBSN)⁴² to communicate and exchange such policies across the EU, together with the lessons learned. Replication of successful policies, while avoidance of making the same mistakes again, is the goal of this initiative.

⁴¹ See Sector Study on Craft and Trade, August 2004.

⁴² The eBSN is an initiative launched by DG Enterprise to improve co-operation among e-business policy-making activities in Europe (for more information, see www.e-bsn.org).

Exhibit 1.8-2: Suggestions for policy actions mapped by objectives and level

Objective	Level	EU	National	Regional
To improve managerial understanding and skills for e-business among SMEs		<p>Make it easier for small firms to participate in European RTD programmes</p> <p>Monitor the demand for ICT skills among enterprises, possibly at sectoral level (at least on the levels of manufacturing and services), develop profiles of skills required and assess the supply situation for those skills</p>	<p>Public administration as a role model in using electronic procurement</p> <p>Promote IT and e-business training opportunities, for instance by providing incentives for participation</p> <p>Develop high-quality ICT education programmes (at university level)</p> <p>Collect good e-business practice examples to overcome mental / cultural reservations among SMEs</p>	<p>Encourage ICT training, especially among micro and small enterprises and in the new Member States</p> <p>Improve access of SMEs to information about e-business</p> <p>Improve the knowledge transfer between competence centres, business development agencies and SMEs</p> <p>Educate SMEs about opportunities of using simple Internet applications</p> <p>Encourage links between small firms and schools & universities to give them access to young skilled people</p> <p>Change the investment attitude of SMEs from saving costs by not investing to building value by investing in ICT</p>
		<p>Encourage the adoption of e-standards</p> <p>In particular, promote the standardisation of computer languages used for more advanced forms of supply chain management</p>	<p>Provide financial incentives for innovation through e-business adoption</p> <p>Develop web-based resources and interactive modules for e-business support in craft and trade</p> <p>Stimulate the customisation of e-business tools as part of innovation policies</p>	<p>Stimulate co-operative projects involving software providers and regional SMEs</p>
To promote participation of SMEs in business networks and e-marketplaces		<p>Monitor the evolution of marketplaces / Internet trading platforms and the related business practices</p>	<p>Monitor the participation of SMEs on electronic marketplaces</p>	<p>Support the establishment of local e-commerce platforms for SMEs, particularly in retail</p> <p>Emphasis on and support for the development of network relations among SMEs and customers</p>
Other measures		<p>Monitor market concentration in online retail markets</p>	<p>Reduce legal barriers to craft business market entry (e.g. in DE, LU), particularly in ICT-related crafts</p> <p>Create the regulatory environment for a competitive telecommunication market, so that companies have access to services at low prices</p>	<p>Educate SMEs about regulatory changes and consequences of the EU enlargement</p>

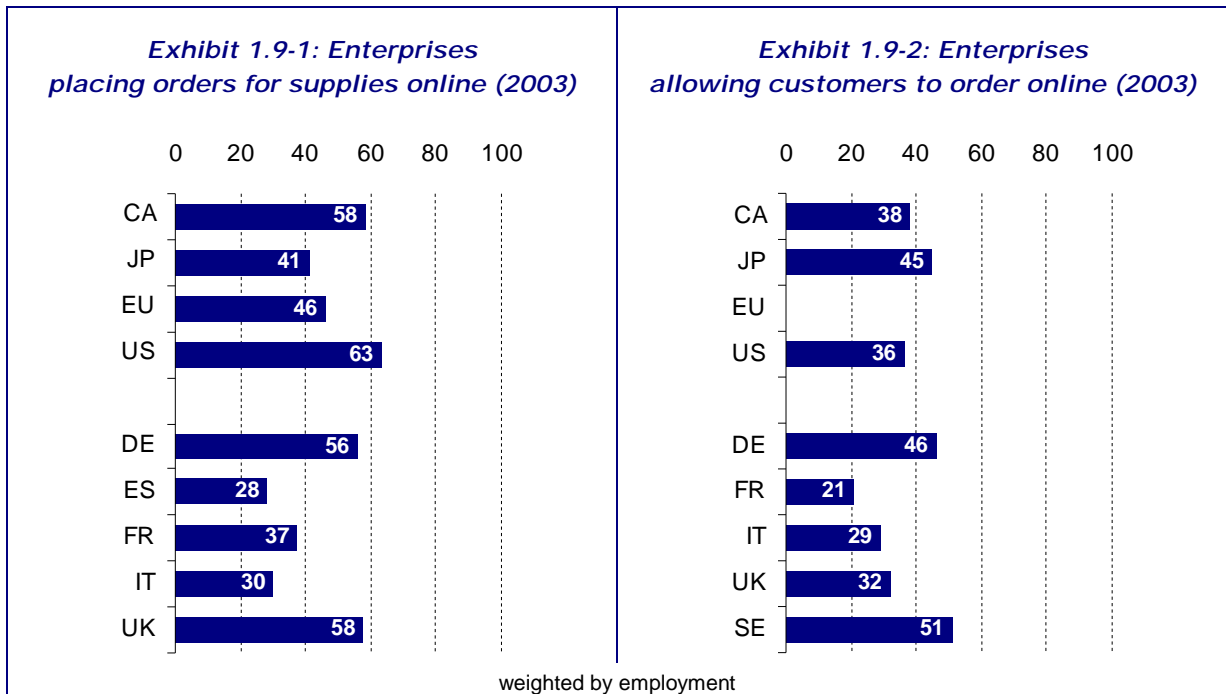
Source: e-Business W@tch (2004)

1.9 International outlook: Worldwide trends in e-business

This chapter undertakes a brief assessment of the development of electronic business in the EU compared to other economies, notably the United States, Japan, Australia and Canada. The analysis is based on statistics and analysis from a number of publicly available international statistical sources and reports, preferably from official statistics or international benchmarking reports. Although it is difficult to compare results due to methodological differences among the various sources used, there is a clear overall picture that emerges from this international outlook:

The alignment of e-business activity has reached an astonishingly high level in the major industrialised economies. Of course there are national specificities, for example the strong impact of traditional long-standing supplier relationships in the Japanese manufacturing industry. On the whole, however, the state-of-play in e-business and e-commerce appears to be very similar in Europe, the USA, Japan, Canada and Australia. Statistics from all these countries show comparable adoption levels and confirm that differences are mainly a function of firm-size and business activity.

There are some differences between individual Member States in the EU, particularly in supply side electronic business, notably after the accession of the 10 new Member States in May 2004. Some of these gaps have been indicated in chapters 1.1-1.4. However, gaps are mostly invisible in aggregate figures for the EU which are dominated by the large and technologically rather advanced economies of Germany, France and the UK. An important question in this context is whether the current gap between the leading ICT nations and the emerging ICT countries will narrow, widen or stay the same. There are contrasting views on and evidence for this issue.⁴³



Sources: International Benchmarking Study 2003 (UK DTI), *e-Business W@tch* (Survey 2003)⁴⁴

⁴³ The International Benchmarking Study 2003 by the UK DTI, for example, concludes that "evidence this year points to the leading ICT nations maintaining and, in some cases, extending their lead" (p. 11). See also the contribution from Soumitra Dutta and Amit Jain, INSEAD, on "The e-alignment of the new EU Member States" in chapter 3 of this report.

⁴⁴ Exhibit 1.9-1: data for CA, JP, US from IBS, for other countries from *e-Business W@tch*. Exhibit 1.9-2: all data from IBS (differences in the underlying survey question make it difficult to compare results). No figure for the EU (aggregate) available.

1.9.1 Development of electronic commerce in the USA⁴⁵

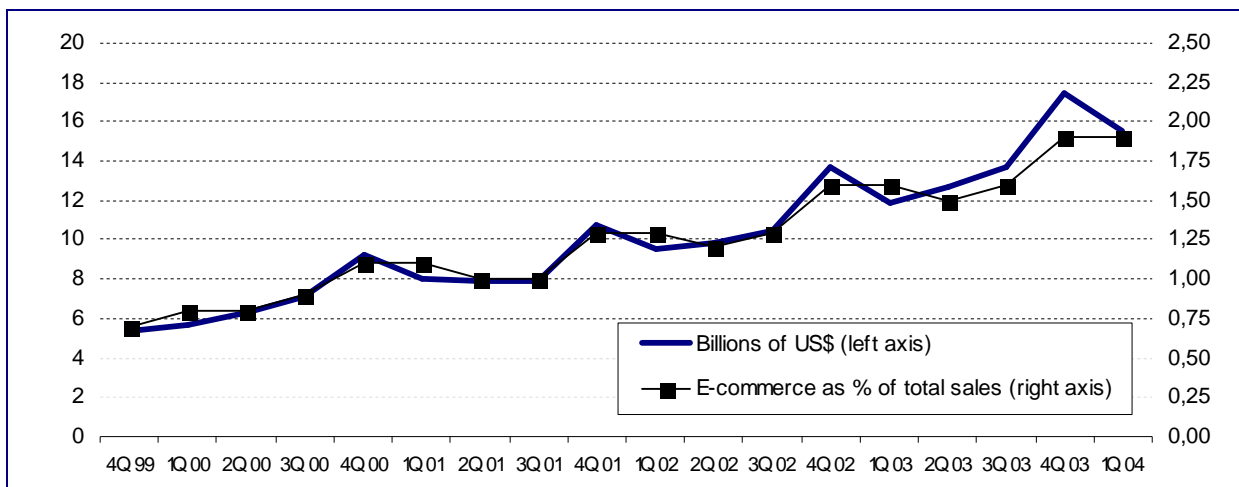
In a news bulletin from April 2004⁴⁶, the Census Bureau of the US Department of Commerce (DoC) summarises the situation and main trends of e-commerce in the USA in 2002.⁴⁷ DoC draws the following conclusions from its surveys:

- E-commerce outperformed total economic activity in three of four major economic sectors (see following paragraphs) measured between 2001 and 2002.
- Business-to-Business activity, which depends critically on Electronic Data Interchange (EDI), dominates e-commerce.
- All industry groups in each sector participate in e-commerce.

E-commerce shares in sectors

In a release from May 2004, the Census Bureau presents figures for US **retail e-commerce sales** for the first quarter of 2004. Not adjusted for seasonal, holiday, and trading-day differences, the total volume is estimated at US\$ 15.515 billion, which means an increase of 28.1% from the first quarter of 2003. Total retail sales for the first quarter of 2004 were estimated at US\$ 834.8 billion, an increase of 8.8%.⁴⁸ According to this estimate, e-commerce sales in the first quarter of 2004 accounted for 1.9% of total sales, while in the first quarter of 2003 e-commerce sales were 1.6% of total sales. In the fourth quarter of 2003 e-commerce sales were 1.9% of total sales.

Exhibit 1.9-3: Estimated quarterly US retail e-commerce sales (1999-2004)



Source: US Department of Commerce

These figures are quite consistent with the *e-Business W@tch* estimate on the share of online sales in the European retail industry, although the different methodologies employed to compute these percentages put a question-mark to comparisons. Data from the e-Business Survey 2003 indicate that the overall share of e-commerce (as % of the total sales volume) in retail was about 1.5% in the EU (in 2003), with some variation between European countries. The e-commerce share was higher, for example, in Germany, Denmark, Norway and Italy (close to 2%).

⁴⁵ Most of the statistical evidence presented in this section is based on data released by the Census Bureau of the US Department of Commerce.

⁴⁶ E-Stats, 15 April 2004

⁴⁷ Data and findings presented are based on an impressive sample of more than 135,000 manufacturing, wholesale, services, and retail businesses.

⁴⁸ News release by Department of Commerce, Washington, May 21, 2004.

Based on data from the 2002 Annual Survey of Manufactures⁴⁹, the DoC also provides statistics about e-commerce as a percentage of the total value of **shipments from manufacturing companies**. The sectors where e-commerce has reached the highest shares are the transportation equipment sector (48% of total shipment value in 2002), the food and beverages sector (44%) and the textile product sector (24%). In total, e-commerce is estimated at 19.6% of shipment value in the manufacturing sectors (18.2% in 2001). Transportation equipment alone accounted for more than 40% of the e-commerce based shipments in 2002.

A direct comparison of these figures with those of *e-Business W@tch* is not possible, as the different methods and definitions to measure B2B trading activity in manufacturing have a stronger impact on results than in the area of B2C retail. What is nevertheless consistent with *e-Business W@tch* findings is the fact that the share of goods traded electronically is much higher for transport equipment than for textiles.

The same statistics are available for **merchant wholesale trade sales** in the United States, where e-commerce is found to account for 11.7% of total sales in 2002 (10.6% in 2001). 86% of e-commerce in merchant wholesale trade sales is EDI based. The DoC report points out that e-sales by merchant wholesalers grew more strongly from 2001 to 2002 than total sales. E-sales increased by 12%, compared to a 1.5% increase in total sales. 27% of the growth in e-sales came from electrical goods, where e-sales grew by USD 4 billion, while sales decreased by USD 8 billion.

In **selected services sectors** the share of e-commerce based revenues is reported to be much lower than in manufacturing and wholesale trade, namely less than 1% of total revenues. The only sector within the services sectors where e-commerce has reached a significant share is travel arrangement and reservation services, where nearly a quarter of all revenues (24%) stem from e-commerce. Four groups account for almost half of total selected service e-revenues: travel arrangement and reservation services (15%), publishing (13%), securities and commodity contracts intermediation and brokerage, computer systems design and related services (10% each).

This is very much in line with the assessment by *e-Business W@tch* for Europe. For example, e-commerce as % of total sales in business services is estimated to be about 1.4%. Moreover, the boom in e-tourism has been highlighted in this report as well (see chapter 1.4), although the high share of online reservations (24%) cannot be confirmed for Europe. However, this can also be due to definitions and measurement methods.

Use of ICT continues to be a source of strength in the US economy

The latest "Digital Economy" report (2003) by the US Department of Commerce points out that Investment in ICT and its use have both played a major role in the recent strong labour productivity growth. From 1989 to 2001, IT-intensive industries experienced average annual labour productivity growth of over 3%, which is much faster than the 1.6% pace of the overall non-farm economy.

Firm- and plant-level research by the Census Bureau's Center for Economic Studies shows that a range of related factors affect the role of IT in productivity growth. The roughly 50% of US manufacturing establishments that have computer networks are found to have a higher productivity than manufacturing establishments without networks.

ICT in life sciences R&D is found to be a good example of the dynamic role IT can play in creating new economic opportunities. In bioinformatics (a new field created by the intersection of life sciences R&D with IT-enabled data processing capabilities), IT has expanded R&D horizons by enabling life scientists to acquire, manage, and analyse much larger amounts of and more complicated biological data. This has increased demands on IT producers for more advanced computers and software.

⁴⁹ cf. <http://www.census.gov/eos/www/papers/2002/2002finaltables.pdf> (accessed in August 2004)

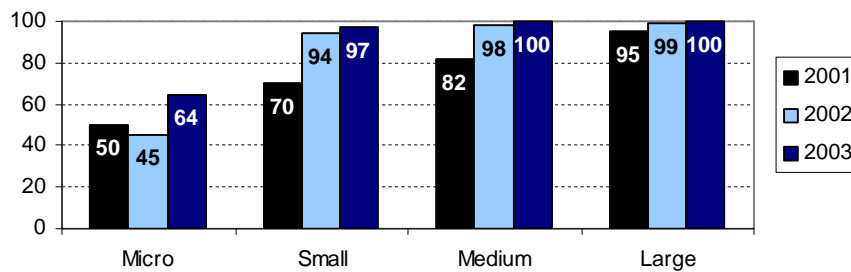
1.9.2 International snapshots

Japan

The International Benchmarking Study 2003 by the UK Department of Trade and Industry reports that Japanese businesses increased the average proportion of sales value online from 22% to 26%. Regarding B2B online trading, the report points at the importance of the tradition of developing strong and long lasting relationships with supply chain partners (Keiretsus) in Japan. These strong relationships have possibly more benefits for Japanese firms than any cost cutting potential which might arise from switching suppliers. Consequently, Japanese businesses are unlikely to focus on cost cutting online sourcing strategies in the same way as many European and US businesses do. Although the Japanese practice may be waning (Nissan is a notable example), the keiretsu tradition still exists in many business sectors including banking, insurance, steel, manufacturing, and chemicals.⁵⁰

As in the EU and in the USA, Internet access among Japanese enterprises has become ubiquitous, except among micro-firms. The respective figures for 2003 for the former EU-15 (according to *e-Business W@tch*) are: Micro: 75%; Small: 91%; Medium: 97%; Large: 100%.

Exhibit 1.9-4: Companies connected to the Internet in Japan



Source: International Benchmarking Study 2003 (UK DTI)

Australia⁵¹

Recent statistics on the adoption of ICT and e-business among Australian companies published by the Australian Bureau of Statistics (ABS) are remarkably similar to the respective results for European companies as published by *e-Business W@tch*. The percentage of firms with Internet access appears to be slightly higher in Australia than in the EU. Regarding online trading, the share of companies that orders online (out of those firms that are online) is more or less on the same level (39% in Australia, 37% in the EU). Australian firms have a higher propensity towards making online sales, though (19% of firms online compared to 12% in the EU).

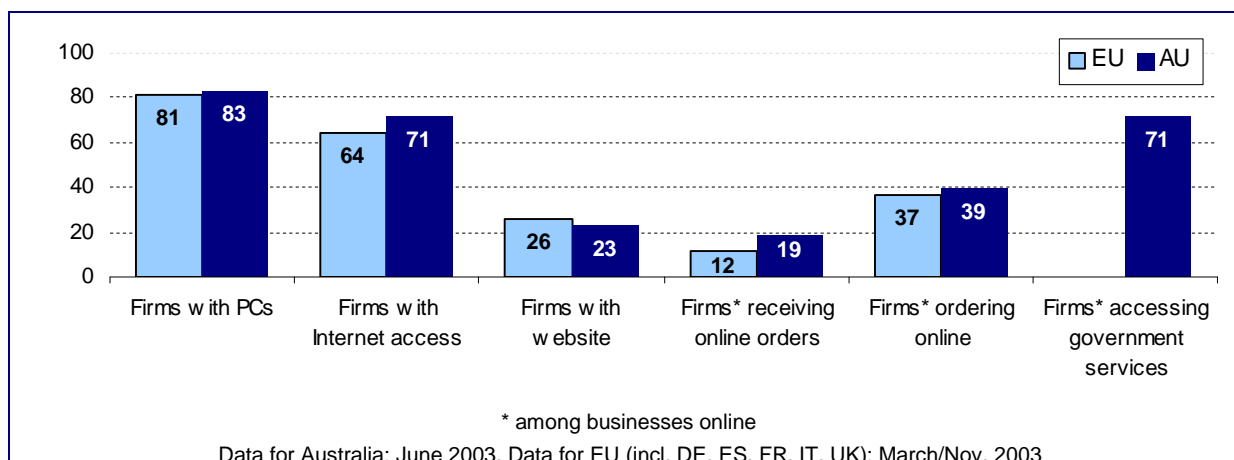
Based on its Business Use of Information Technology survey, ABS highlights a trend that is also found by the *e-Business W@tch* for Europe and presented in this report: the migration of businesses to broadband Internet connections. According to ABS, between June 2002 and June 2003 there was an increase in the proportion of businesses accessing the Internet by digital subscriber line (DSL) from 7% to 18%, and a decrease in dial-up via modem, from 86% to 76%.

Regarding e-commerce, the total e-commerce revenue by Australian companies is estimated that at 24.3bn A\$, up from 5.1bn in 2000. This figure includes the value of Internet or web orders received by businesses ("Internet income"). E-mail not linked to a website was the most common method to receive orders online (68%). Orders received by an e-mail facility linked to a web site was reported by 40% of businesses and 14% of businesses received orders through a web site with online ordering.

⁵⁰ International Benchmarking Study 2003 (UK DTI). P.83

⁵¹ Sources: Australian Bureau of Statistics: Newsletters Innovation and Technology Statistics Update, Bulletin No. 10, June 2004 (available online at www.abs.gov.au); Australian Government, Department of Communications, Information Technology and the Arts (2004): Australia Online - 1st Quarter 2004 Statistics. July 2004. www2.dcita.gov.au/ie/framework/benchmarking

Exhibit 1.9-5: ICT and e-business use by Australian and the European enterprises (2003)



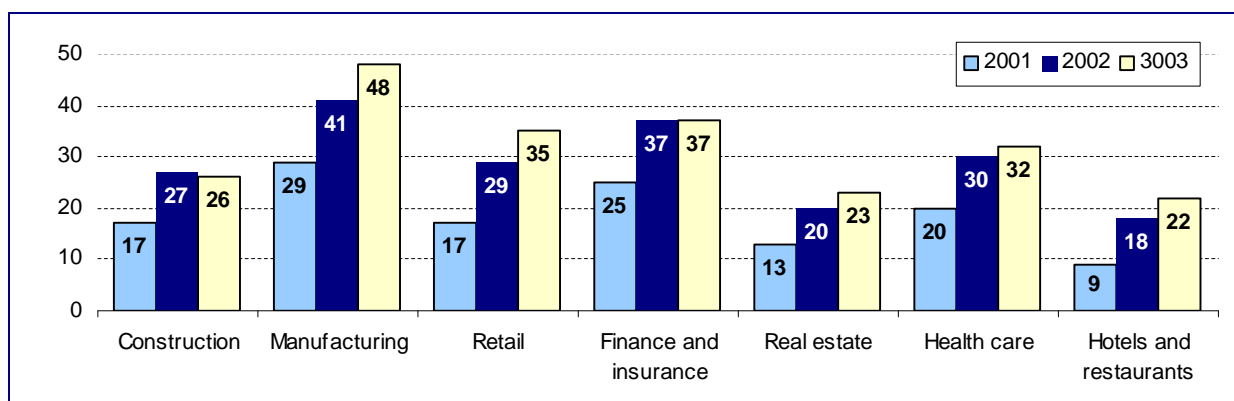
Sources: Australian Government, Dep. of Communications, Information Technology and the Arts (2004): Australia Online - 1st Quarter 2004 Statistics. July 2004; *e-Business W@tch* (e-Business Survey 2003)

Canada⁵²

Statistics Canada reports that e-commerce has increased in 2003 for the fourth year in a row, but Internet based online sales still accounted for less than 1% of total operating revenues for private businesses. About 7% of private sector firms sold goods or services online in 2003, virtually unchanged from 2002. However, these 7% of firms accounted for 29% of gross business income in Canada. Online sales were found to be highest in the wholesale trade sector.⁵³

Thus, the overall development in Canada is absolutely consistent with the trend reported by the *e-Business W@tch*: While the proportion of firms selling online remains relatively low, the proportion of firms making purchases online continued to grow rapidly in 2003. About 37% of firms made purchases online in 2003, up from 32% in 2002. These firms accounted for 68% of all gross business income nationally.

Exhibit 1.9-6: % of Canadian enterprises that use the Internet to buy goods or services



Sources: Statistics Canada, Survey of Electronic Commerce and Technology (SECT 2003)

Also in line with *e-Business W@tch* results for Europe, Canada reports that broadband is catching on quickly. In 2003, two-thirds (66%) of all private companies used broadband to connect to the Internet – up from 58% the year before, and only 48% in 2001.

⁵² See also contribution from George Sciadras, Statistics Canada, on "Measuring e-Business in Canada" in this report, chapter 3.

⁵³ Statistics Canada, Survey of Electronic Commerce and Technology (SECT 2003). Cf. The Daily, 16th April 2004, <http://www.statcan.ca/Daily/English/040416/d040416a.htm>

Part 2: Summaries of 10 e-Business Sector Studies (2004)

This chapter features summaries of the 20 Sector Impact Studies on 10 sectors published in May 2004 (first issue) and August 2004 (second issue). The full reports can be downloaded from the publications section of the *e-Business W@tch* website (www.ebusiness-watch.org). The first issue of each sector study (May 2004) mainly presented the quantitative picture, focusing on the results of the e-Business Survey 2003. The second issue (August 2004) analysed in more detail specific topics which were found to be particularly relevant for the sector at stake.

2.1 The textile industries

2.1.1 Economic profile

“Textile, clothing and footwear industries” have been defined as those business activities described by NACE Rev.1⁵⁴ Divisions 17, 18 and 19. NACE 17 comprises the manufacture of textiles and NACE 18 the manufacture of clothing (wearing apparel, dressing and dyeing of fur). NACE 19 comprises the manufacture of leather products, of which we cover only the manufacturing of footwear. For the purposes of this study, the term “textile industries” will be understood to cover the textiles, clothing and footwear sectors.

Exhibit 2.1-1: Configuration of the textile, clothing and footwear industries (NACE Rev. 1)

NACE Rev. 1 Division	Group	Activity
17		Manufacture of textile and textile products
	17.1	Preparation and spinning of textile fibres
	17.2	Textile weaving
	17.3	Finishing of textile
	17.4	Manufacture of made-up textile articles except apparel
	17.6	Manufacture of knitted and crocheted fabrics
	17.7	Manufacture of knitted and crocheted articles
18		Manufacture of wearing apparel, dressing and dyeing of fur
	18.1	Manufacture of leather clothes
	18.2	Manufacture of other wearing apparel and accessories
19		Manufacture of leather and leather products
	19.3	Manufacture of footwear

Industry structure and employment

The textile industries in original member states comprise around 185,000 companies and employ 2.2 million people, representing 7.3% of total manufacturing employment. More than 90% of enterprises have less than 50 employees. There has been a sharp decline in employment over the past decades, together with a substantial rise in productivity brought about by deep restructuring and the introduction of new technologies.

These industries are dominated by SMEs, a large share of which is concentrated in regional clusters. Textiles are one of the most fragmented industries, and possibly one of the most global ones. More

⁵⁴ NACE Rev. 1 (Statistical classification of economic activities in the European Community), Office for Official Publications of the European Communities, Luxembourg, 1996.

than 50% of employees work in micro and small enterprises, this figure reaching 60% in the leather industry. SMEs also account for more than 40% of production value.

The industry structure in the new EU Member States mirrors the picture of EU-15. Fragmentation and size distribution, in fact, show very similar patterns, while as far as the structure of employment is concerned, large companies account for a much wider share of employment

Market size

The textile, clothing and footwear industries in original member states generate a combined production value of about 218m Euro, accounting for about 4.5% of total European manufacturing (the production of the textile, clothing and leather sector as a whole is about 240m Euro). The former EU-15 accounted for 29% of world textile production and 26% of world clothing production in 1999 (source OETH, 2000), lying well behind Asia which accounted for 39% and 45% respectively. In the footwear sector, the EU accounted for 7.3% in volume of world production in 2002.

In some new member states, textile has been traditionally a major sector in manufacturing. The relative importance is, in some, cases, well above the EU average. In the year 2000, the production value generated by these industries in new member states countries was about 5% of the production value generated in EU-15 in the same year.

Productivity and labour costs

Labour productivity, expressed in value added per employee, is low compared to other manufacturing sectors. The gap is very relevant in clothing (51% lower than the manufacturing average in 2001) and in the leather industry (46% lower than the manufacturing average in 2001). EU companies are relatively more competitive in textile, where advanced technologies can be used more extensively, than in the other two sub-sectors. The gap in textile stands nevertheless at 33%.

In the former EU-15 Member States, labour costs in the combined textile industry are much lower than the manufacturing industries average: -30% in textile, -46% in clothing and leather. In the 10 new Member States, labour costs amount to only about one fifth of the labour costs in the Member States.

Trends and challenges

The competitive scenario of these industries has undergone profound changes in the past year. The main macro trends which have been and still are affecting this evolution are: liberalisation of trade and globalisation of production and markets, strong competitive pressure related to price-competition, concentration in manufacturing and distribution, pressure on innovation and differentiation. Competitiveness increasingly depends on the – quickly changing – consumer side and the requirements of distribution. Successful companies in this sector are increasingly paying attention to strategic issues such as: further control on fixed costs; optimisation of production processes with the aim of reducing time to market and lead time; IT systems able to integrate the whole supply chain: from point of sale (POS, bar code) to order management and logistics; selection of suppliers in the framework of long-term strategies. The point is no longer (or not only) the minimisation of direct production costs but increasingly the minimisation of the overall supply chain cost, including standardised and agreed mechanisms able to evaluate quality and timing performances.

2.1.2 Diffusion of ICT and e-business in 2003/04

The textile industries are quite conservative in adoption of ICT. Despite a tradition of long-term partnerships, many of their members are reluctant to pass on information and to open up their information systems. Other features that have been delaying the process of incorporating e-business in everyday practice are: the average micro/small size of the vast majority of the operators; the very limited degree of computerisation; the diverse quality of access to ICT which inhibits the process of integration.

Investments in innovation have traditionally addressed the production side. The fragmentation along the value chain has determined the development of IT tools for the management of the various production processes. This resulted in the so-called “islands of activity” which have so far seen very little integration.

The main opportunity and current objective of electronic business are related to the acceleration of information flows along the value chain, in order to: shorten the development cycle; improve links with all existing manufacturing operations; capture and analyse information about distribution channels and final customers.

The following business objectives and related application areas were found to be among the most important ones in this sector:

Exhibit 2.1-2: Importance of e-business applications in the textile, clothing and footwear industries

E-business area	Importance	Remark / example
Diffusion and quality of access to ICT	~ ~ ~ ~	A large share of companies lack basic conditions for e-business implementation. Quality of access also needs to be enhanced
Use of e-business standards for exchanging structured data	~ ~ ~ ~	Textile companies could largely benefit from standardisation to favour the flow of information along the value chain
Web services and XML based standards	~ ~ ~ ~ TM	It is important to foster migration to tools and standards which offer data access flexibility, openness, ease of usage and low cost
Supply chain process integration	~ ~ ~	The winners in the changing environment are those companies that are embracing ICT in co-operation with their business partners
Extended enterprise: collaborative (online) e-product design	~ ~ ~	In this area, companies from the textile sector are close to the average of other manufacturing sector in terms of usage and diffusion
Automate internal business processes	~ ~	e-business might significantly enhance the efficiency of internal processes in a sector where the production process is complex, fragmented and organised in a number of different activities.
Improve ERP-to-ERP connectivity	~ ~ ~	Availability of sector-specific applications is a condition for the spread of ERP in the sector
Electronic customer management	~ ~ TM	Mass customisation, shortening of lead times and fast reaction to market changes will increase importance of these applications
B2B marketplaces on the Internet	~ ~ TM	Marketplaces have increased in number although their potential has not been fully exploited
~ = little relevance; ~ ~ = average relevance; ~ ~ ~ = very relevant; ~ ~ ~ ~ = high relevance for sector TM = mixed results, depending on the sub-sector within the combined textile industries		

Source: e-Business W@tch (2004)

ICT infrastructure

Survey data indicate that adoption rates of technologies and applications are lower than in other sectors. There is clearly a divide between these industries and the rest of manufacturing and service sector. This divide is comparatively larger than the divide between larger and smaller companies within the sector itself.

74% of enterprises representing 91% of employment use computers while the total for the 10 sectors studied by the e-Business W@tch is respectively 89% and 95%. About one quarter of micro-enterprises do not have any access to ICT. 17% of enterprises representing 50% of employment have a LAN, and the usage of WAN is limited to only a few large companies. Both numbers are significantly lower than the average of all sectors.

This picture clearly mirrors the composition of the sector and in particular the large share of micro and small enterprises, many of which have the characteristics of handcraft workshops rather than companies active in the market. These companies have little investment capacity and also limited needs: a stand-alone basic system, if any, is enough to suit their requirements.

Remote access is clearly limited within larger companies. Wireless LANs have been adopted only by a few large firms, normally by those which maintain more than one establishment.

Exhibit 2.1-3: Use of ICT Infrastructure by firms from the textile industries (2003)

	Local Area Network	Wide Area Network	Remote Access to company network *	Wireless LAN	Internet access
Sector total (EU-5)	N=501	N=501	N=501	N=501	N=501
% of employment	50	17	29	10	2
% of enterprises	17	2	10	2	58
0-9 employees	11	0	8	1	52
10-49 employees	30	8	13	4	79
50-249 employees	69	21	32	11	98
250+ employees	95	45	61	29	97
All (9) sectors (EU-5)	N=4516	N=4516	N=4516		N=4516
% of employment	61	29	39	n.a.	88
% of enterprises	32	5	18	n.a.	76

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Internal business processes

Knowledge management and e-learning: The use of Intranet and knowledge applications is not a common practice in this sector. The survey results depict a scenario where information flows and access to knowledge within companies are carried out electronically in the minority of cases. Whereas Intranet are available to 32% of employees, mostly working in larger enterprises, knowledge management and e-learning applications are not yet part of the culture of this sector. Only 1% of firms report that they use a special knowledge management solution and e-learning tools; this figure corresponds respectively to 5% and 3% of employment.

Online technologies for internal processes: The use of e-business solutions might significantly enhance the efficiency of internal processes in a sector where the production process is complex and organised in a number of different activities. Most of the companies, however, are concentrated on single apportioned phases. The need (and the capacity) for integration is therefore shifted more at value chain level than inside single businesses. Wherever internal information flows are relevant, they are currently carried out using traditional instruments, such as telephone and fax. Only e-mail has been recently included as a more sophisticated means of information. Only larger enterprises are comparatively advanced in the usage of online technologies to support internal processes. Companies accounting for 15% of employment use online technologies to track working hours and production time and 13% to support the human resources management.

ERP: Enterprise Resource Planning systems play an important role in supporting the connectivity between enterprises. Use of ERP is limited to larger enterprises. 52% of firms with more than 250 employees and 21% of medium-sized companies have adopted an ERP system. Overall, companies representing 18% of employment in this sector can rely on such systems. Very few companies have implemented ERP systems to integrate their information systems with those of customers. On the contrary, information is in most cases received through traditional means and inserted manually into the system. The low percentage of companies currently using ERP is due not only to their size and limited investments but also to the scarce availability of solutions specifically developed for small enterprises.

Exhibit 2.1-4: ICT use for internal business processes in the textile industries

	Use an Intranet	Use an ERP system	Use online technologies ...		
			to share documents for collaborative work	to track working hours and/or production time	to support human resources management
Sector total (EU-5)	N=501	N=501	N=501	N=501	N=501
% of employment	32	18	30	15	13
% of enterprises	10	2	7	3	3
0-9 employees	5	1	4	1	1
10-49 employees	24	6	13	11	8
50-249 employees	43	21	41	20	19
250+ employees	55	52	67	29	26
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	45	29	40	20	21
% of enterprises	21	5	22	5	5

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Electronic procurement and supply chain integration

Electronic procurement: Online procurement can be carried out even if the integration with suppliers is still on a simple level. It is often the first step towards the use of ICT in support of external processes. For this reason, online procurement is observed, at an all sector average, in about one third of the EU-5 enterprise representing 46% of employment. The textile industries stand at about half these percentages, even larger companies rely on online procurement in only 33% of the cases. Significant differences exist among countries: Germany, UK and Norway are the only countries where it is really taking place. Once companies decide to carry out online procurement, they tend to trade both MRO and direct production goods.

Supply chain integration: Only 5% of all companies from the sector say that they have integrated their IT system with that of their suppliers for placing orders. The level of SCM adoption among textile companies is actually low, and as in all sectors, SCM systems are mainly installed in large enterprises (25%).

Exhibit 2.1-5: Electronic procurement and supply chain integration in the textile industries

	Make online purchases	Online purchases account for at least 5% of total volume*	IT system is integrated with that of a supplier for placing orders	Use an SCM (Supply Chain Management) system
% of employment	23	27	11	7
% of enterprises	14	38	5	1
0-9 employees	14	42	1	0
10-49 employees	11	24	24	3
50-249 employees	35	30	12	5
250+ employees	33	16	4	25
All (9) Sectors (EU-5)	N=4516	N=1831	N=4516	N=4516
% of employment	46	51	8	6
% of enterprises	31	59	6	2

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

*Base: enterprises procuring on line

Source: e-Business W@tch (2004)

Customer facing processes

A website on the Internet is a very simple way to address customers and provide information about products. Firms from the textile industries are less present on the web than companies from other sectors: only 22% of enterprises (about 80% among the largest ones) with just a minority of these (3% of enterprises) making online sales. Even for firms successfully pursuing the strategy, this channel is complementary and relies upon brand and services shared with the traditional selling organisation. A very important sector-specific barrier to a completely automated management of the transactions is the difficulty of codifying the physical characteristics of the products which are, on the other hand, of utmost relevance.

Exhibit 2.1-6: Electronic marketing and sales in the textile, clothing and footwear industries

	Have a website on the Internet	Use a content management system to maintain website	Make online sales	... of those:	
				Allow online payment of products ordered	Online sales system with secure transactions capability
Sector total (EU-5)	N=501	N=113	N=501	N=26	N=26
% of employment	47	15	5	38	68
% of enterprises	22	15	3	38	42
0-9 employees	20	17	3	--*	--*
10-49 employees	24	9	1	--*	--*
50-249 employees	71	19	6	--*	--*
250+ employees	79	14	14	--*	--*
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=598	N=598
% of employment	66	22	16	43	59
% of enterprises	35	9	9	38	46

Base (100%): all enterprises / enterprises making online sales. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). * Percentages not displayed because base of cases observed is too small. Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

2.1.3 Case studies

This chapter features abstracts and key lessons learned from case studies which are presented in more detail in the 2nd Sector Impact Study from August 2004.

GEOX (ITALY)	
<i>Background</i>	Less than 10 years ago, GEOX patented a system for perforating rubber soles which contain a special micro-porous membrane that recreate an ideal microclimate inside the shoe, keeping the feet dry and at the right temperature. On this breakthrough product technology, the company built its development in world business, with turnover growth rates of 40% per year, reaching a 2003 production level of over 6 million pairs of shoes and currently operating in 68 countries. Product innovation has constantly been supported by innovative organisational solutions and increasing investments in ICT.
<i>Activities</i>	The company's strategy follows four main lines of development: <ul style="list-style-type: none"> • Focus on product innovation and development • Flexibility and reduction of time to market • Development of the distribution network • Expansion in the main international markets.

	<p>Although Geox is marketed as an Italian brand, it is in fact manufactured in two main units: one in Romania (with 1,750 employees) and one in Slovakia (with 400 employees). In addition to this, the company owns two units in Italy where R&D, product design activities and prototyping are carried out.</p> <p>The way production processes are de-localised and centrally managed is a key success factor. The integration with headquarters is very close and includes: purchasing of raw materials (both leather and rubber), accessories, as well as equipment and plants, while technical specifications are managed centrally. The strict control of production has the twofold objective of monitoring quality and reducing the risk of counterfeit.</p> <p>This kind of integration and the centrally managed flow of information allow for significant savings in internal work processes. Relations (information, consultancy, exchange of materials) with external business partners (suppliers, technical consultants, etc.) are all managed centrally. Logistics play a crucial role both for the complex production organisation and seasonal peaks in production and selling. Integration of information systems between the headquarters (where R&D and design are carried out), production sites and the distribution network are supported by a VPN (Virtual Private Network). The company information system is managed by internal IT staff and has been developed in-house using standard technologies. Communication, both internal and external is managed mainly through the company's website.</p>
<i>Results</i>	<p>The success of Geox is related to creativity and innovation, but also to the efficient management of these intangible assets through the support of technologies and organisation. Thanks to an innovative product solution, this company grew from being a micro-enterprise in 1992 (5 employees) to the current turnover of 254.1m Euro and a workforce of more than 5,000 directly or indirectly employed people worldwide. The case of Geox highlights the main features of European competitive strengths in the global economy: creativity, innovation and quality.</p> <p>This case is also representative of the de-localisation strategy for the sector and, most importantly, demonstrates how a business idea can lead to commercial and economic success when supported by an innovative management of organisation and production.</p>

HENNES & MAURITZ (SWEDEN)	
<i>Background</i>	<p>H&M is well known for being a successful and expansive company, both in terms of market and of financial performance. The company's strategy is implemented along the lines of continuous expansion and search for most promising markets, cost-efficient production of goods, and reduction of lead times.</p> <p>H&M is also an example of competitive advantages brought by integrated e-business solutions. Procurement and logistics departments can track sales and stock status as, owning the stores, they share a common IT platform. This allows the company both to react quickly whenever new trends are identified and to avoid procurement of goods which are not appreciated by the market. H&M also relies on efficient and integrated systems for inventory management which have been able to reduce lead times while ensuring adequate stock management</p>
<i>Activities</i>	<p>H&M sells clothes and cosmetics in about 950 stores in 19 countries. The group has more than 40,000 employees and a turnover of SEK 56,550 million in 2003⁵⁵.</p>

⁵⁵ about 6.1 billion Euro

	<p>Central functions are based in Sweden, but there is a national office in most of the countries where sales are conducted.</p> <p>H&M does not have its own factories, but relies on a network of external suppliers managed through two departments: Buying and Production. H&M's method of production is customer-driven. The company puts a lot effort into research and prediction of emerging trends, both through traditional research means and innovative ones such as street trends. This activity is carried out by central staff and by national offices which are responsible for detecting new trends.</p> <p>The production function consists of 21 production offices. H&M purchases garments from around 750 suppliers: 60% of production takes place in Asia and the remainder mainly in Europe. In recent years, H&M has reduced the average lead time by 15-20% through developments in the buying process. Flexibility and short lead times diminish the risk of buying the wrong items and allow stores to restock quickly with the best selling products.</p> <p>IT is a crucial tool along the entire value chain. Individual stores are connected with the logistics and procurement departments and the central warehouse. From central departments, it is possible to follow-up sales of individual items, thus feeding an intelligent procuring system. The company relies on IT integration between the central office and the production offices. Communication between departments takes place electronically, including design and product development.</p>
Results	<p>Main reasons explaining the success of H&M are:</p> <ul style="list-style-type: none"> • Organisation of production and integration of the supply chain; • Vertical integration with the distribution network, allowing direct control of market and customers; • Continuous and efficient collection of information on demand which allows cost-efficiency and shortening of lead times

TEXTILEBUSINESS.IT (ITALY)	
Background	<p>Textilebusiness.it is an electronic marketplace digitally covering the entire process of relations among various players in a supply chain. Firms involved are located in the textile district of Como (I). The case study illustrates how critical the standardisation issue is for B2B integration. It also shows that SME migration towards e-business is a rather long-term process, even under favourable conditions and despite the support of external funding.</p>
Activities	<p>Textilebusiness is an example of electronic integration of the supply chain, allowing participants to take advantage of an e-business solution at low cost. The solution is based on a peer to peer ("P2P") architectural paradigm in which communication among participating firms is totally symmetric.</p> <p>Compared to traditional marketplaces, where a central server manages the system, in Textilebusiness.it the central platform acts as a directory which localises the counterpart. Once the identification has taken place, direct communication is established between the two parties. Participants only need to use an interface bridging XML standardised messages from other knots with their own information system.</p> <p>The real challenge, within this project, has been the standardisation of the communication protocol (i.e., the definition of a commonly shared "vocabulary") that describes documents to be exchanged: orders and sub-contractors specifications,</p>

	<p>confirmation or modification of orders, transport documents and packing lists, fabric technical sheets.</p> <p>The two SMEs involved in the initiative estimate that the implementation of Textilebusiness.it allowed them significant time savings and error reduction. This was achieved with a very limited investment thanks to the public funding of the initiative. Despite several and documented benefits, however, the participant companies find it difficult to involve other partners. Reasons behind this reluctance are: cultural barriers, the types of information system present in the partner enterprises (some of which have no management systems) and the amount of investment required. Though limited (the estimate is around 10,000 – 12,000 Euro), this amount still represents a major hurdle for small firms.</p>
<p><i>Results</i></p>	<ul style="list-style-type: none"> • The principal benefit of this initiative is that it allows independent SMEs to implement methods of trade which are not normally open to them. The absence of a large hub company normally limits the possibility of implementing complex trade systems due to the amount of investment required and due to cultural barriers. In this case, independent SMEs undertook an integration process even without the leadership of a parent company. • An important lesson to be learned from this experience is the amount of time required to implement an initiative of this kind. • On the technology side, complexity is relatively limited, but translation and standardisation of communication vocabulary is very time-consuming, even for companies that have always worked together in the same district.

2.1.4 Conclusions: e-business opportunities and challenges

Exhibit 2.1-7: Overview of e-business related opportunities and challenges for firms from the textile, clothing and footwear industries

Opportunities	Challenges
<ul style="list-style-type: none"> • Speed up of information flows • Decrease of supply chain management costs • Extending market reach and improving visibility via marketplaces • Reduction of stocks through online selling • Enhanced collaboration with business partners • Efficiency gains in internal processes 	<ul style="list-style-type: none"> • General backwardness and large share of Internet refuters • Sophisticated technologies and applications less diffused than in other manufacturing sectors • Need to develop new skills • Standardisation

Source: e-Business W@tch (2004)

Opportunities

Speed up information flows is crucial in a sector where mass individualisation requires small batch production, short lead times and proximity to the final customer.

Decrease of supply chain management costs. Using e-business to decrease cost and error rates in commercial transactions could be a driver for e-business. Due to the large number of transactions and exchanges along the value chain, even limited improvements can turn into significant savings. Benefits can be documented and good practices could be shared, although experience of the case study interviewees indicate that there are still relevant cultural barriers.

Extend market reach. The Internet offers smaller companies the opportunity to make their offer known to a larger target. The number of firms actively using electronic marketplaces is very limited in

this sector (1% of the firms) and the number of operating e-marketplaces⁵⁶ is, in turn, very low if compared to the importance of the sector in the overall economy. It is worth noting, however, that this number has been increasing in the past two years.

Another opportunity offered by the Internet is the opportunity to **sell stock** at reduced prices through an alternative sales channel and using different sales methods. This allows companies operating, for example, in the higher and/or highly seasonal market segments to maintain or even increase sales without damaging their image.

Major advantages can be gained from a better **collaboration with business partners**. Globally dispersed partners can be connected and integrated efficiently.

One of the most important and under-exploited opportunities of e-business is to **improve the efficiency of internal working processes** and achieve productivity gains. Currently only around 20% of firms in this sector record significant impacts in this area, leaving ample room for improved exploitation.

Challenges

A major threat for the sector is represented by the **general backwardness** with regard to ICT usage and awareness. This is widespread throughout the whole value chain and especially among SMEs. Several factors are affecting this situation, among which the relatively low level of specific training and education conducted inside companies is the most important.

Companies getting involved in e-business need to change their business attitudes and culture. They may also face the need for personnel training to adapt to new roles or to the evolution of previous ones. Technical concerns and **insufficient e-business skills** emerge as the main risk factors in this respect.

Last but not least, the lack of data standards affects the possibility of implementing online data exchange

2.1.5 Outlook

The evolution of the competitive scenario in the textile industries will increase dependence on suppliers, customers, technology providers, service providers, intermediaries etc., possibly geographically spread. In such a complex organisation context, efficient management of information flows is fundamental in all company functions. E-business solutions aimed at gaining higher efficiency and integration along the whole value chain will increasingly be needed. E-business could also positively impact on other activities such as: co-design and related assistance, negotiation, administration management of the relation between fabric makers and their customers, technical production specifications, quality control .

Survey data, however, demonstrate that electronic business is not yet part of everyday practice for many companies in these industries. Firms' statements about future importance of e-business and expected expenditures on e-business, moreover, support the view of e-business as a complementary element rather than a predominant asset and confirm that limited ICT dynamics can be expected in the near future.

These industries show a set of features which have been delaying a full exploitation of e-business potential. These features are related to the companies' size and the cultural attitude, lack of trust and knowledge, as well as problems related to ICT competences. The gap in ICT adoption and usage with respect to other manufacturing sectors as well the delay of firms in recognising the role of ICT in everyday activities are becoming a risk factor for European firms across all size bands.

⁵⁶ According to E-marketplaces in the Textile and Leather Sector, issued by ICE (Italian Institute for External Trade), the worldwide number of electronic marketplaces operating in the textile, clothing and leather industries was 45 in October 2003 (<http://www.emarketservices.com>).

**Exhibit 2.1-8: Overview of e-business enablers and barriers
in the textile, clothing and footwear industries**

Enablers	Barriers
<ul style="list-style-type: none"> • Distribution and market pressure to increase efficiency • International competition and resulting pressure on cost saving and counterfeit production 	<ul style="list-style-type: none"> • Cultural barriers • Negative market trends • Limited degree of computerisation and diversity of information systems; lack of ICT integration • Concerns about security

Source: *e-Business W@tch* (2004)

Successful companies will try to maintain and gain access to the final customers and to exploit strategic advantages from this situation. This will be important even in the management of relationships with partners and providers. It can be expected that, besides ICT investments aimed at optimising the supply chain and reducing transaction costs, there will be large efforts made in addressing the area of customer monitoring.

Selected references

e-Business W@tch (2003). The European e-Business Report 2003 edition. A portrait of e-business in 15 sectors of the economy. Second Synthesis Report of the *e-Business W@tch*. Luxembourg: Office for Official Publications of the European Communities.

DTI (UK Department for Trade and Industry). E-commerce Impact Study of the Footwear sector, 2002

Euratex. European Research in the Textile and Clothing sector. Common Strategy Paper. March 2002

Report on the promotion of competitiveness and employment in the European footwear industry (2001).

Commission of the European Communities.

The textile and clothing industry in the EU. A survey. Enterprise papers N°2, 2001. DG Enterprise. Available at <http://europa.eu.int/comm/enterprise/library/enterprise-papers/paper2>

Impact of electronic commerce on the textile industry. CELTTA, 2000

OECD, EBIP project. Textile-clothing sector in Italy. Future Centre Telecom Italia Lab, 2001. Available at <http://www.oecd.org/dataoecd/41/11/2675551.pdf>

Textile and Clothing Strategy Group, A National Strategy for the UK Textile & Clothing Industry, 2002

Web sources

ANCI Italian Association of Shoe Makers (<http://www.anci-calzature.com>)

European Confederation of Footwear industry (<http://www.cecshoe.be>)

Euratex (European Association of Textile Industries) (<http://www.euratex.org>)

SATRA, (Shoe & Allied Trades Research association) (<http://www.satra.co.uk>)

2.2 The chemical industries

2.2.1 Economic profile

The combined chemical industries, as defined for the purpose of this study, consist of two sectors in the sense of the NACE Rev. 1 classification of business activities: the manufacture of chemicals, chemical products and man-made fibres (NACE Rev. 1 Division 24) and the manufacture of rubber and plastic products (NACE 25). This combined sector consists of the following nine NACE groups:

Exhibit 2.2-1: Configuration of the chemical industries in terms of NACE Rev. 1

NACE Rev. 1		Activity
Division	Group	
24		Manufacture of chemicals, chemical products and man-made fibres
	24.1	Manufacture of basic chemicals
	24.2	Manufacture of pesticides and other agro-chemical products
	24.3	Manufacture of paints, varnishes and similar coatings, printing inks and mastics
	24.4	Manufacture of pharmaceuticals, medicinal chemicals and botanical products
	24.5	Manufacture of soap, detergents, cleaning, polishing
	24.6	Manufacture of other chemical products
	24.7	Manufacture of chemical fibres
25		Manufacture of rubber and plastic products
	25.1	Manufacture of rubber products
	25.2	Manufacture of plastic products

While this classification is typically used for economic statistics, participants from the chemical industry are used to split their sector into sub-sectors in a different way which better reflects the peculiarities of value chains and business relationships in the different sub-sectors. The resulting four main areas of the combined chemical industries are:

- **Basic chemicals**, commodities, in the sense of standardised products that are bought in huge amounts with price being the major decision criterion for the buyer
- **Fine and speciality chemicals**, using basic chemicals as a major input to produce a large variety of special substances, often in relatively small volumes
- **Formulated chemicals**, includes the pharmaceutical industry; products that are mostly produced for end use by individuals, government institutions or other companies and not as inputs for other parts of the chemical industry
- **Rubber and plastic products**: The rubber industry's most important customer is the automotive industry (tyres accounting for about half of production); firms from the plastics industry concentrate either on extrusion or are integrated forward into the production of fabricated products, such as complete windows and doors or thermoformed containers.

Industry structure and employment

The combined chemical industries comprise roughly 72,000 enterprises and provide jobs for about 3.1 million people in the former EU-15. Comparable statistics for the new EU Member States still have many gaps which make it difficult to estimate total employment. Without Poland, the figure is close to 3.3 million people. Rubber and plastics (NACE Rev. 1 25) comprise almost twice the amount of chemical enterprises (NACE 24), but employ slightly less people and generate less than half the amount of value added. These relations indicate the importance of SMEs in the rubber and plastics products sector compared to the chemical products sector. In NACE 24, more than two thirds of the employees work in large enterprises, and more than three quarters of the value added are generated in large enterprises. The relative importance for employment in relation to other manufacturing sectors varies between countries, but in most cases is between 8-13%.

Market size

The total production value of the combined chemical industries in the European Union is about 735bn Euro. 72% stems from the chemical industry (NACE 24), 28% from the rubber and plastics industry (NACE 25). In both NACE 24 and NACE 25, value added at factor cost is roughly one third of the production value, reflecting the great importance of direct production inputs. Much of this input comes from the chemical industry itself; energy and commodities are other important inputs.

Productivity and labour costs

Productivity in the chemical industries is high compared to other sectors. In 2001, in the former EU-15 value added per person was 91,724 Euro in NACE 24 – 80% more than the manufacturing average. The high productivity is driven by the basic chemical industry which operates in very competitive markets for input and output and keeps profit margins high only by producing as efficiently as possible.

In the 15 original EU Member States of 2003, labour costs in the chemical industry (NACE 24) are much higher (+40%) than in the manufacturing industries average, while labour costs in the rubber and plastics industry (NACE 25) are slightly lower (-6%). In the 10 new Member States, labour costs amount to only about one fifth of the labour costs in the Member States in both chemicals and plastics production.

Trends and challenges

The chemical industries are a mature sector with rather stable and predictable demand and supply, but even such a sector was affected by the overall economic downturn of the past few years, and more recently by a massive increase of the prices for oil and gas. Although the various sub-sectors manufacture a broad variety of products which are used in very different contexts and areas of life, supply goods for other industries account for the majority of production, for example for the automotive industry, for packaging and for construction. As a consequence, these sub-sectors of the chemical industries are more susceptible to economic cycles than, for example, the pharmaceutical industries.

According to Cefic, the European Chemical Industry Council, 2003 was a difficult year for the sector, with the majority of sub-sectors experiencing only weak growth of 0.6%⁵⁷. Even if Cefic predicts a modest recovery for 2004/05 with EU chemicals output (excluding pharmaceuticals) up 2% (2004) and 2.7% (2005), the pressure to consolidate business will remain. BASF, a global leader of the chemical industries, forecasts annual growth rates for the sector that are below those of the world economy, in contrast to the situation in the previous 20 years. If so, the chemical industries will focus on realising cost saving potentials even more. In this respect, ICT and electronic business could play an important role, as new technological developments (improved B2B connectivity through web service, for instance) could further increase the cost saving potential of e-business applications.

What is at stake in this context is the competitiveness of the European chemical industry. According to a recent study on the sector's long term perspectives issued by Cefic⁵⁸, the sector has suffered a significant decline in its profitability since the year 2000 and has entered into a period of significant uncertainty. The competitiveness of the industry is at risk and "needs urgent action to be improved".

2.2.2 Diffusion of ICT and e-business in 2003/04

The combined chemical industries have been a rather conservative sector when using information and communication technologies for linking business processes and interacting with their suppliers and customers. However, this does not mean that companies from the sector refuse adoption and innovation. It means rather that management in chemical companies often presses harder for figures on return-on-investment before approving the implementation of new IT architectures or software

⁵⁷ Cefic Press Release, 5 March 2004: EU chemical industry set for modest recovery after difficulty year.

⁵⁸ Chemical Industry 2015. Study issued by Cefic. Cf. Cefic, Press Release from 5 March 2004.

applications than is the case in other sectors. The main opportunity and current objective of electronic business in the chemical industries is not strictly e-commerce related. In essence, it addresses the improvement of business processes with respect to efficiency, quality assurance and speed. The following business objectives and related application areas were found to be among the most important ones in this sector:

Exhibit 2.2-2: The importance of various e-business objectives and applications in the chemical industries in overview

E-business application area	Importance	Remarks
Facilitate remote and mobile work (fieldworkers, homebased telework)	~ ~	Large companies are well equipped with remote access technology, SMEs less so.
Improve knowledge management by using special software	~ TM	Although some sub-sectors are highly RTD intensive, KM software is not widely used.
Automate internal business processes	~ ~ ~	Improving the efficiency and quality of business processes (internally and between trading partners) is a key priority in the sector
Improve ERP-to-ERP connectivity	~ ~ ~ TM	Key e-business application area in the chemical industries. The objective is to realise cost saving potentials by making supply chain processes more efficient. The chemical sector has the highest diffusion of ERP systems (in % of enterprises using them) among all 10 sectors benchmarked.
Supply chain process integration	~ ~ ~ TM	The sector is one of the most intensive users of SCM solutions. Application and focus are closely related to ERP objectives.
Decrease direct procurement costs through e-procurement	~ ~ ~	As in other sectors, larger companies pursue the goals of streamlining the selection of their supply firms and saving procurement costs.
Web-based e-marketing and customer related services	~ TM	Not yet widely developed, but could gain importance in the future.
Electronic customer management	~ TM	Although diffusion of CRM systems is slightly above the all sector average, CRM is not a key issue.
E-commerce: Increase sales volume / area through selling on the Internet	~	Selling online through the company website is not a priority for chemical companies. However, companies could turn to electronic sales once e-procurement objectives have been accomplished.
B2B marketplaces on the Internet	~ ~	The function of "marketplaces" has shifted from providing platforms for buying/selling to providing connectivity services.
Use of e-business standards for exchanging structured data	~ ~ ~	Chemical industries are in a preferred position to benefit from standardisation since many of the products traded can easily be categorised (e-catalogues).
Web services and XML based standards	~ ~	Companies themselves are not yet convinced about XML. However, it could become the main standard for electronic transactions in the future.
Extended enterprise: collaborative (online) e-product design	~ TM	Average use of e-product design technologies. Depends on sub-sector.
~ = little relevance; ~ ~ = average relevance; ~ ~ ~ = very relevant; ~ ~ ~ ~ = high relevance for sector TM = mixed results, depending on the sub-sector within the combined chemical industries		

Source: e-Business W@tch (2004)

ICT infrastructure

On the European E-Business Scoreboard (see Chart Report, p. 41f.), the chemical industries rank above average with regard to the ICT infrastructure of companies. However, there is some ambivalence due to the dichotomy of small firms and large companies in the sector. 83% of all employees in the chemical industries work in companies that have connected their computers with a Local Area Network (LAN), which is a basic indicator of whether the minimum requirements for electronic business on a significant level are in place. However, these are only 40% of all enterprises.

Among the remaining 60% of all firms there are many micro-companies that do not connect their few computers internally.

Remote access solutions are significantly more prevalent in the chemical industries than in other sectors. Internet access, at least basic forms of access, are a given. More than 85% of all firms and more than 95% of all companies with more than 10 employees are connected, and a vast majority of firms uses WWW and e-mail. Close to 40% of all large companies report that the bandwidth of their Internet access is 2 Megabit/s or more, compared to 21% of medium-sized companies and less than 10% of the small firms.

Exhibit 2.2-3: Use of ICT Infrastructure by firms from the chemical industries

	Local Area Network	Wide Area Network	Remote access to company network	Wireless remote access to company network	Internet access
Sector total (EU-5)	N=502	N=502	N=502	N=502	N=502
% of employment	83	48	57	12	99
% of enterprises	40	9	23	5	96
0-9 employees	22	2	15	3	93
10-49 employees	53	10	26	6	100
50-249 employees	88	31	51	12	100
250+ employees	92	70	71	17	100
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	61	29	37	10	95
% of enterprises	32	5	16	4	89

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2004)

Internal business processes

Knowledge management and e-learning: In the chemical industries, 62% of all employees work in enterprises that have implemented an Intranet, while only 12% report that they use a special knowledge management solution and 8% use e-learning tools. However, "knowledge management" has been a buzz-word for years. Related software normally has close links to the Intranet, and in some cases – in particular among SMEs – the Intranet is the de facto "knowledge management" system of a company.

Online technologies for internal processes: Sharing documents to perform collaborative work has become quite common among enterprises from the chemical industries, even among some of the smaller ones. The diffusion of IT solutions for other, more specific applications is less advanced in the sector, but still in all cases above industry average. Companies accounting for 33% of employment use online technologies to track working hours and production time, 28% to support the human resources management and 16% to automate the travel reimbursement of employees.

ERP: Enterprise Resource Planning systems play an important role in supporting the connectivity between enterprises. In fact, improving the ERP-to-ERP connectivity between enterprises is one of the main objectives of many e-business projects in the chemical industries. Some of the major electronic marketplaces and interconnection hubs of the industry address this issue and help to realise this connectivity. Compared to other industries, the preconditions for realising ERP-to-ERP connectivity, and thus fully integrated electronic business, are very good in the chemical industry. Chemicals are easy to describe and easy to classify, and product catalogues have gained acceptance quite quickly. The sector exhibits one of the highest diffusion rates of ERP systems among the sectors analysed by the *e-Business W@tch* since 2002.

Exhibit 2.2-4: ICT use for internal business processes in the chemical industries

	Use an Intranet	Use an ERP system	Use online technologies ...		
			to share documents for collaborative work	to track working hours and/or production time	to support human resources management
Sector total (EU-5)	N=502	N=502	N=502	N=502	N=502
% of employment	62	48	55	33	28
% of enterprises	22	13	24	11	7
0-9 employees	9	5	15	7	4
10-49 employees	32	14	27	13	7
50-249 employees	58	43	53	26	22
250+ employees	79	61	67	45	41
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	45	19	40	20	21
% of enterprises	21	5	22	5	5

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Electronic procurement and supply chain integration

Electronic procurement: 32% of all companies from the sector, which account for more than 50% of employment, say that they order direct supply goods and/or MRO goods online from suppliers. However, when leaving aside companies that say that online purchases account for less than 5% of their total purchases, figures fall to less than half. About four out of five companies that buy supplies online say they order from their suppliers' websites. Special B2B marketplaces on the Internet, ordering via EDI and through extranets of suppliers is less common. EDI connections in particular are not widely used in the chemical industries. It is very difficult to assess the actual volumes or even the industry wide total share of online purchases compared to the level of traditional forms of ordering and purchasing goods and services. A simple computation of the answers received from chemical companies, assuming that the average share will rather be towards the lower end in each of the ranges offered as options for their answer, suggests that EU companies from the chemical sectors made about 5% of their total purchases online in 2003.

Exhibit 2.2-5: Electronic procurement and supply chain integration in the chemical industries

	Make online purchases	Online purchases account for at least 5% of total volume	IT system is integrated with that of a supplier for placing orders	Use an SCM (Supply Chain Management) system
Sector total (EU-5)	N=502	N=502	N=502	N=502
% of employment	51	23	6	13
% of enterprises	32	13	4	4
0-9 employees	23	11	3	1
10-49 employees	39	14	6	7
50-249 employees	50	22	6	7
250+ employees	56	25	8	19
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516
% of employment	46	23	8	6
% of enterprises	31	18	6	2

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Supply chain integration: It comes as a surprise that only 4% of all companies from the sector say that they have integrated their IT system with that of their suppliers for placing orders. This is below the average share of integrated enterprises in other sectors and holds true even for large companies (8%). On the other hand, this assessment is somewhat in contrast to the diffusion of Supply Chain Management (SCM) systems. The level of SCM adoption among chemical companies is actually one of the highest among the ten sectors analysed by the *e-Business W@tch* in 2003/04. However, as in all sectors, SCM systems are mainly installed in large enterprises (19%).

Customer facing processes

Results of the e-Business Survey 2003 indicate that the use of e-business applications for marketing and sales purposes has not yet reached the same level as the use for other business functions. Since chemical companies seem not to have exploited the full potential of e-marketing and sales, it can be a business opportunity to assist companies in developing these skills with a sector-specific approach. Currently, less than 10% of all companies from the chemical sectors let customers order their products online, and only 3% of all firms allow online payment for products ordered online. Also, only 3% have implemented an online sales system with capability for secure transactions. Since many chemical companies trade predominantly with a limited number of business partners, CRM systems are not widely diffused, albeit slightly above industry average (16% compared to 13% on average). 17% of medium-sized enterprises and 19% of large companies from the chemical sectors use a customer relationship management system.

Exhibit 2.2-6: Electronic marketing and sales in the chemical industries

	Have a website on the Internet	Use a content management system to maintain website	Make online sales	... of those:	
				Allow online payment of products ordered	Online sales system with secure transactions capability
Sector total (EU-5)	N=502	N=502	N=502	N=48	N=48
% of employment	84	17	9	35	63
% of enterprises	50	9	8	37	42
0-9 employees	39	6	7	--*	--*
10-49 employees	59	11	10	--*	--*
50-249 employees	82	16	8	--*	--*
250+ employees	96	23	10	--*	--*
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=598	N=598
% of employment	66	22	16	43	59
% of enterprises	35	9	9	38	46

Base (100%): all enterprises / enterprises making online sales. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). * Percentages not displayed because base of cases observed is too small. Reporting period: March/November 2003.

Source: *e-Business W@tch* (2004)

2.2.3 Case studies

This chapter features abstracts and key lessons learned from case studies which are presented in more detail in the 2nd Sector Impact Study from August 2004.

SLOVNAFT (SLOVAKIA)	
<i>Background</i>	Slovnaft is a refinery and petrochemical company based in Bratislava in the Slovak Republic. Since its privatisation in 1992, the formerly state-run company has aggressively focused on modernising and adopting Western European business practices. In 2002, the management decided to improve business processes by implementing an Oracle e-business solution for e-procurement. The major objectives were to cut down procurement costs and reduce paperwork.
<i>Activities</i>	<p>From January 2002 to February 2003, Slovnaft upgraded its Global Enterprise Manufacturing Management information System (GEMMS). As a result, the purchasing process became digitally integrated at a satisfactory level. Procurement control was increased significantly and centralized from different systems to a central one for the whole company. While small orders can thus be automatically processed, product orders which exceed a certain cost have to be purchased on the basis of a tendering procedure. Slovnaft uses electronic auctions, including reverse ones.</p> <p>To facilitate the ongoing search for new potential suppliers, Slovnaft integrated its business software applications with ChemUnity.com, the first European vertical B2B marketplace in the chemical industry. Slovnaft also uses the horizontal marketplace Trade2B.com for electronic Requests for Quotations (eRFQ) and for reverse auctions.</p>
<i>Results</i>	<ul style="list-style-type: none"> • Company-wide integration of purchasing processes: The upgrade to the new e-Business Suite (by Oracle) contributed substantially to integrating a large number of formerly separated applications into one central online system for the whole company. • Reduced direct procurement costs: electronic auctions have helped to reduce costs for purchasing supplies. • Reduced time for accomplishing tasks: Slovnaft estimates that the new systems reduced the time for materials' balancing from two hours per day to 15 minutes, and for a calculation of the 10-days' production costs from 15 to 2.5 hours. • The new system substitutes former paper-based workflows and helped to standardise and increase the transparency of the purchasing processes.

SPECIALCHEM (FRANCE)	
<i>Background</i>	SpecialChem, founded in April 2000, is a gateway to several portals on the Internet which offer a variety of information and support functions for users of chemical products. While all online services delivered through the portals are provided for free, the company uses its community as an asset to offer targeted marketing and sales support to its business clients from the chemical industry itself.
<i>Activities</i>	SpecialChem's business model is based on two closely interrelated activities: community building via Internet portals, and the provision of electronic marketing services on behalf of clients. The approach is interesting as the first of these two business areas does not create any income for the company by itself, but provides the "intelligence" necessary for the second.

	<p>Activity 1: The portals – communities of users of chemical products: SpecialChem is a gateway to several portals on the Internet which offer (for free) a variety of information and support functions for users of chemical products. The user community currently comprises 80,000 registered firms and individuals ("members"), with about 3,000 new registrations per month.</p> <p>Activity 2: Carrying out e-marketing and sales promotion for clients: From this activity, SpecialChem earns its income by organising targeted e-marketing and promotion activities for clients. This activity exploits the database of product users and the profound knowledge about these users collected via the various portals.</p>
<i>Results</i>	<ul style="list-style-type: none"> • The use of ICT for marketing and sales purposes is still remarkably under-developed in the chemical industries, according to SpecialChem's experience. The company says that there are still many companies which do not even know the e-mail addresses of their customers, or at least have not organised them in a way that they could be used even for simple direct mailings. • SpecialChem expects that the e-business focus in the chemical industries will shift from cost cutting and optimising supply processes to marketing. A lot of players, the large ones in particular, have already optimised their supply side processes in highly sophisticated ways or are in the process of doing so. Once this has been accomplished, they may search for better ways to market new products and to extend their markets.

BASF (GERMANY)	
<i>Background</i>	<p>BASF is one of the world's leading chemical companies, headquartered in Ludwigshafen, Germany, with production sites in 41 countries and customers in more than 170 countries worldwide. In response to growing pressures on its commodities business, BASF turned to modern e-business solutions to contain costs. It has successfully implemented a customer focused supply chain integration initiative using Internet and extranet hub portals conforming to the leading industry eChem Standards™.</p>
<i>Activities</i>	<p>BASF has actively engaged in standards development and implementation for chemical e-business since the mid 1980s. Initially the focus was mainly on EDI and tailored one-to-one solutions. During 2000-2001, together with a small number of leading chemical companies and partners, BASF were instrumental in developing the first version of Chem eStandards™. Since then BASF and its partners continue to encourage the adoption and use of Chem XML through a partnership process for standardization and simplification.</p> <p>BASF conduct their e-business activities mainly via its own portal WorldAccount, an integrated global extranet platform for customers, and through the Elemica network. By the end of 2001 WorldAccount had seamlessly integrated the existing regional BASF industry portals for different product categories. BASF's ERP is linked to Elemica, a neutral e-marketplace acting as a transaction hub for the purchase and sale of basic, intermediate, specialty and fine chemicals. BASF uses the Elemica Buyer Direct and the Elemica Seller Direct solution as a "lite" working channel to small and medium sized companies.</p> <p>Vendor managed inventory is the main instrument for building up an integrated supply chain network. BASF has just launched its VMI (Vendor Management Inventory) solution which makes full use of the Chem eStandards™ data structure and processes.</p>

<p><i>Results</i></p>	<ul style="list-style-type: none"> • Online ordering is increasingly becoming a daily routine for BASF's customers. The average number of monthly system-to-system messages carried over various channels (EDI, VPN, ISDN, Internet, extranet) has doubled from 2000 to 2003 and is expected to increase by 35% in 2004 (as compared to 2003). • BASF's sales through WorldAccount, its global e-business portal, exceeded 2bn Euro in 2003. In total during 2003, 11.25% percent of BASF's global sales volume amounting to 3.7bn Euro was conducted electronically. • The channel strategy and expectations vary across segments. For instance, while BASF offers and sells fine chemical products through its global e-commerce platform, the majority of these products is traded through its own customer sales force.
-----------------------	--

2.2.4 Conclusions: e-business opportunities and challenges

Exhibit 2.2-7: Overview of e-business related opportunities and challenges for firms from the chemical industries

Opportunities	Challenges
<ul style="list-style-type: none"> • Save costs by improving the efficiency of supply chain processes, in many cases with a rapid return on investment • Reduce the error rates in B2B transactions by eliminating paper-based processes • Faster accomplishment of tasks by using electronic planning and controlling tools • For buyers: reduced procurement costs • Possibly, not yet exploited: innovative, better focused marketing approaches to reach new customers 	<ul style="list-style-type: none"> • For suppliers: further pressure on profit margins due to sophisticated e-procurement mechanisms (such as e-auctioning) • Investment risks due to uncertainty about the technology and market development: potential lock-in to specific applications and B2B connectivity modes

Source: e-Business W@tch (2004)

Opportunities

Save costs by improving supply chain processes: In the chemical industries, the main opportunity of e-business for companies is to save processing costs. This is achieved by improving the efficiency of business processes in transactions between trading partners and related processes within the company. Cost saving potential of systems and standards for electronic supply chain processes can be regarded as proven, as the Case Studies on BASF and Slovnaft demonstrate, at least for large firms. The question is whether this will lead to a win-win-situation or whether large companies are the main beneficiaries.

Reducing error rates by eliminating paper based processes: As per definition, doing business electronically aims to eliminate paper based processes. In some cases, this can even be an explicit objective for implementing e-business systems. The main advantage for the company is that the error rate in transactions with other firms tends to decrease in parallel with reducing the handling of printed documents. This increases the quality of business processes and can ultimately help to save costs.

Faster accomplishment of tasks: In manufacturing sectors, integrated electronic supply chain systems help companies to perform various planning and controlling tasks much more quickly. The Slovnaft case study shows that, after implementing an e-procurement suite, the company was able to reduce the time for materials' daily balancing from two hours per day to 15 minutes, and for calculating the 10-days' production costs from 15 to 2.5 hours.

Reduced procurement costs: Case studies have demonstrated that companies were able to reduce direct procurement costs by more than 10% after introducing an electronic purchasing system. The e-Business Survey 2003 has shown that 50% of those companies from the sector that make online purchases observe positive effects on direct procurement costs (45% have not however, observed any effects on direct costs). Thus, although the main objective for e-purchasing systems is to improve processes, direct savings are certainly an opportunity for buyers, and electronic auctions can be an instrument in achieving this effect.

Targeted marketing strategies to reach new customers: Many firms from the sector have already made substantial progress in exploiting supply side e-business opportunities. It is, therefore, plausible to assert that attention will gradually shift toward customer facing strategies.

Challenges

Erosion of profit margins: While saving procurement costs is an opportunity for buyers, it equally puts pressure on suppliers. It has long been observed and pointed out that electronic procurement schemes of large companies may eventually lead to an erosion of profit margins. The underlying mechanism is as follows: Electronic purchasing tools reduce the transaction costs for purchasers to solicit offers from potential suppliers. As a consequence, more suppliers can be invited to make a bid, which naturally increases the level of competition. In other words, e-procurement is a double-edged sword for suppliers: they can benefit from improved access to the supply chains of potential customers, but they have to pay a price for this convenience in the form of increased competition, as their competitors enjoy the same advantage.

Costs for technology implementation / investment risks: About 40% of those firms from the sector that say that electronic business does not yet play a role in their day-to-day operation argue that the required applications "are too expensive".⁵⁹ Whether something is "too expensive" or not is always measured in terms of return on investment (ROI) and amortisation time. The return on ICT investments can be very difficult to measure. As a consequence, upgrading the ICT network or introducing new ICT supported processes can bear considerable investment risks for companies.

2.2.5 Outlook

Electronic business as an accelerator of process innovation

Electronic business has accelerated the speed of process innovation in the sector compared to the pre-digital era. There is an ongoing process of further improvements and refinements of the systems. It can be quite demanding for companies to follow this constant innovation and to draw the correct conclusions about adoption. Know-how about the state-of-the-art in electronic business, however, can be regarded as a basic, indispensable skill for firms operating in today's international business environment. In a way, managing electronic relationships with customers and vendors is a natural extension of managing the same kind of relationships in a traditional, more paper-based way. Top-down approaches that might have caused a radical change in the way in which firms trade with each other have not been successful in this sector. The partial failure of the "electronic marketplace" concept in this sector (as in other sectors) is an example supporting this assessment.

If this assessment holds true, it is unlikely that ICT and electronic business will be a force that exerts a major impact on the structure of the sector, at least not beyond the point which it already does today. Moreover, the impact potential of information and communication technologies on product innovation and on production is not as pronounced as in other sectors where these technologies are more intensively used in the production process (for example in transport equipment manufacturing) or are even part of the products themselves (as in the electrical machinery and electronics industries, or in ICT services).

⁵⁹ Result of the e-Business Survey 2003, carried out by the *e-Business W@tch*. Data are reported in Sector Impact Study No. 02- I (May 2004).

Exhibit 2.2-8: Overview of e-business enablers and barriers in the chemical industries

Enablers	Barriers
<ul style="list-style-type: none"> • International competition and resulting pressure on exploiting all cost saving potentials • Structure of supply chain processes in the sector is well suited for B2B online trading • Sector is well suited for use of e-standards • Growing maturity of e-business software and focus of providers on the not-yet-exploited small company market 	<ul style="list-style-type: none"> • Reluctance to re-engineer business processes among smaller firms • Dichotomy between large players and small firms • Shortage of investment capital after the overall economic downturn

Source: e-Business W@tch (2004)

On the other hand, electronic business should not be dismissed as not being important. There are certainly (proven) opportunities for companies, with implications for the sector and its value chain. Firms may gain a – temporary – competitive advantage from possessing better e-business skills than their key competitors. As with all innovations, imitation and replication will level out this advantage over time, resulting in increased aggregate productivity. There is certainly still a long way to go before e-business has reached this stage of maturity in the chemical industries.

Selected references

- AMR Research (2004): “Omnexus closes, Elemica benefits”, AMR Research, Alert Highlight, January 07, 2004.
- Cefic, News Releases (5 March 2004): EU chemical industry in 2015: Bleak future unless urgent action taken now; EU chemical industry set for modest recovery after difficult year.
- CIDX News Release (4 May 2004): CIDX® Announces Availability of Chem eStandards ® Version 4.0. <http://www.cidx.org/images/pdfs/CIDXChemeStandards40Available.pdf>
- e-Business W@tch (2004). A Pocketbook of e-Business Indicators. A portrait of e-business in 10 sectors of the EU economy. Luxembourg, Office for Official Publications of the European Communities.
- e-Business W@tch. E-Business Sector Studies on the Chemical Industries (July 2002, Feb. 2003, July 2003, May 2004). Published in electronic format at <http://www.ebusiness-watch.org>
- Economic impact of inadequate infrastructure for supply chain integration (Planning Report 04-2) / prepared by RTI International for National Institute of Standards and Technology, June 2004.
- Elemica Networking Conference, Cologne, 2-3 Dec. 2003. Proceedings.
- The Wall Street Journal Online (2004): “Top online chemical exchange is an unlikely success story”, Wall Street Journal Online (www.wsj.com), Article from January 8, 2004.
- Various information from the following websites
 EMarketServices (www.emarketservices.com), Elemica (www.elemica.com), ChemConnect, (www.chemconnect.com), RubberNetwork (www.rubbertnetwork.com)

2.3 The manufacture of electrical machinery and electronics

2.3.1 Economic profile

The sector as defined by the *e-Business W@tch* comprises the following NACE Rev. 1 business activities: the manufacture of office machinery and computers (NACE Rev.1 30), of electrical machinery and apparatus (31), and of radio, television and communication equipment and apparatus (92.2).

Exhibit 2.3-1: Configuration of the electrical machinery and electronics industries

NACE Rev. 1		Activity
Division	Group	
30		Manufacture of office machinery and computers
	30.1	Manufacture of office machinery
	30.2	Manufacture of computers and other information processing equipment
31		Manufacture of electrical machinery and apparatus
	31.1	Manufacture of electric motors, generators and transformers
	31.2	Manufacture of electricity distribution and control apparatus
32		Manufacture of radio, television and communication equipment and apparatus
	32.1	Manufacture of electronic valves, tubes and other electronic components
	32.2	Manufacture of television and radio transmitters and apparatus for line telephony
	32.3	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods

The electronics sub-sectors (NACE 30, 32) form a cluster of closely interrelated firms within the electronics industries. A major part of the products of NACE 32.1 are microelectronics (including semiconductors, passive components and electromechanical devices) which are inputs to the manufacture of computers and other information processing equipment, as well as for many consumer electronics products. The electrical machinery and apparatus industries (NACE Division 31) operate in a rather distinct value chain, even though an increasing number of final products include both electrical and electronic components. The electrical machinery and apparatus industry provides its products to three distinct markets (building industry, manufacture industries and energy production industry).

Industry structure and employment

The electrical machinery and electronics manufacturing sector comprise roughly 75,000 enterprises and provide jobs for about 2.4 million people in the former EU-15. Small companies represent 76% of the total number of companies. Large companies, while accounting for only 2% of all companies in the sector, contribute 66% to the sector's employment. Industry concentration is particularly pronounced in the electronics industries (NACE 30 and 32), where rapid technological progress and the production of standardised high volume electronic products enhanced economies of scale and hence the concentration process.

Market size

The total production value of the combined electrical machinery and electronics manufacturing industries in the former EU-15 was about 470bn Euro in 2001, with about 44% stemming from the manufacture of electrical machinery and apparatus (NACE 31) and 39% from the manufacture of radio, television and communication equipment (NACE 32). In NACE 31 and 32, value added at factor cost was roughly 25-35% of the production value, while in NACE 30 it was about one sixth, reflecting the large importance of direct production inputs in all sub-sectors.

Most of the new Member States are still far behind the former EU-15 in terms of production value and value added (at constant prices), although some of them are already well positioned. In Hungary and

Poland, the industry has seen a promising and rapid development and plays an important role both in a national and international context.

Productivity and labour costs

The manufacture of office machinery and computers is the sub-sector with the highest productivity (76,000 Euro value added per person employed), compared to 45,000 Euro in the manufacture of electrical machinery and apparatus and 53,000 Euro in the manufacture of radio, television and communication equipment. Productivity shows significant variances throughout Europe and even within sectors. The productivity is particularly high for products of sub-sectors needing highly complex operating processes, heavy transactions loads or technically sophisticated products.

Labour costs in the new Member States were only about one quarter to one third (on average) of those in the EU-15 according to Eurostat statistics. These harmonised official statistics date back 2-3 years, and the gap may have narrowed in the meantime. However, the difference is still considerable by all measures.

Trends and challenges

The various sub-sectors of this industry exhibit different dynamics, value chains, and market players. Electrical machinery and apparatus industries (NACE 31) are the more traditional sector, dominated by companies and products, which have been in the market for long periods of time. By contrast, the electronics industries (NACE 30 and 32) belong to a very dynamic and volatile high-tech market.

However, the past two years confronted the industry with a recessive demand scenario in the EU. Western European electronics component and equipment markets declined by about 13% in 2002 and 2% in 2003⁶⁰. In order to counteract this development, the industry has increased investments in research and development, which are key competitive advantages in the sector. R&D is, in particular, the primary competency of fab-less⁶¹ companies, some of which spend 20% of their revenue on R&D.

The production of electronics has become an entirely global business, characterised by international mergers and acquisitions, global price competition, and the formation of regional production clusters specialising in one particular production activity (such as hard-disks in Singapore or LCD screens in Taiwan). Throughout the entire electronics value chain, some trends are omnipresent: labour-intensive, volume manufacturing has been shifted to Contract Equipment Manufacturers (CEMs) in Asia, while Europe and the US retain the high-end, knowledge-intensive stages of the value chain, such as product development and R&D.

Further, intense competition, rapidly declining prices, unpredictable customer demand, and constrained material supplies are facts of life in the global electronics supply chain. The pursuit of higher prices and margins leads to a continuous stream of new products, each able to command a premium price for a short period of time before becoming a commodity. This challenging cycle is faced every day by hundreds of companies operating in practically every segment of the electronics industry.

2.3.2 Diffusion of ICT and e-business in 2003/04

The electrical machinery and electronics industry, and the high-tech sub-sectors in particular, tend to be early adopters of electronic business. Among the 10 sectors studied by the *e-Business W@tch*, this sector is one of the most advanced ones in the use of ICT for doing business. The electronics industry is even more advanced than the electrical machinery sector. Exhibit 2.3-2 summarises the importance of various e-business application areas in this sector.

⁶⁰ Yearbook of Electronics Data 2004, West Europe, Reed Electronics Research, December 2003; estimates for 2003.

⁶¹ Companies that do not fabricate their own products and outsource the manufacture and assembly to a foundry. Their focus is on component or product design.

Exhibit 2.3-2: The importance of various e-business objectives and applications in the electrical machinery and electronics industries in overview

E-business application area	Importance	Remark / example
Facilitate remote and mobile work (fieldworkers, homebased telework)	~ TM	The sector is well equipped with remote/wireless access. This could become an important application area in the future in the electrical machinery sub-sector.
Improved knowledge management	~ TM	E-learning applications are used more than on average in other sectors.
Automate internal business processes	~ ~	Very advanced compared to other sectors in the usage of online technologies to support internal processes. Important e-business application area in the electronics industries.
Improve ERP-to-ERP connectivity	~ ~	ERP is much more used in the electronics sector than average. ERP is used specifically by large companies which implement it to rationalise complex chains of processes.
Supply chain process integration	~ ~ TMTM	Managing the supply chain has a high relevance for the electronics sub-sector. In total, the sector uses SCM solutions more than other sectors do on average. B2B collaboration is also important.
Decrease direct procurement costs through e-procurement	~ ~ TM	Purchasing online is one of the most widely used e-business applications in the sector, for firms from all size-bands, including the purchase of maintenance, repair and operations goods and direct production goods.
Web based e-marketing and customer related services	~ ~ TM	This issue could gain importance in the future. Currently it is more important for the electrical machinery sub-sector than for the electronics companies.
Electronic customer management	~ TM	Not a focus on this sector
E-commerce: Increase sales volume / area through selling on the Internet	~ ~ TM	Enterprises that actually sell online are still the exception, especially in the electrical machinery sub-sector. It could, however, become more important in the near future.
B2B marketplaces on the Internet	~ ~ TM	An important issue for the electronics sub-sector, but less so for the electrical machinery sub-sector. Marketplaces are an accepted channel among companies that use the Internet to sell their products.
Use of e-business standards for exchanging structured data	~ ~ TMTM	The use of e-business standards for exchanging structured data is more widely used in the sector than on average. Most electronics manufacturers use electronic business applications via EDI. E-business standardisation processes have a generally high relevance in the electronics sub-sector and an average relevance in the electrical machinery sub-sector.
Web services and XML based standards	~ ~ TM	Companies themselves remain to be convinced about XML. However, it could become the main standard for electronic transactions in the future.
Extended enterprise: collaborative e-product design	~ ~ TMTM	High relevance for the electronics sub-sector.

~ = little relevance; ~ ~ = average relevance; ~ ~ ~ = very relevant; ~ ~ ~ ~ = high relevance for sector
TM = mixed results, depending on the sub-sector within the electrical machinery and electronics industries

Source: e-Business W@tch (2004)

ICT infrastructure

In most aspects of ICT infrastructure, the electrical machinery and electronics industries are clearly ahead of the industry average consisting of the aggregate value of nine sectors. Basic computer usage is available in nearly 100% of firms in all countries. A LAN (Local Area Network) and remote access are relatively well deployed, whereas a fortiori wireless LAN is much less dispersed. A Wide Area Networks (WAN) is predominantly used by large firms, many of which connect their different establishments or departments by means of a WAN.

Nearly all employees work in firms that have access to the Internet. The growth of the Internet has spawned a number of new application software solutions designed to reduce transaction costs and increase communications efficiency. However, if nearly all companies have access to the Internet, few

of them (15% in EU-5) have invested in a broadband connection equal to or above 2 Mbit/s. 37% of employees in the sector work in firms that have Internet access with more than or equal to 2 Mbit/s bandwidth, whereas only 7% of sector employees work in companies that still use analogue dial-up modems to access the Internet.

*Exhibit 2.3-3: Use of ICT Infrastructure by firms
from the electrical machinery and electronics industries*

	Local Area Network	Wide Area Network	Remote access to company network	Wireless remote access to company network	Internet access
Sector total (EU-5)	N=502	N=502	N=502	N=502	N=502
% of employment	89	55	61	25	98
% of enterprises	60	11	27	7	98
0-9 employees	53	8	24	5	97
10-49 employees	74	9	24	7	99
50-249 employees	93	31	52	14	100
250+ employees	95	75	73	35	98
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	61	29	37	10	95
% of enterprises	32	5	16	4	89

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Internal business processes

Knowledge management: The diffusion of Intranets among companies belonging to the electrical machinery and electronics industries is nearly twice the percentage as on the all sector average (39% compared to 21%). This is directly linked to the larger penetration of WAN and Internet use within the electrical machinery and electronics industries, since an Intranet is often the first, comparatively simple, application which companies can develop within a corporate network.

Online technologies for internal processes: The electrical machinery and electronics sector is very advanced compared to other sectors in the usage of online technologies to support internal processes. The most widely used application is sharing documents online and performing collaborative work using the Internet. 26% of firms in the sector currently use this basic application. Other applications, such as automatic reimbursement of travel costs online, are used to a lesser extent.

ERP: Time to market constitutes a big issue throughout the electronics industry. One of the challenges that the industry has to meet is deciding which products should be manufactured on a continuous basis and which ones on a discrete scheduled basis, with a view to handling market changes and shortened product life cycles. The ability to tie customer point of sale data via a company's advanced planning and scheduling system and an ERP system to the plant floor is providing significant competitive advantages to leading companies. ERP systems are currently used by 13% of enterprises of the sector, representing 45% of employment, which is one of the highest adoption rates across all sectors studied by the e-Business W@tch.

**Exhibit 2.3-4: ICT use for internal business processes
in the electrical machinery and electronics industries**

	Use an Intranet	Use an ERP system	Use online technologies ...		
			to share documents for collaborative work	to track working hours and/or production time	to support human resources management
Sector total (EU-5)	N=502	N=502	N=502	N=502	N=502
% of employment	77	45	54	36	35
% of enterprises	39	13	26	8	5
0-9 employees	34	9	21	4	2
10-49 employees	44	14	31	14	10
50-249 employees	71	41	49	34	22
250+ employees	89	55	63	43	49
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	45	19	40	20	21
% of enterprises	21	5	22	5	5

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2004)

Electronic procurement and supply chain integration

Electronic procurement: Procurement is a most interesting domain for manufacturing companies in the electronics industry with a view to electronic business. Most market studies show that about 80% of their costs of goods sold stem from materials which are sourced from suppliers. In the back office, streamlining the relationship with suppliers is driving demand for SCM and e-procurement systems. E-procurement solutions provide electronics companies with access to parts catalogues and give them the opportunity to place orders at any time to contracted distributors.

**Exhibit 2.3-5: Electronic procurement and supply chain integration
in the electrical machinery and electronics industries**

	Make online purchases	Online purchases account for at least 5% of total volume	IT system is integrated with that of a supplier for placing orders	Use an SCM (Supply Chain Management) system
% of employment	59	30	12	11
% of enterprises	51	28	5	2
0-9 employees	49	28	5	0
10-49 employees	53	31	7	4
50-249 employees	59	21	4	7
250+ employees	62	32	19	14
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516
% of employment	46	23	8	6
% of enterprises	31	18	6	2

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2004)

Thus, unsurprisingly, purchasing online is one of the most widely used e-business applications in the sector, in all size-bands of firms and indiscriminately for MRO (maintenance, repair and operations) goods as well as for direct production goods. Approximately every second enterprise in this industry already purchases goods or services over the Internet. There is hardly a gap between small and large firms.

Supply chain integration: Here, a much higher share of large enterprises than of SMEs has begun making integration efforts with suppliers and/or customers. Obviously, large enterprises with their high ordering volumes see much more cost-saving potential in automating purchasing routines than their smaller counterparts. Moreover, large companies act as early adopters and drivers to impose complex SCM solutions to their smaller suppliers thanks to their market power.

Customer facing processes

A major issue to be tackled by electronics (and especially consumer electronics) firms is that errors in the sales and distribution process may cause substantial retailer compliance charge-backs and inventory misallocations. The sector has very different customers, including PC manufacturers, appliance manufacturers, warehouse stores and retail distribution networks. It appears that – currently – online marketing and e-commerce activities in this sector are often limited to e-relations with distributors that include online information, promotion tools and orders management (availability of products, tariffs, orders), but do not include the accomplishment of transactions.

Consequently, payment tools and online systems enabling secure transactions are not widely dispersed across the sector. Even though the sector is among the most intense users of e-business, only 8% of its companies make online sales. This is below even the all sectors average (10%). Among those companies that actually use the Internet to sell their products, Internet trading portals are more intensively used than in most other sectors.

Exhibit 2.3-6: Electronic marketing and sales in the electrical machinery and electronics industries

	Have a website on the Internet	Use a content management system to maintain website	Make online sales	... of those:	
				Allow online payment of products ordered	Online sales system with secure transactions capability
Sector total (EU-5)	N=502	N=502	N=502	N=55	N=55
% of employment	87	28	14	31	59
% of enterprises	61	16	8	37	54
0-9 employees	55	15	7	--*	--*
10-49 employees	74	18	10	--*	--*
50-249 employees	86	18	11	--*	--*
250+ employees	94	37	17	--*	--*
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=598	N=598
% of employment	66	22	16	43	59
% of enterprises	35	9	9	38	46

Base (100%): all enterprises / enterprises making online sales. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). * Percentages not displayed because base of cases observed is too small. Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

2.3.3 Case studies

This chapter features abstracts and key lessons learned from case studies which are presented in more detail in the 2nd Sector Impact Study from August 2004.

VOLTIMUM (EUROPE)	
<i>Background</i>	<p>In 2000, several major players in the electrical industry (ABB, Legrand, Nexans, Osram, Philips, Pirelli and Schneider-Electric) decided to create a European portal for the electrical installation industry and to set up the technological and organisational infrastructure of Voltimum.</p> <p>Voltimum aims at being the leading B2B portal website covering the specific needs and requirements of electrical installation professionals. Voltimum is not a trading portal. It offers a shared platform for manufacturers and other industry partners for marketing and communication, as well as a single entry point for marketing information (a rich product database for the electrical installation industry).</p>
<i>Activities</i>	<p>Voltimum provides the following services:</p> <ul style="list-style-type: none"> • a portal website and online service tool for all users • “the richest” database for the electrical installation industry • an on-line marketing tool for manufacturers • an option to distributors for information-deep-linking (VoltiLink function) <p>The main target groups are electricians (installation professionals) and prescription providers (distributors) to whom information regarding increasingly complex products is provided.</p> <p>To date, more than 20m Euro have been invested in Voltimum. This includes software and hardware platforms, as well as 3 years working capital to launch the project. It took 24 months to create the database. The final application was tailor-made, based on open source (Linux/PHP).</p> <p>Voltimum has established itself as the reference portal website of the industry in 2003 with 250,000 products in its online catalogue, 110 catalogues and 220,000 associated documents, 35 manufacturing partners and 80 brands. 500 wholesaler outlets distributor branches are listed in the Voltimum directories. In 2004, the portal achieves between 1-4 million page views per month and has about 120,000 registered users.</p>
<i>Results</i>	<ul style="list-style-type: none"> • E-support to electricians looking for solutions to functional problems. This function resembles e-training and can develop into e-learning. In fact, the next stage (2005) will focus on adding product knowledge and general technical knowledge to the web-site. • The evolution of the site toward offering more transactional functionalities is rather slow. The next step should be the online delivery process, but most of the countries (except Sweden) are not yet ready. The rate of RFQs (Requests for Quotation) is still low, with about 300 RFQs out of 1,000,000 requests. These types of functionalities (product prices, availability of products) are already often supplied by distributors, but are not often used by installers. • SMEs (providing “minor brands”) have shown strong interest and were highly motivated to be referenced in Voltimum, because they see it as an opportunity to be driven by “major brands”. Their products gain more visibility whereas their marketing investment in product information decreases.

LAKE COMMUNICATIONS (IRELAND)	
<i>Background</i>	<p>Lake Communications, a medium sized enterprise (120 employees) headquartered in Dublin, is a supplier of wireless and wired communications products targeted at the residential and small office segments. Products are sold indirectly to the end customer (consumer market) via its partnerships with major telecom operators (such as BT) and Internet service providers (ISPs).</p> <p>LAKE radically streamlined the delivery process for its products in order to counteract the following difficulties:</p> <ul style="list-style-type: none"> • Escalating costs due to holding and storage of stock (contractual obligation to hold agreed levels of goods at their distributors warehouse facility). • A low degree of control over manufacturing and distribution (shipping of orders process), as no automation existed. • Costly, repetitive administrative procedures, since all orders needed to be manually entered into their ERP system.
<i>Activities</i>	<p>The overall supply chain system required tight integration with three partners. The operational workflow process was precisely designed with the customer, from the first stage (customer would place orders through their existing EDI system) until the last stage (deliver the parcel to the end customer). Once the system was up and running, the process of getting shipments to end customers would be completely automated.</p> <p>Instead of holding large volumes of stock at their distributors, LAKE could now work according to the “just in time” principle of manufacturing on demand. The process would be as follows: A telecommunications company places an order, with orders being batched and forwarded to LAKE’s system three times per day. The order would be sent to manufacturing to fulfil it and ship the requested item to the distributor. The distributor would then ship it directly to the customer.</p> <p>In all, the project took approximately two man-years to design, build, integrate and implement. The total budget amounted to 379,000 Euro (of which public founding was 127,000 Euro). Prior to the rollout, the customer received training from LAKE in how to operate the web interface in order to query, monitor and amend orders. The ordering process experienced by the customer (firstly 15 BT branches) remained the same as before, with all orders coming via their EDI system.</p>
<i>Results</i>	<ul style="list-style-type: none"> • The automation of the supply chain system provided much more control of the whole process from ordering to delivering to their end users. Integration with both their manufacturer and distributor’s systems has also improved relationships. • Lake is now in a better position to guarantee delivery times to their customers and to make more accurate forecasts of demand levels. • One of the main challenges experienced by Lake Communications was related to the points of integration with partners’ systems. These had to cover all file formats transmitted between the two parties, the protocols used and the timing of these transmissions. The main problem that arose was the reliance on third parties to fulfil their integration tasks in a set time frame. As there was no formal contractual agreement between each party with regard to the e-business project, the project time lines and milestones often slipped.

2.3.4 Conclusions: e-business opportunities and challenges

The electronics industry in particular is very suitable for e-business because of the high degree of standardisation of products, globalisation of production, and specialisation of firms along the value chain. Within the sector, the electronics industry is clearly more advanced than the electrical engineering industry. Both sub-sectors exhibit different dynamics, value chains, and market players. These structural differences have a major impact on the use of e-business applications within each sub-sector. In spite of the already advanced status, driving this industry to an even more intensive use of transactional e-business practices will constitute a major challenge for the next few years.

Exhibit 2.3-7: Overview of e-business related opportunities and challenges for firms from the electrical machinery and electronics industries

Opportunities	Challenges
<ul style="list-style-type: none"> • Better collaboration in the supply chain • Increased efficiency of business processes • Bulk discounts • Access to information 	<ul style="list-style-type: none"> • Managing complexity • Managing outsourcing without losing global visibility and control • Managing demand variability and attaining accurate forecasts • Achieving accurate demand and supply picture • Investment risks • Eroding profit margins

Source: e-Business W@tch (2004)

Opportunities

Better collaboration in the supply chain: Advantages can be gained from a better collaboration with suppliers and customers. Outsourcing and specialisation are enhanced, and strong strategic partnerships can be built within an industry group. Globally dispersed business units can be connected and integrated in efficient communication platforms. Experience shows that customer satisfaction and loyalty can be increased if e-commerce channels are offered and used.

Increased efficiency of business processes: E-technologies can lead to greater speed and efficiency of processes. This implies cost saving opportunities, which increases when procedures are carried out by a large number of people and with high frequency. Thus, there are economies of scale which make these types of applications especially attractive to large firms where overheads can be reduced. Examples are online tools for management and control purposes.

Bulk discounts: Bundling of internal orders via an e-procurement system can help companies to achieve higher bulk-discounts from their suppliers, and thus reduce costs.

Access to information: E-technologies can also provide access to new resources, channels, and information that would otherwise not be available. Thus, they create opportunities for improving decision-making and for expanding business opportunities. Examples are online B2B marketplaces, websites and online shops for reaching customers on a global basis.

Challenges

Managing complexity: Implementing e-business solutions is anything but trivial. The system may not work as proposed, or the training of employees may be insufficient to make it work effectively. The new system may also prove incompatible with existing systems and processes.

Managing outsourcing without losing global visibility and control: This implies solutions that support all types of high-tech manufacturing business models (from completely in-house to completely outsourced manufacturing operations), that support transition to the virtual manufacturing environment (the virtual factory) and supplier drop-ship across multiple legal entities.

Managing demand variability and attaining accurate forecasts: This implies solutions that enable demand collaboration and improve forecast accuracy by enabling ubiquitous information sharing among players (semiconductor suppliers, OEMs, contract manufacturers) as well as independent forecasting and consumption of optional components (demand planning, collaborative planning).

Achieving accurate demand and supply picture: Electronics manufacturers are looking for a single holistic supply chain plan that provides long-range aggregate planning across the whole value chain (semiconductor suppliers, contract manufacturers, OEMs, foundries, test and assembly houses, contract manufacturers) as well as short-term detailed scheduling (Advanced Planning).

2.3.5 Outlook

Collaboration – a crucial element in the creation of business value

At a strategic level, the electronics industry has evolved dramatically since the early 1980s. Vertically integrated companies have restructured themselves, focusing on core competencies, slashing costs and building networks of suppliers and partners that are also specialized and cost competitive. Industries involved in the manufacture or consumption of electronics products increasingly rely on partners for design and manufacturing activities. This trend, combined with the one towards global sourcing, means that companies must manage end-to-end processes that extend outside their company and across multiple tiers of their supply chain. Cutting edge products now come together not solely from individual companies but from networks of companies, each contributing a specialized, high-value aspect of the total solution.

This complexity has made it difficult for companies to get the right information at the right time in order to be responsive to changes and make the informed decisions necessary to run their business. This complexity has also resulted in excess inventory buffers, expediting fees, high materials management costs, lost sales and wasted person-hours spent on manual processes. As a consequence, the new challenge consists in combining strategic industry change (specialization and the creation of extended enterprise networks) with the operational challenges of keeping inventories low (but not disrupting the continuous cycle of new product introductions). In order to do so, business partners have to work together effectively in new ways: collaboration across the supply chain has become a crucial element in the creation of business value.⁶²

Main drivers for e-business

In the overall electronics sector, the main drivers of e-business adoption are the high level of its IT know-how, the high competitive pressure, the high degree of standardisation of products and components, the specialisation of firms along a complex value chain, the globalisation of production, and globally dispersed production schemes. In addition, this sub-sector is naturally IT-savvy and predestined to be open to experiment with new technology-driven management solutions. Consequently, in the electronics industry, e-business enables and drives innovative production and logistic schemes, globalisation and specialisation.

In the semiconductor industry, the early success of e-business can be partly explained by the high level of standardisation of a large part of electronic components used as an input in the production of electronic systems, and partly by the very short time to market required given the short lifecycle of electronic components. These factors strongly enhance the industrialisation and automation of the purchase process throughout e-procurement systems between component suppliers and system manufacturers (component buyers).

Most segments of the electronics industry just come out from a difficult recession period. The sector is now focusing more on growing its revenues after three years of focusing on pure cost cutting.

⁶² Cf. Christophe Begue (IBM Business Consulting Services). All together now: Supply chain collaboration in the electronics value chain. IBM Corporation 2002.

Exhibit 2.3-8: Overview of e-business enablers and barriers in the electrical machinery and electronics industries

Enablers	Barriers
<ul style="list-style-type: none"> • Sector's propensity to IT issues • Pressure to decrease costs • Good access to technology • Diffusion of standards favours the development of e-business solutions for SMEs 	<ul style="list-style-type: none"> • Implementation costs • Return on investment issues • Backwardness of SMEs • Cultural barriers

Source: e-Business W@tch (2004)

Many companies still try to reduce production costs by adopting e-business applications to stay competitive in the market. During these turbulent times, IT has proven itself to be an ally of the electronics industry. IT has enabled electronic manufacturers to create greater efficiencies in their organisations as a result of streamlining and creating a more agile supply chain. Reduction of manufacturing costs has resulted in a tightening of operations, particularly of those activities associated with the supply chain and manufacturing processes. Many electronics companies would agree that their business is now leaner and more efficient as a result of efforts during the past three years.

If electronic standards are widespread across the industry, this could boost further use of electronic business among SMEs. The new XML-based standards (such as RosettaNet) help to reduce costs and enable dispersed trading partners to conduct electronic commerce in a mutually understood way.

Selected references

- B2B Integration over the Internet with XML – RosettaNet Successes and Challenges - Suresh Damodaran Chief Technologist, RosettaNet - <http://www.rosettanet.org> - May 17–22, 2004, New York, USA. www.enterprise-ireland.com/practicalbusiness/Case_studies
- Bacon, Allison, Larry Lapide and Janet Suleski - Supply Chain Collaboration Today: It's a Tactic, Not a Strategy. AMR Research. September 2002.
- Christian Seider (IBM Business Consulting Services) - Reinventing the electronics industry through enterprise collaboration - IBM Global Services / IBM Corporation 2003. www.ibm.com
- Christophe Begue (IBM Business Consulting Services) - All together now: Supply chain collaboration in the electronics value chain - IBM Corporation 2002. www.ibm.com
- Dirk Pilat. The impacts of ICT on Economic growth – An overview. OECD, 2003.
- Kapur, Vivek and Denis Mathias. "Collaboration: Using eHubs to Create Value in High-tech." IBM BusinessConsulting Services, 2002.
- Professor Naren Agrawal, Study of collaboration in the networking, computer, consumer electronics and instruments industries, Leavey School of Business, Santa Clara University, 2002.
- The Yearbook of World Electronics Data 2004. Volume 1 (West Europe). Reed Electronics Research, December 2003.

2.4 The transport equipment industries

2.4.1 Economic profile

According to the NACE Rev. 1 classification of business activities, the transport equipment manufacturing industries include the following activities:

Exhibit 2.4-1: Configuration of the transport equipment industries in terms of NACE Rev. 1

NACE Rev. 1		Activity
Division	Group	
34		Manufacture of motor vehicles, trailers and semi-trailers
	34.1	Manufacture of motor vehicles
	34.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
	34.3	Manufacture of parts, accessories for motor vehicles
35		Manufacture of other transport equipment
	35.1	Building and repairing of ships and boats
	35.2	Manufacture of railway, tramway locomotives, rolling stock
	35.3	Manufacture of aircraft and spacecraft
	35.4	Manufacture of motorcycles and bicycles
	35.5	Manufacture of other transport equipment

Whereas the activities in the sub-sectors of NACE sector 34 – which we call the “automotive” or “car industry” – form a cluster of closely interrelated firms, the shipyards, the railway equipment industry, and the aircraft and spacecraft industries (NACE 35 “other transport equipment”) operate in markets with rather different profiles.⁶³

The transport equipment industries are precursors of economic development in Europe. As a major purchaser of basic metals, metal products, chemicals, rubber, plastic, electronics, electrical machinery, business and financial services, the sector plays a key role in the European economy in general. Products of the transport equipment sector also belong to the most important export goods sector of the European Union, contributing a large positive share towards the European trade balance.

Industry structure and employment

Together, the two sub-sectors (NACE 34+35) employ 2.82 million people; 2.64 million in the former EU-15 and 0.18 million in the new Member States. The EU-15 recorded 33,533 enterprises in the two sectors for 2001. A particularity of the sector is the high degree of concentration, both in terms of regional and size-class distribution of production value and employment.

Germany and France contribute the largest share towards European manufacturing in the automotive industry (NACE 34), together accounting for 64% of production value in the former EU-15 in 2001. The “other transport equipment” industries (NACE 35) are also highly concentrated in certain regions in Europe. More than half of the European production value in these sectors is contributed by France (32%) and the UK (22%). Germany and Italy together contribute another 30%.

The entire transport equipment manufacturing sector is dominated by a few large enterprises. In the automotive industry (NACE 34) in the former EU-15, only 6% of all enterprises have more than 250 employees, but this small fraction of large firms accounts for 88% of value added at factor cost and 84% of total sector employment. On the other hand, 55% of enterprises have less than 10 employees, but they only account for 1% of value added and 2% of sector employment. This strong degree of industry concentration is also visible in the new Member States, which suggests that this industry

⁶³ For details, see *e-Business W@tch*, July 2002.

structure is not a regionally limited phenomenon, but is inherent to the sector by industry-specific factors such as substantial investments for production facilities and high engineering costs.

A pronounced degree of industry concentration is also observable in the “other transport equipment” sectors (NACE 35). Here, large firms with more than 250 employees make up only 2% of the number of enterprises in this sector in the EU-15, but account for 82% of value added and 74% of sector employment. The structure in the 10 new Member States is quite similar.

Market size

The two sub-sectors together (NACE 34+35) contributed a value of 731bn Euro to manufacturing production in Europe⁶⁴. 702.5bn or 96% originate from the 15 original Member States, 29bn or 4% from the 10 new Members. 78% of the production value can be attributed to the automotive industry (NACE 34) and 22% to “other transport equipment” (NACE 35). Within the automotive industry, the manufacture of motor vehicles, comprising the very large producers of final products, is by far the biggest industry which accounts for 73% of production value in NACE 34 (EU-15). Nearly two-thirds of the production value in the “other transport equipment” sector is produced in the aircraft and spacecraft industry.

Productivity and labour costs

Productivity in the transport equipment industries is above average compared to other manufacturing sectors. In 2001, value added per person employed in the former EU-15 was 60,197 Euro in the automotive industry (NACE 34), which is 18% more than on average. Similar numbers are reported for the “other transport equipment” sectors (NACE 35), which exhibit 63,613 Euro value added per person employed in the former EU-15 (24% more than on average).

Labour costs in both sub-sectors are also about 25% higher than in the manufacturing industries average. There is still great variation in labour costs in this sector in Europe. While Germany exhibits the highest labour costs in both sub-sectors (paying more than 53,000 Euro per employee, including social benefits), Portugal reports the lowest with less than 20,000 Euro per employee for both sub-sectors. However, the countries with the highest labour cost also exhibit the highest labour productivity.

Trends and challenges

One of the most important current developments in the European transport equipment sector is the EU enlargement. In particular the disappearance of customs borders between the original EU-15 and the 10 new Member States has major implications. In addition to easier export conditions for new cars from the former EU-15 to the new Member States, exports of used cars also became unrestrained. As a consequence, imported used cars are winning growing market shares in the new Member States. The consequences for the established car manufacturers in the old Member States are mainly positive. In addition to an increasing demand for their products as a direct result of the accession of the new countries, Central Europe offers interesting potentials as a production location.

An additional trend is that many supplier firms follow original equipment manufacturers (OEMs) to the East with their production facilities. These developments have led to an increasingly important role for the transport equipment sector in the new Member States. In Slovakia, for example, the car industry already contributes approximately 20% to total manufacturing volume, and plays a significant role in the economic growth of the country. Manufacturers will have to adjust to the changing environment of the enlarged EU, but overall the accession of the new Member States provides primarily good business opportunities for enterprises in the transport equipment sector.

⁶⁴ 2001 data for EU-15, 2000 data for 10 new Member States (without Lithuania, missing data) – source: Eurostat New Cronos 2003.

2.4.2 Diffusion of ICT and e-business in 2003/04

The transport equipment sector exhibits high endowment with basic ICT infrastructures, such as Internet access and e-mail usage. Compared to other manufacturing sectors, the transport equipment industry is among the most intensive users of e-business technologies and applications. A particularity in the transport equipment industries is the pronounced gap in ICT usage between large firms and SMEs. While large enterprises in the transport equipment industry are among the most intensive users of ICT, many SMEs remain reluctant. The following business objectives and related applications areas were found to be among the most important ones in this sector:

Exhibit 2.4-2: The importance of various e-business objectives and applications in the transport equipment industries in overview

E-business application area	Importance	Remark / example
Facilitate remote and mobile work (fieldworkers, homebased telework)	~ ~	Large companies are well equipped with remote access technology, SMEs less so.
Improve knowledge management by using special software	~ ~	Knowledge management is an issue in some of the large, international companies. SMEs barely use such applications.
Automate internal business processes	~ ~ ~ ~	Improving the efficiency and quality of business processes (internally and between trading partners) is a key priority in the sector, especially in large enterprises.
Improve ERP-to-ERP connectivity	~ ~ ~	An important e-business application area in the transport equipment industries: The objective is to realise cost saving potentials by making supply chain processes more efficient. Particularly relevant for large firms: 76% of large enterprises use ERP systems.
Supply chain process integration	~ ~	Only used by a few large companies with the objective realising cost savings and efficiency gains along the entire supply chain. However, the implementation of web-based SCM is very complex, expensive, and error-prone.
Decrease direct procurement costs through e-procurement	~ ~ ~ ~	Companies use e-procurement mainly to cut procurement costs and streamline procurement processes. E-procurement is one of the most important Internet applications in this sector.
Web-based e-marketing and customer related services	~ ~	Mainly used by large firms in the sector. Some OEMs do not use the Internet to actually sell their products, but mainly for marketing purposes and to gather and manage customer-related data.
Electronic customer management	~ ~	CRM systems are mainly used by large enterprises to manage and collect customer-related data to improve customer service.
E-commerce: Increase sales volume / area through selling on the Internet	~	Selling online through the company website is not a priority for companies in this sector.
B2B marketplaces on the Internet	~	Covisint, the major initiative in this sector, is abortive. Large companies rather rely on their own solutions; SMEs remain sceptical towards online marketplaces.
Use of e-business standards for exchanging structured data	~ ~	EDI and proprietary standards still dominate.
Web services and XML based standards	~	XML is not yet widely used.
Extended enterprise: collaborative (online) e-product design	~ ~	Slightly above average use of e-product design technologies, mostly in large companies.
~ = little relevance; ~ ~ = average relevance; ~ ~ ~ = very relevant; ~ ~ ~ ~ = high relevance for sector		

Source: e-Business W@tch (2004)

ICT infrastructure

The diffusion of basic Internet access and standard Internet applications such as e-mail and WWW usage have almost reached saturation levels in the transport equipment sector throughout Europe. Almost 91% of all enterprises in this sector in the EU-5, representing nearly 100% of employees, use computers. 99% of sector employees in the EU-5 work in companies that have Internet access and use e-mail, 94% in companies that also use the WWW, and 81% in companies that use an Intranet. Compared to the 9-sector average, the access rates reported in the transport equipment sector are very high.

Some size-class specific differences can be observed in penetration levels. It is remarkable that only 54% of micro-enterprises in the sector make use of the WWW and only 70% use e-mail. This cannot be explained by economies of scale or cost-advantages of large enterprises. Basic Internet access and the use of e-mail and the WWW are affordable and useful applications for any enterprise nowadays, especially since computers are available in almost all companies. One might speculate that disinterest, Internet illiteracy, and unawareness of useful applications delay adoption of these applications in a number of micro-enterprises.

The implementation of computer network infrastructure is also subject to great size-class related differences. Whereas 90% of large enterprises in the EU-5 have a local area network (LAN), only 22% of small firms with less than 9 employees (micro-enterprises) have such a network infrastructure. A similar structure emerges for wide area network (WAN) and remote access. Whereas WAN (respectively remote access) is available in 71% (79%) of large enterprises, only 3% (16%) of micro-enterprises have implemented these technologies. The reluctance of small firms has two quite contradictory implications. Firstly, some adoptions such as Intranets do not make much sense in a firm with just a few employees; thus it is a rational decision not to introduce them. In addition, there are strong economies of scale in the generation of complex networked systems, and the level of operation of these firms does not justify the expenditure. On the other hand, it cannot be excluded that a failure to implement the necessary e-business infrastructure can lead to the marginalisation of a company in a market in which connectivity is a central element. In this case, not implementing ICT infrastructure can have negative consequences for competitiveness, despite the fact that conventional investment criteria would discourage any engagement.

Exhibit 2.4-3: Use of ICT Infrastructure by firms in the transport equipment industries

	Local Area Network	Wide Area Network	Remote access to company network	Use the WWW	Internet access
Sector total (EU-5)	N=501	N=501	N=501	N=501	N=501
% of employment	88	61	70	94	99
% of enterprises	37	9	20	64	83
0-9 employees	22	3	16	54	77
10-49 employees	54	8	13	77	96
50-249 employees	89	30	44	92	100
250+ employees	90	71	79	95	100
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	61	29	37	77	88
% of enterprises	32	5	16	58	76

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Internal business processes

Online technologies for internal processes: Online technologies can be used in various ways to support internal business functions, such as human resource management. E-learning tools are, for example, primarily used to complement traditional training and seminars, and to diffuse specific

training contents in a short time to a large number of employees. Knowledge management tools can be used to systematically collect specific knowledge of employees and make it accessible to all of them, comparable to a firm-specific expertise library. Other tools to support human resource management include career planning and evaluation functionalities. Most of these solutions primarily serve to facilitate communication in complex organisations, and they support processes that are mostly found in large firms (micro-enterprises usually don't have highly standardized human resource management or training schemes). Hence, it is not very surprising that these tools are primarily implemented by large enterprises. Given the high share of employees working in large firms in the transport equipment sector, a relatively high percentage of sector employees work in firms that have implemented such online tools, compared to the 9-sector average. For example, 33% of sector employees in the transport equipment sector work in companies that use Internet technologies to support human resource management, compared to 21% on average.

ERP: Enterprise resource planning software (ERP) is one of the most commonly used systems in the transport equipment sector. 72% of sector employees in the EU-5 work in firms that have an ERP system. Large companies in particular often rely on these solutions – 76% of them currently use ERP. At the other extreme, ERP hardly plays any role in small companies with less than 50 employees. As with many other IT tools, ERP systems are primarily targeted at larger enterprises and their complex organization and processes. Although software vendors such as SAP are increasingly trying to increase their base of SME customers, adoption ratios in small companies remain far behind the levels observable among larger firms.

Exhibit 2.4-4: ICT use for internal business processes in the transport equipment industries

	Use an Intranet	Use an ERP system	Use online technologies ...		
			to share documents for collaborative work	to track working hours and/or production time	to support human resources management
Sector total (EU-5)	N=501	N=501	N=501	N=501	N=501
% of employment	81	72	50	42	33
% of enterprises	29	10	21	9	7
0-9 employees	22	3	13	3	2
10-49 employees	32	10	27	12	9
50-249 employees	54	34	52	39	26
250+ employees	88	76	54	44	37
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	45	19	40	20	21
% of enterprises	21	5	22	5	5

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Electronic procurement and supply chain integration

Online purchasing is one of the most popular applications of the Internet in the transport equipment sector. 65% of sector employees in the EU-5 currently work in enterprises that use the Internet to make online purchases. This corresponds to 30% of all enterprises in the sector. 33% of sector enterprises in the EU-5 use online technologies other than free text e-mail to exchange documents with suppliers, 5% report that their IT system is integrated with that of a supplier for placing orders, and 3% have a supply chain management system installed. These numbers correspond to a large degree with the all-sector average. It shows that a much higher share of large enterprises than SMEs has engaged in integration efforts spanning beyond their own borders. Obviously, large enterprises with their high ordering volumes see much more cost-saving potential in automating purchasing routines than their smaller counterparts.

Exhibit 2.4-5: Electronic procurement and supply chain integration in the transport equipment industries

	Make online purchases	Use of online technologies* to exchange documents with suppliers	IT system is integrated with that of a supplier for placing orders	Use an SCM (Supply Chain Management) system
Sector total (EU-5)	N=501	N=501	N=501	N=501
% of employment	65	55	15	19
% of enterprises	30	33	5	3
0-9 employees	24	27	5	1
10-49 employees	34	42	5	1
50-249 employees	56	47	7	10
250+ employees	64	58	16	22
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516
% of employment	46	37	8	6
% of enterprises	31	24	6	2

* other than free text email

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Customer facing processes

According to the e-Business Survey 2003, 49% of transport equipment manufacturers in the EU-5 have launched their own website. This is significantly more than the average of the 9 other industries. The difference between small and large firms is particularly evident for web presence: only 38% of micro-enterprises have a website, against 92% of the large companies. 34% of enterprises in this sector in the EU-5 use online technologies other than free text e-mail to exchange documents with customers. This share is also significantly higher in large enterprises.

Exhibit 2.4-6: Electronic marketing and sales in the transport equipment industries

	Have a website on the Internet	Use of online technologies* to exchange documents with customers	Make online sales	... of those:	
				Allow online payment of products ordered	Online sales system with secure transactions capability
Sector total (EU-5)	N=501	N=501	N=501	N=48	N=48
% of employment	89	60	17	25	50
% of enterprises	49	34	8	31	50
0-9 employees	38	27	7	--**	--**
10-49 employees	64	44	7	--**	--**
50-249 employees	77	52	11	--**	--**
250+ employees	92	62	15	--**	--**
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=598	N=598
% of employment	66	33	16	43	59
% of enterprises	35	23	10	38	46

* other than free text email

Base (100%): all enterprises / enterprises making online sales. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). ** Percentages not displayed because base of cases observed is too small. Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

It is a big step for a firm to move from a mere presentation of the firm and its products to actually selling online. Indeed, although 49% of firms in the sector have a website, only 8% sell online. This is

slightly less than the all-sector average of 10%. Making online sales is more common among large firms (15%) than among SMEs (7%). The percentage of firms that not only sell online, but also allow online payment and offer secure transaction possibilities, is still much lower. Only 2% of enterprises in this sector sell online and also offer online payment, and only 4% sell online offering secure transaction capabilities.

2.4.3 Case studies

This chapter features abstracts and key lessons learned from case studies which are presented in more detail in the 2nd Sector Impact Study from August 2004.

COVISINT (INTERNATIONAL)	
<i>Background</i>	Covisint – the most spectacular e-business venture in the automotive industry – has not lived up to its promise. After four years of struggle and despite the involvement of some of the biggest industry players, the residual of Covisint was taken over by Compuware Corporation in February 2004. Inflated ambitions, a vague business model, insufficient support from the sponsors and a lack of trust and acceptance among automotive suppliers led to failure. However, the failure of Covisint does not imply that all e-marketplaces in this sector have similar problems.
<i>Activities</i>	<ul style="list-style-type: none"> • Aiming at achieving an industry dominant position, the firm started in 2000 as a business-to-business supplier exchange for the automotive industry, backed up by some of the biggest OEMs. • The originally broad range of services covering procurement, product development, and supply chain management was gradually discarded and parts of the firm were successively taken over by rivals. • Covisint's left-over currently focuses on its messaging and portal services.
<i>Results</i>	<ul style="list-style-type: none"> • After two years, the original \$500 million investment into Covisint generated only monthly revenues of \$6 million but accrued \$10 million of monthly expenses. In light of these numbers, the initial work force of 420 was cut to 270 employees. • Reasons for the failure of Covisint are OEMs' arrogance towards their suppliers, distrust of suppliers towards OEMs and Covisint, as well as inflated ambitions and poor management by Covisint. • Despite Covisint's collapse, other industry online platforms continue to flourish, confirming the need for e-marketplaces in the automotive industry.

WIX-FILTRON (POLAND)	
<i>Background</i>	Wix-Filtron is a supplier of filters to the international automotive industry. Serving a wide range of customers, the company lacked a centralised customer data management. To solve this problem, the firm decided to implement a CRM application. The new system improved the flow of information and enabled the better monitoring and control of business processes. Furthermore, the system deployment increased the quality of customer service and reduced sales and marketing costs.
<i>Activities</i>	<ul style="list-style-type: none"> • Implementation of a CRM system • Integration of CRM with ERP system • User training and monitoring

<i>Results</i>	The primary objective of the project – creation of a complete information base on company's customers – was successfully fulfilled. Currently, every entitled employee is able to immediately obtain a profile of every company's customer, which includes contact data, list of employees responsible for the relationship, and a record of dealings with the customer. This feature enables employees, who have not dealt with a particular business partner before, to immediately get an overview of past transactions and, if necessary, to prepare an ad-hoc business meeting. Thus, having this information at hand, employees can primarily concentrate on customer support and not on information search. Apart from the basic information on a company's customers, the system allows real-time access to the strategic information on sales plans and developments broken down by separate customers. This enables more time and resources to be devoted to the most profitable customers.
----------------	---

MASTERFORM (POLAND)	
<i>Background</i>	Masterform is a small family-owned company specialising in metal processing and manufacturing of machine parts and devices. Based in Poland, the firm takes advantage of the growing trend of outsourcing production work to Central Europe. In order to increase competitiveness and meet high quality standards, Masterform has adopted various e-business solutions. Although successful in adopting IT systems to support internal processes, the firm finds it difficult to choose a system for data exchange with its customers. The variety of applications used by Masterform's customers prevents the company from adopting one particular solution.
<i>Activities</i>	<ul style="list-style-type: none"> • Implementation of a document management system to meet the quality standards of ISO 9001:2000 and other IT systems. • Considers further adoption of IT solutions to support data exchange with external organisations. However, due to its many partners and customers representing different industry groups, Masterform finds it difficult to choose an application that would enable it to conduct business with every partner. Masterform's customers in the automotive industry already use a variety of standards such as EDIFACT, VDA and ODETTE. Additional standards are used by Masterform's customers in other industries, for example shipbuilding.
<i>Results</i>	<ul style="list-style-type: none"> • The firm uses various IT and e-business solutions to adapt to the new market conditions and follows industry trends. • Masterform still hesitates, however, to adopt any system for external communication and data exchange. The lack of a common system in most industries, together with considerable up-front costs for implementing the systems, still hinder the implementation of a data exchange standard by small firms.

BLAUPUNKT (GERMANY)	
<i>Background</i>	Blaupunkt, one of the world's leading and most innovative producers of car infotainment equipment implements various e-commerce applications to improve its performance. For example, in order to optimise procurement activities, the firm has participated in industry initiatives such as SupplyOn. Furthermore, since the mid 90's Blaupunkt has successfully operated its online retail channel – Extr@Net. Designed for online sales, the platform has significantly reduced operating costs and improved the quality of relationships with Blaupunkt's customers.

<p><i>Activities</i></p>	<ul style="list-style-type: none"> • Internet presence since 1996 • A company specific online sales solution, called Extr@Net, was launched in 1998. At first, the platform was limited to Blaupunkt's partners located in Germany. Due to the high level of acceptance, the application was successively extended to other countries and geographical regions. Since 2003 Extr@Net can be used worldwide and, in addition, it can also be used by field sales staff. • Using Extr@net, Blaupunkt distributes all relevant information about its products including photos, text, and technical drawings for spare parts and enables 24/7 access to products and services for its business partners. • Despite the general success of the sales platform, the company does not consider allowing end-users to purchase products directly from Blaupunkt. The company believes that, due to a high level of product complexity, it is not desirable to omit the resellers who have the experience and knowledge about products and are thus able to professionally advise the final user on Blaupunkt's car equipment.
<p><i>Results</i></p>	<ul style="list-style-type: none"> • Thanks to Extr@Net, Blaupunkt is able to commit more resources to value-added activities in marketing and sales such as consulting, customer care, service, and acquisition of new customers. • The implementation of the e-commerce solution considerably simplified order processing and increased convenience for customers. The platform enabled a 24/7 access to Blaupunkt's products and services. This, together with other features, increased the intensity and quality of the interactions between the firm and its business partners. • Blaupunkt benefits from more accurate and consistent information about the partners.

2.4.4 Conclusions: e-business opportunities and challenges

Exhibit 2.4-7: Overview of e-business related opportunities and challenges for firms from the transport equipment industries

Opportunities	Challenges
<ul style="list-style-type: none"> • Enabling innovations and strategic changes via: <ul style="list-style-type: none"> ○ Cost savings ○ Greater speed and efficiency of standardized procedures ○ Improvement of relationship with customers and suppliers ○ Transparency ○ Reduced overhead – unleashing additional resources for value-added tasks • Proven strategy to accompany enterprise growth 	<ul style="list-style-type: none"> • Initial uncertainty about ROI⁶⁵: <ul style="list-style-type: none"> ○ Implementation risk ○ Acceptance ○ Opportunity costs • Potential lock-in to a specific technology, standard, or industry-group

Source: e-Business W@tch (2004)

⁶⁵ ROI: Return on Investment

Opportunities

As in other manufacturing sectors, many companies in the transport equipment industry currently use Internet-related technologies to successfully optimise their routines and information flows, or to introduce new services to their customers. These technology-induced changes can lead to significant cost saving potentials by optimising standardised, repetitive procedures such as procurement or processing of customer orders. Also, many companies have successfully implemented e-business solutions in a way that actually led to an improvement of the relationship with customers and/or suppliers.

Furthermore, information technologies may help to increase transparency about various types of information and to efficiently store and manage them. Examples are order data, customer data, inventories, status of certain procedures, or various types of documents. This additional transparency can be exploited to reduce errors, optimise planning, inventories, processing and engineering times.

In many cases, e-business technologies reduce the time required for carrying out routine-tasks (such as searching for paper-based information about customers) and therefore unleash the additional work time of employees to carry out value-added tasks (like assisting customers). This potentially improves efficiency and contributes towards employee satisfaction. Taking advantage of these opportunities is particularly important for firms in this industry to stay competitive in an increasingly globalised market.

Challenges

Like all investment decisions, investments into e-business technology are subject to risks. Foremost, at the time of the firm's investment decision is uncertainty about the return on their investment. In other words, there is always some risk that the investment will not pay off. This can happen for various reasons. For example, the new system might prove incompatible with other existing systems and processes. In addition, there is always an inherent risk that after making the investment the system will not function as proposed or that the training received by employees will be insufficient for effective use. It is important to realise that investments into IT can only pay off if additional, complementary investments are taken into process re-design and employee know-how. Given the relatively low level of IT know-how among SMEs in this sector compared to other sectors (such as the electronics or computer service industries), these necessary complementary investments make the adoption of e-business solutions more costly. Hence, reaching positive ROI becomes less likely than for SMEs in other industries. There is also an initial uncertainty about the acceptance of the new technology among its potential users, which includes employees themselves as well as customers.

In addition, given that most companies have only limited financial resources for investments, there are opportunity costs involved with every investment. Financial resources that are attributed to e-business investments are not available for alternative investment opportunities. As e-business investments are not necessarily superior to other investments, firms have to make a careful strategic decision about how to allocate their scarce resources.

Another risk is that of getting locked-in to a specific type of technology, technology provider, standard, or even an industry group. A lock-in usually occurs if there are network effects involved in an investment. Network effects occur when the value of a network increases with the number of its components. The "network" could be a number of enterprises in an industry that decide to use a particular communication standard to exchange data. For example, it was partially this risk of a "lock-in" to a critical standard that caused the reluctance of many suppliers to join Covisint. Similarly, the "network" could be a number of related information technology tools that a firm uses to manage its data flows. In this case, the components of the "network" are the hardware and software tools, either directly linked to exchange data or indirectly compatible, because they require similar skills to operate them. In this case, the presence of previously adopted technologies in a firm provides a positive network externality towards the adoption of any additional, related technology (see Köllinger and Schade, 2004). Thus, there can also be firm-internal network effects that lead to a lock-in of an enterprise to a specific way of doing business (based on a specific group of related technologies). Finally, investments into ICT could easily lead to a lock-in to a specific technology provider who can

then exploit its position by charging monopoly prices. Thus, it will also be important to monitor the strategy and pricing policies of industry-specific platforms like SupplyOn.

Lock-in effects are not very problematic as long as there is no superior alternative to such a scenario. For example, a “lock-in” to the e-business paradigm of doing business is fine as long as no other alternative exists that would yield a higher pay-off to enterprises. Alternatively, if a firm gets locked-in to the best technology provider in the market, this should also not be problematic as long as the technology provider does not gain a monopoly position and abuses its market power. What is, however, important for enterprises is that they should be aware that investments into e-business technologies are likely to be subject to network effects and possible lock-ins. They then need to carefully evaluate whether such lock-ins could lead to disadvantages or not.

2.4.5 Outlook

The Internet is currently an important enabler of innovation in the transport equipment manufacturing sector. Many firms actually make use of ICT to conduct process innovations or to offer new products or services to their customers. In fact, about two thirds of all process innovations in the sector in 2003 appear to be directly related to or enabled by Internet-based technology. Thus, e-business technologies and the Internet do begin to have a significant impact on enterprises and their performance. However, most firms in the sector have not yet taken full advantage of all opportunities that e-business technologies offer to improve their business. It can be expected that e-business will continue to gain acceptance in this sector, primarily as a strategic device that helps firms to make internal processes more efficient, to save costs, and to comply with the new communication and business standards that are currently developing in this industry.

Exhibit 2.4-8: Overview of e-business enablers and barriers in the transport equipment manufacturing industry

Enablers	Barriers
<ul style="list-style-type: none"> • Competition • Access to technology • Positive network externalities 	<ul style="list-style-type: none"> • Implementation costs • Need to re-engineer business processes • Lack of e-business skills and experience • High endowment with EDI • “Battle of power” between OEMs and suppliers • Return on investment issues

Source: e-Business W@tch (2004)

Enablers: factors that could drive e-business adoption

Competition is intense in the transport equipment sector, both among OEMs and their suppliers. This leads to a rapid imitation of innovations and, hence, to a continuous search for new diversifying features, cost-saving techniques and opportunities. E-business provides a set of powerful tools for these objectives and can thus become an important competitive factor.

Access to technology does not appear to be a problem for many companies. The sector exhibits a high endowment with basic ICT infrastructures that are a necessary prerequisite for participation in e-business. In addition, the increasing use of e-business technologies by many firms in the sector provides positive network externalities to other potential e-business adopters. Often, firms decide to adopt certain technologies primarily because some of their most important business partners also use them. Also, there can be knowledge and experience spill-overs between firms via communication or employee migration. Finally, some e-business technologies and services have reached critical mass and therefore become attractive for enterprises that had previously chosen a “wait-and-see” approach.

Barriers: factors that may inhibit e-business diffusion

Implementation costs are still a major barrier for many e-business initiatives, especially for firms with constrained budgets and, more often, for smaller firms.

The need to re-engineer business processes might also be an adoption barrier for some firms. Although this is an opportunity to improve overall business performance, it often involves changes to the work routines that can easily lead to conflicts. The implementation of new e-business technologies and work processes often requires extensive training and motivation measures. This is costly, time-consuming, and often seen as an opportunity cost to doing “productive work”. This is partially reflected by the low number of SMEs that support the development of IT skills in this sector.

Another factor that slows down the adoption of some e-business applications in this sector is the high endowment of many larger firms with EDI technologies. Some companies argue that there is no urgent need to introduce new systems before EDI-investments have amortised. Also, for many companies the additional value of Internet-based technologies compared to EDI is not big enough to justify additional investments or even a complete switch towards non-proprietary technologies.

Furthermore, the industry-wide implementation of e-commerce systems, such as procurement market-places initiated by OEMs, have often resulted in a battle over the shifting power between OEMs and their supplier base in the past. Other strategic conflicts along the supply chain, such as the reluctance of many smaller suppliers to join e-commerce initiatives of OEMs that were mainly used to reduce prices, have slowed down industry-wide adoption of e-business tools.

Finally, investments into e-business initiatives have to be justified by positive returns on investment. However, cost savings often occur indirectly or are difficult to measure. Sometimes they might even be intangible, for example via increased customer satisfaction or better motivation of employees. Firms that do not yet have much experience with e-business, like many SMEs in this sector, may find it particularly challenging to make a qualified judgment about the expected ROI of an e-business solution.

Selected references

- CVTS2 – Continuing Vocational Training Survey of the European Commission, http://europa.eu.int/comm/education/programmes/leonardo/new/leonardo2/cvts/index_en.html.
- ebusinessforum (2001): Estonia: An e-leader. <http://www.ebusinessforum.com>
- ebusinessforum (2003a). Doing ebusiness in Czech Republic. <http://www.ebusinessforum.com/>
- ebusinessforum (2003b). Doing ebusiness in Hungary. <http://www.ebusinessforum.com/>
- ebusinessforum (2003c). Doing ebusiness in Poland. <http://www.ebusinessforum.com/>
- Handelsblatt (19. Nov. 2003). Die Automobilindustrie setzt ihre Erfolgsstory fort. <http://www.handelsblatt.com>.
- J.D. Power (2003). 10 new EU members may incrementally affect production in European automotive market, if not sales. <http://www.globalautoindustry.com/EUROtalkDEC2003articles.htm#10newEUmembers>.
- O'Rourke, B. (20. Aug. 2003). Eastern Europe: region grows as manufacturing point for auto industry. <http://www.rferl.org/nca/features/2003/08/20082003153918.asp>.
- PWC – PricewaterhouseCoopers (15. Dec. 2003). Wheels turning for big changes, but auto sector remains flexible, in: Prague Business Journal.
- PwC Global – PricewaterhouseCoopers (Nov. 2003). To the EU at low speed, in: Unia&Polska. <http://pwc.com>.
- Köllinger, P. and Schade, C. (2004). Adoption of e-business: patterns and consequences of network externalities. CASE discussion paper series. http://appel.rz.hu-berlin.de/Zope/CASE/Publikationen/papers/papersKatalog/05_pk_cs.pdf.
- Supplierbusiness (24. Nov 2003). Automotive investment in Slovakia moves up a gear. <http://supplierbusiness.com>.
- Warsaw Voice (19. Nov. 2003). Automotive – special report: overcoming the crisis. <http://www.warsawvoice.pl>.
- World Economic Forum (2003). Global Information Technology Report 2003-2004. http://www.weforum.org/pdf/Gcr/GITR_2003_2004/Framework_Chapter.pdf

2.5 Craft and trade sectors

2.5.1 Economic profile

“Craft and trade” is considered here as a group of professions in which “workers apply their specific knowledge and skills to produce or process goods” and in which “the tasks call for an understanding of all stages of the production process, the materials and tools used and the nature and purpose of the final product”.⁶⁶ However, there is no European definition for craft enterprises, and crafts cover a very wide range of activities that do not constitute a marked-off sector in the General Industrial Classification of Economic Activities within the European Communities (NACE).

The *e-Business W@tch* applies an operational definition of craft enterprises as “firms with less than 50 employees in craft-related NACE Rev. 1 business activities”. These business activities comprise manufacturing activities in fields such as food, wood, metals and ceramics (NACE 15-37, excluding 23-25), construction (NACE 45), repairs (NACE 50), transport (NACE 60), and several “other services” (NACE 90 and 93). The definition of “small” and “micro” enterprises – in this context as well as in other sectors studied – has been derived from and is in full conformity with the European SME definition.⁶⁷

Exhibit 2.5-1: Configuration of the craft and trade sectors in terms of NACE Rev. 1

NACE Rev. 1		Activity
Division	Groups	
17	17.1-7	Manufacture of textiles and textile products
18	18.1-2	Manufacture of wearing apparel, dressing and dyeing of fur
19	19.3	Manufacture of leather and leather products (footwear only)
30	30.01-02	Manufacture of office machinery and computers
31	31.1-2	Manufacture of electrical machinery and apparatus n.e.c.
32	32.1-3	Manufacture of radio, television and communication equipment and apparatus
34	34.1-3	Manufacture of motor vehicles, trailers and semi-trailers
35	35.1-5	Manufacture of other transport equipment
20	20.1-5	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
36	36.1	Manufacture of furniture
45	45.2-4	Construction (Building of complete constructions, building installation and completion)

Employment

Small businesses and crafts were the motor of employment in the past decade. Most crafts are rooted in the local economy and only a small percentage is engaged in international trade. Thus, crafts are also important drivers of local and regional structural change.

Craft firms account for the vast majority, commonly more than 90%, of enterprises in any country and any sector under consideration. In construction, the EU average share is even 99%. The significance of employment in craft firms differs largely by country and sub-sector, implying differing industry structures and market situations. Construction is the sub-sector with the highest share of craft employment in total employment, with an EU average of 73%.

Value added and productivity

The share of craft value added in total manufacturing value added tends to be lower than the share of enterprises and people employed for most sectors. Again, the EU average percentages vary largely between the sub-sectors considered, showing the different levels of concentration in the sub-sector.

⁶⁶ See the European equivalent to the International Standard Classification of Occupations in Elias/Birch (1994).

⁶⁷ http://europa.eu.int/comm/enterprise/enterprise_policy/sme_definition/index_en.htm

The share of craft value added tends to be lower in the new Member States compared with the former EU-15 Member States.

Productivity, measured as value added at factor cost per person employed, is much lower in crafts than in medium-sized and large enterprises (MLEs). In EU average, crafts only reach 71% of MLE productivity in the construction sector, 68% in the textiles sector, 63% in wood and furniture manufacturing, 61% in transport equipment manufacturing and 58% in electrical machinery and electronics. Data availability for the new Member States is very limited, except for the Czech Republic where craft productivity is relatively large in the textiles sector (61% of MLE productivity) and lowest in wood and furniture manufacturing (40%).

Trends and challenges

Single market: The enlargement of the European Union opens up new trade opportunities for craft enterprises in the former 15 and current 25 Member States – but also challenges their competitiveness. The same applies to the free trade zone between European Union and Mediterranean countries that is planned to be established by 2010, to open the European market to further suppliers from low-wage countries. Adapting to the new environment of the single market for enterprises will be important for craft firms to tap into the opportunities of free trade in Europe.

Limited resources / administrative burdens: Craft and small businesses suffer from having limited human and financial resources, as well as from being more locally bound than their larger counterparts. Several issues are related to this disadvantage, the most important among them being administrative burdens, as well as technical and administrative standards. For example, the ISO 9000 system is firmly established today in the European economy. Many crafts, in particular those operating as subcontractors for big companies, were obliged to become certified. Certification costs for them turned out to be relatively higher than for large companies.

Otherwise, trends and challenges differ by sub-sector:

- Important trends in the *textile sub-sector* include: globalisation, business acceleration, concentration (for example chemicals on the supply side and big textile retail on the demand side), the quality imperative as well as customisation and personalisation.
- The business climate in *electronics and electrical machinery* remains volatile, maintaining pressure to innovate and increase efficiency. The electronics sector (NACE 30 and 32) was the fastest growing business sector in many European countries during the 1990s, but the past two years confronted the industry with a recessive demand scenario.
- The current business environment in the *transport equipment* sector is difficult for many producers in the whole value chain, including crafts. The global economic environment continues to be uncertain, and general economic growth is slow in most EU countries.
- The cost of raw materials is one of the most important issues in the *wood manufacturing industry*. In international comparison, stumpage costs in the EU are relatively high because of fragmented and private ownership of forests.
- The *construction* industry is currently facing stagnation. According to the European Construction Industry Federation (FIEC), construction activity in the EU grew by a moderate 0.6% in 2002 and hardly grew (figures not yet consolidated) by more than 0.5% in 2003.

2.5.2 Diffusion of ICT and e-business in 2003/04

The statistical picture from previous *e-Business W@tch* research confirms that small firms in general have taken their first step to go digital. However, they are still far from digitally integrating their business processes: the “e”-part of their business processes tends to be a front-end, customer-faced activity. In craft firms in particular, computers do not appear much in work; they are mainly used for administration as well as in sales and purchasing processes.

Exhibit 2.5-2: The importance of various e-business objectives and applications in the craft and trade sectors

E-business application area	Importance	Remark / example
Internal processes		
Automate internal business processes	~ ~	As the number of employees in craft firms is small, automation of internal business processes is not a key issue but still relevant, e.g., for document sharing
Electronic customer management	~	Customer relationships are very important for craft firms but are preferably being realised in personal contact. The use of CRM systems is not a big issue.
Improve knowledge management by using special software	~	Due to the small size of craft firms, KM software is not widely used. No clear benefit perceived.
E-commerce		
Supply chain process integration	~ ~ TM	Particularly important for the furniture industry which has a variety of different inputs, requiring efficient Enterprise Resource Planning.
Decrease direct procurement costs through e-procurement	~ ~ ~	As in other sectors, the potential of reducing costs is the most important benefit of online procurement. Improving process efficiency is almost equally important.
IT system integration with suppliers	~ ~ ~ TM	Key e-business application area in the construction industry. Small firms often need to download procurement catalogues from large suppliers and harmonise their IT system with that of the large supplier
Web-based e-marketing and customer related services	~ ~	Improving customer service is the most important benefit stated by craft firms that sell online. However, the share of online sellers is small.
Increase sales volume / area through selling on the Internet	~ TM	Selling online through the company website is not a priority for craft companies. However, an increased sales volume is the second most important effect stated by online sellers. Sector differences apply.
Extended enterprise		
Communication with business partners	~ ~ ~ TM	Improving the efficiency and quality of business processes between trading partners is a priority in the construction sector that needs to establish communication between a large number of stakeholders in a construction project
E-business standards for exchanging structured data	~ ~ TM	Electronic procurement is an important application for craft companies. In this context, standards for electronic document exchange are important.
Collaborative (online) e-product design	~ ~ TM	Quite important for the electronics, transport equipment and textiles industries; not so much in construction.
What will be important?		
Facilitate remote and mobile work (fieldwork, home-based telework)	~ ~ TM	Particularly important for the construction sector and its building site activities.
Web services and XML based standards	~ TM	There does not appear to be a great need for XML among craft firms. Web services could become fairly important in the construction sector.
~ = little relevance; ~ ~ = average relevance; ~ ~ ~ = very relevant; ~ ~ ~ ~ = high relevance for sector TM = mixed results, depending on the sub-sector within the craft' and trade industries		

Source: *e-Business W@tch* (2004)

ICT infrastructure

Compared with the other nine sectors covered by the *e-Business W@tch* in 2003/04, craft firms lag behind in all network infrastructure indicators. Enterprises representing 91% of employees in the combined sectors use computers, but only one third (30%) have connected their computers to a Local Area Network (LAN). Remote access to the company's computer system is even less common.

About three quarters of firms (in % of employment) are connected to the Internet. However, the sector exhibits a gap between the use of e-mail and World-Wide Web. The latter is only used by about half of all firms (in % of employment), which indicates that a significant percentage of firms is still in its early stages of Internet use. Broadband Internet connections are used by 12% of craft firms with 10 employees or more, which is above average (of the other nine sectors) for this size-band.

Exhibit 2.5-3: Use of ICT infrastructure in craft and trade sectors

	Local Area Network	Wide Area Network	Remote access to company network	Internet access	Broadband Internet access (2 Mbit/s)
Sector total (EU-5)	N=1,414	N=1,414	N=1,414	N=1,414	N=1,414
% of employment	30	5	11	77	7
% of enterprises	21	3	8	67	4
0-9 employees	19	2	7	68	3
10-49 employees	41	7	13	87	12
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	61	29	37	95	27
% of enterprises	32	5	16	89	11

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: November 2003.

Source: *e-Business W@tch* (2004)

Internal business processes

Knowledge management and e-learning: 12% of craft enterprises (and 21% of those with more than 9 employees) use an Intranet. The level of Intranet use among these small enterprises equals the level in the other nine sectors studied by the *e-Business W@tch* (21%).

Exhibit 2.5-4: ICT use for internal business processes in craft and trade sectors

	Use an Intranet	Use an ERP system	Use online technologies ...		
			to share documents for collaborative work	to track working hours and/or production time	to support human resources management
Sector total (EU-5)	N=1,414	N=1,414	N=1,414	N=1,414	N=1,414
% of employment	16	5	16	8	5
% of enterprises	12	4	11	5	3
0-9 employees	10	3	10	4	2
10-49 employees	21	7	21	12	8
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	45	19	40	20	21
% of enterprises	21	5	22	5	5

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: November 2003.

Source: *e-Business W@tch* (2004)

Online technologies for internal processes: E-business solutions can enhance communication between personnel and the processing of staff-related issues within a company. Enterprises representing 16% of employees in the craft and trade sector reported that they share documents

between colleagues or perform collaborative work in an online environment. More specific internal business processes are quite rare. All types of online support of internal business processes are used less frequently than in the all-sector average.

ERP: Enterprise Resource Planning (ERP) systems are used by a small minority of craft firms (4%), as in the other sectors (5%). However, the share of craft firms with 10-49 employees reporting the use of an ERP system was 7% which is higher than the other sectors' average. This higher level is not only caused by small electrical machinery and electronics crafts (14%) and transport equipment crafts (10%) in the sample, but also by relatively high levels of ERP use in wood and furniture manufacturing firms with 10-49 employees (10%).

Electronic procurement and supply chain integration

Electronic procurement: In total, enterprises comprising 24% of employees in the craft and trade sector make online purchases. Of the former, 60% purchase maintenance, repair and operation (MRO) goods online, and an equal share (59%) direct production goods. The share of online purchasers varies widely between countries. It is much higher in Germany and the UK, for example, than in Southern European countries and in most of the new Member States.

Companies can use various media to purchase online. Most important are suppliers' websites. Craft firms comprising 83% of employment use this method. B2B marketplaces (19%) and suppliers' extranets (21%) are less important but notable, while Electronic Data Interchange (EDI) is used in a negligible share of companies. The interviewees were asked what has been their experience of the effect of online procurement. The reduction of procurement costs appears to be the most beneficial impact of craft firms' purchasing online activities. Enterprises representing 11% of employment reported very positive effects in this respect, 45% reported fairly positive effects.

Supply chain integration: Due to the small size of craft firms, supply chain integration is less developed than in sectors with large enterprises. However, when only considering firms that actually make online purchases, about one in four firms has integrated its IT system with that of a supplier. This is more than on average in the other nine sectors.

Exhibit 2.5-5: Electronic procurement and supply chain integration craft and trade sectors

	Make online purchases	Online purchases account for at least 5% of total volume	IT system is integrated with that of a supplier for placing orders	Use an SCM (Supply Chain Management) system
Sector total (EU-5)	N=1,414	N=1,414	N=1,414	N=1,414
% of employment	24	10	6	3
% of enterprises	21	10	5	2
0-9 employees	20	10	5	2
10-49 employees	25	9	6	4
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516
% of employment	46	23	8	6
% of enterprises	31	18	6	2

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: November 2003.

Source: e-Business W@tch (2004)

Customer facing processes

Enterprises representing one third (32%) of craft employment and one quarter of craft enterprises (25%) have a website on the Internet. Only a small fraction of those uses a content management system to update and maintain the site. The share of craft firms that sell online is very small – only around 3% in both weighting schemes. Of those firms selling online, around one third (31%) offers online payment of goods or services ordered and also one third (34%) has an online sales system with secure transactions capability.

Exhibit 2.5-6: Electronic marketing and sales craft and trade sectors

	Have a website on the Internet	Use a content management system to maintain website	Make online sales	... of those:	
				Allow online payment of products ordered	Online sales system with secure transactions capability
Sector total (EU-5)	N=1,414	N=1,414	N=1,414	N=85	N=85
% of employment	32	6	3	17	30
% of enterprises	25	4	3	31	34
0-9 employees	23	3	3	***	***
10-49 employees	41	9	3	***	***
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=598	N=598
% of employment	66	22	16	43	59
% of enterprises	35	9	9	38	46

*** percentage not computed as no. of observations is too small.

Base (100%): all enterprises / enterprises making online sales. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). * Percentages not displayed because base of cases observed is too small. Reporting period: November 2003.

Source: e-Business W@tch (2004)

2.5.3 Case studies

This chapter features abstracts and key lessons learned from case studies which are presented in more detail in the 2nd Sector Impact Study from August 2004.

E-BUSINESS IN SMALL DANISH FURNITURE MANUFACTURERS	
<i>Background</i>	<p>The case study of Danish Furniture On-line and the Aksel Kjersgaard cabinetmaker factory is a good example of how to use the Internet for information and marketing purposes. It shows that the Internet can be an important medium for furniture presentation as well as for initiating contacts with customers and suppliers.</p> <p>The Association of Danish Furniture Industries (ADFI) represents more than 90% of Danish furniture production, including almost 350 members in June 2004. As early as 1996 the ADFI introduced "Danish Furniture On-Line" (http://www.danishfurniture.dk). The driving force behind creating this online portal was to give the ADFI's members opportunities to present their companies in a new electronic medium.</p> <p>The Aksel Kjersgaard factory, a cabinetmaking enterprise based in Odder on the Danish east coast, specialises in manufacturing very high quality tables, hall furniture and home office furniture. The firm was founded in 1952, currently has 25 employees and exports to most parts of the world.</p>
<i>Activities</i>	<p>In 2001, the Aksel Kjersgaard factory established its website. The site has developed into an important communication platform for customers to make inquiries, many of which are questions on where to buy certain products. Currently, the company receives around 10 to 15 inquiries a week. The firm's website is linked to the Manufacturers' Index in Danish Furniture On-line.</p> <p>Aksel Kjersgaard does not sell online because the high-quality furniture it produces does not lend itself to be sold through the Internet. "<i>Customers want to see and touch furniture</i>", explains the management. In addition, it is expensive to send furniture back and forth if something goes wrong with the order.</p>

	Online procurement practice at Aksel Kjersgaard is limited to goods such as machine parts and software. However, the Internet has been a valuable source of information about suppliers and their products in the past six years.
<i>Results</i>	<ul style="list-style-type: none"> While comprehensive e-business use may not be useful for many small furniture manufacturers, the Web offers opportunities for increasing the number of end customers and intermediate vendors, selecting more and better suppliers as well as improving customer service.

AIR-CRAFT – E-PROCUREMENT AT AIRBUS INVOLVING CRAFT COMPANIES	
<i>Background</i>	<p>AIR-CRAFT was a project supporting e-business relationships between Airbus Hamburg and small local construction enterprises. The project had a budget of around 950,000 Euro and was funded by the German Federal Ministry of Education and Research (BMBF) from August 2001 to July 2004.</p> <p>The starting point of the project was the fact that professional buyers in large firms are increasingly replacing traditional paper-and-telephone forms of procuring craft services by catalogue- and network-based platforms. In the case of recurring services, catalogue-based online procurement can streamline business processes and save internal process costs in the large firms.</p>
<i>Activities</i>	<p>Airbus Hamburg implemented a catalogue-based online platform for acquiring craft services in 2003, offering craft firms the opportunity to connect to this catalogue. The craft firms knew that they needed to respond to this offer in order to stay in business with Airbus, particularly because Airbus is seeking to buy craft services exclusively through its electronic system in the future. That is why representatives from the Hamburg Chamber of Crafts and Airbus initiated AIR-CRAFT, which resulted in 23 craft firms from six construction and construction-related industries getting linked to this Airbus platform.</p> <p>AIR-CRAFT's core objective was to make craft employees familiar with handling e-business applications in order to increase craft firms' strategic competence in e-business and develop new markets for them. Furthermore, it was sought to prove the feasibility of linking craft firms to e-business platforms and to prove the economic viability of e-commerce.</p> <p>AIR-CRAFT included three special issues, namely the development of standardised e-procurement systems, qualification modules and the formation of a co-operative craft service supply.</p>
<i>Results</i>	<ul style="list-style-type: none"> AIR-CRAFT strengthened existing supplier relationships through joint development and usage of e-procurement tools and reduced process costs. AIR-CRAFT was meant to make craft firms familiar with electronic service catalogues used by large companies' procurement departments. However, as each large enterprise has its own catalogue, standardisation of service catalogues would be required in order to allow craft firms to service various large enterprises. Craft firms retain reservations about the possibility of adequately describing services in standard catalogues at all.

2.5.4 Conclusions: e-business opportunities and challenges

Exhibit 2.5-7: Overview of e-business related opportunities and challenges in craft and trade sectors

Opportunities	Challenges
<ul style="list-style-type: none"> • Introducing a new marketing and sales channel • Reducing procurement costs • Making business processes more efficient 	<ul style="list-style-type: none"> • IT skills development • Catching up of new Member States

Source: *e-Business W@tch* (2004)

Opportunities

E-business can improve the whole business process of craft enterprises, including functions such as procurement, marketing, sales, personnel management, communication within and outside the company, and decision-making.

Extended marketing of products and services: A website is an easy-to-realise opportunity for small firms to present their products and services, attracting the increasing number of customers who are used to selecting suppliers by comparing their websites. For crafts with specialised products, particularly if they can be shipped easily, the Internet can also be used as a new sales channel and a larger sales area. Those craft firms that do not want to sell on the Internet themselves can consider participating in an online portal for marketing their products (see for example the case study of Danish Furniture On-line).

Improved access to information: A major opportunity of Internet-enabled business for small firms is the improved access to market information, which previously used to be a privilege of larger firms. Specific craft portals, for example, can arrange contacts between craft firms and potential customers, suggest standard contracts, and offer up-to date industry information. Moreover, e-business tools for planning and controlling can significantly improve the availability of data for management, particularly in the construction industry.

Product innovation: E-business can positively influence product innovation; the *e-Business W@tch* analysis shows particularly high impacts in textile craft.

Employee attraction: Active use of electronic business practice can imply increased attractiveness of a craft firm for apprentices and trained employees. It could be an instrument to counteract the negative trend of craft firms becoming less attractive for young people searching for an apprenticeship.

Challenges

Lack of skills: On introducing Internet use and e-business practices, craft firms need to develop IT skills. This is a considerable challenge, because in firms with only a small number of employees, it does not pay to employ IT specialists. Consequently, owners and staff need to be knowledgeable about e-business themselves, or buy IT services from outside the company. However, data from the *e-Business W@tch* show that craft firms do not develop IT skills as much as other sectors, not even by learning during working time.

The development of IT skills will be of particular importance in the craft and trade sector in the new Member States. Data from the *e-Business W@tch* also shows that there is still a gap between companies from the new Member States and the former EU-15 in the craft and trade sector. Companies from Estonia, being the exception, have reached a high level of e-business application, surpassing many former EU-15 Member States. In the short run, the development of e-skills will be important for those craft firms that offer their products and services internationally or to larger local enterprises.

2.5.5 Outlook

Small firms in general, and crafts in particular, have taken their first step to go digital. However, they are still far from digitally integrating their business processes. An important reason for this lag appears to be that many craft firms do not see a necessity to invest in e-business, mostly because craft business relies to a large extent on personal, face-to-face business relationships.

Exhibit 2.5-8: Overview of e-business enablers and barriers in craft and trade sectors

Enablers	Barriers
<ul style="list-style-type: none"> • Diffusion of IT in society and economy • Standards set by large suppliers and customers • Generational change of craft firm owners 	<ul style="list-style-type: none"> • Lack of investment funds • Lack of specialised IT knowledge in-house

Source: e-Business W@tch (2004)

However, e-business offers many benefits to craft enterprises, including product presentation opportunities, pre-sales and after-sales consulting, new sales channels, marketing and provision of sector-specific information in craft portals, third-party advertising, reduced procurement costs, employee attraction, and improved business efficiency in general.

One of the core drivers to introduce and extend e-business practices is the necessity to stay competitive. Craft firms that are part of value chains with large enterprises can be expected to feel knock-on effects of e-business initiatives of the sector's large companies. In many cases, small firms which supply to larger customers will be forced to adapt to the latter's standards or get out of business. The case study on e-procurement of construction services by Airbus shows that large firms may switch to completely procuring craft services online in the future.

Selected references

- European Commission (2002). SMEs in Europe, including a first glance at EU candidate countries. Observatory of European SMEs 2002, No. 2. Luxembourg: Office for Publications of the European Commission.
- European Commission (2000). European Charter for Small Enterprises. 19 – 20 June 2000. http://europa.eu.int/comm/enterprise/enterprise_policy/charter/
- FIEC, European Construction Industry Federation (2003). Construction activity in Europe. Brussels.
- Information and Communication Technologies Working Group (2003). Draft final report. Phase II, e-construction, 2001 – 2003. 1 July 2003. Forthcoming; to be published at <http://europa.eu.int/comm/enterprise/construction/it/compitp2.htm>.
- Institutio Guglielmo Tagliacarne (2001): Proposal for the development of a methodology for the collecting and grouping of statistical data on small craft businesses in Europe. November.
- Koch, Matthias; Baier, Daniel (2002). Anwendungsstand und Nutzenpotenziale des E-Commerce in KMU in der Bauwirtschaft. Eine theoretische und empirische Bestandsaufnahme. In: Meyer, Jörn-Axel (ed.), New Economy in kleinen und mittleren Unternehmen. Jahrbuch der KMU-Forschung 2002. München: Vahlen.
- UEA (2004). The EU Furniture Industry. <http://www.ueanet.com/outlook.htm>, 07.01.2004.
- UEAPME. Annual Reports 2003, 2002, 2001

2.6 The retail industry

2.6.1 Economic profile

Retail trade is characterised by a complex structure, with very small enterprises on one hand and large enterprises on the other. The sector is increasingly shaped by a few very large groups or chains exploiting economies of scale, mixed with many small shops serving a local market.

The *e-Business W@tch* analysis focuses on the retail trade, particularly retail sales in non-specialised stores with a prevalence of food and beverages (52.11), of non-food items (52.12), or in stores specialising in the sale of new goods other than food and beverages or cosmetics and pharmaceuticals (52.4). Non-specialised points of sale and specialised points of sale classified under NACE Group 52.4 (referred to below as “Retail sales in specialised stores”) are the most relevant in the entire retail trade sector.

Exhibit 2.6-1: Configuration of the retail industry in terms of NACE Rev. 1

NACE Rev. 1		Activity
Division	Group	
52		Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
	52.11	Retail sale in non-specialised stores with food, beverages or tobacco predominating
	52.12	Other retail sale in non-specialised stores
	52.4	Other retail sale of new goods in specialised stores (a)

a) Contains all points of sale that are not included in the assortment of stores specialising in one of the following:

- Food, beverages and tobacco (NACE Code 52.2)
- Drugs, medical products, cosmetics and perfumery products (NACE Code 52.3)
- 8 different product categories: textiles (NACE Code 52.41), clothing (52.42), shoes and leather goods (52.43), furniture and lighting (52.44), household appliances, radios and televisions (52.45), hardware, stains and paints, glass (52.46), books, newspapers, magazines and paper goods (52.47), other products such as office machines and equipment, eyewear, jewellery, toys, sporting goods, fuel, boats, plants and flowers, etc (list not exhaustive).

Industry structure and employment

A vast majority of companies within the former EU-15 are small firms, but employment is equally distributed between very small firms and large corporations. In total, the retail industry employs about 14 million people. In the new EU Member States, which account for about 5% of total employment, more than 97% of the companies have less than 10 employees. In contrast to the EU-15, large firms are not as significant in terms of their share of employment. In the new Member States, the retail industry structure is still a very traditional one with small specialised shops.

Market size

Production value of the retail trade industry in the formerly EU-15 was about 590 billion Euro, with value added representing more than 55% (328 billion Euro) of the production value. Four countries in the formerly EU-15 (Germany, France, Italy and the United Kingdom) accounted for 76% of the production value. In the new Member States, the aggregate production value of the ten countries was 23bn Euro (in 2000).

Productivity and labour costs

In the former EU-15 the average value added per person employed is about 25,000 Euro. Countries with the highest productivity are Finland (34,321 Euro), France (33,789 Euro) and Luxembourg

(33,497 Euro). Figures on productivity per employee also reveal rather marked differences among individual countries. Generally speaking, countries in Mediterranean Europe have lower levels of productivity than those in continental and Northern Europe. These differences in productivity partially depend on the retailing structure. Countries with a fragmented retailing structure exhibit a lower productivity performance. The average value added per person employed within the new Member States is about one fifth of the average for the EU-15.

Labour costs per employee in the former EU-15 is around 18,500 Euro. Labour costs vary considerably from country to country and depend greatly on country specific factors. Average labour costs in the new Member States are about one fifth of the average labour costs in the EU-15.

Trends and challenges

Throughout the nineties, the main European retailers conducted a series of takeovers that significantly increased the level of sector concentration; these takeovers were predominantly domestic during the first half of the '90s, but later extended beyond national borders. This evolution process and the need for economies of scale in the purchasing area stimulate retailers to reach agreements in order to gain greater bargaining power vis-à-vis suppliers or to become directly integrated upstream through the distribution of brand-name products.

The concentration and geographical expansion processes have been coupled with diversification: downstream into financial services and travel, upstream into co-manufacturing and logistics management. The general slowdown in growth of consumption in the EU implies the need for rationalization of activities, for instance through attempts to improve network efficiency.

Demand, on the other hand, is characterised by the rediscovery of the "neighbourhood formula" and a drop in appreciation of stores that are growing larger and larger. Despite the fact that inflationary thrusts and slowdown are increasing consumers' awareness of the price factor, hypermarkets are performing poorly, or at least worse than the other formats, on the main European markets.

2.6.2 Diffusion of ICT and e-business in 2003/04

The use of e-business in the retail sector is far from being a pervasive reality, and is below the average adoption rates in other sectors studied by the *e-Business W@tch*. One of the reasons is that, in contrast with most manufacturing sectors, SMEs play a dominant role in the retail sector. SMEs are frequently clustered and organised as buying or franchising groups, though, which allow scope economies and power negotiation in relations with the upstream and downstream players in the value chains. Purchasing online is the most important applications for e-business, with the objective of optimising supply chain processes. The retail supply chain integration is not far away from the overall average.

Exhibit 2.6-2: Importance of e-business applications in the retail industry

E-business application area	Importance	Remark / example
Facilitate remote and mobile work (fieldworkers, homebased telework)	~ ~	Large companies are well equipped with remote access technology, SMEs less so.
Improve knowledge management by using special software	~ TM	KM software is not widely used, neither in small nor in large companies.
Automate internal business processes	~ ~	Improving the efficiency of business processes especially by sharing documents for collaborative work is a priority in the sector, particularly for the large companies.
Improve ERP-to-ERP connectivity	~ TM	Enterprise resource planning has a very low diffusion, due to the important share of the small and medium enterprises in this sector.
Supply chain process integration	~ ~ ~ TM	There is significant use of solutions for supply chain management integration, especially where large retailers and chains are diffused. Intranets and online technologies in general are widely diffused to support internal business processes. Technologies for upstream integration have far-reaching potential.
Decrease direct procurement costs through e-procurement	~ ~ TM	The larger companies and a significant share of SMEs pursue the goal of streamlining the selection of their supply firms. In general, though, the focus is rather on making processes more efficient.
Web-based e-marketing and customer related services	~ ~ TM	Not yet widely developed, but could gain importance in the future.
Electronic customer management	~ TM	Not yet diffused; could gain importance in the future in large and medium enterprises and in specialised retailers.
E-commerce: Increase sales volume / area through selling on the Internet	~	Selling online through the company website is not a priority for retailers. The strategy is rather to adopt a multi-channel approach, or to concentrate on online sales in some market niches.
B2B marketplaces on the Internet	~ ~ TM	B2B marketplaces are used above average for both purchases and sales. The main platform is still the website of suppliers.
Web services and XML based standards	~	Companies are not yet convinced about the importance of XML.
Extended enterprise: collaborative (online) e-product design	~ TM	Average use of e-product design technologies. Depends on sub-sector.
~ = little relevance; ~ ~ = average relevance; ~ ~ ~ = very relevant; ~ ~ ~ ~ = high relevance for sector TM = mixed results, depending on the sub-sector within the retail industry		

Source: *e-Business W@tch* (2004)

ICT infrastructure

IT infrastructures in the retail sector are rather heterogeneous. This reflects the structural differences within the sector. Leaving aside basic computer equipment (computer usage), data about network technology penetration point at significant differences. On the one hand, there are the large chains that concentrate sales, financial resource availability for IT and require a high level of integration on the vertical level with suppliers, as well as among the various points in their sales network. On the other hand, there are the small retailers whose availability and needs for horizontal relations do not justify significant investments. The retail industry in fact ranks significantly below average with regard to the ICT infrastructure of companies.

Exhibit 2.6-3: Use of ICT Infrastructure by firms from the retail industry

	Local Area Network	Wide Area Network	Remote access to company network	Internet access	Use e-mail
Sector total (EU-5)	N=504	N=504	N=504	N=504	N=504
% of employment	51	21	26	80	74
% of enterprises	26	4	13	64	51
0-9 employees	25	4	13	63	50
10-49 employees	52	14	24	87	80
50-249 employees	75	26	36	93	92
250+ employees	79	46	37	94	94
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	61	29	37	10	95
% of enterprises	32	5	16	4	89

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Internal business processes

Knowledge management and e-learning: Knowledge management tools in the retail industry usually support information shared by people operating in marketing, reporting on a firm's activity and deciding the strategy of the firm. Tools for organising corporate knowledge are not widely used in the retail industry: 22% of retailers in the EU have an Intranet and only 5% of retailers use a special knowledge management application. Unsurprisingly, these tools are mainly employed by large companies.

Exhibit 2.6-4: ICT use for internal business processes in the retail industry

	Use an Intranet	Use an ERP system	Use online technologies ...		
			to share documents for collaborative work	to track working hours and/or production time	to support human resources management
Sector total (EU-5)	N=504	N=504	N=504	N=504	N=504
% of employment	37	13	30	11	13
% of enterprises	22	7	13	3	4
0-9 employees	21	7	12	3	4
10-49 employees	26	23	27	13	9
50-249 employees	56	24	32	17	13
250+ employees	59	19	50	15	22
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	45	19	40	20	21
% of enterprises	21	5	22	5	5

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Online technologies for internal processes: Applications supporting internal business processes have a limited diffusion in the retail industry. Online technologies for sharing documents internally are used by 13% of companies comprising 30% of employees. The percentage rises to 50% for large companies. Other specific technological means to automate travel, track working or support human resources management are extremely scarce (used by 2-4% of enterprises).

ERP: Enterprise resource planning (ERP) systems are used by only 7% of retail enterprises, corresponding to 13% of employment. Unexpectedly, and in contrast to most other sectors, larger companies express a slightly lower propensity for the introduction of ERP (enterprise resource

planning systems) solutions than medium-sized firms. Legacy systems, as well as past experiences, may play a role in this context. Furthermore, the current offer of systems is still not suitable for many companies, thus not making it a "killer application" in the short run. The overall low penetration of ERP systems may only be explained by the fact that they are yet not considered as effectively strategic for business activities in the retail sector.

Electronic procurement and supply chain integration

Electronic procurement: Less than one company in five purchases goods online, but the ratio rises with the size of the enterprises. Half of large companies purchase goods online. Online purchases are less diffused in the retail industry in the EU-5 countries than the average in the other industries. The distribution platforms most used for online purchases are suppliers' websites, preferred by more than 80% of the enterprises making online purchases. Other methods for online purchases such as marketplaces, extranet, mobile commerce (WAP) are less used (by 30-40% of those companies that buy online), while EDI is the least diffused. The diffusion of these platforms is very similar to the average in the other industries.

Exhibit 2.6-5: Electronic procurement and supply chain integration in the retail industry

	Make online purchases	Online purchases account for >5% of total volume	IT system is integrated with that of a supplier for placing orders	Use an SCM system
Sector total (EU-5)	N=504	N=504	N=504	N=504
% of employment	38	16	11	5
% of enterprises	23	12	9	5
0-9 employees	23	12	9	4
10-49 employees	39	25	15	5
50-249 employees	43	19	14	9
250+ employees	52	13	12	7
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516
% of employment	46	23	8	6
% of enterprises	31	18	6	2

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2004)

Supply chain integration: Retail companies can use a variety of electronic applications and methods to strengthen the vertical integration with their suppliers. The e-Business Survey 2003 investigated the use of different approaches. Using online technologies to exchange documents is the simplest way, as it can be pursued by just being connected to the Internet; 34% of the companies with Internet access exchange documents with suppliers. About 40% of the companies that make online purchases have integrated their IT system with that of a supplier. Interestingly, the share is higher among small firms, partly because they are forced to do so by large firms they are dealing with. Only 5% of retail firms have a Supply Chain Management systems (SCM).

Customer facing processes

E-commerce is still very limited, increasing slightly with firm size. Only 8% of retail companies, accounting for 17% of employment, are selling online. Among large companies, one in four makes online sales. 20% of the firms selling online allow customers to pay online. However, these transaction oriented statistics fail to some extent to take into account the rapidly increasing importance of the Internet for making purchasing decisions. Many consumers routinely browse the web in a pre-purchase stage, prior to making their purchases in a retail store. Such "quasi-consumption" behaviour allows consumers to inform themselves about product availability, specifications and to compare prices. As a consequence, know-how in electronic marketing will be important for many retailers as part of their customer service, even if they do not actually use the web for selling products online.

Exhibit 2.6-6: Electronic marketing and sales in the retail industry

	Have a website on the Internet	Make online sales	... of those:	
			Allow online payment of products ordered	Online sales system with secure transactions capability
Sector total (EU-5)	N=504	N=504	N=88	N=88
% of employment	52	17	32	52
% of enterprises	26	8	20	40
0-9 employees	24	7	17	39
10-49 employees	61	22	40	42
50-249 employees	70	25	23	45
250+ employees	77	27	34	61
All (9) Sectors (EU-5)	N=4516	N=4516	N=598	N=598
% of employment	66	16	43	59
% of enterprises	35	9	38	46

Base (100%): all enterprises / enterprises making online sales. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). * Percentages not displayed because base of cases observed is too small. Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

The high cost of mass media as advertising channels has further pushed the use of direct marketing within the retail industry. Retail is one of those industries where direct marketing has always been important. Direct marketing and related customer relationship activities require good customer databases. A website can be a useful instrument to establish and maintain such databases.

2.6.3 Case studies

This chapter features abstracts and key lessons learned from case studies which are presented in more detail in the 2nd Sector Impact Study from August 2004.

ARGOS (UK)	
<i>Background</i>	<p>Argos was founded in 1973 and is now the UK's leading general merchandise retailer and catalogue store chain with sales of over £3bn (April 2002 - March 2003). Argos is a non-specialised store selling a large number of household goods including furniture, sound & vision, household appliances, photography, baby products, garden & pet products, toys, office goods, computers, personal care, jewellery & watches.</p> <p>The company is based on and was born from a simple idea: combining the comfort and the convenience of home selection via a catalogue with the closeness of high street stores. Argos maintains a broad network of stores and distributes its catalogue to more than two-thirds of all UK households. There is an Argos store within 10 miles for 98% of the UK population.</p>
<i>Activities</i>	<p>Argos has from the beginning been noticeable for its innovative use of IT, which has affected internal communication as well as communication with customers and suppliers. Argos offers to the customers a multi-channel approach to shopping. Customers can see the goods on their mobile phone, on the Argos website and on their television. They can browse the catalogues, check the stock availability, pay and collect their goods directly in the store or use the "Click & Collect" service via the website. The Argos website was first launched in 1995. Argos e-commerce presently accounts for 5% of total business sales. Customers can also check stock</p>

	<p>availability and reserve goods through the "Ring & Reserve" call centre and the "Text & Take Home" (SMS) services using their telephone or their mobile phone. Finally, Argos customers can, since December 1999, place orders and buy goods through their digital television sets.</p> <p>Argos has to efficiently manage the flow of merchandise from an extensive base of more than 750 suppliers to any one of its Argos distribution centres throughout the UK. For this purpose, the company uses a UPS Supply Chain Solution, which electronically validates the merchandise against the needs, confirms that the merchandise is ordered and ensures correct delivery time.</p> <p>The company has delegated the management of the warehouse to Retek Inc. The company uses "Advanced Inventory Planning", which is able to synchronize supply with consumer demand across multiple channels, thus improving and maximizing the performance of inventories.</p>
<i>Results</i>	<ul style="list-style-type: none"> • The company has successfully developed a multi-channel approach, including online and off-line channels. • An important success factor in this context is that the integration of the sales channels should be planned and implemented in parallel to a high level of integration of supply functions. • The supply chain is strongly integrated, both in the warehouse and in the purchasing process.

EURO-LABEL (EU)	
<i>Background</i>	<p>One of the most important barriers to the development of e-commerce is the trust and security aspect. Euro-Label is a brand that certifies the reliability and trustworthiness of electronic commerce in Europe. The idea of the brand is targeted to European SMEs in order to increase confidence in the B2C market. A companies that wants to certify its website has to place a request at the "Certification body" of its country. The Euro-Label central organization does not directly certify traders, but works through a network of national members across Europe.</p>
<i>Activities</i>	<p>There are now 231 Euro-Label certified e-shops. In all but four of the 26 retailers' categories, there is a great predominance of German enterprises. Germany has 136 e-shops certified (the online market in this country represents 2% of the total retail sales). In Austria, the second country by number of certified e-shops, there are 64 websites with the Euro-Label logo. In France the number of e-market is growing slowly but steadily and there are now 30 certified websites. In the other two countries that promote the logo, Spain and Italy, the number of e-shops is still very low and slowly developing, in spite of the efforts made by the national associations.</p> <p>In many cases the cooperation between the certification body and the retailers is an ongoing process that does not end with awarding the logo. Many of the certified companies turn to the certification body regularly to discuss aspects of the shop that have not been included in the certification process, for example the integration of new payment options, the implementation of an interactive shopping assistant, or delivery to new countries.</p>
<i>Results</i>	<ul style="list-style-type: none"> • Certification has a great potential. Research shows that online customers prefer to buy goods or services from a company that has affixed on its website some type of third-party recognition. Normally, this will include a label that proves its use of a set of enforceable business practice standards. The Euro-Label brand on a website adds value to the information that the customers are likely to use in making their purchasing decision.

	<ul style="list-style-type: none"> Firms located in countries with a lower share of online sales appear to be less interested in Euro-Label. These firms tend to regard online selling as a complementary activity rather than as an integrated activity.
--	--

CENTRALIA (ITALY)	
<i>Background</i>	<p>The Italian food market is presently controlled by large retailers and some large chains. Small and independent non specialised retailers hardly survive the price and service competition of large chains. It is estimated that food and beverages is subdivided among supermarkets and chains (44%), independent retailers (16%), HORECA (29%), others (5%) (source: Confcommercio).</p> <p>Centralia officially started its activity in October 2003 and it was founded by Confcommercio. The enterprise is owned by Confcommercio (60%), Monte dei Paschi Bank and Advanced Logistics Network (a firm specialised in logistic services). The main goal of Centralia is to efficiently integrate the purchasing process of small retailers in the food sub-sector. Centralia presently purchase and distribute fresh and frozen products in Lombardy, Piedmont and Aemilia; and non perishable products in the whole country. In addition, it serves restaurants and large chains abroad only for a small amount of very typical Italian food.</p>
<i>Activities</i>	<p>Centralia is working as a procurement system exclusively serving independent retailers and hotels, restaurants and caterers (HORECA). It integrates the functions of a purchasing group and the delivery capability at the point of sale of its customers. The enterprise is fully based on web technology, reducing the transaction costs of its customers. The web or a call centre (working 24 hours a day) collect orders that will be delivered to the customer point of sale, directly by Centralia or through the cooperation of logistics partners. Orders are supported by a secure cash collection process (virtual purchasing card). Half of the activity is managed by its own logistics capacity and half by external partners.</p> <p>The Centralia IT system is web-base and comprises a data warehouse, a CRM system and an ERP system (accessible for their main customers), while the demand planning system is under development. The payment system is fully automated, does not request any sensitive information and is secure and trusted as such by the customers.</p>
<i>Results</i>	<ul style="list-style-type: none"> Centralia's intermediation permits the independent retailers to take advantage from an integrated supply system without making investments – unless wanting to do so. The telephone connection (to the call centre) or the access to the Internet is more than enough. Small retailers gain from significant saving costs on purchases, thanks to the participation in a purchasing centre. Small retailers can profit from economies of scale and scope which are usually enjoyed by large firms. Such a system may drive knowledge transfer and the adoption of information technology among independent retailers.

2.6.4 Conclusions: e-business opportunities and challenges

Exhibit 2.6-7: Overview of e-business related opportunities and challenges for firms from the retail industry

Opportunities	Challenges
<ul style="list-style-type: none"> • Cost savings • Efficiency and productivity gains • Increasing information about the market and the customers (e-marketing) • Online selling and multi-channel approach 	<ul style="list-style-type: none"> • Increasing awareness of the e-business impact • Increasing market competition, where retailers are very concentrated • Economic return of e-business

Source: *e-Business W@tch* (2004)

Opportunities

Cost savings: Using e-business to decrease the costs related to commercial transactions is a major driver of e-business in this sector. Due to a large number of products and transactions, improvements in these processes can drive towards substantial savings. E-procuring via marketplaces or buying groups may give significant cost advantages to small retailers due to economies of scale and scope.

Efficiency and productivity gains: E-business is favouring the vertical integration of the enterprises involved in the retail sector supply chain. E-business in fact is a very useful tool for those operators aiming to reduce the quantity of goods to be stocked under the same sales conditions, and to accelerate supply flows to offer better customer service. E-business tools permit information sharing among chain partners (retailers, logistics providers, manufacturers). This, in turn, leads to the topic of the e-extended supply chain, where, ideally, demand drives and automatically determines supply flows.

Increasing information about the market and the customers: Information and Communication Technologies may be employed for customer management. In this case, techniques are used for customer data processing, marketing, sales and services with the goals of collecting information, attracting and retaining customers. This implies developing activities such as warehousing, data mining, e-marketing and e-services. The Internet may help developing the customer-supplier relationship along three lines: an increase in the information content; an improved market relationship (personalisation and increased customer loyalty). This may be difficult and expensive for small retailers, but could be an effective marketing tool for large and multi-product retailers.

Online selling and multi-channel approach: Although the percentage of companies that sell online is still limited and the ration of online sales on total sales is even less, there are growth prospects. The main issue for retailers adopting e-commerce as a desirable path of growth is that the online channel should not be added as if the two channels were independent. The retailer's website not only affects the online performance of the company, but also its relationships with customers and its overall sales performance.

Challenges

Lack of awareness: e-business may offer significant opportunities to retailers. The *e-Business W@tch* survey indicates that retailers may not be sufficiently aware of the impacts which ICT could have on their products and services (product innovation, cost saving and therefore competitive pricing) and on their business processes.

Increasing market competition: The enhanced access to market information for customers increases the competition level even where concentration is already high. This has an impact on pricing, which is a positive effect for consumers but involves risks of eroding profit margins for retailers. Firms will therefore be forced to look for further cost saving potentials, which could have a detrimental effect on overall quality and service.

Economic return of e-business: Investments required for e-business solutions may be considerable for many small and medium retailers. SMEs are usually not in a position to plan investments with long/medium term returns. In particular, future costs for maintenance and upgrades are difficult to forecast and may lead to non-adoption.

2.6.5 Outlook

The structure and the recent evolution of the retail industry give ICT a very important role. This role is connected to the necessity of upstream integration in the supply chain and of downstream communication with customers. It is also related to the exchange and integration of information within the same enterprise, as a consequence of network organisation of the points of sale. In this context, the size of the firm is an important variable along with the number of points of sale and the organisational structure of its distribution network.

Retailers have to manage a high degree of complexity due to the large number of products traded and the need to optimise the balance between service (constant availability of goods in stock) and efficiency (minimum inventory). For retailers, information technology is mostly a "production" technology that can affect the productivity of physical processes.

Exhibit 2.6-8: Overview of e-business enablers and barriers in the retail industry

Enablers	Barriers
<ul style="list-style-type: none"> • Dynamics in demography , modern life style, consumer choice, legislation are positive signals for the promotion of e-business • Need to set up supply relationship • The majority of retailers intend to expand their offer of private label products. This sets the ground for improved relations and the exchange of information with suppliers and customers. 	<ul style="list-style-type: none"> • Lack of basic interest in Internet among a large number of retailers • IT skills gap • Trust and security

Source: e-Business W@tch (2004)

The retail sector is characterised by rather low sales margins, even if these margins can vary considerably in different sub-sectors of the retail industry. For this reason, electronic procurement is of particular importance for retailers. Adoption of e-business applications are driven by the goal of improving profitability and efficiency of the supply system. Retailers tend firstly to invest in e-procuring activities and supply chain integration, and secondly in e-commerce and e-marketing practices. Most of firms seem to prioritise the use of efficient tools, in the sense that profitability is a major condition for setting up ICT systems. For the moment, however, ICT does not seem profitable enough, especially where e-commerce and e-marketing is involved.

Selected references

Colla E.: La grande distribution Européenne – Paris Vuibert –collection Gestion Internationale, 2001

Colla E.: The Outlook for European Retailing : competition and format development, International Review of Retail Distribution and Consumer Research, 4(1)

Colla E.: The outlook for European Grocery Retailing: Competition and Format Development, International Review of Retail, Vol. 14, January 2004

Reynolds J.: e-Commerce: a Critical Review. International Journal of Retail &Distribution Management, Volume 28. N° 10-2000. MCB University Press

Reynolds J.: Charting the multi-channel future: retail choices and constraints. International Journal of Retail &Distribution Management, Volume 30. N° 11-2002. MCB University Press

Ziliani C.: e-marketing – direct, database e Internet marketing, McGraw-Hill, 2001

2.7 The tourism industry

2.7.1 Economic profile

Tourism is usually defined as services provided for people travelling to and staying outside their usual environment for less than one consecutive year for leisure or for business purposes. Tourism involves transport, accommodation, restaurants, cultural activities and leisure, and could be more effectively viewed and evaluated as a market rather than a sector. The combined sector consists of the following NACE groups:

Exhibit 2.7-1: Configuration of the tourism sector in terms of NACE Rev. 1

NACE Rev. 1		Activity
Division	Group	
55		Hotels and restaurants
	55.1	Hotels
	55.2	Campsites and other forms of short-stay accommodation
	55.3	Restaurants
	55.4	Cafés
	55.5	Bars
	62.1	Scheduled air transport
	63.3	Activities of travel agencies and tour operators; tourist assistance activities n.e.c.
92		Recreational, cultural and sporting activities
	92.33	Fair and amusement park activities
	92.52	Museum activities and preservation of historical sites and buildings
	92.53	Botanical and zoological gardens and nature reserve activities

The tourism sector involves various activities which have been grouped in accordance with the definitions provided by the NACE Rev. 1. The sector report focuses on “hotel and restaurant activities” (55) as well as “activities of travel agencies and tour operators” (63.3). “Scheduled air transport” (62.1) is considered outside the scope of the report, as this sector is dominated by major enterprises. “Recreational, cultural and sporting activities” (92) lack comprehensive statistical data to form a thorough analysis on this group.

Industry structure and employment

The tourism sector (as defined above) in Europe is represented by approximately 2 million enterprises. 99% of European tourism enterprises are small firms with less than 50 employees, and only a marginal percentage of the enterprises are large enterprises (with more than 250 employees). In the hotel and restaurant sub-sector (NACE 55) only 0.1% of all enterprises have more than 250 employees. This fraction accounts for 26.4% of the value added and 22.1% of the total number of people employed in the sector. 92.4% are enterprises in the micro category with less than 9 employees, which accounts for 37.6% of value added and 44.6% of the total number of employees. The micro-enterprises represent a higher percentage of employees than value added. Eurostat statistics (New Cronos 2003) indicates that the structure of the industry in the new EU Member States resembles – in terms of structure – tourism in the former EU-15.

Production value and regional distribution

The United Kingdom accounts for 39% of production value and 24.4% of value added in the EU-15 in 2001. France and Italy contribute to the production value by 13.3% and 12.2% respectively, whereas the value added is at 14.3% and 13.0% respectively, which proportionately is a stronger contribution than the United Kingdom.

Even though Europe in general experienced recession from 2000 to 2001, the total production value and value added in the tourism sector increased (by 8% and 1.5% respectively) from 2000 to 2001.

For the 10 new Member States, the statistics show growth in the sector, but at a rather limited size compared to the former 15 EU countries, both in contribution of production value and value added, which accounts for about 2% of the total European value each.

Trends and challenges

The demand for tourism products and services from the Internet is still growing despite the dotcom bust in late 2000. Some well known travel sites, such as Last-minute.com and Expedia.com are still going strong, and new sites are continuously being added. Europe's three largest economies (the UK, Germany and France) are expected to experience high growth in online travel through 2007.

In terms of demography, all indications are that the proportion of older citizens will increase in Europe's economies, whilst workforces will contract as the number of young people levels off. As a result of this, there will be an increase in demand for tourism products suited to the elderly market segments. Furthermore, North European workforces will be supplemented by migrants from the south and the east of the continent, which will create demand for travel and tourism with a greater emphasis on value-for-money. Western society is experiencing record divorce rates, later marriage and family formation, and increased single parent households. The implication of this is the greater variety of households or household segments for which the travel and tourism sector has to cater.

Another trend is a demand for niche tourism products. These products will range from specialised eco-interest products involving studies of chosen subjects, through to the bulk of general interest holidaymakers wishing to incorporate a day trip to a nature reserve or a cultural site. At the same time, tourists are highly mobile and flexible in making their travel arrangements, looking for the best price offer, often on a last-minute basis. Recent debates in the sector indicate that the Internet is also fuelling a trend where tourists "disassemble" the conventional package and make reservations through tour operators only for selective parts of their vacation. This represents a major challenge to the business model of traditional tour operators.

Continuing advances in information technology and the relative decrease of travel costs have helped accelerate growth in tourism. The number of people who can afford global destinations has sharply increased over the past 15 years. Globalisation also drives uniformity of the offers. A significant number of tourists wish to participate in hedonistic (pleasure) activities over an intense period at destinations which guarantee excesses of entertainment and good weather.

2.7.2 Key application areas of electronic business

Exhibit 2.7-2 gives an initial overview of the importance of various e-business objectives and related application areas in the tourism industry. The assessment is largely based on the statistical picture derived from the e-Business Survey 2003, which was presented in the first Sector Study (May 2004).

Based on this overview, the subsequent pages outline some important issues in more detail, supported by abstracts and key lessons learned from case studies which are presented in more detail in the 2nd e-Business W@tch Impact Study from August 2004:

- Web-based e-marketing and customer related services – performing marketing over the Internet, on web-pages or through mailings, in this case in relation with other parties on a specific destination.
- Extended enterprise: collaborative (online) e-product design with business partners, including suppliers and customers.
- E-commerce: increasing sales volume / area through selling on the Internet, by focusing on selling products and services and by communicating these possibilities to target customers.
- Electronic customer management – operating electronic CRM systems in order to "tie" the customers to a given organisation or to maximise the potential revenue.

Exhibit 2.7-2: The importance of various e-business objectives and applications in the tourism industry

E-business application area	Importance	Remark / example
Facilitate remote and mobile work (field-work, home-based telework)	~ ~	Large companies are average performers in remote access applications when compared to other sectors, SMEs less so.
Improve knowledge management by using special software	~ TM	KM software use is limited, as the organisations do not perceive clear benefits. KM is estimated to have a vast potential within the industry.
Automate internal business processes	~ ~	Business process improvements are considered to be a relatively low priority to the organisations in the tourism sector.
Improve ERP-to-ERP connectivity	~ ~ TM	ERP applications should make supply chain processes more efficient and thereby improve lead-time.
Supply chain process integration	~ ~	The sector is beginning to focus on SCM, but is yet underperforming as compared to the cross sector average.
Decrease direct procurement costs through e-procurement	~ ~ TM	As in other sectors, the larger companies pursue the goal of streamlining their supply firms. In general, the focus is rather on making processes more efficient.
Web-based e-marketing and customer related services	~ ~ ~ ~	The tourism sector is highly dependent on the Internet in terms of distribution of information, sales and services performed via the Internet. This is a key-application area for the sector.
Electronic customer relationship management (CRM)	~ ~ ~ TM	A key element for the sector as personal relations and customisation of services are success factors
E-business: Increase sales volume / area through selling on the Internet	~ ~ ~ ~	Selling online through the company website is of high priority and a key activity for organisations in the tourism sector. Both large and small companies are operating online selling, and are constantly revising their services.
B2B marketplaces on the Internet	~ TM	Only a limited number of enterprises in the sector are using marketplaces, but this is an area which is expected to grow over the coming years
Use of e-business standards for exchanging structured data	~ TM	Below average use of exchanging document, an element which is yet carrying little focus in the sector.
Web services and XML based standards	TM	SMEs are reluctant to invest in XML as they are not yet convinced of the benefits and it is a costly investment.
Extended enterprise: collaborative (online) e-product design	~ ~ ~ TM	More and more organisations are forming partnerships and relations with external players in their supply chain to design new products, to forecast demand, and to manage capacities and market services.
~ = little relevance; ~ ~ = average relevance; ~ ~ ~ = very relevant; ~ ~ ~ ~ = high relevance for sector TM = mixed results, depending on the sub-sector within the tourism industry		

Source: e-Business W@tch (2004)

E-Marketing and Relationship Development

A new trend within the tourism industry is the growing tendency to create relationships among players regarding a given destination in order to optimise the outcome of the marketing efforts. This tendency can be spotted on national, regional and local level, where countries on a national level are introducing portals to present themselves as a whole – see for instance www.visitgermany.com. This is linked to operations at a regional level, be it intra-country regions such as the south of Spain (see www.andalucia.com) or inter-country ones such as the Scandinavian countries (see www.qoscandinavia.com).

Attempts to operate relationship and networks on a practical level have led to a variety of alliances and partnerships in recent years (Hartman et al, 1999). An overarching trait of these partnerships is

that they bridge players from different sectors and/or industries of the society that have traditionally tended to be more isolated from one another (Hartman et al, 1999; Inkpen & Crossan, 1995). As these partnerships develop, they face the challenge of learning. Often this challenge is greater than in homogenous groups, for example networks that consist of enterprises from only one sector. In the cross-sectored networks, very different rationales and mindsets meet, making the creation of a common basis for development more difficult (Ford, 2002; Lütz, 1999).

Exhibit 2.7-3: Online marketing and e-commerce activities (2003)

	Have a website on the Internet	Make online sales	Allow online payment of goods/services ordered	Online sales system with secure transactions capability
Sector total (EU-5)	N=502	N=502	N=502	N=502
% of employment	76	37	16	18
% of enterprises	63	33	14	15
0-9 employees	61	33	14	15
10-49 employees	85	38	13	14
50-249 employees	93	53	22	34
250+ employees	92	39	23	27
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516
% of employment	66	16	7	9
% of enterprises	35	9	4	4

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

In tourism, the customer is controlling the market to a large extent. The Internet has further shifted power to consumers, as it facilitates the search for offers and increases market transparency. Costs for switching between suppliers are low, which increases the importance of communication and marketing tools for service providers (such as tour operators, travel agencies). Most SMEs from the sector co-operate with various partners in one way or the other, but very few have made a strategic decision on establishing formal relationships in order to achieve a better market position and a competitive advantage.

CASE STUDY: TRYSILFJELLET BA (NORWAY)	
<i>Background</i>	<p>Trysilfjellet BA is an umbrella-organisation – a consortium conducting wide-ranging tourism activities in the Trysil area, Norway's largest skiing area. The consortium is managing the following areas:</p> <ul style="list-style-type: none"> • Further expansion and investments of Trysilfjellet BA • Running the ski and golf resort • Booking and management of a vast number of hospitality entities <p>The consortium is comprised of the subsidiary companies Trysilfjellet Alpin AS (the ski resort), Trysil Booking AS (booking of accommodation and activities), Fjellbygg AS (construction of rental accommodation), Trysilfjellet Golf AS (golf resort) and ownership in other enterprises.</p>
<i>Activities</i>	<p>The players in the Trysil area have found it more beneficial to be represented as one grand enterprise instead of a number of individual players. This has made it easier for the individual organisation to reach customers and likewise for the customer to realise the potential of the area.</p>

	<p>Trysilfjellet BA has set up the website inviting customers to share their experiences of the resort and activities offered by the consortium. At present, Trysilfjellet BA is working on a customer loyalty scheme, which will be put into effect as of summer 2005 and will be tied to the current e-business systems.</p> <p>As 92% of their customers seek their travel information via the Internet⁶⁸, Trysilfjellet BA uses the Internet extensively for marketing purposes. This high rate of penetration is providing Trysilfjellet BA with a competitive advantage, compared to other ski resorts in Scandinavia. Trysilfjellet BA is currently developing a system where customers can book on their website from a "dynamic packaging" offer, including offers for transportation, lodging, ski rental, restaurant visits, lift cards, ski school and other activities.</p> <p>Most importantly, this network has made it possible for the Trysil area to establish an extremely professional website with e-booking and e-payment possibilities. By joining forces, the players have the opportunity to invest in high tech equipment and ICT, which would have been impossible if they were working individually. The website is one of the most detailed destination sites available in Europe providing a significant amount of information and e-business solutions.</p>
<i>Results</i>	<ul style="list-style-type: none"> • Trysilfjellet BA has succeeded in profiling the destination as a whole instead of various players on the same geographic location. • The individual organisations represented in the consortium are benefiting from the joint marketing and sales efforts and are targeting their customers in a better way than prior to the existence of Trysilfjellet BA. • By forming Trysilfjellet BA, it has become possible for different SMEs to invest in ICT and e-business applications, which on an individual basis would have been too costly for their operation. • The e-business setup and an active performance in e-marketing have improved the overall competitive situation for the destination to become the leading Norwegian winter holiday destination.

E-business applications to support revenue management

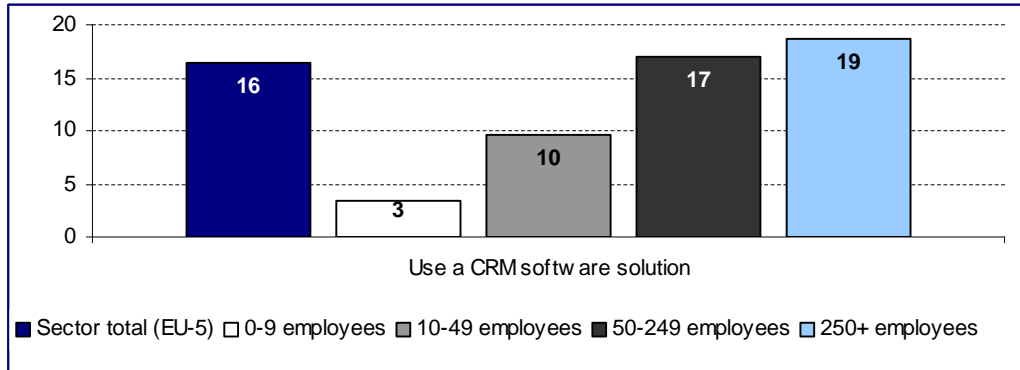
Electronic Customer Management systems or Customer Relationship Management (CRM) systems have over the last few years become more and more popular in the attempt to make consumer services and management a part of the daily operation of firms. In the tourism industry, the suppliers not only have to calculate the variation of supply throughout the seasonal changes, but the industry also has to adjust prices, availability and product according to demand.

The emergence of e-business has created both opportunities for and challenges to the tourism industry's revenue-management practices. The potential to reduce distribution costs (e.g. commissions) by using e-business has made tourism managers more conscious of the need to maximise gross profits (revenue less costs, including distribution costs) rather than solidly focusing on increasing revenue.

The basic principle of revenue management is to match the rate and timing of the sale to the buyer's need. Sellers offer discounted rates to stimulate demand for products or services (inventory) that would otherwise be unallocated, but limit the availability of the discounts to customers who are willing to pay a higher price to obtain, for example, last-minute accommodation, or to those who want a particular room at a specific time.

⁶⁸ Survey conducted by Trysilfjellet BA/Refleks BA, 2003.

Exhibit 2.7-4: Companies from the tourism sector using a CRM system (2003)



Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=502 for EU-5 sector total.
 Weighting: Figures for size-bands in % of enterprises. Figure for "Sector total" is weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

One of the principal objectives for Global Distribution Systems (GDS) development is the establishment of a sophisticated system of market communication through a distinct distribution channel. This enables the product/service supplier to link more directly with customer sources and therefore reduces market transaction costs. As these systems are developed further to embrace other constituent elements of the tourism service distribution network, such as travel agents and hotels, a number of significant issues will begin to emerge for the integration and extension of Revenue Management applications, such as GDS and B2B e-integration.

This suggests that the chain operation embracing a strong brand image may benefit more, or suffer less, from the distribution of its product through a GDS than an independent operation where individuality and personalisation are critical aspects of its competitive strategy.

CASE STUDY: ACCOR HOTELS (FRANCE)

Background
 Accor is a worldwide hotel group managing, owning or franchising nearly 4,000 hotels in 140 countries, with the characteristics of SMEs. The hotels, headquarters and branch offices employ 157,000 people worldwide and generated a revenue of 7,071 m Euro in 2002. Accor Hotels runs a portfolio of economy to upscale luxury class hotels in both business and leisure. Brand names in Europe and the rest of the world (besides the US) are Ibis, Formule 1 and Etap Hotel, and in US, Motel 6 and Red Roof Inns. Accor is also very well positioned in the upper and medium scale hotel range with the Sofitel, Novotel and Mercure brands on all five continents. The company is using information technology to attain customers and has already invested in, and continues to invest substantial resources in, achieving a leading position in the online hotel market

Activities
 The Revenue Management applied by Accor operates at the hotel level. Each individual hotel controls its own pricing and allocation strategy for their inventory. This allows them to adjust the system according to the needs of local customers, and as the system is interlinked with the group GDS system, the group keeps updated on Revenue Management worldwide. Accor's GDS is integrated into their e-business set-up. In practice this allows the individual hotel to allocate and price its inventory with an instant update in the GDS system and the e-booking system.

Accor place emphasis on their marketing efforts on the Internet in order to get still more customers to book online, and especially on their own website (www.accor.com) as this will decrease their transaction costs (e.g. by saving

	commissions to third party websites). This whole chain of pricing reactions starts when the individual hotel alters their prices in the Revenue Management system.
<i>Results</i>	<ul style="list-style-type: none"> • Accor Hotels has succeeded in implementing an electronic revenue management system tying the SME hotel operations in a common network. This has improved their overall market performance by better foreseeing trends and market developments. • By linking the revenue management system to the GDS booking system Accor has developed a forecast system optimising their sales, allotments and pricing strategies • Electronic bookings get traceable in the internal financial systems, thus saving transaction time and cost. • Accor is saving costs on commissions for travel agents as customers are making bookings directly to the chosen hotel. • The prerequisite for the operation of revenue management in Accor Hotels has been the development of a worldwide network system linked to the headquarters in Paris.

E-business: a new medium for communication

E-business and e-commerce has developed over the years not only in terms of focusing on buying and selling, but more importantly, as a new medium of communication between buyer and supplier or between internal parties in an organisation. An increasingly popular application for Intranets is the sharing of expert information inside the company. Over the years, most businesses have accumulated valuable data about their customers, products, processes, and competitors. However, few of them take advantage of this free but valuable information.

Customer service is at the core of any business success and particularly within the tourism industry. Internet technology and ERP systems can assist an organisation to accomplish the following:

- Reduce reception or guest call centre loads and e-mail backlogs.
- Empower customers to find their own answers and share information across the organisation by using the Internet, Intranet and Extranet.
- Reduce service response time.
- Reduce employee training time and costs.
- Create ongoing customer dialogue.
- Improve customer satisfaction and loyalty.

The Internet is assisting organisations to accomplish the abovementioned, as customers are taking over some of the elementary services, previously provided by employees.⁶⁹ According to the 2003 e-Business Survey, however, Enterprise Resource Planning software (ERP) is used by only a fraction of tourism enterprises (7%). This is far below the average of all sectors (19%) studied by the *e-Business W@tch*.

To improve these applications, various companies have specialised in providing web-based customer service solutions to organisations in the tourism industry.

⁶⁹ Language and time differences should be taken into account when applying Internet as a customer service or communicative tool.

CASE STUDY: RUN21 TRAVEL (ITALY)	
<i>Background</i>	<p>Run21 Travel is a small Italian travel agency with 5 employees. It is managed by an entrepreneur with more than 20 years' experience in the tourism sector. The company sells directly to end customers and small travel agents. Run21 Travel makes information about promotional fares available, enabling SME travel agents to compete against the large groups through access to promotional fares. The company also offers an IT solution called Speedy Fares, a software programme addressed to travel agencies allowing them to identify promotional airplane tickets in the Run21 Travel database.</p>
<i>Activities</i>	<p>The company is a micro-sized frontrunner in the implementation of new ICT technologies in the tourism sector. Recently, Run21 Travel has implemented an ERP solution and an Extranet with the help of its partner, Datatur. Datatur is a company offering administrative solutions and the software for the promotional fares database. The database has enabled Run21 Travel to provide fares that Central Reservation System (CRS) cannot allocate due to the lack of interconnectivity between the sequential databases of the system.</p> <p>Even though Run21 Travel is a small firm, it has made e-business and ICT their core competence to explore how to conduct business on the B2C level. Run 21 are now selling their own operational system to other small-sized travel agents through out Europe.</p> <p>The travel agency can now communicate with a broader segment of tourists over the Internet. This would not be possible through traditional communication channels as it would be too costly for a micro-enterprise. The infrastructure, communication platform and ERP system have been built to suit the needs of both customers and Run21. By properly identifying the needs of both the organisation and the customers Run21 is optimising communications both with its customers and internally, thereby optimising resources available for customer handling.</p>
<i>Results</i>	<ul style="list-style-type: none"> • Run21 Travel efficiently improved their operations by applying a tailor-made ERP system. • The developed concept of a small-scale ERP systems has turned into a business case. Run21 Travel enhanced its business model and is now selling ICT set-ups to other travel agents and small tour operators. • Run21 Travel has successfully implemented an integrated small scale system by sharing the ERP expenses with a partner organisation. • By systematically implementing both Intranet and Extranet applications, Run21 Travel has managed to maintain a streamlined organisation with a minimum of employees even though their sales and customer base is growing.

E-partnering between traditional tourism operations

One of the functions of an "extended enterprise" is collaborative product or service design. In tourism, companies can offer prospective customers to contribute to this process through the Internet. The co-ordination and management of this network often involves third-party relationships maintained on behalf of the customers. Enterprises, to be successful, must not only look at their internal processes but also need to manage this network efficiently and provide all members with exactly the information they need. This involves a high degree of interaction, collaboration and exchange of information and knowledge.

The choice of a specific e-partnership depends on a number of variables, such as the novelty of the business area that the partnership intends to cover, the scope of revenue and profitability of the intended business, the organisational form of the involved partners, the number of supplementary partners, etc.

Despite the fact that e-partnership organisations start at different points, they appear to move in the same direction. Moreover, the developments on the level of individual partnerships can be mirrored in the concept of the ecosystem, where e-partnerships will play a central role. As a result the package tour industry has transformed from a traditional travel agency to electronic intermediaries such as www.easy.com, www.lastminute.com, www.run21.com, etc.

CASE STUDY: THE LONDON EYE (UK)	
<i>Background</i>	<p>British Airways London Eye (the Eye) is the world's largest observation wheel and now a world-famous attraction. In the three years since opening, more than ten million customers have experienced the trip on the Eye. Between 190 and 210 people work annually at the Eye, serving the wide customer base ranging from tourists to charities, schoolchildren, corporate clients and many other groups and people from all walks of life.</p> <p>The Eye is a privately owned and funded sponsorship receiving establishment and construction donations from British Airways, the Tussauds Group and Marks Barfield Architects. Financing for the project was provided by Westdeutsche Landesbank and Sumitomo Bank.</p>
<i>Activities</i>	<p>The Eye created e-partnerships by selling tickets for the Eye, including e.g. entrance fee, dinner or drink vouchers, musical tickets, etc. only available on the Internet. This is done to both increase the traffic on its website, attract more customers and to earn revenues by experimenting in alternative business options available in the market. The e-partnerships are formed on a relatively informal basis, thus allowing the Eye to react rapidly either to the demands of its customers by setting up new e-partnerships, or to terminate the partnerships if these are neglected by the other party or unattractive for customers.</p> <p>The Eye has introduced e-partnering as part of its strategy to improve sales and optimise revenues. The cost of the e-partnering is only the set-up and maintenance costs of the website, which would be incurred anyhow if the Eye were selling its own tickets exclusively over the Internet.</p> <p>e-Partnering has made it possible for the Eye to increase e-business sales by combining differentiated products and services for its customers. Electronic bookings and sales have increased from 25% in 2002, when only tickets for the Eye were available online, to 40% in 2003, when e-partnering tickets were available.</p>
<i>Results</i>	<ul style="list-style-type: none"> • Through e-partnering, the Eye has optimised sales as an increasing number of customers are booking and buying online. Currently, about a third of the Eye's customers is buying tickets via the Internet, a fraction which is expected to increase over the coming years (reaching a 50% margin), as customers are getting a better price on the Internet and escape the queue for buying tickets. This increase in online selling of tickets allows the Eye to allocate resources to other activities. • The Eye has experienced an increase in revenues, by receiving commissions from its partners for whom the Eye is selling tickets, fares, fees or food and beverages. • The e-partnering clusters have enabled the Eye to attract more customers with a minimum of effort as the network is fully integrated.

2.7.3 Opportunities and challenges

Despite the benefits of Internet-based commerce to SMEs from the tourism industry, a number of challenges to increased adoption can also be identified. The diversity and sometimes idiosyncratic behaviour of small companies can find its expression in a sticking to traditional business methods and a refusal of innovation and e-business, even if rational economic arguments are strongly in favour of e-business adoption. This can have ramifications for business performance.

Exhibit 2.7-5: Overview of e-business opportunities and challenges for the tourism sector

Opportunities	Challenges
<ul style="list-style-type: none"> • Direct access to potential customers • Cutting marketing and sales costs • Optimising lead-time and instant adjustments of supply according to demand 	<ul style="list-style-type: none"> • Developing new business models to adjust to the new market reality • Minimising set-up costs by developing IT-systems and applications more suitable for SMEs • Creating standard ICT and e-business solutions for SMEs • Employ multi-channel strategies

Source: e-Business W@tch (2004)

Even though the supply, demand and technology have changed the market conditions for e-business in tourism over the last years, it is difficult to predict whether or not these changes are directly reflected in SMEs' revenue and sales. In all four organisations presented in the case studies it has become evident that a high number of customers (between 78% for The London Eye and 92% for Trysilfjellet BA) have searched the Internet and websites for information before visiting them. All four of the interviewed organisations pointed out that the technological changes in the socio-economic context are setting new standards for information search and buying behaviour. They all agreed that customers are not only more knowledgeable about the available products and services, but also more interested in the opportunity to make reservations online.

For tourism organisations, a website is an active marketing tool, which allows customers to search for information and to access presentations on particular products and services 24 hours a day. This is a very important aspect in this industry, where consumers increasingly use the Internet to plan and arrange their vacations from home, even if they do not ultimately make the reservation online. Cost savings remain a compelling motivation to engage in e-business – and a prime argument to convince companies, and especially SMEs, to “go digital”. For an SME, however, this benefit can be difficult to understand when the systems available on the market are focused on larger enterprises.

In contrast to earlier forms of electronic trading, new forms of collaborative commerce imply not only more open relationships, but also far richer modes of interaction between company resources and capabilities. The Internet makes customers increasingly well-informed and knowledgeable about products and services provided by a given organisation. Thus they become more demanding and empowered. On the other hand, the Internet is also expanding the availability and range of products on the market, making even specific products and services known to large numbers of customers. For the customer this will ease their booking process and making "dynamic packaging" an option. Making “the customer a part of the company” could be achieved by allowing peer product reviews, peer evaluations of buyers and sellers, comments on e-mail campaigns etc. These elements, which are allowed in some parts, but not throughout the European Union, would allow organisations to establish cross-border customer references.

Selected references

- Applebee, A., B. Ritchie, S. Demoor, and A. Cressy (2000) *The ACT Tourism Industry Internet Study: attitudes, perceptions and adoption*. Canberra (<http://www.ce.canberra.edu.au/tourismprogram/CTR.html>)
- Dixon, P. (2000) *Fare Game, Airlines, Travel Agents Duke It Out over the Web*. San Diego Union Tribune 09/01/2000 (www.signonsandiego.com)
- e-Business W@tch* E-business Sector Studies on the Tourism Industry (July 2002, April 2003, October 2003, May 2004). Published in electronic format at www.ebusiness-watch.org
- Hartman, C., S. Hofman & E. Stafford (1999) *Partnerships: a path to sustainability*. Business Strategy and the Environment 8(5): pp. 255-266.
- Inkpen, A. & M. Crossan (1995) *Believing is seeing: joint ventures and organisational development*. Journal of Management Studies 32(5): pp. 295-619.
- Lütz, S. (1999) *Learning through intermediaries: the case of inter-firm research collaborations*. In The formation of Inter-Organisation Networks, Ebers M (ed.). Oxford University Press: Oxford; pp. 220-237.
- Middleton, V. & J. Clarke (eds.) (2001) *Marketing in Travel and Tourism*. Butterworth-Heinemann: Oxford
- Various information from the following websites: www.andalucia.com, www.easy.com, www.expedia.com, www.goscandinavia.com, www.last-minute.com, www.run21.com and www.visitgermany.com

2.8 ICT services

2.8.1 Economic profile

The ICT services sector as defined by the *e-Business W@tch* comprises the telecommunications industry (NACE Rev. 1 64.2) and computer related activities (NACE Rev. 1 72). The latter are also referred to as "computer services", as all of them are concerned with service activities and with the production of immaterial goods (software). The manufacturing of computers and related equipment is not included.

Exhibit 2.8-1: Configuration of the ICT services sector in terms of NACE Rev. 1

NACE Rev. 1		Activity
Division	Group	
	64.2	Telecommunications
72		Computer related activities
	72.1	Hardware consultancy
	72.2	Software consultancy and supply
	72.3	Data processing
	72.4	Database activities
	72.5	Maintenance and repair of office, accounting and computing machinery

Telecommunication services are much more than just telephone services. This sector embraces the distribution of data, sound, images, and other information via cable, broadcasting, relay or satellite. Included in this definition are the management and maintenance of networks as well as the provision of services using these networks. Excluded, however, is the provision of radio and television programmes (NACE 92.2). Within the EU-15, telecommunication services account for 54% of the production in the combined ICT services sector – just half of the value added and for about a third of the employees – but for only 3% of the enterprises.

Computer services produce value added of a similar size as telecommunication services, but in a totally different way. The average enterprise is considerably smaller than in telecommunication services and production is significantly more labour-intensive. This explains why computer services companies employ about two thirds of all employees in the ICT services sector and make up around 97% of all enterprises in this sector. While software production used to be mainly a service activity, where software was produced according to individual specification for each buyer, the sector bears more resemblance with a product business today. The outcome of the production process – often so-called standard software – is sold in similar ways as hardware and often via the same sales channels. Data processing activities are typically called IT outsourcing in the industry.

Industry structure and employment

The ICT services sector comprises roughly 360,000 enterprises and provides jobs for about 2.2 million people in the former EU-15. While in telecommunications, about 90% of the employees work in large enterprises (with more than 250 employees), in computer services 70% of the employees work in SMEs. The computer services sector employs more people in most member countries than the telecommunications services sector.

Market size

In 2001, telecommunications companies in the former EU-15 had a production value of 277 billion Euro and created a value added of 127 billion Euro. In computer services, the figures were respectively 239 billion Euro for production and 129 billion Euro for value added. The four largest markets (DE, FR, IT, UK) account for almost 73% of the combined value added.

Telecommunication and computer services both showed a picture of healthy growth in production and markets in the second half of the 1990s. From 2001, however, ICT services markets have been severely affected by the burst of the Internet economy bubble and growth has been reduced significantly. From EITO estimates, CAGR have reached only 3.4% over the 2001-2003 period (1.7% in IT services and 4.6% in carrier services). The European ICT market is now entering a phase of maturation.

Productivity

Productivity, measured as output per employee, differs significantly between telecommunications and computer services. The turnover, as well as the value added per person employed, is considerably smaller in the computer services sector. This can be explained by the high capital intensity of telecommunications and the fact that the statistics only measure labour productivity and not total factor productivity.

Trends and challenges

Telecommunication services have changed considerably during the previous years, bringing new sector-specific issues and challenges to companies. Important issues are related to the technology, regulatory framework and the general market developments:

Technological innovation has considerably influenced telecommunication services and opened up new opportunities for e-business. One of these technologies is broadband Internet access. Another group of new technologies related to the telecommunication network itself as well as to its administration is the digitisation of networks.

Regulatory framework: The software industry is still intensively discussing two related legal questions. The first is the question of intellectual property rights protection, as international exchanges of software over the Internet made copyright infringement easier, leading to an alleged increase in software piracy. The second concerns software patents. While most forms of software were originally protected by copyright, the ICT industry now appears to be strongly against patenting software as this might arguably stifle innovation in the software development industry.

In telecommunications, the new competitors have been only partially successful, due to weaker than expected demand and interconnection disputes with incumbents. Such disputes about access to essential facilities of the incumbents as well as about the pricing of this access have been background noise for the telecommunication industry since its liberalisation.

Market developments: Mobile telephony, for years Europe's big success story, has lost some of its former appeal. The average revenue per user (ARPU) has fallen significantly, as mobile users with lower usage have become customers and as prices for mobile phone calls have fallen. At the same time, costs for running the phone network have remained constant or even increased, putting significant pressure on margins. High bets have also been placed on the success of the third generation wireless technology (Universal Mobile Telecommunications System – UMTS).

Another important issue is the rising importance of data traffic. The increased use of the Internet has fuelled demand for access services as well as for Internet backbone services. It was expected that data would quickly overtake voice as the main source of traffic on global telecommunication networks. However, despite the increasing demand, considerable overcapacity for backbone services has been built up. This capacity, which was more than needed, is to a large extent unused by now, and is putting pressure on prices for backbone services.

Within the IT consulting business, a major challenge was to cope with the rapidly increasing demand for e-business related consulting and integration services and the subsequent sudden fall in demand. The bursting of the Internet bubble has led to overcapacities in many consultancies, which today have to adapt to the lower level of business activity without demoralising their remaining staff. At the same time, the outsourcing services industry (part of NACE 72.3, data processing) has also seen an increasing demand.

2.8.2 Diffusion of ICT and e-business in 2003/04

The results of the e-Business Survey 2003 show that the ICT services sector stands well ahead of the other sectors monitored in terms of ICT equipment and adoption of e-business applications. Almost 82% of the respondents of the survey state that e-business constitutes a significant or some part of the way their company operates today, compared to 60% in the other sectors. The ICT services sector is an early adopter of e-business applications in every respect.

Exhibit 2.8-2: The importance of various e-business objectives and applications in the ICT services sector in overview

E-business application area	Importance	Remark / example
Facilitate remote and mobile work (fieldworkers, home-based telework)	~ ~ ~	ICT services companies are well equipped with systems that facilitate remote and mobile work. The rapid technological changes and innovations in the sector require vast amounts of information and knowledge sharing from different locations.
Improve knowledge management by using special software	~ ~ TM	Use of KM software increases, but predominantly among large companies.
Automate internal business processes	~ ~ TM	Reducing administrative costs (travel reimbursement, HR management) and improving business processes (relationships with trading partners) is a priority in most sub-sectors.
ERP systems	~ TM	ERP is not an e-business priority in this sector. These systems are more useful to manage complex supply chains involving physical supply goods.
Supply chain process integration	~ TM	Like ERP systems, and for similar reasons, SCM is not a top priority for companies in the sector.
Decrease direct procurement costs through e-procurement	~ ~ TM	As in other sectors, the largest companies pursue the goal of streamlining the selection of their supply firms. In general, the focus of the organisation is rather on making processes more efficient.
Web based e-marketing and customer related services	~ ~ TM	These applications are widely used. They are important for the ICT services sector, especially in the telecommunications and software sub-sectors.
Electronic customer management (CRM)	~ ~ ~ ~	The ICT services sector stands far ahead of the other sectors. The growing demand in customised and flexible services makes CRM a key issue, especially in telecom and software sectors.
E-commerce: Increase sales volume / area through selling on the Internet	~ ~ ~ TM	Selling online through the company website is already a reality for many firms from the sector. The Internet is a key distribution channel.
B2B marketplaces on the Internet	~ TM	B2B marketplaces are used by telecommunications companies and, to a lesser extent, software firms, both for procurement and sales.
Use of e-business standards for exchanging structured data	~ ~ ~	The exchange of structured data remains a crucial issue as the ICT market becomes more and more global, in particular in the software services sector.
Web services and XML based standards	~ ~	Companies themselves are only moderately convinced about XML. However, it could become the main standard for electronic transactions in the future.
Extended enterprise: collaborative (online) e-product design	~ ~ TM	E-product design technologies in software sectors are widely used, but diffusion varies among other sub-sectors.
~ = little relevance; ~ ~ = average relevance; ~ ~ ~ = very relevant; ~ ~ ~ ~ = highly relevance for sector TM = mixed results, depending on the sub-sectors in the ICT services industry		

Source: e-Business W@tch (2004)

ICT infrastructure

ICT services companies are better equipped with ICT infrastructure (LAN, WAN, remote access technology, Wireless LAN) than the 9 sectors studied by the e-Business W@tch in 2003/04. Internet, e-mail and the Web are common tools that enable to transfer data and communicate in every ICT

services firm, regardless of its size. More than 90% of office workers have access to and use Internet applications. An interesting observation from the e-Business Survey in November 2003 was the relatively good ranking of firms in some of the new Member States, such as Estonia and Slovenia, in terms of network infrastructure. They outperform companies from some of the former EU-15 Member States.

Exhibit 2.8-3: Use of ICT Infrastructure in the ICT services sector

	Local Area Network	Wide Area Network	Remote access to company network	Wireless remote access to company network	Internet access
Sector total (EU-5)	N=502	N=502	N=502	N=502	N=502
% of employment	87	59	73	25	98
% of enterprises	72	15	53	11	97
0-9 employees	71	13	52	10	97
10-49 employees	87	45	78	23	96
50-249 employees	93	58	78	29	99
250+ employees	93	85	79	33	98
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	61	29	37	10	95
% of enterprises	32	5	16	4	89

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: *e-Business W@tch* (2004)

The ICT services sector has a greater use of broadband networks than the other sectors monitored by the *e-Business W@tch*. More than 5 in 10 employees in the sector work in companies that use more than 2 Mb/s Internet connections. Broadband connections are crucial, for example, for telecom services companies. They have to transfer or receive large amounts of data to manage daily business operational processes and transactions, for instance billing processes, telecom switching maintenance, or customer relations. Furthermore, broadband access to Internet is becoming critical for companies that turn more and more to outsourcing for managing some of their activities such as data centre activities (server management, data updating, storage capacity), disaster recovery management (backup services, physical disaster recovery services), or call centres management.

Internal business processes

Knowledge management and e-learning: In the ICT services sector, more than three quarters of employees have access to the company's Intranet, one third use e-learning applications, and one quarter use knowledge management application; this is far beyond the average of the other sectors. Knowledge sharing is becoming a strategic issue in the ICT sector. For instance, e-learning applications are well suited as a tool to keep employees' informed about the latest technological trends. The ICT services sector must deploy tremendous efforts in this context. Knowledge management and e-learning have close links with the Intranet, as the latter often constitutes the basic platform for related applications.

Online technologies for internal processes: Two thirds of the employees of the ICT services sector work in companies that use online technologies to share documents or for collaborative work, compared to only 40% of the employees on average in all sectors. The share of companies using online tools for project controlling purposes (track working hours and production time) is even four times higher than on average. Online technologies can particularly improve efficiency in the framework of projects realised by different working sites at different or remote locations, which is quite common in the ICT services.

On the other hand, only 21% of the employees from the sector work in companies using an ERP system. ERP systems are especially employed in telecom services companies, which have to deal with complex technologies and a large number of customers.

Exhibit 2.8-4: ICT use for internal business processes in the ICT services sector

	Use an Intranet	Use an ERP system	Use online technologies ...		
			to share documents for collaborative work	to track working hours and/or production time	to support human resources management
Sector total (EU-5)	N=502	N=502	N=502	N=502	N=502
% of employment	77	21	67	43	42
% of enterprises	41	4	47	20	16
0-9 employees	39	3	45	19	14
10-49 employees	65	18	67	28	37
50-249 employees	91	20	65	45	41
250+ employees	94	32	78	57	57
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	45	19	40	20	21
% of enterprises	21	5	22	5	5

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Electronic procurement and supply chain integration

Electronic procurement: In a competitive global market, procurement processes and supply chain management systems are of increasing importance. This holds true for the ICT services sector which ranks first regarding online purchasing and e-procurement usage compared to the other sectors studied.

Exhibit 2.8-5: Electronic procurement and supply chain integration in the ICT services sector

	Make online purchases	Online purchases account for at least 5% of total volume	IT system is integrated with that of a supplier for placing orders	Use an SCM (Supply Chain Management) system
Sector total (EU-5)	N=502	N=502	N=502	N=502
% of employment	74	54	19	11
% of enterprises	75	58	8	2
0-9 employees	74	58	8	2
10-49 employees	80	62	12	8
50-249 employees	71	51	13	6
250+ employees	73	50	27	18
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516
% of employment	46	23	8	6
% of enterprises	31	18	6	2

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Online buying is also well used by SMEs from the sector. 80% of small companies (10-49 employees) purchase online. However, online purchasing of small and large companies is fundamentally different. In large companies, online buying implies the existence of integrated procurement systems. For instance, when Telecom Italia launches online tenders via its corporate Internet site, it allows suppliers to know about offers and the final results in real time, thus making mutual relations even more transparent between players. In SMEs, online buying is often a rather simple, "manual" buying process via websites from suppliers.

As in the other sectors, companies use different networks and platforms to purchase online, such as suppliers' websites, B2B marketplaces, extranets or EDI based ordering systems. In the ICT services sector, almost every company (96%) that makes online purchases has bought from a supplier's website. This is a very simple and common way to buy virtual or material goods. One in four companies that buy online use their supplier's extranet. This method is used by larger companies more than by SMEs. About one quarter of the companies purchasing online makes use of B2B marketplaces on the Internet.

Supply chain integration: The ICT services sector is ahead of other sectors in integrating electronic purchasing processes. One in two companies of the sector commonly use online technologies to exchange documents with suppliers, a basic form of integrating processes in the supply chain. But even with its leading position, integration of IT systems with that of suppliers and Supply Chain Management is still an emerging technology, which less than 10% of enterprises have put into practice.

Customer facing processes

Electronic marketing: More than 66% of ICT services companies have implemented a website on the Internet, which is almost twice the rate of the all sector average. ICT services companies have integrated the web into their marketing and commercial policies in a more sophisticated way than most other sectors. This applies to small companies as well. The functions of websites can go beyond the mere provision of information on products and services, and on the company itself. IT consulting firms, for instance, often make considerable amounts of research information available on their sites in the form of reports, extensive studies, white papers or newsletters. In this way they transform their websites into knowledge portals, whereby the main functionalities and types of interactions with customers are different for the various sub-sectors.

Exhibit 2.8-6: Electronic marketing and sales in the ICT services sector

	Have a website on the Internet	Use a content management system to maintain website	Make online sales	... of those:	
				Allow online payment of products ordered	Online sales system with secure transactions capability
Sector total (EU-5)	N=502	N=502	N=502	N=102	N=102
% of employment	88	38	24	54	69
% of enterprises	69	24	15	65	61
0-9 employees	67	23	15	--*	--*
10-49 employees	89	35	20	--*	--*
50-249 employees	95	39	20	--*	--*
250+ employees	95	46	30	--*	--*
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=598	N=598
% of employment	66	22	16	43	59
% of enterprises	35	9	9	38	46

Base (100%): all enterprises / enterprises making online sales. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). * Percentages not displayed because base of cases observed is too small. Reporting period: March/November 2003.

Source: e-Business W@tch (2004)

Online selling: Selling products and services online is considerably affecting the ICT services industry in areas such as delivery channels, pricing strategies, and customer services. This is particularly true in mobile phone and Internet access markets where competition is fierce and where rapid commercial response to changes in the marketplace has become a key asset to staying in the market. Usually online sales channels combine a large variety of additional customer (self)-services, promotion and online billing services. But even in the ICT services sector, online sales are not as widespread as online procurement. Only 15% of firms offer online sales facilities to their clients (while 75% of companies in the sector buy online themselves). In the telecommunications sector, operators sell practically all of their services online such as mobile phone or fixed network broadband subscriptions. On the business market, they usually offer products and services through their own website or via extranets, depending on the size of potential customers.

2.8.3 Case studies

This chapter features abstracts and key lessons learned from case studies which are presented in more detail in the 2nd Sector Impact Study from August 2004.

VODAFONE GREECE	
<i>Background</i>	<p>Vodafone Greece, formerly named Panafon, is a 65.4% subsidiary of the worldwide leader of mobile phone services, the Vodafone Group. The telecom service operator serves 3.4 million customers representing 36% of the total Hellenic mobile telephony market.</p> <p>After the liberalisation of the Greek wireline telecommunications market, Vodafone Greece has experienced increased competition both from domestic and foreign telecommunications providers. To succeed in this intensively competitive environment, the company strived to minimise customer churn rates, target new customers and deliver consistently exceptional service and satisfaction. To this end, the company implemented a CRM solution to enable it to better understand its customers' preference and deliver improved service.</p>
<i>Activities</i>	<p>Vodafone decided to implement a CRM system by Siebel (Siebel eCommunications), a CRM solution that is tailored to the specific needs of telecommunications companies. Siebel helped Vodafone Greece to configure the system and integrate it with numerous back office applications, for instance with Genesys Computer Telephony Integration (CTI) software to support inbound and outbound call routing.</p> <p>More than 300 call centres, sales, marketing, and operations professionals in Vodafone Greece use now Siebel eCommunications. By synchronising and coordinating all customer interactions across multiple channels, including the telephone, email, face to face, postal mail, and fax, the solution has helped employees to improve customer service, increase productivity and maximise revenues.</p>
<i>Results</i>	<ul style="list-style-type: none"> • The use of CRM has helped the telecom operator to reduce annual customer churn by 6.7%. • The out-of-box functionalities of the CRM solution have contributed to reduce the deployment time by 20% as compared with the original planning. • The company's call centre receives more than 40,000 inquiries every day – equivalent to more than 14 million calls each year. The workflow automation capabilities of the CRM solution have enabled the company to manage each and every one of these calls efficiently and professionally.

BUSINESS OBJECTS (FRANCE)	
<i>Background</i>	<p>Created in 1990, Business Objects is the market leader in the business intelligence (BI) solutions market. BI provides the reporting, query and analysis, and performance management tools to turn data into actionable information. The company's solutions leverage the information stored in an array of corporate databases, ERP and CRM systems.</p> <p>Looking for a better way to control its worldwide consulting operations, Business Objects decided to implement PeopleSoft Enterprise Service Automation (ESA).</p>
<i>Activities</i>	<p>Business Objects asked PeopleSoft to provide a single source of real-time information which should help Business Objects to control project costs and optimise the management of its global consulting workforce. The target was to replace the existing multiple in-house legacy systems with PeopleSoft Enterprise Service Automation (ESA) in just 90 days, using an accelerated implementation strategy based on business process modelling.</p> <p>Business requirements included the automation of key processes such as project accounting, expense management and resource management, and the ability to automatically monitor key performance metrics (for example an improved ability to conduct project profitability analysis).</p> <p>Before working with PeopleSoft, Business Objects operated silo systems all over the world, using disparate systems and spreadsheets to schedule consultants, estimate projects, and prepare management reports.</p> <p>Since the new system has been implemented, Business Objects' employees are able to enter their skills and availability online. Management is thus freed from the nightmare of scheduling hundreds of consultants using spreadsheets.</p>
<i>Results</i>	<ul style="list-style-type: none"> • Business Objects managed to merge 15 legacy systems / processes into a single global system and thus cut expenses and time for report processing by 150%. • Business Objects can now gather information on key performance metrics for over 800 annual projects in less than an hour. • Scenarios can be built to compare the costs of subcontracting versus handling a project in-house.

2.8.4 Conclusions: e-business opportunities and challenges

In the changing business environment of today, the ICT services sector faces new opportunities. Telecom operators may focus on the development of mobile and broadband services to provide more multimedia and interactive business services that match customers' needs in terms of easy-to-use, personalised and timely delivered services. For computer service companies, the development of non proprietary standards and interoperable software applications open a new market for products and services at reasonable costs.

Moreover, the emergence of the Open Source model and Web services and new ways of delivering services (ASP and hosted services) should fundamentally change the methods of producing ICT and computer services.

However, the reengineering of production processes is not without impacts on IT skills requirements. Increasingly, organisations are looking for IT senior managers experienced in leading projects. The shortage of IT people with the required skills significantly hinders the development of the sector, as SMEs have the greatest difficulties in recruiting IT skilled people.

Exhibit 2.8-7: Overview of e-business related opportunities and challenges in the ICT services sector

Opportunities	Challenges
<ul style="list-style-type: none"> • Improve internal processes and enhance information flows • Improve customer relationship management • Extend market reach towards SMEs • Enhance procurement processes 	<ul style="list-style-type: none"> • Increase customer retention • Develop common standard and protocols in the security domain • Design of more interoperable and easy-to-use e-business systems

Source: e-Business W@tch (2004)

Opportunities

Improve internal processes and enhance information flows: One of the most important opportunities of e-business is to improve the efficiency of internal work processes and achieve respective productivity gains. While this benefit is often related to manufacturing sectors, it is equally true for ICT services. In particular, in those sub-sectors where activities are typically knowledge-based and organised in projects, e-business solutions such as project and human resource management or knowledge management can significantly enhance the efficiencies of internal processes.

Improve customer relationship management: Particularly in large companies, where customer care tasks make up for a large part of overall business processes, increasing efficiencies and decreasing costs related to these processes can have a major impact on overall profitability.

Extend market reach towards SMEs: Internet offers smaller companies the chance to make their services known to a global audience at low costs. As many products and services in the sector are experience goods, making trial products (for example, free market research, trial versions of software) available over the Internet reduces typical trust problems of such goods.

Challenges

Increase customer retention: While e-business technologies can help to improve customer services on the one hand, they bear a certain risk of weakening customer retention on the other hand. This risk results from a replacement of personal services by more efficient online customer self-services. When buying standard software, for example, the entire process, from making the purchasing decision, to actually buying, paying and downloading the software and even to using after-sales services such as updates or bug fixes can be conducted online by the customer without any personal contact with the selling company.

Develop common standard and protocols in the security domain: European institutions and standard organisations have tried to facilitate the emergence of common standards in the security domains. The growing number of virus attacks and threats and the lack of standards in the identification and authentication applications limit data exchanges through the Internet.

2.8.5 Outlook

The ICT services sector is going through a critical period of transition after the bursting of the Internet bubble. Despite a context of low sales, ICT services companies keep on implementing e-business applications to gain productivity, as well as developing remote communications access to deal with and transfer data to their external partners. ICT services companies still have a high IT investment rate compared to other sectors. As the economy is becoming more global with cheaper communications prices, ICT services companies are at the foremost position (except for electronics) to adopt more flexible organisations and take advantage of lower labour costs in other countries. Outsourcing services are rapidly becoming involved in this process of cost reduction.

The emergence of the Open Source model and Web services and new ways of delivering services (ASP and hosted services) should fundamentally change the ways of producing services. The big giants of the e-business software industry have already felt the trend and try to accompany it. Customers are now looking for less proprietary standard and more flexible systems that can be rapidly customised and adjusted to their specific needs.

But the reengineering of production processes is not without impacts on IT skills requirements. Organisations are increasingly looking for IT senior managers with experience to lead projects. The shortage of IT people with the required skills significantly hinders the development of the sector, as SMEs have the greatest difficulties in recruiting IT skilled people.

Exhibit 2.8-8: Overview of e-business enablers and barriers in the ICT services sector

Enablers	Barriers
<ul style="list-style-type: none"> • Strong e-business know-how • Market pressures to increase internal efficiencies • Develop low cost e-business solutions 	<ul style="list-style-type: none"> • Weak demand for ICT services • Weaknesses of SMEs • Shortage of managerial IT skills

Source: *e-Business W@tch* (2004)

One of the most important enablers of e-business in the ICT services sector is the strong know-how and familiarity with e-business concepts and technology and well-skilled employees in this sector. Contrary to other sectors, where the lack of knowledge about the benefits of e-business and the relevant technologies forms an important barrier to e-business development, this is not the case in ICT services. Rather ICT services firms apply e-business solutions internally to serve as role models for their own customers.

On the other hand, as long as the demand for ICT services from other sectors remains weak, budgets for internal e-business solutions of ICT services companies also remain small. This could be a barrier for the further development and advancement of e-business applications.

Selected references

- Atos Origin (2003), Creating CRM Success for telecom operators, White Paper, www.atosorigin.com
- Computer Sciences Corporation (2003), The Architecture revolution, Leading Edge Forum, www.csc.com
- Dunn, Frank A. What's Ahead for Telecom, An Industry Perspective, Nortel Networks, ITU Telecom world 2003, Geneva, Switzerland
- Economist Intelligence Unit (2004): Reaping the benefits of ICT, Europe's productivity challenge, A report sponsored by Microsoft
- IBM (2003), Transforming your Supply Chain To On Demand, www.ibm.com
- Kadifa G. (2004), The On Demand Economy, Corio, February 2004
- Les Cahiers du e-business, N°3, Bimestriel; May 2003, <http://www.ebusiness.info>
- Mears J. (2004): Interest in ASPs, Web Hosting Picking up, E-commerce Times, www.ecommercetimes.com
- META Group (2004),: Securing Internal Networks: The Final Frontier, A White Paper
- Novell: Eliminate Security Risks, White Paper, www.novell.com
- Picarille L. (2004):The Art of War, destination CRM, www.destinationcrm.com
- RSA Conference 2004 at San Francisco, Notes, DIGITIP, Ministry of the Economy, Finance and Industry, February 2004
- Vodafone Greece reduces customer churn using Siebel eCommunications, Case studies, www.siebel.com
- Kingstone Sherryl (2004): The Emerging Importance of Hosted CRM, Yankee Group

2.9 The business services sector

2.9.1 Economic profile

Enterprises belonging to the “business services” sector according to NACE Rev. 1 74⁷⁰ cover a wide range of activities, which are closely related to the activities in various other sectors:

Exhibit 2.9-1: Configuration of the business services sector in terms of NACE Rev. 1

NACE Rev. 1		Activity
Division	Group	
74		Business Services
	74.1	Legal, accounting, bookkeeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy; holdings
	74.2	Architectural and engineering activities and related technical consultancy
	74.3	Technical testing and analysis
	74.4	Advertising
	74.5	Labour recruitment and provision of personnel
	74.6	Investigation and security activities
	74.7	Industrial cleaning
	74.8	Miscellaneous business activities not elsewhere classified (for example: photographic activities, packaging activities, secretarial and translation activities)

Industry structure and employment

The business services sector provides jobs for more than 13 million people in the enlarged European Union. The sector is characterised by a strong dominance of small enterprises. Almost 94% of the enterprises employ less than 10 people and about 99% less than 50 people (2000). At the same time, small companies with less than 50 employees in the former EU-15 generated more than half of the value added at factor cost and employed about 45% of the sector workforce. Though accounting only for less than one percent of the total number of enterprises, the large companies (more than 250 employees) employed over 38% of the total sector work force, but generated only 30% of the added value in the EU-15. This dominance of small companies is even more pronounced in the new EU Member States, where more than 97% of business services enterprises were micro companies with less than 10 employees in 2000. In addition, the shares of value added at factor cost and of people employed by micro firms were significantly higher than in the EU-15 of 2003.

Market size

The total production value of the business services sector in the EU-14 (former EU-15 without Greece) amounted to more than 922bn Euro in 2001. Of this, about two thirds was generated in knowledge-intensive sub-sectors (here defined as NACE 74.1, 74.2, 74.3 and 74.4) with almost 40% of the sector production being created by the legal, accounting and management consultancy companies (NACE 74.1) alone. However, the proportion of a certain sub-sector contributing to the total production value does not necessarily reflect its importance for other economic indicators such as employment. Companies active in industrial cleaning (NACE 74.6), for example, generate only about 5% of the total production value, but employ almost 18% of the sector workforce.

⁷⁰ Strictly spoken, these are “other business services”, as many definitions of business services also include activities covered in other *e-Business W@tch* reports. For example, the definition for business services often chosen by the EU also includes IT services (NACE 72.1-6) as well as renting and leasing activities (in NACE 71.1-71.3). Cf. European Commission (1998): The contribution of business services to industrial performance: a common policy framework, COM (1998) 534 final.

Exhibit 2.9-2: Structure of the business services in the EU (2000)

NACE 74	Total	Enterprises with ... people employed			
		1-9	10-49	50-249	250+
	Number of enterprises	Structure in % of total			
former EU-15	2,127,191	93.5	5.4	0.9	0.2
new MS*	357,978	97.4	2.0	0.5	0.1
	Value added at factor cost	Structure in % of total			
former EU-15	487,254.8	30.8	21.2	17.8	30.3
new MS**	9,634.8	48.8	17.7	18.3	15.3
	Number of people employed	Structure in % of total			
former EU-15	12,824,500	27.8	17.7	16.3	38.2
new MS***	407,028	43.5	21.2	19.4	15.9

*Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland only. - **Czech Republic, Hungary, Latvia, Poland only. - ***Czech Republic, Hungary, Latvia only.

Source: Eurostat New Cronos 2003, calculations and estimates by DIW Berlin (2003)

Trends and challenges

A frequently discussed topic in the business services sector is the challenges resulting from the EU enlargement, as there are significant gaps in productivity and labour costs between the EU-15 of 2003 and the 10 new Member States. This could further increase cost pressure on services companies, internationalisation and the complexity of projects in this sector.

A more intense price competition is expected in business services with a rather technical focus such as technical testing, architecture or engineering services. This pressure is caused by a larger supply of comparatively "cheap" experts and by the fact that many components of such services can also be delivered from abroad. Business services without specific requirements on human capital such as cleaning also feel the cost pressure, especially due to (temporary) migration of the eastern European workforce or due to companies from the new Member States extending their activity to the former EU-15. Business services that require rather country-specific human capital, such as tax or law consultancies, are less affected in this context.

The EU enlargement also drives the development of international co-operation and projects. This in turn leads to an increasing demand from multinational clients for multinational support from business services enterprises, especially in the context of complex, international projects. Large business services companies in particular can benefit from this trend, for example internationally active business consulting firms, law or tax advice companies. Small firms will try to compensate for their limited capacities by engaging in co-operation and subcontracting. Setting up and keeping networks of experts and specialised suppliers as well as managing the associated co-ordination work becomes an increasingly important challenge for business services.

In addition to the EU enlargement several other recent trends constitute challenges for providers of business services. In particular, new trends propagated by the IT services sector such as Business Process Outsourcing (BPO) and the automation of services procurement will place new demands on the e-readiness of business services providers. Outsourcing services, for example, are increasingly offered both for running the companies' IT infrastructure as well as for operating entire business processes such as HR (Human Resources), finance, accounting or supply chain systems. The trend towards BPO places new requirements on IT services providers as well as on business services enterprises. IT service providers have to accumulate specific knowledge about the management of business processes, while business services must become increasingly familiar with ICT issues related to their services.

Services procurement applications are supposed to be a “growing segment in the overall eProcurement / eSourcing market” according to a study by Forrester⁷¹. This trend is driven by the need of many companies to better control services spending.

2.9.2 Diffusion of ICT and e-business in 2003/04

As a consequence of the trends outlined above, the proper deployment and management of e-business tools as well as the set-up of an appropriate ICT infrastructure become crucial issues for business services. The sophisticated use of the Internet, for instance to get access to international job markets, as a platform for collaboration and exchange of information and documents, as a basis for IT-based project management, or for integrating with ordering systems of clients, becomes an essential requirement.

Exhibit 2.9-3: The importance of various e-business objectives and applications in the business services sector

E-business application area	Importance	Remark / example
Improve access to information	~ ~ TMTM	Key priority, in particular for knowledge-intensive business services
Management of knowledge	~ ~ TM	Of particular importance for knowledge-intensive enterprises with a large number of employees.
Project management and collaboration among employees	~ ~ TMTM	Project management and collaboration among employees is at the heart of services provided on a project basis
Integration of fieldworkers	~ ~ TMTM	Increasing importance in particular for business services activities carried out in the field.
Enhancing co-operation with third parties	~ ~ TMTM	Management and co-ordination of third-party relationships is of key priority for project-based business services.
Process management and integration by the use of ERP	~	Of little relevance due to the small company sizes
Buy-side e-commerce	~ ~	Usage numbers for online procurement are above the EU-5 average, but sales volumes are very low.
Supply chain integration by the use of SCM systems	~	Of little relevance due to the small company sizes
Web-based e-marketing and customer related services	~ ~ ~	Simple applications (e.g. websites) widely distributed, but still differences between large and small companies
Sell-side e-commerce activities / Participation in e-marketplaces	~ TM	Generally weak, mainly due to the low level of standardisation
Electronic customer management (CRM)	~	Not a key issue in the business services sector, mainly due to the small company sizes.
Use of e-business standards for exchanging structured data	~ ~	Not a key issue yet, most of information exchange takes part informally, companies usually exchange Microsoft Word and Excel files.
Web services and XML based standards	~ ~	Not a key issue yet due to the small company sizes and the rather basic applications used.
Extended enterprise: Collaborative product design	~ ~ TM	Of some relevance in particular for specific sub-sectors such as architecture, technical engineering or advertising
~ = little relevance; ~ ~ = average relevance; ~ ~ ~ = very relevant; ~ ~ ~ ~ = high relevance for sector TM = mixed results, depending on the sub-sector within the combined business services sector		

Source: e-Business W@tch (2004)

Key application areas of ICT in the business services sector are accessing and exchanging information, facilitating collaboration among employees, enhancing third-party relationships and the integration of fieldworkers. Their importance, however, differs with respect to the characteristics of the various sub-sectors. The use of ICT and e-business for accessing and exchanging information as well

⁷¹ Forrester (April 2004): “Services procurement needs executive sponsorship to achieve potential”, Executive Summary, April 15 2004.

as for the management of knowledge, for example, plays a key role in knowledge-intensive sub-sectors. In consulting, research, and advertising services knowledge is the main input factor besides labour, therefore efficient ways to access and exchange it are of outstanding importance.

ICT infrastructure

Companies in the business services sector are generally very well equipped with basic ICT infrastructure. More than 90% of all employees are working in companies with Internet access and use basic applications such as e-mail. The fact that not only large but also small companies have a good ICT infrastructure distinguishes the business service sector from many others sectors. Even for small companies the respective percentages are at 90% or higher. The most important use of new technologies in this sector is for accessing and exchanging information. The WWW is used more intensively than in other sectors studied by the *e-Business W@tch*.

Business services enterprises also show above average values with regard to Internet access. For example, DSL connections are more widespread. The fact that nearly half of business services enterprises already use DSL connections is further evidence of the comparatively modern ICT infrastructure in this sector.

20% of enterprises from the sector provide their employees with remote access to the company's computer system. This rate is slightly above the average of all sectors (16%) surveyed by the *e-Business W@tch*. The number of fieldworkers as well as the necessity to access the company's IT system from remote locations is higher in large companies than in small businesses. Accordingly, 60% of the large companies have already deployed remote access solutions. 5% of the business services enterprises even offer remote access with wireless devices such as mobile phones or PDAs⁷².

Exhibit 2.9-4: Use of ICT Infrastructure by business services companies

	Local Area Network	Wide Area Network	Remote access to company network	Wireless remote access to company network	Internet access
Sector total (EU-5)	N=501	N=501	N=501	N=501	N=501
% of employment	68	30	43	12	97
% of enterprises	41	5	20	5	93
0-9 employees	39	4	19	4	93
10-49 employees	76	9	33	10	99
50-249 employees	76	33	51	13	96
250+ employees	84	55	60	18	99
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	61	29	37	10	95
% of enterprises	32	5	16	4	89

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: November 2003.

Source: *e-Business W@tch* (2004)

Internal business processes

The use of ICT and e-business to support and optimise internal processes has become increasingly important in the business services sector. All indicators for the usage of online technologies to support internal processes are above the average of all sectors surveyed by the *e-Business W@tch*. Since collaboration is a central element in producing business services, online technologies for sharing documents and performing collaborative work are most widespread.

Knowledge management and e-learning: The increasing amount of information available on the Internet has made the efficient management of knowledge a key success factor for knowledge-

⁷² Personal Digital Assistants

intensive services. Accordingly, Intranets as well as specific tools for knowledge management are relatively widely diffused in the sector. The efficient management of knowledge is important for companies of all sizes, but they are most valuable for large enterprises with a complex and often dispersed knowledge base and files that have to be accessed by many different parties in the workflow. Accordingly, 5% of the micro firms, less than 10% of small and medium-sized firms, but 20% of the large companies in this sector use knowledge management systems.

Project and Human Resources management: Another important area supported by online technologies is that of processes related to project and human resource management. Since personnel is not only an important cost factor but also the most important resource, optimal utilisation of the workforce determines profitability in many business services companies. In particular, large corporations with a large and diverse workforce that needs to be allocated to various projects at different locations can significantly increase efficiency by using e-business tools to support project or human resource management. About 40% of large business services companies use online technologies to track working hours and production time.

Exhibit 2.9-5: ICT use for internal business processes in the business services sector

	Use an Intranet	Knowledge Management System	Use online technologies ...		
			to share documents for collaborative work	to track working hours and/or production time	to support human resources management
Sector total (EU-5)	N=501	N=501	N=501	N=501	N=501
% of employment	49	12	46	25	25
% of enterprises	27	5	36	6	5
0-9 employees	26	5	36	5	5
10-49 employees	38	9	27	15	5
50-249 employees	53	8	50	29	26
250+ employees	68	20	58	40	47
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516	N=4516
% of employment	45	10	40	20	21
% of enterprises	21	5	22	5	5

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: November 2003.

Source: e-Business W@tch (2004)

Electronic procurement and supply chain integration

Electronic procurement: Business services companies are already actively using new technologies to purchase online. About 35% of all companies in the sector are purchasing online, compared to only 31% on average of all sectors studied by the e-Business W@tch. Nevertheless, volumes purchased online in many companies are still relatively low, pointing to the fact that most companies still experiment with online purchasing.

64% of those business services companies that purchase online buy maintenance, repair and operation (MRO) goods such as office and cleaning supplies online. Since transaction costs for MRO goods are typically high in relation to the actual cost of the products, major efficiency gains can be achieved by electronically procuring this type of goods. In particular companies providing standardised continuous services can profit from streamlining recurring procurement processes. While buying of MRO goods is more important than buying direct production inputs in this sector, the share of those firms procuring direct inputs is not negligible. Almost half of business services companies buy direct inputs online.

It must be remembered that purchasing online can be interpreted in a rather broad sense - it means different things for large or small companies and for different sub-sectors. Complex e-procurement systems, for example, are beneficial for companies with a large volume of direct inputs for providing continuous services (for instance industrial cleaning) and for companies with complex supplier-

networks (for instance architectural services). In other sub-sectors and particularly in smaller companies, the Internet simplifies the finding of appropriate suppliers and might just be a substitute for fax or telephone ordering.

Supply chain integration: The importance of the third-party-relationship management compared to other buy-side activities is also reflected in the survey results: 29% of business services enterprises (with Internet access) use online technologies to exchange documents with suppliers. In contrast, only 2% of all enterprises from the sector have integrated their IT system with that of their suppliers for placing orders. SCM systems are more appropriate to address the needs of large manufacturing companies than to support the rather small enterprises in the business services sector.

Exhibit 2.9-6: Electronic procurement and supply chain integration in business services

	Make online purchases	Online purchases account for at least 5% of total volume	IT system is integrated with that of a supplier for placing orders	Use an SCM (Supply Chain Management) system
Sector total (EU-5)	N=501	N=501	N=501	N=501
% of employment	50	23	6	6
% of enterprises	35	22	1	1
0-9 employees	34	22	1	1
10-49 employees	52	30	2	1
50-249 employees	57	26	3	9
250+ employees	57	20	13	12
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=4516
% of employment	46	23	8	6
% of enterprises	31	18	6	2

Base (100%): all enterprises. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: November 2003.

Source: e-Business W@tch (2004)

Customer facing processes

Marketing: Company websites have become a common element in the overall marketing strategy of business services companies. More than two thirds of enterprises with more than 9 employees in this sector have a website today. In their simplest form websites are online brochures which provide information on the company. More sophisticated websites offer interactivity to the viewer, for example searching archives, downloading documents, ordering services and requesting further information. For knowledge-intensive business services, providing work samples, case studies and research publications to a large audience over the Internet can help build the brand and reduce the trust problems of new customers.

Maximising customer satisfaction and building long-term relationships with clients are a key success factors for business services companies. Automating client interaction with the support of Customer Relationship Management (CRM) systems can help larger companies to achieve this goal. In fact, 18-19% of large and medium-sized companies from the sector use a CRM system, while the diffusion among micro and small firms is below 5%.

Sales: In general, online sales are most appropriate if products can be standardised and/or digitised to be traded and/or delivered online. The degree of standardisation of inputs and outputs seems to be rather limited in large parts of the business services sector. This is also confirmed by the survey results. Only 3% of business services enterprises sell online, which is only about a third of the average value for the sectors surveyed.

The fact that about 97% of business services enterprises do not sell products or services online does not mean that online technologies are not used to support the sales process. For example, 21% of business services enterprises use an electronic invoicing system (40% of the large firms, and even 22% of the micro-firms).

Exhibit 2.9-7: Electronic marketing and sales in business services

	Have a website on the Internet	Use a content management system to maintain website	Make online sales	... of those:	
				Allow online payment of products ordered	Online sales system with secure transactions capability
Sector total (EU-5)	N=501	N=501	N=501	N=40	N=40
% of employment	72	28	11	46	73
% of enterprises	35	7	3	39	62
0-9 employees	33	6	2	--*	--*
10-49 employees	69	15	10	--*	--*
50-249 employees	79	19	11	--*	--*
250+ employees	97	52	17	--*	--*
All (9) Sectors (EU-5)	N=4516	N=4516	N=4516	N=598	N=598
% of employment	66	22	16	43	59
% of enterprises	35	9	9	38	46

Base (100%): all enterprises / enterprises making online sales. EU-5 (DE, ES, FR, IT, UK). Weighting: Figures for size-bands in % of enterprises. Figures for totals are weighted by employment ("enterprises comprising ...% of employees"). * Percentages not displayed because base of cases observed is too small. Reporting period: November 2003.

Source: e-Business W@tch (2004)

2.9.3 Case studies

This chapter features abstracts and key lessons learned from case studies which are presented in more detail in the 2nd Sector Impact Study from August 2004.

PROCESS OPTIMISATION BY MOBILE SOLUTIONS IN THE CLEANING SERVICES SECTOR (AUSTRIA)	
<i>Background</i>	Tempore Zeiterfassungssysteme GesmbH is a developer of time recording systems for the services companies who want to optimise the deployment of labour. Labour costs constitute a large part of total costs, particularly in services companies. Optimizing the usage of labour is thus an important factor for staying competitive.
<i>Activities</i>	<p>In general, the Tempore solutions consist of four elements:</p> <ul style="list-style-type: none"> • Contact points: At each site served a coin-sized button is fixed and contains the site's ID. At the beginning of work, employees have to sign on and at the end they have to sign off by touching the button shortly with their mobile devices. • Mobile device: The mobile device is a small box for recording and storing the sign-on and sign-off data and the respective IDs. • Trip recorders: Vehicles used by the fieldworkers are equipped with a trip recorder, which stores all the information necessary for a driver's logbook such as times of departure or arrival, and distances. On the mobile device, the driver can also determine whether the vehicle is used for private or work purposes. When signing off at the end of the day, all the information stored in the trip recorder will be transferred to the mobile device. • Data synchronisation and analysis: Once the fieldworkers are back in the office, the data stored on the mobile devices will be transferred into a specific software programme. This software contains analysis tools to produce tables and charts as well as interfaces to the company's accounting and controlling systems.

	The solution is not only appropriate for large companies. More than half of the Tempore users are companies with less than 50 employees.
<i>Results</i>	<ul style="list-style-type: none"> • Fieldworkers in business services can be better integrated with the companies' IT systems by mobile solutions. For companies that have used this system, it was important that the solution was specifically adapted to the needs of this particular sector. • The success of the Tempore solution, in particular in the cleaning sector, is based on its simple use – even low-skilled workers can easily work with it – and on focusing on problems with which customers are confronted with. • Challenges in implementing mobile solutions are management challenges rather than technical issues. Finding appropriate measures that ensure the acceptance of mobile solutions by employees is a major challenge in this context.

PROVIDING BENEFITS OF E-LEARNING TO SMEs (GERMANY)	
<i>Background</i>	<p>Tax advisers seem to be well-suited to using e-learning technologies: They are already using computers for their daily work and there is a great need for advanced training in this sector. However, the high costs for implementing and running e-learning solutions, often make the use of e-learning technologies uneconomical – particularly for small and medium-sized tax consulting companies.</p> <p>This triggered the idea of providing e-learning services to tax advisers by the Bundessteuerberaterkammer, a syndicate with about 50,000 associated tax consultancy companies, which employ about 500,000 people. DWS Steuerberatung-Online GmbH was founded as a subsidiary to develop this service.</p>
<i>Activities</i>	<p>The first e-learning programme by DWS-Online was launched in February 2002. The e-learning programme of DWS-Online consists of training units that cover current problems relevant for consultants and related to tax and economic law as well as of applied courses in business administration. In addition, basic courses on tax law and accounting are available.</p> <p>The lectures are presented via video streams assisted by parallel Power Point presentations. Further reading material and scripts can be downloaded. Participants have access to about 1-2 current courses per month as well as to past seminar programmes. Within three years more than fifty courses have been produced. The participation fees are charged per company and depend on the number of employees in the company.</p> <p>About 500 small and medium-sized tax consulting companies have already subscribed to DWS-Online.</p>
<i>Results</i>	<ul style="list-style-type: none"> • The case study demonstrates how professional organisations and business associations can contribute to the diffusion of e-business technologies among SMEs. • The benefits from e-learning are not only direct cost savings. Experience of users shows that e-learning also supports the individual working and learning style of the consultants and contributes to an advanced learning culture in tax consulting firms.

B2B ELECTRONIC MARKETPLACES IN THE BUSINESS SERVICES SECTOR	
<i>Background</i>	<p>This case study comprises four different business cases of B2B trading platforms in the business services sector. A common feature is that they all started as “e-marketplaces” during the dotcom boom in the years 1999 to 2001. However the way in which challenges have been addressed as well as the success of these strategies differ significantly.</p>
<i>Activities</i>	<ul style="list-style-type: none"> • The Slovakian company Synergy-VCG was founded in 1999 with the objective of designing, developing, implementing and operating virtual business services for the Slovakian market. The business model of Synergy, however, has failed, and the activities were stopped in 2003 for economic reasons. • The German based e-marketplace workXL was launched in 2000. It runs a tendering platform for various services offered by small and medium-sized companies. Today, workXL offers its services over a network of 14 associated industry portals. About 30,000 services providers are listed in more than 700 sector-specific categories of the directory. • The US-based company Elance considers its trading platform ElanceOnline to be the world’s largest services marketplace. Elance had launched its platform in 1999. In addition to pure trading functions, a variety of collaboration and management tools are provided. • LanguageWire was launched as an e-marketplace supporting the exchange of translation services in 1999. Very soon the company became aware that this model does not meet the actual customer needs in the translation services sector. Finding the cheapest supplier is not the main problem faced by customers when searching for translation services. Therefore, the company has changed its business model to become a hybrid company. It operates an Internet platform, which connects more than 2,400 translation professionals worldwide, and offers extensive project management and consulting services to support customers in all aspects of translation activities.
<i>Results</i>	<ul style="list-style-type: none"> • The examples described in this case study show that not all services are equally suited for being traded on Internet platforms. Services that can be easily standardised and delivered over the Internet such as translation or writing services are more likely to be traded on Internet platforms. • Supporting the entire service procurement process as well as industry-specific communication and transaction forms is important. • Ensuring qualification of suppliers is a key success factor. • There is room for co-operation between public institutions and e-markets

2.9.4 Conclusions: e-business opportunities and challenges

Exhibit 2.9-8: Overview of e-business related opportunities and challenges for firms from the business services sector

Opportunities	Challenges
<ul style="list-style-type: none"> • Easier access to information • E-learning to improve employees training • Facilitating collaboration among employees • Enhanced co-operation with third parties • Process optimisation by integration of fieldworkers in internal work processes • Support of marketing and sales activities and enhanced customer relationships • Improving quality and enhancing usability of services provided 	<ul style="list-style-type: none"> • Overall challenges driving the use of ICT and e-business such as: <ul style="list-style-type: none"> ○ Intensive price competition ○ Complexity and internationalisation of projects ○ Business process outsourcing and automation of services procurement • Technical challenges due to the enhanced deployment of e-business technologies: <ul style="list-style-type: none"> ○ Integration of IT components ○ Security issues ○ Acquisition of technical knowledge • Management challenges due to the enhanced deployment of e-business technologies: <ul style="list-style-type: none"> ○ Reorganisation of company workflows ○ Ensuring acceptance among employees ○ Involvement of external partners

Source: *e-Business W@tch* (2004)

Opportunities

Easier access to information: For business services enterprises, in particular for the knowledge-intensive service providers, access to information plays a key role. In this regard, the use of ICT and e-business has significant implications, as the efficiency of accessing, compiling and distributing information is enhanced considerably. The Internet puts any sort of information at the fingertips of connected knowledge workers. This applies to information necessary for producing the services (e.g. legal documents, research) as well as to new business opportunities (e.g. through tender databases).

Micro and small companies in particular can make use of these advantages. Before the Internet existed, such information had to be collected expensively (in libraries or archives) or was only available to larger companies, which could distribute the costs of using expensive databases over many projects and workers. Thus, barriers to market entry are lower now since the minimum size necessary to produce high-quality services is lower than it used to be.

Facilitating collaboration among employees: The use of online technologies to facilitate collaboration among employees is another key issue in this sector. According to the survey results by the *e-Business W@tch*, one of the most important effects of ICT and e-business usage is an increased efficiency of internal work processes. More than half of the companies using the Internet report a positive impact on collaboration and knowledge exchange between employees as well as on the availability of information for management and control. These advantages apply particularly to knowledge-intensive sub-sectors, where the exchange of information is a key priority for the provision of services.

Enhancing third-party relationships: The co-ordination and management of third-party relationships, for instance with suppliers, sub-contractors or end-users, is an important part of business services. ICT and e-business applications today play a major role in managing these rather complex relationships and in enhancing efficiencies in the communication process.

Change of products and services provided: In many sub-sectors of business services, the services themselves change, for instance by being provided digitally or by having digital components added to them. Such changes can lead to cost savings for the service companies' customers, but it can also increase the service quality and, consequently, the value of the service to customers. As a result, a strong link between innovative use of ICT and competitiveness exists in the business services sector.

Challenges

Business challenges enforce deployment of ICT and e-business solutions: Business services enterprises are confronted with a number of business challenges, which enforce the deployment and professional use of ICT and e-business technologies. Internationalisation, business process outsourcing (BPO) and the automation of services procurement processes are important drivers in that respect. This poses increasingly higher demands on the technical capabilities of business services enterprises.

Technical challenges: Introducing e-business technologies in business services enterprises brings along specific technical challenges, such as the need to integrate new IT components or to find and implement appropriate security solutions.

Management challenges: The adoption of new technologies often requires a redesign of company workflows. Mobile solutions to integrate fieldworkers, for example, are often associated with the elimination of entire process steps. Such significant changes are associated with the reallocation of employees or, at least, of working time. In addition several human control mechanisms disappear and must be replaced by adequate new ones.

2.9.5 Outlook

Drivers on the supply side and demand side

Factors that will drive the further adoption of e-business technologies in the business services sector can be found both on the supply and on the demand side. On the supply side, basic ICT infrastructure, including computers and Internet connections, is becoming increasingly powerful while prices remain stable or even decrease. The availability of a modern Internet access technology is also the basis for the introduction of more sophisticated ICT applications such as video conferencing, to support the management of third-party relationships.

Exhibit 2.9-9: Overview of e-business enablers and barriers in the business services sector

Enablers	Barriers
<p>Enabling factors on the supply side:</p> <ul style="list-style-type: none"> • Increasing quality of ICT infrastructure at stable or decreasing prices • Technologies increasingly suited to the needs of SMEs • Rising awareness of the importance of services management by IT services sector <p>Enabling factors on the demand side:</p> <ul style="list-style-type: none"> • Strongly developed basic ICT infrastructure • Increasing knowledge about use and benefits of e-business technologies 	<p>Barriers related to small company size:</p> <ul style="list-style-type: none"> • Lack of technologies for SMEs • Lack of knowledge among SMEs and negative experiences <p>Further barriers:</p> <ul style="list-style-type: none"> • Low degree of standardisation • Sensitive customer relationships

Source: e-Business W@tch (2004)

An increasing number of ICT solutions suitable for SMEs are becoming available. Many software manufacturers and ICT service providers have modified their solutions in order to win small and medium-sized companies. In addition, manufacturers of ERP (Enterprise Resource Planning) solutions

and other enterprise applications have discovered the management of service production as an interesting market. They have introduced new applications that are targeted at the specific needs of business services sub-sectors such as facility management or consulting. Installing such pre-configured solutions tends to be cheaper than modifying a general-purpose solution to the specific demands.

On the demand side, business services enterprises seem to be well prepared for a further adoption of e-business technologies. They are already well equipped with basic ICT infrastructure. Many enterprises have gained experience with e-business technologies. Five years after the dotcom-boom, many e-business projects have been completed, and companies in the business services sector know better which solutions work and which do not.

Selected references

- Ariba & London Business School (March 2004): "European enterprises admit existence of spending black holes", Press Release published by Octopus Communications, March 10, 2004.
- Berlecon Research (2003): "E-Business-Standards in Deutschland – Bestandsaufnahme, Problem, Perspektiven, i.A. des Bundesministeriums für Wirtschaft und Arbeit, Report, Berlin, April 2003.
- Berlecon Research (2004): "Prozesse optimieren mit Mobile Solutions", Report, Berlin, März 2004.
- Commission of the European Communities (1998): Communication on: "The contribution of business services to industrial performance: a common policy framework", COM (1998) 534 final, Brussels, 21.09.1998.
- Commission of the European Communities (2003): "Final Report of the Expert Group on B2B Internet trading platforms" (<http://europa.eu.int/comm/enterprise/ict/policy/b2b>), European Commission, DG Enterprise, July 2003.
- Commission of the European Communities (2003): Communication on "The competitiveness of business-related services and their contribution to the performance of European Enterprises", COM (2003) 747 final, Brussels, 04.12.2003.
- CRIC (2004): "Innovation in Services: Issues at Stake and Trends", ESRC Centre for research on Innovation and Competition on behalf of the European Commission's DG ENTR, Final Report, Brussels-Luxembourg, 2004.
- Sector Impact Studies by *e-Business W@tch* on the Business Services Sector (www.ebusiness-watch.org).
- Forrester (April 2004): "Services procurement needs executive sponsorship to achieve potential", Executive Summary, April 15, 2004.

2.10 Health and social services

2.10.1 Economic profile

In section N "Health and social work" of NACE⁷³ Rev. 1, division 85 "Health and social work" comprises three groups: *human health activities* (85.1), *veterinary activities* (85.2) and *social work activities* (85.3). The *e-Business W@tch* health sector reports concentrate on those sub-sectors where networking with other health institutions is of particular importance and where ICT plays a relatively more important role. In particular, they focus on *hospital activities* (85.11), *medical practice activities* (85.12) and *social work activities* (85.3).

Exhibit 2.10-1: Configuration of the health sector in terms of NACE Rev. 1

NACE Rev. 1		Activity
Division	Group	
N85	Health and social work	
	85.1	Human health activities
	85.2	Veterinary sector
	85.3	Social work activities

Human health activities (N 85.1) represent an extremely complex and varied environment for the application of information and communication technologies (ICT). The analyses focused on the two key actor groups in this field:

- Hospital activities (85.11): According to NACE, this class comprises medical care and accommodation activities and it includes "*short- or long-term hospital activities of general or specialised hospitals, sanatoria (...)* The activities are chiefly directed to in-patients."
- Medical practice activities (85.12): Defined by NACE, "*these activities can be carried out in private practice, group practices and in hospital out-patient clinics.*"

Social work activities (N 85.3) cover a wide variety of institutions and types of services, many of which have little economic relevance. Organisations providing social (care) services to, or at, the client's home are a key segment within this group.

Sector characteristics

When comparing the European health and social services (H&SS) sector with other industrial or service sectors, one has to bear in mind that it is a highly regulated national, often regional or local market. Services are delivered in most instances not by private entities but by government, public or not-for-profit bodies. This dominance of public or "protected" not-for-profit actors contributes to the absence of competition in most business fields. Thus, due to its functions, structure and societal relevance usual commerce metrics derived from demand/supply considerations such as "buying cheaper" or "selling more" are rarely the dominant criteria, and cultural change, due e.g. to a more competitive environment and to the changing behaviour of "customers", will come about very slowly.

Economic relevance

By 2000, H&SS was *the* dominant economic sector of the European Union with more than 15 million people employed – more than 9% of European employment – and more important than retail with 13.0m and business services with 13.3m. Its gross *value added* amounted to almost 500bn Euro – more than 6% of European Union GDP – topped only by business services with 514bn Euro.⁷⁴

⁷³ NACE Rev. 1 (Statistical classification of economic activities in the European Community), Office for Official Publications of the European Communities, Luxembourg, 1996.

⁷⁴ These are only rough figures due to considerable differences in national statistics on which these data are based.

Looking only at the *human* health subsector, for which more detailed and comprehensive data are available, total health *expenditure* accounted for 8% of GDP in the EU-15 in 2000. On a per-capita basis, health expenditures in current US\$⁷⁵ varied from high values of 2,514 for Luxembourg and 2,422 for Germany to only 884 in Greece and 862 in Portugal.

Concerning the 10 new Member States and two Candidate Countries, extreme disparities between three separate country groups become apparent. Whereas three new Member States, namely Cyprus (888), Malta (807) and Slovenia (788), almost reach the expenditure per capita level of Greece and Portugal, the two Candidate Countries Romania (48) and Bulgaria (59) fall far below the mean value (1,818) for the former 15 Member States of 2003.

Among the EEA countries, Iceland and Norway have health expenditures per capita which are about 50% higher than the former EU-15 mean value. In others of the larger and most advanced countries worldwide these values are 60% for Japan, 95% for Switzerland and the even 150% for the USA.

Funding of health expenditure is dominated by the public sector. However, whereas "*the role of public funding has increased considerably in several lower-income countries*" since 1990, "*many higher-income OECD countries experienced a moderate decrease in the public share of health spending in the 1990s ... with a considerable decline in a few countries (e.g. Italy, Finland, Sweden, Hungary).*"⁷⁶ For the future, considering the trends to be discussed below, it can be expected that particularly in the higher-income countries the private share of health spending will henceforward increase faster than the public share. At the same time, this will open up a new growth perspective for a more widely defined, holistic health market.

Trends and challenges

The European population is ageing at an accelerating rate. This will have considerable impacts on a wide variety of socio-economic factors and processes, and last, but not least, on the health and social care system. The prevalence of chronic diseases will grow and the number of disabled people will rise. "*One can expect that the age-related rationing [of healthcare interventions] would become more prominent because of the pressures on the health systems created by the increasing proportion of older people.*"⁷⁷

As a key means to cope with mounting health and social care costs across the Union – and to improve the quality of care at the same time – *health telematics infrastructure* questions have recently gained in importance at the European policy level, and the creation of a European e-Health Area has been proposed.⁷⁸ Key hurdles for the wider diffusion of advanced telemedicine and e-Health applications across Europe are technical infrastructure issues at the national and local level, security and privacy issues, as well as missing medical and clinical standards. Both at the national and at the European Union level various activities for assuring the *interoperability* of health systems - concerning technical, semantic, organisational and health system level issues - are underway or planned. This will support the advancement of national health and social care systems, the creation of a truly seamless pan-European healthcare market, and the further growth of the European health ICT industry and the sustainability of its international competitive advantage.

⁷⁵ Data available to us only in US\$ from the World Bank (from Jan. to Dec. of 2000, the exchange rate changed from about 1 USD for 1 Euro to about 1 USD for 1.06 Euro). Health, Nutrition and Population Statistics (HNPStats), Human Development Network Development Data Group, The World Bank Group (<http://devdata.worldbank.org/hnpstats>)

⁷⁶ Health at a Glance - OECD indicators (2003), Paris, p. 64.

⁷⁷ World Health Organization (2002): The European Health Report 2002. WHO Regional Office for Europe, Copenhagen (WHO regional publications, European Series, No. 97), p. 62.

⁷⁸ Cf. Commission of the European Communities - COM (2004) 356: Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: e-Health - making health care better for European citizens: An action plan for a European e-Health Area, Brussels, 2004-04-30, and references cited there.

A core component of a European health telematics infrastructure⁷⁹ will be the *Electronic Health Record* – EHR – (or Electronic Medical Record – EMR) integrating all relevant information on a patient. “*The holy grail of connectivity is the transformation of the current paper-based medical record into an electronic medical record that is accessible to all necessary providers and possibly to the patient. Web-enabling the EMR expands the potential users and uses ...*”⁸⁰

2.10.2 Diffusion of ICT and e-business applications in 2003/04

In the H&SS sector, the term e-health is often used as a synonym for e-business, but often it is also used in a slightly different way, focusing more on customer-facing and less on back-office applications. On the other hand, it sometimes encompasses any and all ICT-based applications and services.

The matrix in Exhibit 2.10-2 presents a summary overview of e-business or e-health application areas and an assessment of how important (or unimportant) these are in the H&SS sector. The scores provided not only reflect the "importance" as measured by means of the empirical surveys reflecting the actual state of affairs, but also an assessment of future relevance based on our analyses, expert judgements and policy priorities (indicated by square brackets []). Furthermore, an attempt has been made to reflect the influence of size of organisation (indicated by empty circles O).

Importance of e-business areas

Across all of our surveys, the health and social services sector shows the lowest summary scores of all economic sectors as measured by the *e-Business W@tch* indicators. The gap between small and large organisations concerning their perceptions of relevance and importance as well as with respect to applications and usage, remains very wide. The same holds for differences across Member States, which are a reflection of different national health and social care system structures, their impact on the size structure of relevant organisations, and of priorities set by health and social policies.

Concerning specific fields of applications, the following summary observations can be made:

ICT infrastructure

Hidden behind average values for this sector, huge differences exist with respect to ICT and network infrastructure not only across size classes of organisations but also across Member States. There are many large (and also a few very small) organisations with complex and advanced IT architectures on the one hand, and a lot of smaller companies equipped with very basic, frugal information technology and networks on the other. Only 42% of all employees in H&SS work in organisations that have connected most of their computers to a Local Area Network (LAN). However, these are only 22% of all organisations. Predominantly the large organisations (legal units) with more than 250 employees have LANs implemented (91%).

Remote access solutions are only slowly emerging, and access via internal wireless LANs is almost absent (even large organisations score a value of only 19%). Whereas standard Internet access is no longer a useful indicator for connectivity in most sectors, in the H&SS sector the figures are still relatively low in comparison to the rest of the sectors studied by the *e-Business W@tch*: Only 63% of all organisations are connected (Cf. Exhibit 2.10-3).

⁷⁹ Iakovidis, Ilias: Towards a Health Telematics Infrastructure in the European Union. In: Information Technology Strategies in US and EU, Amsterdam IOS Press (2000), pp 23-33.

⁸⁰ Danzon, P M, Furukawa, MF: Health Care: Competition and Productivity, in: Litan, R. and Rivlin, A. (2001) The Economic Payoff from the Internet Revolution. Brookings Task Force on the Internet. Washington, D.C.: The Internet Policy Institute, Brookings Institute Press, p. 208.

Exhibit 2.10-2: Importance of e-business application fields in health & social services

E-business application area	Importance	Remark
Infrastructure and skills		
LAN implemented	~ TMTM	The implementation level is very low except for very large organisations.
Recruitment of ICT specialists	~	Recruitment activities are extremely low.
Internal business processes		
Availability of an Intranet	~ TM	Even in large organisations the availability of Intranets is far below the European all sector average.
e-learning applications	~ ~	Electronic training and continuing education support is slightly above EU average.
Human resources management applications	~ ~ TM	In line with the key importance of human capital for this sector, such applications are relatively widely diffused.
Procurement and supply chain management		
Online purchasing	~ ~ ~	Next to personnel, supplies are the second largest cost factor; this is reflected by the relative importance of online purchasing.
Decrease direct procurement costs through e-procurement	~ ~ ~	As in other sectors, realising the potential of reducing costs is the most important benefit of online procurement. Improving process efficiency is almost equally important.
Marketing and sales		
Web presence	~ TM	Very few online marketing activities beyond simple web presence can be observed, largely restricted to larger organisations. Interactive options for patients are virtually absent.
(Inter)active patient information and involvement	~ [~ ~ ~]	Comprehensive, reliable online health information for citizen and empowerment of patients is a key European policy concern, but virtually absent as far as health care services are concerned.
Extended enterprise		
Electronic networking with other actors and organisations	~ [~ ~ ~]	Connectivity amongst participants of the health care delivery chain is of utmost importance for the further development of e-health applications. The actual use of online technologies (other than free text e-mail) for service co-operation is, however, still very low. Interoperability has become a key policy concern.
e-business standards for exchanging structured data	~ TM	Except for large organisations, the exchange of standardised data is very limited. Proprietary standards still dominate, thus hindering interoperability.
Anticipated importance		
Integration of IT components through web services	~ ~ ~ TM	Looking into the future, the highest importance was attached to service integration via web services.
Virtual private networks (VPN)	~ ~ TM	The expansion of VPNs to improve services and reduce costs is equally of great relevance.
XML based standards	~ [~ ~]	The great importance of XML-based standards for the future integration of services has not yet been recognised by the sector players.
Significance and impact		
Assessment of present significance	~ ~ TM	Significance of e-business applications is assessed higher than the present implementation level would suggest. It increases strongly with size of organisation.
Key implementation barriers	~ ~ TM	Size of organisation, complexity of technology and costs are regarded as key barriers to the wider diffusion.
Greatest impact: collaboration and information exchange	~ ~ ~ ~	In line with earlier results, the greatest impact is anticipated in co-operation for service provision and the comprehensive availability of management information.
~ = little relevance; ~ ~ = average relevance; ~ ~ ~ = very relevant; ~ ~ ~ ~ = high relevance for sector TM = mixed results, depending on the size of organisation; [] = assessment of future relevance		

Source: e-Business W@tch (2004)

Exhibit 2.10-3: Use of ICT infrastructure in the health & social services sector (2003)

	Use of computers	Internet access	Use e-mail	Local Area Network	Use the WWW	Wide Area Network	Remote Access	Wireless LAN
Sector total (EU-5)								
% of employment	93	72	63	42	58	14	17	6
% of enterprises	87	63	51	22	47	2	9	3
0-9 employees	85	61	48	15	44	2	8	3
10-49 employees	96	83	77	48	73	4	25	5
50-249 employees	97	90	87	59	82	12	18	9
250+ employees	100	86	86	91	77	50	30	19
All 9 Sectors (EU-5)								
% of employment	95	88	84	61	77	29	37	10
% of enterprises	89	76	68	32	58	5	16	4

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=501 for EU-5 sector total and 50-100 per country.

Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: November 2003.

Source: e-Business W@tch (2004)

Internal business processes

Improving the efficiency of internal processes is one of the main drivers for e-business in the H&SS sector. Large organisations are most likely to make use of these applications as the efficiency gains from ICT-supported internal business processes tend to increase with company size. In the H&SS sector, only 25% of all employees work in organisations that have implemented an Intranet (see Exhibit 2.10-4) compared to an EU-5 average of 45% for all sectors, and this covers only 11% of all organisations. For all applications, diffusion increases by size-class, but organisations with 250+ employees clearly dominate this field. However, even in large organisations Intranets have not yet become a commonplace – only 63% have one.

Sharing documents to perform collaborative work is quite common again only among the largest organisation (61%). Applications for tracking working hours are very limited. In line with the key importance of human capital in this sector, *human resources management* applications are already relatively widely diffused amongst the largest organisations (47%), and even those with 50-249 employees boost a value of 19%.

Exhibit 2.10-4: ICT use for internal business processes in the health & social services sector (2003)

	Use an Intranet	Use online technologies ...		
		to share documents for collaborative work	to track working hours and/or production time	to support human resources management
Sector total (EU-5)				
% of employment	25	28	9	16
% of enterprises	11	16	3	3
0-9 employees	9	18	2	2
10-49 employees	19	22	11	14
50-249 employees	36	38	16	19
250+ employees	63	61	26	47
All (9) Sectors (EU-5)				
% of employment	45	40	20	21
% of enterprises	21	22	5	5

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=501 for EU-5 sector total and 50-100 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: November 2003.

Source: e-Business W@tch (2004)

Electronic procurement and supply chain integration

Next to personnel costs, healthcare supplies are the second largest cost factor for all medical and care service providers. In light of this key importance, it is not surprising that in this field the H&SS sector is with 34% at least somewhat close to the European overall average (46%) with respect to online purchasing (see Exhibit 2.10-5). About four out of five companies (81%) that buy supplies online say they order from websites of their suppliers. Thus, similarly again to the situation in other sectors, suppliers' websites still play a far more important role for e-procurement than special B2B marketplaces (10% of organisations) or extranets of suppliers (24%). EDI connections are hardly used (2% only).

Not unexpectedly, organisations that have experience with e-procurement report that reductions in procurement costs are the dominant effect of this method: altogether 68% said that the perceived effects were fairly positive (51%) or even very positive (17%).

Exhibit 2.10-5: Electronic procurement and supply chain integration in the health & social services organisations (2003)

	Make online purchases	Online purchase of MRO* goods	Online purchase of direct production goods	Use of online technologies** to exchange documents with suppliers	Use an SCM (Supply Chain Management) system
Sector total (EU-5)					
% of employment	34	21	15	22	1
% of enterprises	24	14	10	17	0
0-9 employees	22	10	8	17	1
10-49 employees	45	33	20	23	0
50-249 employees	36	24	14	31	1
250+ employees	53	33	26	34	5
All (9) Sectors (EU-5)					
% of employment	46	29	23	37	6
% of enterprises	31	19	17	24	2

* Maintenance, repair and operations goods (indirect production goods)

** Other than free text e-mail

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=501 for EU-5 sector total and 50-100 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: November 2003.

Source: *e-Business W@tch* (2004)

Customer facing processes

When looking at the health and social services sector, one has to bear in mind that this is a very specific sector as far as marketing and sales activities are concerned. Particularly in the human health subsector, more advanced e-commerce activities in the sense of "selling" health and well-being will remain limited to niche applications both for ethical reasons and rules of professional code of conduct.

Explained by this specific "selling" situation of the H&SS sector, the data for online sales and more advanced interactive applications are very low (Exhibit 2.10-6). The UK appears as an exception, where the National Health Service (NHS) is investing heavily into expanding client-facing e-business applications beyond a mere web presence.

Exhibit 2.10-6: Online marketing and e-commerce activities by health & social services organisations (2003)

	Have a website on the Internet	Make online sales	... of those:	
			allow online payment of goods/services ordered	online sales system with secure transactions capability
Sector total (EU-5)				
% of employment	41	7	6	6
% of enterprises	21	2	1	1
0-9 employees	16	2	1	1
10-49 employees	59	6	0	2
50-249 employees	55	2	0	2
250+ employees	77	16	16	16
All (9) Sectors (EU-5)				
% of employment	66	16	7	9
% of enterprises	35	9	4	4

Base: all enterprises. EU-5 = DE, ES, FR, IT, UK. N=501 for EU-5 sector total and 50-100 per country. Weighting: Figures for size-bands in % of enterprises. Figures for countries are weighted by employment ("enterprises comprising ...% of employees"). Reporting period: November 2003.

Source: e-Business W@tch (2004)

Functions of the extended healthcare enterprise

The main idea behind the concept of the *extended healthcare enterprise* is that a health or (social) care organisation is not only constituted by its management, administration, professionals, staff, and means of healthcare delivery, but also by a functioning network of "business" partners, including its suppliers and clients.

Several rather sophisticated e-business solutions including EDI networks, supply chain management (SCM), and e-marketplaces address these issues of an extended enterprise. Although in this sector the relationships and concerns differ basically from those in most other industrial and service sectors of the economy, connectivity amongst the various participants is of utmost importance for the further development of e-health and e-business applications. The use of online technologies (other than free text e-mail) for service co-operation is still very low (10% employment weighted), but organisations in countries like Denmark, the UK and Austria seem leading the way (with percentages varying at around 20-25%).

2.10.3 Case studies

This section features abstracts and key lessons learned from case studies which are presented in more detail in the 2nd Sector Impact Study from August 2004.

A NATIONAL E-HEALTH INFRASTRUCTURE - MEDCOM (DENMARK)	
<i>Background</i>	MedCom is a national healthcare data and information network for enabling secure electronic communications between all actors in the health and social care sector in Denmark. The service has been built up since 1994 when MedCom was created as a regional co-operative venture (bottom up) between authorities, organisations and private firms linked to the Danish healthcare sector. By now more than 3,500 hospitals, pharmacies, homecare providers, GPs and specialists are connected. Access for citizens and patients is also provided.

<p><i>Activities</i></p>	<p>Initially, general practitioners were the pivotal point in communications, which primarily passed between medical practices, hospitals, laboratories and pharmacies. Then local authorities joined in and became an important partner in home care and other areas. Messages in the form of prescriptions, laboratory results, X-ray results, discharge letters etc. were exchanged in steadily increasing numbers. Telemedicine applications were added. The Internet opened up new opportunities both in relation to including patients and for the dialogue amongst healthcare professionals. By linking together existing secure Intranets, MedCom has established a healthcare Internet, known as HealthcareDIX (Sundheds-DIX) via VPN connections to VPN nodes. At the same time, MedCom IV has been concerned with the expansion and quality assurance of EDI communications (including securing interoperability amongst various standards), as well as the development and implementation of communication to and from electronic patient records. Planning is underway to expand activities beyond the Nordic Countries into some of the 10 new Member States.</p>
<p><i>Results</i></p>	<ul style="list-style-type: none"> • Improved access to and quality of care: The health network and MedCom standards have made electronic patient booking and GP prescription renewal possible. Certain telemedicine services have been implemented, and teleconferencing has been carried out. • Professionals' access to the specialists' evaluations has been improved, as has the prompt access to examination reports. Fast, complete and valid information regarding the whole period of care is the most important benefit. Electronic communication enables direct reuse of data and automatic validation of data prior to sending it. • The Danish National Health Portal (One Portal for Citizens and Professionals) enables communications and services between health professionals and citizens. The portal also provides facilities for citizens to book appointments with GPs, conduct e-mail consultations with their GP and renew their prescriptions. • Cost benefits: Several studies confirmed significant benefits for patients and financial savings. Through gains in efficiency, more time has become available for the care and treatment of patients. Financial benefits due to improved communication flows were estimated at the level of about 84 m Euro. • MedCom is a key European example for the stepwise, bottom-up development of a national health communications network providing for the integration and co-operation of a wide variety of health and care systems actors.

<p>NHS PURCHASING AND SUPPLY AGENCY (UNITED KINGDOM)</p>	
<p><i>Background</i></p>	<p>The National Health Services Purchasing and Supply Agency works with 400 NHS trusts and health authorities, manages 3,000 national purchasing contracts, influencing around half of the 7bn sterling spent in the NHS on goods and services.</p>
<p><i>Activities</i></p>	<p>The NHS Purchasing and Supply Agency is a national centre of expertise in purchasing and supply matters for the health service, and an advisory and co-ordinating body impacting on procurement policy and modernising purchasing and supply. More than 100 NHS organisations and over 40,000 healthcare professionals in more than 300 hospitals use the EROS eProcurement system which is vital to successful supply chain engineering. EROS automates the purchasing process, minimising manual intervention and paperwork Purchasing teams within the Agency support NHS Logistics in purchasing products, proposing selling prices and managing data for the 40,000 product lines that appear in its catalogue.</p>

<p><i>Results</i></p>	<ul style="list-style-type: none"> • Supplier Information Database (NHS-sid): a web-based system for suppliers to register tender pre-qualification information. • NHS-eCat: On 1 April 2003 the Agency started distributing information on its contracts via a web-enabled on-line catalogue. • NHS Contract Information System (NHSscis): a web-based database that can be used by NHS organisations to hold and share high level information on all trust/confederation contracts. • Bar Coding/Automated Information and Data Capture (AIDC): The Agency has worked with a number of stakeholders on a programme to research the current and potential use in the NHS of bar code technology. • E-auctions: Five e-auctions with a total spend of 50 m sterling have been completed by January 2004. The combined effect of competitive tendering, followed by an e-auction, was an overall saving of 15.7 m sterling (31%). • E-tendering: During 2003/4 a contract was awarded for e-tendering pilots to be undertaken at Agency, confederation and trust level. • E-transactions via XML: Electronic transmission of eInvoices will be in XML format and in accordance with UKGOV.XML standard recommended by the Office of Government Commerce. Pilot projects initiated by the Agency have shown that, beside cost savings and process improvements, e-procurement proved to increase patient safety. • The savings target set for 2003/4 was 5% of the total value of contracts, i.e. 202 m sterling at December 2003. This target has already been exceeded and the Agency is on course to deliver 300 m sterling – making a grand total of around 1bn sterling over the four years of its existence.
-----------------------	--

<p>CROSS-BORDER HEALTH CARE DELIVERY IN EUREGIO MEUSE-RHINE</p>	
<p><i>Background</i></p>	<p>The Euregio Meuse-Rhine (EMR – encompassing parts of Belgium, Germany and the Netherlands) has a 15 year history of cross-border health care activities, some of them supported by the European INTERREG Programme. These activities started with small co-operation projects between hospitals, expanded to co-operation with health insurance funds, and led to a new alliance involving and benefiting all actors in the health arena, including users and patients.</p>
<p><i>Activities</i></p>	<p>The core activities of this “Cross border healthcare provision in the Meuse/Rhine region of Europe” are built around a network of 10 health funding organisations and five hospitals. The hospitals and funding bodies have signed contracts with each other and work together on aspects of about 20 cross border projects. These projects support a variety of activities, including communication between medical professionals, cross border integrated ‘chain care’, MRSA (Methicillin Resistant Staphylococcus aureus) protocols for hospitals, transparency of hospital costs; research into trans-cultural aspects; quality circles, and procedures in oncology (mammography screening, tumour bank, teledermatooncology). There are also cross-border contacts among patients groups; networks for the care for the elderly; the Euroregional Public Health Report, Euroregional environmental health projects; co-operation in the care of drug addicts; co-operation among institutes for higher education and Euroregional Health Conferences.</p>
<p><i>Results</i></p>	<p>The EMR has been identified as a beacon to a future of borderless health services provision in Europe, due to its success in facilitating:</p> <ul style="list-style-type: none"> • Free access to health care across borders, facilitated, for instance, by an electronic patient card, for a better quality of care.

	<ul style="list-style-type: none"> • Hospitals / care providers co-operation in the areas of patient care, innovation, research and education to improve outcomes. • Cooperation among hospitals, physicians and health insurance funds, providing for new trans-border products and contracts, and cost savings by sharing of expensive resources. • The integration of patient organisations. • Support and engagement of health authorities and regional or national governments.
--	--

HIGH QUALITY HEALTH INFORMATION - THE HEALTH ON THE NET FOUNDATION (GLOBAL)	
<i>Background</i>	The Swiss-based Health on the Net Foundation (HON) provides high quality health information. In 1996 HON introduced the first Code of Conduct for online medical and health information providers, the HONcode, which now has more than 3,600 participating websites in 72 countries. The HONcode is the first attempt at "truth in labelling" for online health content based upon consensus between content providers, webmasters, medical experts and lay users.
<i>Activities</i>	<p>The HONcode is a voluntary accreditation system based on an "active seal" concept creating a "confidence space" of qualifying websites. Site administrators must take the initiative to apply for HONcode accreditation. Then each request for accreditation is examined by a member of the HONcode review/accreditation team.</p> <p>HON's specialised search engines - a sort of "Michelin guide of the web" - are: MedHunt (free search within approximately 75,000 documents), HONmedia (6,800 images concerning 2,000 different topics), HONcodeHunt (trustworthy website adhering to the HONcode principles), and HONselect (medical encyclopaedia containing 33,000 medical terms in 5 languages). In addition, HON provides direct access to trustworthy sources, provides HONDossiers concerning specific subjects, offers Daily News (latest health news from selected trustworthy sources) and Conferences & Events with schedules of international medical conferences.</p>
<i>Results</i>	<ul style="list-style-type: none"> • The HON website has become a reference for medical websites on the Internet. HON's search tools and code of conduct, the HONcode, are de facto standards for the quality of online health and medical information. • Demand for HONcode accreditation has consistently exceeded HON's capacity, and waiting times of several months have become common. • HON's specialised search engines proved highly efficient. HON is further developing additional tools for automatic determination of information quality, use of natural language queries, or interaction of the user with HON's databases for refining the search.

2.10.4 Conclusions: e-business opportunities and challenges

For health policies at the national and the European level, to enhance the overall performance and innovation of health care delivery, it is crucial to understand opportunities and problems related to e-business diffusion in this sector. A summary overview over some key e-business opportunities and challenges for *organisations* in the health and social services sector is provided in *Exhibit 2.10-7*. Almost all e-business application areas indicated in Exhibit 2.10-2 above provide important opportunities and challenges, be they with respect to the present situation of relatively low investments in these fields, be they with respect to their expected relevance for providing health care in the future.

Exhibit 2.10-7: Overview of e-business opportunities and challenges for organisations in the health & social services sector

Opportunities	Challenges
<p><i>Overall perspective:</i></p> <ul style="list-style-type: none"> • piggy-back on e-health infrastructure developments • gain competitive advantage from co-operation with other value chain partners <p><i>Internal workflow:</i></p> <ul style="list-style-type: none"> • reduce costs and improve services through better management of supplies <p><i>Facing the client:</i></p> <ul style="list-style-type: none"> • enhance marketing of services through health information and improve client loyalty through interactive e-communications and services 	<p><i>Overall aspects:</i></p> <ul style="list-style-type: none"> • be aware of increasing competition • take into account legal, regulatory and security issues, including conformity testing and accreditation needs <p><i>Management considerations:</i></p> <ul style="list-style-type: none"> • ensure staff motivation and training • take a longer-term view of developments to come • reduce disadvantages of size through networking with partners

Source: e-Business W@tch (2004)

For national and European health policies it will be mandatory to take more account of these opportunities and challenges. Measures must be geared towards supporting and enhancing opportunities perceived and towards combating challenges faced by market players.

2.10.5 Outlook

In the health and social services sector the diffusion of *basic* ICT has progressed in many fields and amongst most organisations, rather like in the other sectors studied by the *e-Business W@tch*. However, with respect to more advanced e-business solutions and services, the sector tends to lag considerably behind. As a whole, it is clearly amongst the late adopters, and the smaller organisations in particular tend to be very late adopters – if at all. On the other hand, one must take into consideration that due to its functions, structure and societal perceptions, usual commerce metrics such as "buying cheaper" or "selling more" are rarely the dominant criteria in this sector.

In some contrast to these general observations, our case studies have shown that there are indeed "lighthouse" examples of good e-health practice in the e-business field across Europe. These are only a very small selection, and many more interesting e-health cases have been identified elsewhere.⁸¹

Exhibit 2.10-8: Overview of e-business enablers and barriers in the health & social services sector

Enablers	Barriers
<ul style="list-style-type: none"> • Health system guidance and leadership • Competition • User-friendliness and functionality of tools • Good practice examples, learning from network partners • Standardisation 	<ul style="list-style-type: none"> • Missing awareness of opportunities by system players • Size of organisations • Interoperability deficits • Financing of e-business investments • Legal, regulatory and privacy/security issues, including reimbursement and certification

Source: e-Business W@tch (2004)

⁸¹ CEC - IST and European Institute of Public Administration (2003): 2003 eHealth Conference - Guide to Exhibition, Brussels: and CEC - IST and European Institute of Public Administration (2004): eEurope Awards for eHealth - 2004, Catalogue. Maastricht. Cf. also eEurope Awards' website: www.e-europeawards.org

Looking into the future, key drivers and barriers from a national health system perspective are summarised in Exhibit 2.10-8. While the first ones are expected to facilitate and support the diffusion of ICT and e-business tools, the latter ones constitute factors which could inhibit the further deployment of these tools.

When discussing enablers and barriers at the macro level, one has to bear in mind that issues to be discussed tend to be of great relevance at the micro level as well. Moreover, enablers and barriers are often flip sides of the same coin, i.e. they could be analysed from both perspectives.

Not least, due to activities at the European level, health policy-makers and health system stakeholders are increasingly realising the pivotal relevance of e-business / e-health developments for cost containment, quality of care and equal access for all citizens to health and care services. The vision of a European e-Health Area will further contribute to this. This may both stimulate the faster implementation and diffusion of e-business applications in the years to come, and help the European Union to meet the challenge of integrating health systems in new Member States.

Selected references

- CEC - IST and European Institute of Public Administration (2003): 2003 eHealth Conference - Guide to Exhibition, Brussels.
- CEC - IST and European Institute of Public Administration (2004): eEurope Awards for eHealth - 2004, Catalogue. Maastricht. Cf. also eEurope Awards' website: www.e-europeawards.org
- Coheur, A. (2001): Integrating care in the border regions – An analysis of the Euregio projects. Eurohealth, Vol. 7, No. 4, Autumn 2001, p. 10-12.
- Commission of the European Communities - COM (2004) 356: Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: e-Health - making health care better for European citizens: An action plan for a European e-Health Area, Brussels, 2004-04-30.
- Danzon, P M, Furukawa, MF: Health Care: Competition and Productivity, in: Litan, R. and Rivlin, A. (2001) The Economic Payoff from the Internet Revolution. Brookings Task Force on the Internet. Washington, D.C.: The Internet Policy Institute, Brookings Institute Press.
- eHealth 2003 Ministerial Declaration (2003), Brussels, 22 May.
- European Commission (2003): Health Telematics Working Group of the High Level Committee on Health - Final Report. Luxembourg, 04/2003, HLCH/2003/1/7
- Health at a Glance - OECD indicators (2003), Paris.
- HONcode principles. In Health On the Net Foundation. <http://www.hon.ch/HONcode/>
- Iakovidis, Ilias (2000): Towards a Health Telematics Infrastructure in the European Union. In: Information Technology Strategies in US and EU, Amsterdam IOS Press, pp 23-33.
- MedCom – the Danish Healthcare Data Network - Status, plans and projects, Dec. 2003 / MC-S177, <http://www.medcom.dk/publikationer/publikationer/MedCom4-ENGELSK.pdf>
- Robinson, Simon, Stroetmann, Karl, Stroetmann, Veli (2004). Tele-homecare for chronically ill patients: improved outcomes and new developments. Journal of Information Technology in Health Care, 2(4), pp. 251-262.
- Scott, R.E, Jennett, P.A., Yeo, M. (2004): Access and authorisation in a Global e-Health Policy Context. International Journal of Medical Informatics, 73 (3), pp. 259-266.
- Stroetmann, Veli N, Hüsing, T., Kubitschke, L. and Stroetmann, KA: The attitudes, expectations and needs of elderly people in relation to e-health applications: results from a European survey, in: Journal of Telemedicine and Telecare, Vol 8 (2002), Suppl. 2: S2:82-84.
- von Eiff, Wilfried: Einkaufsgemeinschaften professionalisieren sich (Procurement co-operatives become professional), Klinik Management Aktuell, No. 97 - 07/2004.
- World Health Organization (2002): The European Health Report 2002. WHO Regional Office for Europe, Copenhagen (WHO regional publications, European Series, No. 97).

Part 3: Contributions

Introduction

As in the previous editions of the European E-Business Reports, the *e-Business W@tch* has invited experts and researchers who have investigated e-business related topics to contribute an article to the report. For this year's edition, articles have been selected that present research on impacts of electronic business, conditions for successful adoption, and on innovative approaches for establishing e-business related metrics and compound indicators.

Tony Clayton and *Peter Goodridge* from the UK Office for National Statistics have investigated productivity impacts of electronic business in manufacturing and services. It appears that productivity effects of ICT use, difficult to show in earlier years using e-commerce survey data, may now be easier to see. Data suggest that most firms gain from integration of business processes, in particular multiple integration. The authors highlight some interesting specifics which are important to be followed-up: it appears that there are notable difference between results for production and services. While most productive service firms are those with multiple links including customers, logistics or external operations, in manufacturing, the most productive firms are those with supplier links. The authors conclude that evidence challenges the concept of a single "ICT productivity effect".

A good practice example for international research co-operation (in this case between US and European researchers) is the analysis on "What Drives E-Business Diffusion among Firms?". A research team led by *Prof. Kenneth L. Kraemer* from the University of California, Irvine, used European survey results to investigate drivers and barriers for e-business uptake among firms. The authors have established a sound conceptual framework and used statistical methods to test the influence of several factors. The authors find that the potential of e-business for cost reduction becomes more important as industry competition becomes more intensive. Moreover, technology competence appears to facilitate e-business adoption only when firms possess compatible skills, distribution channels, and corporate culture. This leads to important conclusions for management and policy regarding conditions for successful e-business innovation.

George Sciadas from Statistics Canada makes a case for reliable measurements of e-commerce and e-business and outlines how statistics has coped with this challenge since the 1990s. Statistics Canada has been a pioneer in driving forward the development of methods and instruments since the beginnings. It was the first statistical office to carry out an economy-wide survey on the use of ICT and e-commerce, involving 21,000 enterprises, and has substantially contributed to the OECD conceptual frameworks. His contribution strengthens the international perspective of this report and helps to put *e-Business W@tch* results into a global perspective.

Hans Schedl from the ifo Institute for Economic Research in Munich summarises the results of the "B2B Metrics" research project. B2B Metrics has developed and piloted an instrument for the empirical surveys of business-to-business e-commerce activity. Based on the results of these pilot surveys, the author raises serious concerns that the gap between small and large firms in their B2B application may eventually widen in the near future. The project also concludes that it is not technology, but complementary innovation that appears to be decisive for the success of e-business.

The contribution from *Soumitra Dutta* and *Amit Jain* from INSEAD is extremely valuable as it features a complementary perspective to the otherwise predominantly sectoral analysis of this report: it investigates, from a national point of view, the "e-alignment" of the new EU Member States and Candidate Countries. Although their "eEurope 2005 Index" is not restricted to firm-related indicators, thus going beyond the scope of the *e-Business W@tch* analysis, it is clearly relevant for electronic business as it provides a measure for the overall ICT maturity of a country (including its citizens and businesses and government). Their approach of creating an Index that is based on the eEurope 2005 Action Plan is certainly relevant to European policy, and takes forward a similar exercise presented in

this section of last year's report.⁸² Moreover, it demonstrates the usefulness of compound indicators to visualize complex developments. Compound indicators are a good starting point for asking the right questions about underlying reasons ("Why?", "How?"), even if they do not provide the answers.

How long will it take until the diffusion of ICT among firms from a certain sector or country is likely to reach the current diffusion level of another sector or country? *Pavle Sicherl* from Sicercenter introduces his method to translate time-series statistics into "time-distance" statistics. Based on S-curve-diffusion patterns observed for this indicator, the ICT adoption status of firms from different countries or sectors can be translated into relative time-gaps. The author argues that the present state-of-the-art in comparative analysis and statistics does not fully utilise the information content, particularly for the needs of policy-making, and that the time-distance method could enrich the information value of such statistics.

Last but not least, *Prof. Jože Gričar* and his research team from the University of Maribor, Slovenia, offer an insight how students from e-commerce classes at their university use *e-Business W@tch* resources in the context of student projects with real companies. This case is certainly a good practice example in itself for the transfer of knowledge to companies through applied research. It also demonstrates that research can meet actual business needs in the area of electronic business development, and how educational issues link to ICT diffusion policy.

Hannes Selhofer (empirica GmbH), Georgios Karageorgos (European Commission, DG Enterprise)

Editors

⁸² See contribution from Simon Robinson, "Measuring e-business readiness: Challenges for statistics and research", p. 187-192

3.1 E-Business and Labour Productivity across the Economy

by Tony Clayton and Peter Goodridge, UK Office for National Statistics⁸³

Introduction

Analysis of ONS firm level data suggests that enterprises with automatic links between their e-commerce systems and operating business processes enjoy higher labour productivity. The effects depend on specific process links, and on firm size and sector. It appears too that e-commerce in firms is becoming less 'experimental, with more stability in use.

Earlier ONS work in this area has been limited to e-commerce, the buying or selling of goods via electronic networks (Crisuolo and Waldron, 2003). However the potential of electronic networks lies in how they transform the operations of an enterprise, not just its transactions. E-commerce is increasingly seen as one of many applications of e-business.

US work in this area includes a study by Atrostic and Nguyen (2002). They show, using the 1999 US Bureau of Census Computer Network Use Survey (CNUS), that:

- computer networks in firms have a positive impact on Total Factor Productivity (TFP),
- only half such networks were used for buying or selling.

Case evidence suggests that integration of business processes through computer networks, with organisational and human capital investments, promotes gains in labour productivity (Brynjolfsson and Yang, 1999). The concept of a firm with integrated systems linking production, distribution, procurement and sales functions making operations more efficient is supported by international case studies.

E-business process measurement

Questions on electronic business processes have been included in ONS e-commerce surveys to business in 2001 and 2002. In both years the questions:

- focus on links between e-buying / selling and internal business process types (e.g. logistics), and links to customers' and suppliers' e-enabled business processes
- cover both open systems such as the Internet, and closed systems.

Closed electronic business links predate the Internet, and are often known as Electronic Data Interchange (EDI). Such systems are usually set up by firms to organise procurement or order handling and involve dedicated business to business links. Many of these systems are migrating to the Internet, but remain "closed" in the sense that they are owned by one firm, which selects partners that can do business through them.

The business process questions included in the ONS' 2002 survey (see Exhibit 3.1-1) are based on a model of business processes developed by Michael Porter (Porter 1985). This framework works well for manufacturing, but is less applicable to some firms in services. This has given rise to difficulties for respondents, particularly smaller firms in the service sector, and discussions have been held with other statistics offices to develop improved survey approaches.

The analysis which follows:

- explores e-business process use in the 2002 E-commerce Inquiry
- examines associations between e-business process integration and labour productivity

⁸³ Tony Clayton and Peter Goodridge work in New Economy Measurement at ONS. They would also like to thank Cecil Prescott and Mark Pollard of ONS Statistical Output Group for data and advice. This article is based on research published in ONS Economic Trends during 2003/4. Results were presented at the e-Business Annual Event on 7 July 2004.

Exhibit 3.1-1: Business process questions included in ONS' 2002

On the last working day of 2002,

27. did your electronic ordering systems link automatically to electronic systems either within or outside of your business?
(please put a cross in the box that applies)

Yes No 180 → If no, go to question 29

28. did your business's electronic ordering, sales or purchasing systems link automatically, within your business to:
(for each category, please place a cross against either yes or no)

	Yes	No	
your production or service operating systems	<input type="checkbox"/>	<input type="checkbox"/>	185
your logistics or delivery systems	<input type="checkbox"/>	<input type="checkbox"/>	186
your invoicing or payment systems	<input type="checkbox"/>	<input type="checkbox"/>	184
your marketing or customer relationship management systems	<input type="checkbox"/>	<input type="checkbox"/>	187
your other internal operating systems	<input type="checkbox"/>	<input type="checkbox"/>	188
your suppliers' ordering or business systems	<input type="checkbox"/>	<input type="checkbox"/>	181
your customers' ordering or business systems	<input type="checkbox"/>	<input type="checkbox"/>	183
other links to external businesses' systems	<input type="checkbox"/>	<input type="checkbox"/>	189

Source: UK Office for National Statistics

E-business use in 2002

Responses to the E-commerce survey in 2002 show business process links are quite common, with 40-50% per cent incidence among large firms (over 250 employees), but under 10 per cent incidence among firms with less than 20 employees. For micro businesses (under 10 employees) use of electronically linked businesses processes is reported at 1-2%. These results are shown in Exhibit 3.1-2, overall and for specific types of process links.

Exhibit 3.1-2: % of businesses with electronic integration of different business processes

Firm size (number of employees)	0-9	10-49	50-249	250-999	1000+
With integrated processes in some form (overall question)	2	8	20	40	51
• integrated production or service operating systems	1	3	11	25	31
• integrated logistics or delivery systems	1	2	8	25	33
• integrated invoicing or payment systems	1	5	14	32	43
• integrated marketing or CRM systems	1	2	5	11	18
• integrated other internal systems	1	4	9	23	33
• integrated with suppliers' ordering or business systems	1	3	5	15	24
• integrated with customers' ordering or business systems	-	1	5	16	20

Source: ONS E-commerce survey 2002

Internal integration is more common than direct links with customers or suppliers business systems, and integrated financial processes (sales or procurement to invoicing or payment) are the most widespread form. There is also evidence that external links to suppliers are more common than links to customers.

ONS' survey does not ask, as US surveys have, about use of Enterprise Resource Planning (ERP) by firms. ERP entails use of integrated, IT based, controls across the firm, and so ERP enabled firms are those with multiple business processes links. We assess this by identifying firms whose responses show they have linked most of the processes in Exhibit 3.1-2.

Exhibit 3.1-3 shows, by comparison, the proportion of firms with differing levels of multiple links. It indicates that a majority of firms, across all size bands, that have linked one process to procurement or sales have linked at least three. So multiple linking is common for those firms that have made a start. But the proportion of firms heavily integrated and answering 'yes' to five or more questions, is less than half of the firms with some form of e-linked processes.

Exhibit 3.1-3: % of businesses with multiple linking of electronic business processes

Firm size (number of employees)	0-9	10-49	50-249	250-999	1000+
With integrated processes in some form (cf. Exhibit 3.1-2)	2	8	20	40	51
• with 3 + linked processes	1	4	12	30	39
• with 5 + linked processes	<1	1	4	15	19

Source: ONS E-commerce survey 2002

Integration of electronic business processes should offer firms improved productivity and hence profitability. The survey shows that firms are investing in such technologies. Next we investigate whether the investments are associated with higher firm productivity.

Labour productivity and e-business use

There is evidence from successive UK e-commerce surveys that entry and exit in electronic markets, which was high in 2000 – 2001, has started to level off. Firms are now more likely to show stable patterns of e-trading. This suggests that productivity effects of ICT use, difficult to show in earlier years using e-commerce survey data, may now be easier to see.

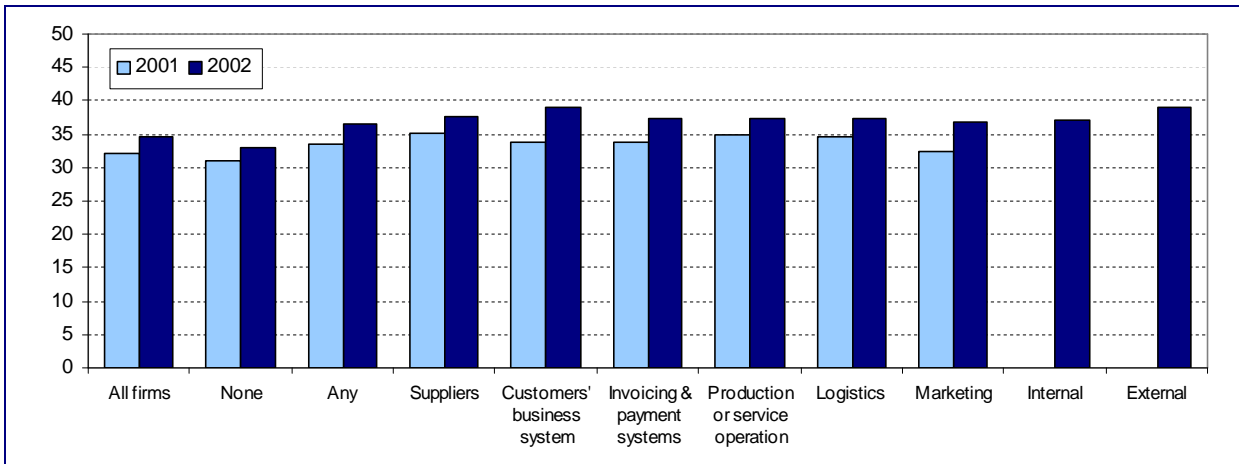
To analyse whether labour productivity is related to the way firms use e-business processes, we link firm responses to the E-commerce survey and Annual Business Inquiry (ABI) in 2001 and 2002. The ABI is the UK's structural business survey, used to derive labour productivity, calculated using Gross Value Added at basic prices (GVA). Our analysis excludes firms for which GVA was either negative or zero. All firms are weighted equally and analysis was conducted after trimming 5% at each end of the GVA distribution, by industry.

Due to sample size, limited by the overlap between the two surveys, it is only possible to separate firms into broad production or service sectors. However, given reservations on the applicability of the business process questions to the service sector, this is important to do.

Exhibit 3.1-4 shows value added per employee for firms across all sectors related to use of linked e-business processes. It indicates that firms with automatic links between certain processes and e-commerce activity have higher average labour productivity than firms with no links, and than the average for the whole sample. The most productive firms have multiple linkages that include suppliers or customers. However causation cannot be assumed, since successful integrated business processes are more common among large productive firms, with greater resources and economies of scale.

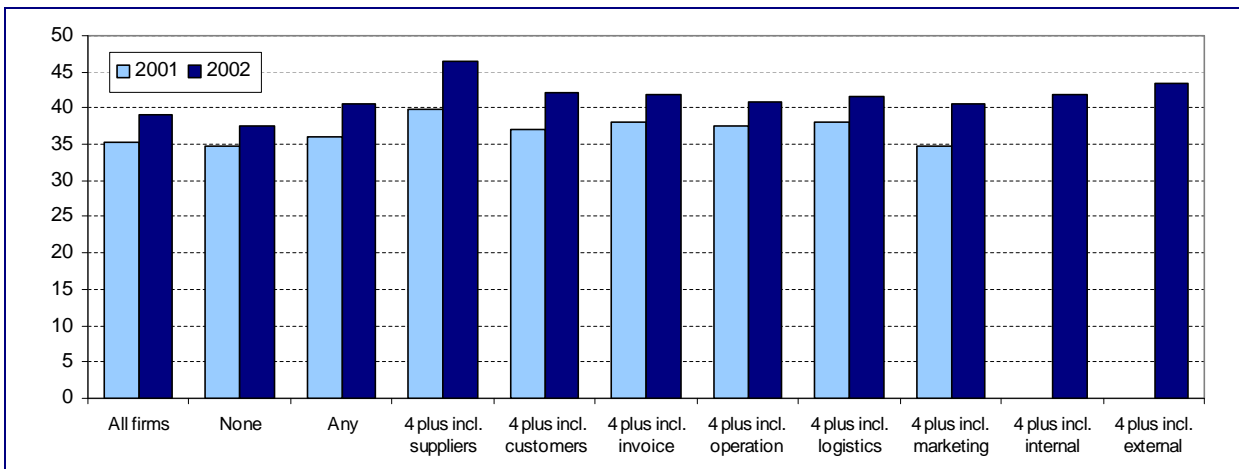
Exhibit 3.1-5 shows similar data for firms in the production sectors only, but with a focus on firms that have at least four business processes linked electronically. The data suggests that firms with any type of link have higher labour productivity than those without, and that firms with multiple links enjoy even greater benefits. The links associated with highest productivity levels in production are those with suppliers or other external systems. This is consistent with previous analysis showing productivity benefits for those manufacturing firms employing e-procurement (Criscuolo and Waldron, 2003).

**Exhibit 3.1-4: Average labour productivity for all firms, by type of e-business link.
(in value added per employee, £000's)**



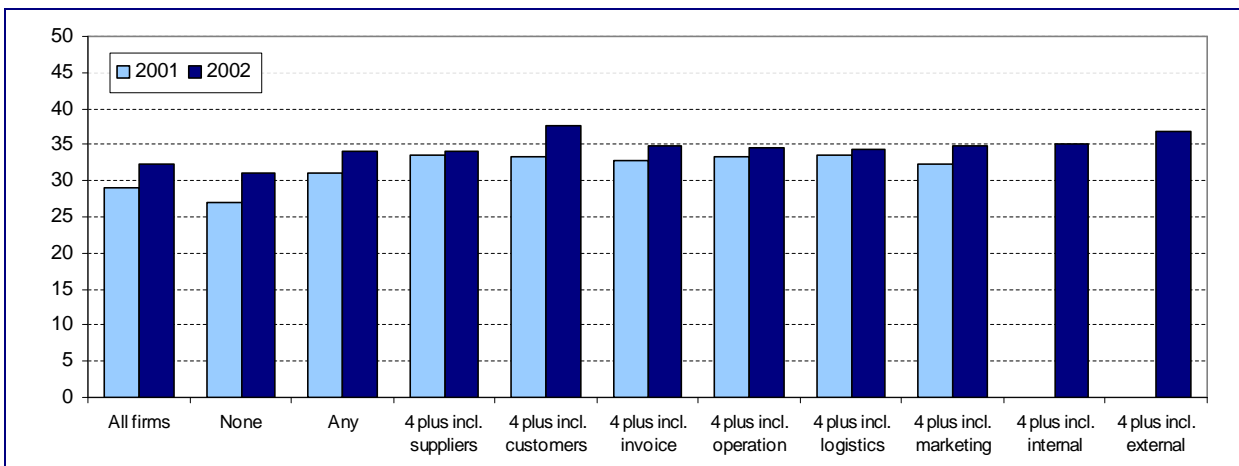
Source: E-commerce Inquiry and Annual Business Inquiry, 2001/2 (ABI 2002 provisional)

**Exhibit 3.1-5: Average labour productivity in Production, by type of e-business link.
(in value added per employee, £000's)**



Source: E-commerce Inquiry and Annual Business Inquiry, 2001/2 (ABI 2002 provisional)

**Exhibit 3.1-6: Average labour productivity in Services, by type of e-business link.
Value added per employee (£000's)**



Source: E-commerce Inquiry and Annual Business Inquiry, 2001/2 (ABI 2002 provisional)

These results, and those for services in Exhibit 3.1-6, suggest most firms gain from integration of business processes, particularly multiple integration. Despite survey difficulties for processes in services, it appears that the additional productivity associated with e-business is as great for firms in services as it is for manufacturers, but that the pattern of benefits is different.

Conclusions and Next Steps

The notable difference between results for production and services is that the most productive service firms are those with multiple links including customers, logistics or external operations. In manufacturing, the most productive firms are those with supplier links. The manufacturing result supports earlier work showing procurement / supply chain management advantages from ICT. Is there a comparable rationale for the services results?

In a recent OECD workshop⁸⁴, attention was drawn to differences in value creation between manufacturing and services. In manufacturing value is created at points through the value chain, and additional value can accrue to a firm either through greater internal efficiency, or via effective outsourcing. In services value is often added at the point where customer needs and firm capability interact. ICT, from this view, can increase productivity in services by enabling firms to draw more effectively on their capabilities - often in the form of knowledge - to meet individual customer needs.

Our results are consistent with a view of different economic structures. They also suggest that the integration of marketing processes can have greater advantages in services, supportive of the idea that value added in services is focused on the point of customer contact.

Taken together, the results indicate that:

- benefits from e-business processes at least partly depend on industry sector
- benefits depend on firms' choice of the processes integrated.

The evidence here challenges the concept of a single "ICT productivity effect". It suggests that in seeking to analyse ICT impacts on firm performance we should look both at investments firms make, and how investments are used.

Work is under way to integrate analysis of ICT investment, the use of electronic business processes, and other indicators of ICT use. ONS is currently co-ordinating a project to measure the impact of ICT on firm-level performance. This has four main elements:

- building an ICT capital stock at firm level using various capital expenditure surveys
- assessing the effects of ICT investment on total factor productivity (TFP)
- combining this with the type of ICT use analysis outlined in this paper
- drawing on other sources of data on inputs, including that available on human capital

Initial results suggest that ICT capital in TFP analysis shows an excess return for hardware over and above "normal" return on capital. This is consistent with new results for the US (Atrostic and Nguyen, 2003). An additional explanatory variable being examined is the percentage of firm employees using access to the Internet, and this too appears significant.

Econometric analysis also shows positive and significant results associated with the use of e-business methods. In general it appears that integration does help improve productivity and that process integration is particularly beneficial in areas such as operation, logistics or financial systems.

Continuing work will analyse operational measures of firm performance including inventory turn and innovation. It will draw on recently published studies from OECD (The Economic Impact of ICT, 2004) which explore ICT impact measures on a range of dimensions.

⁸⁴ OECD Meeting of Experts on Measuring Electronic Business, December 2003

Most of all this work is dependent on continuing supply of data use of e-business processes in sufficient detail, on firm level. US work on their Computer Network Use Survey, and case analyses such as that summarised in the EU's BEEP database⁸⁵, suggest that:

- we should broaden e-business definition beyond links to e-commerce, to cover electronic links not associated with buying or selling
- our definition of e-business should include systems within and between firms for managing knowledge, often associated with innovation

The aspects of firm behaviour we are seeking to understand in this work are complex and difficult to measure. They will almost certainly require further iterations, both of survey design and of analysis, before adequate answers are reached.

References

- Atrostic B.K and S Nguyen (2002) Computer Networks and US Manufacturing Plant Productivity, New evidence from the CNUS Data, Centre for Economic Studies, January 2002
- Atrostic B.K and S. Nguyen (2003) The Impact of Computer investment and Computer network use on Productivity. <http://www.nber.org/~confer/2003/CRIWF03/CRIWF03prg.html>
- Brynnolffson and Yang (1999), The Intangible Costs and Benefits of Computer Investments: Evidence from the Financial Markets. Atlanta Georgia: Proceedings of the International Conference on Information Systems.
- Criscuolo and Waldron (2003), E-commerce and Productivity. Economic Trends http://www.statistics.gov.uk/articles/economic_trends/ETNov03Criscuolo.pdf
- Porter (1985) Competitive Advantage: Creating and Sustaining Superior Performance, Free Press
- OECD (2004), The Economic Impact of ICT: Measurement, Evidence and Implications

⁸⁵ Best eEurope Practices (BEEP) Project, www.beep-eu.org

3.2 What Drives E-Business Diffusion among Firms? Evidence from European Companies

by Kenneth L. Kraemer, Kevin Zhu & Sean Xu (University of California, Irvine), and Werner B. Korte and Karsten Gareis (empirica GmbH)⁸⁶

3.2.1 Introduction

As Internet-enabled electronic business (e-business⁸⁷) has been widely adopted by firms in a variety of industries to support value chain activities (Zhu et al. 2003), there is a growing need to better understand the factors that drive organizational adoption of e-business. We investigated this issue from three perspectives. Firstly, viewing e-business as a technological innovation (Rogers 1983), we examined impacts of e-business characteristics on organizational adoption from an innovation diffusion perspective. Secondly, since the success of innovation adoption might be affected by the contexts in which it is adopted (Tornatzky and Fleischer 1990), we also incorporated influences of contextual (i.e., technological, organizational, environmental) factors. Thirdly, as features of the innovation and the adoption environment often interact to reinforce one another (Tornatzky and Klein 1982), we felt it was important to study the interaction effects of the innovation characteristics and contextual factors, which we defined as the “fit” between the innovation and its adoption contexts.

We integrated the three perspectives into a conceptual framework for studying e-business adoption, and examined the following research question: How do e-business characteristics, adoption contexts, and the fit between them affect organizational adoption of e-business? In the next section, we present hypotheses about the adoption drivers, followed by our research method and empirical results. We conclude with a discussion on major findings and implications for both managers and policy-makers.

3.2.2 Theoretical Development

The dependent variable is e-business adoption, which refers to whether or not a firm uses Internet technologies for e-business (e.g., for online selling, procurement, or supply chain co-ordination). Drawing upon the conceptual framework, we examine three groups of factors influencing e-business adoption.

(1) On the e-business characteristics side, we choose four of the commonly studied innovation features (Rogers 1983; Tornatzky and Klein 1982): relative advantage (including revenue advantage and cost advantage), compatibility, and adoption costs. We also add a new feature unique for the e-business phenomenon, security concerns, because security concerns are found to be a key barrier to e-business diffusion (UNCTAD 2002).

(2) On the adoption context side, we focus on three dimensions: technological context, organizational context, and environmental context (Tornatzky and Fleischer 1990). Drawing upon the technology-organization-environment categorization, we incorporate six specific variables with consistent literature

⁸⁶ Kenneth L. Kraemer is a Professor, Kevin Zhu is an Assistant Professor, and Sean Xu is a doctoral student at the Center for Research on Information Technology and Organizations (CRITO), University of California, Irvine. This research has been supported by grants from the U.S. National Science Foundation (CISE/ISS/ITR and DST, grant numbers 0085852 and 0132911 respectively) and by the European Commission (Projects SIBIS, STAR). Data were provided by Empirica, GMBH, Bonn, Germany. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation or the EC. The research has benefited from the comments of Jason Detric, Shutao Dong, Deborah Dunkle, Jennifer Gibbs, and seminar participants at CRITO.

⁸⁷ E-business is defined as using the Internet to support or conduct business activities along the value chain, including marketing, selling, procurement, and supply chain co-ordination (CRITO, GEC Survey, 2002).

support (Zhu et al. 2003): technology competence, firm size, firm scope, consumer readiness, competitive pressure, and partner readiness.

(3) Further, we hypothesize five interaction effects to represent the influence of “fit” (Tornatzky and Klein 1982). These factors, as well as associated hypotheses, are elaborated below.

E-business characteristics

The relative advantage of an innovation (Rogers 1983) has been widely examined in the innovation diffusion literature. Previous studies have consistently demonstrated the positive influence of innovation’s relative advantage on its diffusion. We decomposed the relative advantage of e-business into two categories: revenue advantage and cost advantage. The former refers to the potential of e-business to help increase sales, and the latter the potential to reduce costs. These benefits should provide incentives for e-business adoption, which leads to the following hypotheses:

H1a: Firms facing greater revenue advantage of e-business are more likely to adopt.

H1b: Firms facing greater cost advantage of e-business are more likely to adopt.

To study the influence of compatibility, we draw upon Roger’s (1983) conceptualization. That is, innovation compatibility is defined as the degree to which the innovation to be adopted is consistent with organizational skills, distribution channels, and corporate culture. Choosing compatible innovations may help to minimize the organizational adjustments required and thereby reduce the potential resistance to innovation adoption (Rogers 1983). In line with Rogers’ conceptualization, we focus on the compatibility of e-business with the firm’s skills, distribution channels, and culture of potential users. Firms that can better provide required skills, achieve channel synergy, and those that have compatible corporate culture are more likely to successfully adopt e-business. Hence, we put forward the following hypothesis:

H1c: Firms with greater compatible skills, distribution channels, and corporate culture are more likely to adopt.

In the innovation literature, costs have been consistently identified to be a factor inhibiting innovation adoption (Tornatzky and Klein 1982). We included *adoption costs* in our conceptual framework because adopting e-business requires substantial investments in hardware, software, system integration, and employee training. We expect these adoption costs to be a barrier to e-business adoption and hypothesize:

H1d: Firms facing greater adoption costs are less likely to adopt.

We also propose an additional factor unique for e-business – security concerns, which refer to the degree to which organizations deem e-business insecure for confidential data and online transactions. Potential users might have security concerns due to the open standards of the Internet and the immaturity of the institutional framework regarding contracts, financial transactions, and privacy protection (UNCTAD 2002). Such concerns might retard the adoption decision and therefore we hypothesize:

H1e: Firms with greater security concerns about e-business are less likely to adopt.

Adoption Contexts

Technological context

Firms’ technology competence is an important factor within the technological context. To study the influence of technology competence, we conceptualise two underlying dimensions — IT infrastructure and Internet skills. IT infrastructure refers to technologies that enable Internet-related businesses; Internet skills are defined as employees’ skills in using the Internet and related technologies. Our working hypothesis in this context is:

H2a: Firms with higher levels of technology competence are more likely to adopt e-business.

Organizational context

Firm size has been consistently recognized as a facilitator for innovation adoption, because of the so-called “resource advantage” associated with large firms. In general, large firms possess more knowledge and slack resources, and thus enjoy advantages in generating innovative ideas and making the investments necessary for innovation adoption. Therefore, we hypothesize a positive impact of firm size:

H2b: Larger firms are more likely to adopt e-business.

Another important organizational factor, firm scope is defined as the horizontal extent of a firm’s operations. The role of firm scope in e-business adoption can be explained from a transaction costs perspective. In general, companies may face a steep rise in transaction costs when they expand into heterogeneous market segments. As documented in the literature, e-business may help reduce transaction costs (Garicano and Kaplan 2001). Such reduced costs include the time spent by managers and employees searching for customers and suppliers, communicating with counterparts in other companies regarding transaction details, and the costs associated with negotiation and order processing. Thus, we expect that firms with greater scope would perform more proactively in adopting e-business, as hypothesized below:

H2c: Firms with greater scope are more likely to adopt e-business.

Environmental context

Beyond the walls of the organization, three environmental factors are expected to influence the diffusion process: consumer readiness, partner readiness, and competitive pressure (Zhu et al. 2003). This study defines consumer readiness as a combination of consumer willingness and Internet penetration. Consumer willingness reflects the extent to which consumers engage in online shopping; Internet penetration measures the diffusion of PCs and the Internet in the population. Therefore, the combination of the two factors represents consumers’ readiness for online purchasing, which may promote e-business adoption:

H2d: Firms facing higher levels of consumer readiness are more likely to adopt e-business.

A firm’s decision to adopt e-business may be influenced by the status of the e-business development of its trading partners, since for an electronic trade to take place, it is necessary that all trading partners adopt compatible systems and provide Internet-enabled services for each other. The benefits of e-business initiatives for a firm depend not only on its own efforts to digitise its value chain, but also on the partner readiness to simultaneously engage in electronic linkages. Hence we form the following hypothesis:

H2e: Firms facing higher levels of partner readiness are more likely to adopt e-business.

Competitive pressure has long been recognized as an important factor in the adoption literature (Iacovou et al. 1995). It may drive organizational and IT innovation to create or maintain a competitive edge. Thus, we hypothesize a positive association between competitive pressure and e-business adoption:

H2f: Firms facing higher levels of competitive pressure are more likely to adopt e-business.

The Innovation-Context Fit

After examining the main effects of e-business characteristics and adoption contexts, we proceed to study the interaction effects (i.e., fit) between them on e-business adoption. We examine five interaction effects: (1) revenue advantage and competitive pressure, (2) cost advantage and competitive pressure, (3) compatibility and technology competence, (4) adoption costs and technology competence, and (5) adoption costs and partner readiness. By studying these interactions, we seek to capture the theoretical perspective that the impacts of certain e-business characteristics would differ as the adoption context changes, and the features of the adoption context may further interact with e-business characteristics to influence organizational adoption (Tornatzky and Klein 1982).

We first examine the interaction of relative advantage and competitive pressure. By adopting information systems, firms might be able to alter the rules of competition, affect the industry structure, and leverage new ways to outperform rivals, thus changing the competitive environment. We theorize that competitive pressure will reinforce the impact of relative advantage (both revenue and cost advantages), in that in a more competitive environment, firms will be more proactive in pursuing innovations when facing greater e-business advantages. Therefore, we put forward the following hypotheses:

H3a: The influence of revenue advantage on e-business adoption will be stronger given higher levels of competitive pressure.

H3b: The influence of cost advantage on e-business adoption will be stronger given higher levels of competitive pressure.

Secondly, we propose to study how compatibility may interact with technology competence. Compatibility refers to the degree to which e-business is consistent with organizational skills, distribution channels, and corporate culture. All of these compatibility components are intangible resources that are complementary to technological resources. When firms lack compatible skills, distribution channels, and culture, they have to spend more time and effort on organizational reconfiguration to accommodate e-business. As a result, the effects of technology competence on e-business adoption success would be compromised. On the other hand, when these critical resources are present, adopting firms can better leverage technologies to facilitate e-business transformation. Such technology competence plays a stronger role if the technology is compatible with firms' skills, distribution channels and corporate culture. Thus, we hypothesize:

H3c: The influence of technology competence on e-business adoption would be stronger given higher levels of e-business compatibility.

Finally, we examine how technology competence and partner readiness may moderate the effect of adoption costs. In general, firms expect e-business expenditures (i.e., investments in e-business projects) to translate into economic benefits. Until economic returns are likely to be achieved, adoption costs will act as an innovation inhibitor. However, the transformation process from expenditure to payoff is affected by adopting firms' technology competence and the status of e-business development of their business partners. Firms with greater technology competence can make more effective use of the Internet; partner readiness enables electronic integration of information and business processes that may improve firm performance in supply chain activities. Firms with high levels of technology competence and partner readiness are more likely to convert e-business expenditures into innovation payoffs, and thereby tend to be less concerned with adoption costs. Thus, we hypothesize that the negative influence of adoption costs would be weakened when firms possess greater technology competence and face greater partner readiness:

H3d: The influence of adoption costs would be weaker given higher levels of technology competence.

H3e: The influence of adoption costs would be weaker given higher levels of partner readiness.

3.2.3 Research Methodology and Empirical Results

Research methodology

To empirically test the hypotheses formed above, we used the data from SIBIS (Statistical Indicators for Benchmarking the Information Society), a database developed by Empirica, GMBH, a research institution based in Bonn, Germany. The database stems from the SIBIS research project which was funded by the European Commission. In addition, we used the ECaTT database, which was a precursor of SIBIS and was conducted two years before SIBIS by the same institution. Our purpose in using ECaTT was to compute indicators to measure competitive pressure. Our final sample includes 2,838 companies from twelve industries in six European countries that were covered by both SIBIS and ECaTT surveys (Finland, France, Germany, Italy, Spain, and the UK).

Using the SIBIS dataset, we first developed constructs involved in the hypotheses by confirmatory factor analysis. After successive runs of theoretical modelling, statistical testing, and refinement, we obtained a satisfactory measurement model with acceptable construct reliability, convergent validity, and discriminant validity. Then, drawing upon the measurement model, we formed factor scores for constructs, which were used for hypothesis testing.

To test hypotheses formed earlier, we conducted Logit regression. Results of the main effects of e-business characteristics and contextual factors on e-business adoption decision are shown in Exhibit 3.2-1. A significant (significance below 0.10) and positive coefficient suggests the role of an adoption driver; while a significant (significance below 0.10) and negative coefficient suggests a barrier.

Empirical results

As demonstrated in Exhibit 3.2-1, revenue advantage, cost advantage, and compatibility emerge as adoption drivers, while adoption costs and security concerns are shown to be adoption inhibitors. Thus, we found support for all of the hypotheses on e-business characteristics (H1a-H1e).

Regarding the influence of contextual factors, we found that technology competence, firm size, consumer readiness and partner readiness had significant and positive coefficients, but firm scope and competitive pressure had insignificant coefficients. These results suggested that technology competence, firm size, consumer readiness, and partner readiness had positive influences on e-business adoption, but e-business adoption was not affected by firm scope and competitive pressure. Thus, we found support for four hypotheses on technology competence (H2a), firm size (H2b), consumer readiness (H2d), and partner readiness (H2e), but not for the two hypotheses on firm scope (H2c) and competitive pressure (H2f).

*Exhibit 3.2-1: Results of Hypothesis Testing:
E-Business Characteristics and Contextual Factors*

DV=E-Business Adoption	Coefficient	Significance
E-Business Characteristics		
Revenue Advantage	0.518	0.013
Cost Advantage	1.648	0.000
Compatibility	1.926	0.000
Adoption Costs	-1.048	0.000
Security Concern	-7.530	0.000
Adoption Contexts		
Technology Competence	0.602	0.033
Firm Size	0.172	0.085
Firm Scope	-0.079	0.716
Consumer Readiness	11.424	0.003
Partner Readiness	2.057	0.000
Competitive Pressure	2.272	0.911

Source: Center for Research on Information Technology and Organizations, University of California, Irvine

After testing these main effects of e-business characteristics and adoption contexts, we proceeded to examine the interaction effects as hypothesized earlier – the “fit” effect. We chose the method of subgroup analysis that involves dividing the sample into subgroups based on different levels of the suspected moderator, and then testing whether the regression coefficients of the remaining independent variables differ significantly between the groups (Jaccard et al. 1990: 49). The results are shown in Exhibit 3.2-2.

We use the interaction of revenue advantage and competitive pressure to illustrate our method. As shown in Exhibit 3.2-2, revenue advantage was a significant adoption driver in the subgroup with high competitive pressure (coef.=0.649, sig.=0.016), but became an insignificant factor under low competitive pressure (coef.=0.347, sig.=0.211). Such a difference seems to suggest the importance of revenue advantage increases with competitive pressure. However, the Wald test on coefficient

difference turned out to be insignificant (sig.=0.398), which indicated that revenue advantage did not have statistically different effects between the two subgroups. Thus, we only found partial support for hypothesis H3a.

Other results in Exhibit 3.2-2 showed that cost advantage, adoption costs, and technology competence had different regression coefficients between subgroups defined in terms of competitive pressure, technology competence, partner readiness, and compatibility. The associated Wald tests were all significant (significance below 0.05). Thus, we found strong support for hypotheses H3b-H3e.

Exhibit 3.2-2: Results of Hypothesis Testing: The Innovation-Context Fit

DV=E	Coefficient	Significance	Wald Test
Revenue Advantage * Competitive Pressure			
Revenue Advantage (High Competitive Pressure)	0.649	0.016	0.72 (sig.=0.398)
Revenue Advantage (Low Competitive Pressure)	0.347	0.211	
Cost Advantage * Competitive Pressure			
Cost Advantage (High Competitive Pressure)	2.420	0.000	3.95 (sig.=0.047)
Cost Advantage (Low Competitive Pressure)	0.801	0.143	
Adoption Costs * Technology Competence			
Adoption Costs (High Technology Competence)	0.457	0.127	6.76 (sig.=0.009)
Adoption Costs (Low Technology Competence)	1.578	0.000	
Adoption Costs * Partner Readiness			
Adoption Costs (High Partner Readiness)	0.823	0.002	10.54 (sig.=0.001)
Adoption Costs (Low Partner Readiness)	4.859	0.000	
Technology Competence * Compatibility			
Technology Competence (High Compatibility)	1.362	0.004	9.50 (sig.=0.002)
Technology Competence (Low Compatibility)	0.194	0.463	

Source: Center for Research on Information Technology and Organizations, University of California, Irvine

3.2.4 Major Findings

E-business characteristics

The results on e-business characteristics have demonstrated the power of the classic innovation diffusion theory for understanding e-business adoption (Rogers 1983; Tornatzky and Klein 1982). As shown in Exhibit 3.2-1, the relative advantage and compatibility facilitate e-business adoption, while firms' concerns about e-business adoption costs and security inhibit e-business adoption.

Further, our study decomposed the relative advantage of e-business into two finer-grained dimensions: revenue advantage and cost advantage, both of which have been shown as significant adoption drivers. This result has demonstrated different orientations of e-business usage: market-orientation, and operation-orientation. Our study incorporates the two orientations in one model and confirms their effects in driving e-business adoption. However, their effects may vary across different competitive environments, which will be discussed below.

The last innovation characteristic, security concerns, is unique to the e-business phenomenon. The significant and negative regression coefficient reveals managers' caution regarding security on the Internet. Such concerns seem to be related to the very nature of the Internet – its wide connectivity and open-standard structure – as well as to the immature institutional frameworks for privacy protection and enforcement of online contracts for both businesses and their customers. These features make security an important concern in e-business adoption decisions, and may continue to do so in the future.

Adoption contexts

Within contextual factors, we have found that technology competence, firm size, consumer readiness, and partner readiness are adoption facilitators. In particular, firms need to possess technology competence for smooth e-business adoption. Our conceptualisation of the technology competence construct sheds light on the composition of technological capability, in that both physical infrastructure and intangible knowledge (i.e., Internet skills) are important constituents. In addition, both consumer readiness and partner readiness are significant. This suggests that e-business adoption is more a value-chain phenomenon than an individual firm's problem. E-business is essentially a network of companies (value chain partners). This supports the inclusion of environmental factors in our conceptual model.

Yet it is surprising to see the insignificant regression coefficients of firm scope and competitive pressure. We have hypothesized that greater firm scope may represent a greater potential of e-business to help reduce transaction costs. Actually, the extent to which such potential could be realized depends on firms' IT infrastructure and capabilities of using the technologies. Thus, there could be a gap between firm scope and the actual status of e-business usage, which might explain why firm scope turned out to be insignificant. To bridge this gap, firms might need to develop abilities for electronic integration, both internally and externally with their suppliers and business partners. This seems to suggest a promising avenue for future research. The insignificant result for competitive pressure might suggest that, as firms have observed the burst of the dotcom bubble and realized the required organizational resources for e-business, their decisions on adopting e-business have become more cautious and arguably more mature. It might be that their decisions are less affected by whether peers have adopted than whether they possess the required resources for e-business (e.g., technology competence).

Innovation-context fit

We have tested how contextual factors moderate e-business characteristics to influence e-business adoption. Below we highlight three findings based on our subgroup analysis:

1. *The potential of e-business for cost reduction becomes more important as industry competition becomes more intensive, which indicates the importance of an operations-orientation in e-business usage for competitive advantage.*

The cost-reduction dimension of relative advantage becomes more important as competitive pressure intensifies (significant Wald test associated with cost advantage, sig.=0.047; but insignificant test with revenue advantage, sig.=0.398). This finding reveals that when industry competition becomes more intensive, the use of e-business is mainly operations-oriented and this becomes even more critical as competition intensifies. Prior studies on B2B procurement have demonstrated the potential of e-business for improving operational efficiencies and reducing costs (Mukhopadhyay and Kekre 2002). Our study further emphasizes the importance of an operations-orientation for firms in a competitive industry.

2. *Technology competence facilitates e-business adoption only when firms possess compatible skills, distribution channels, and corporate culture, which highlights the complementarity between technological readiness and organizational readiness.*

As shown in Exhibit 3.2-2, technology competence does not facilitate e-business adoption when the level of e-business compatibility is low (coef.=0.194, sig.=0.463). It becomes a significant adoption facilitator (coef.=1.362, sig.=0.004) only if the level of compatibility is high. For a smooth e-business transformation, firms should be competent in a variety of areas, including technology infrastructure, supportive technical skills, and organizational compatibility. Our results demonstrate significant complementarity between technological readiness (IT infrastructure and Internet skills) and organizational readiness (compatible skills, distribution channels, and corporate culture) for facilitating e-business adoption.

3. *Firms with greater technology competence and partner readiness are less concerned about adoption costs, which seems to suggest that technology competence and partner readiness can help adopting firms to efficiently leverage e-business investments.*

As shown in Exhibit 3.2-2, the negative impact of adoption costs on adoption is weaker for firms with higher levels of technology competence (coef.=-0.457, sig.=0.127) than for firms with lower levels of technology competence (coef.=-1.578, sig.=0.000), with the difference being statistically significant (sig. of Wald test=0.009). We found a similar result: that partner readiness compensates the negative impact of adoption costs. Adopting firms must invest in necessary technologies for launching e-business. Such investments (or costs) could act as a barrier for e-business adoption, but our results indicate different effects of adoption costs across firms with differing technology competence and partner readiness. This finding seems to suggest that firms with greater technology competence and partner support can make more efficient usage of the investments, and as a result, the negative effect of adoption costs might be mitigated.

3.2.5 Managerial and Policy Implications

Our study offers several implications for managers. Firstly, our conceptual model provides a systematic framework that managers can use to assess their organization's readiness for adopting e-business. This framework covers technical, organizational, and environmental conditions that need to be taken into consideration for e-business management, and includes a series of important features describing the nature of e-business innovation. Those specific factors in the current study indicate measures of organizational readiness for e-business. A firm could look at how it measured up on the features and then decide whether it was ready or what it needed to do to get ready for adopting e-business.

Secondly, our results suggest that firms must pay great attention to their technological capability to adopt e-business, and keep in mind that technology competence constitutes both physical infrastructure and intangible knowledge, such as Internet skills. As Internet technologies diffuse and become more common, technical and managerial knowledge becomes even more significant. This should encourage top managers to foster managerial skills and to develop human resources that possess knowledge of e-business.

Thirdly, the results also point to the importance of using e-business for cost reduction as industry competition becomes more intensive. Both Wal-Mart and Dell, Inc., which are leaders in the highly competitive retail and personal computer industries, have illustrated the effectiveness of using e-business to achieve lower costs and operational excellence. Both firms have vigorously adopted e-business and both have become the value and market leaders within their industries. The fact that the importance of the e-business cost advantage increases with industry competition, suggests that business managers allocate more resources to initiatives that help to build electronic integration both internally and with suppliers and business partners, as these are key avenues to cost reduction. Such initiatives, combined with business process redesign, will enable firms to leverage Internet technologies to streamline business processes, reduce transaction costs, substitute information for inventory, and improve responsiveness along the value chain.

Our results also highlight the critical role of compatibility of the innovation with the organization's previous technology, corporate culture, and business partners. The importance of compatibility has been projected through both the main effect and the interaction effect of compatibility with technology competence. The results imply that to fully leverage their technological resources (e.g., IT infrastructure), firms must also build managerial knowledge about how to deploy the technology within their organizations, as well as user skills to employ it effectively. Some firms may also need to adjust their distribution channels and corporate culture, as in the case of channel conflict or resistance to technical change. Firms that are the flagships in a value chain might need to assist smaller firms further up or down the chain in order to increase the efficiency of the e-business network. Firms in critical industries might call upon government or e-business vendors to invest in, and use, the key e-business technologies for value chain integration.

Toward this end, vendors need to offer applications, services, and training programmes for individual firms – but these must be tailored to the needs of specific industries. For example, in the electronics industry, a consortium of firms developed the RosettaNet standards for executing transactions over the Internet. Flagship firms such as Intel, Cisco, and Hewlett-Packard are using these standards and, in turn, promoting their use by suppliers, business partners, and customers. This promotes greater efficiency across the industry as well as along the value chain.

Finally, the results point to an important role for public policy to encourage e-business adoption among consumers and businesses. Security concerns are the major environmental barrier to e-business adoption. These include concerns about both privacy protection for corporate and individual data and financial protection for online contracts. Governments can promote e-business adoption by providing such protections in legislation, which will increase consumers' willingness to engage in purchasing over the Internet, and which, in turn, will increase firms' willingness to adopt e-business.

References

- Garicano, L., and N. Kaplan. The effects of business-to-business e-commerce on transaction costs. *Journal of Industrial Economics* (49:4), 2001, pp. 1-23.
- Iacovou, C.L., I. Benbasat, and A.S. Dexter. "Electronic data interchange and small organizations: Adoption and impact of technology," *MIS Quarterly* (19:4), 1995, pp. 465–485.
- Jaccard, J., T. Robert, and K.W. Choi. *Interaction Effects in Multiple Regression*, Sage Publications, Newbury Park, CA, 1990.
- Mukhopadhyay, T., and S. Kekre. "Strategic and operational benefits of electronic integration in B2B procurement processes," *Management Science* (48:10), 2002, pp. 1301-1313.
- Rogers, E.M. *Diffusion of Innovations* (3rd ed.), Free Press, New York, 1983.
- Tornatzky, L.G., and M. Fleischer. *The Processes of Technological Innovation*, Lexington Books, Lexington, MA, 1990.
- Tornatzky, L.G., and K. Klein. "Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings," *IEEE Transactions on Engineering Management* (EM-29:1), 1982, pp. 28-45.
- UNCTAD. *E-Commerce and Development Report 2002*, United Nations Conference on Trade and Development, New York and Geneva, 2002.
- Zhu, K., K.L. Kraemer, and S. Xu. "E-business adoption by European firms: A cross-country assessment of the facilitators and inhibitors," *European Journal of Information Systems* (12:4), 2003, pp. 251-268.

3.3 Measuring e-Business in Canada

by George Sciadas, Statistics Canada⁸⁸

The pervasiveness of ICT, together with their use and applications, is clearly visible in the business sector. Whether motivated by the desire to gain a competitive edge or simply reacting to the general momentum of competitive forces (running to stay put) businesses are increasingly adopting new technologies directed towards the modernization and expansion of their information and communications infrastructure. Such investments are generally intended to improve both the internal functioning of businesses and the management of their external relationships with suppliers and customers.

The economic advantages attributed to “connected” businesses range from increased efficiency and enhanced innovative capacity, through the faster flow and sharing of information and the management of knowledge, to the broadening of their customer bases and their long-term success through access to new markets. These are closely related to issues of competitiveness in the context of globalization.

A taxonomy for measurements

The need to understand the ICT-induced transformations underpinned the case for reliable measurements. Early efforts in this area by statistical offices were guided by the framework implied by the S-curve (see OECD 2000). The primary focus was on e-readiness, which includes penetration of ICT, employee access and perceived barriers. In a broader context, e-readiness includes issues pertaining to the technical, commercial, policy, legal and social infrastructure needed to engage in e-business activity.

Interest subsequently shifts to intensity-of-use. Issues here relate to the type, purpose and volume of usage, including the nature, volume and value of transactions. Indicators include the extent of computer use, the uses of websites, the proportion or value of sales and purchases made online, types of goods sold or purchased over these networks, etc.

Once basic measures exist, benchmarking by sector of activity, firm size and other characteristics becomes possible. That permits the identification of business leaders or laggards, and the emphasis then shifts to impacts. These are diverse and relate to productivity, profitability, competitiveness and the creation of wealth. They are best examined analytically, as opposed to being directly measurable – although the latter cannot be precluded.

E-business and e-commerce

The enormous attention attracted by e-commerce in the late 1990s in government departments, boardrooms and the press, was due to its potential to alter existing economic and social arrangements. It posed substantial challenges to businesses and policy-makers alike. Not only would Internet commerce change the way business is conducted and how governments respond, but it would also transform the surrounding socio-economic environment, including consumer behaviour. It would involve serious realignments in cost levels and structures, inventories, receiving, placing and processing orders, distribution and logistics, servicing and follow up support. It could lead to disintermediation (or re-intermediation), new markets and products, forms of competition, alliances and the like. Changes would extend to organization of work, workers’ functions, skills and adaptability.

The exuberance of the late 1990s was moderated by the collapse of the dotcom bubble, but now we are in a better situation to see clearer the lasting power of ICT and their applications. We also understand better that e-commerce is one important manifestation of broader e-business processes. In addition, it has had profound implications on empowering consumers.

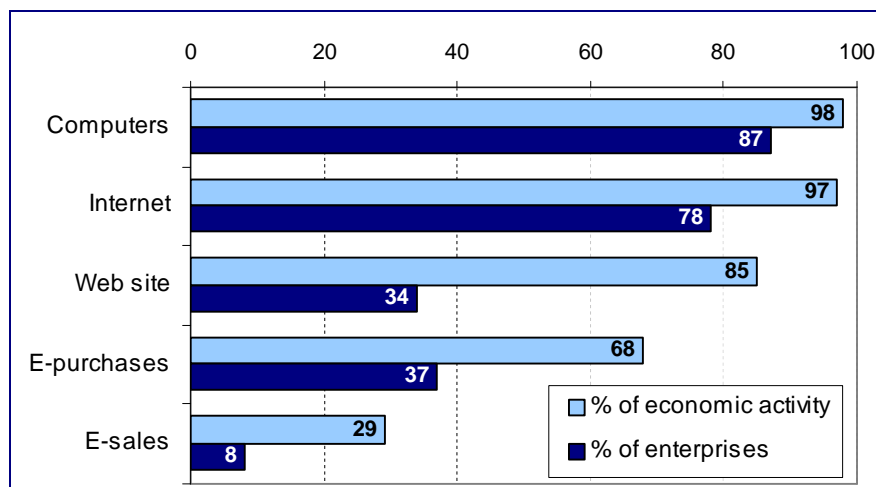
⁸⁸ Dr. George Sciadas is Chief of Information Society Research and Analysis in the Innovation and Electronic Information Division of Statistics Canada.

On the measurement front, the first challenge was the lack of a definition that would be consistently applied to inform policy debate and the drafting of business strategies. A plethora of widely varied private sector estimates exaggerated the phenomenon, thus generating a fair amount of confusion as to its level, growth and potential impact. The quest to compile definitions of e-commerce which are “policy relevant and statistically feasible” required a framework that linked policy needs with the development of indicators. Work by Statistics Canada (1999) found its way into the nested OECD definitions, which define e-commerce as transactions over the Internet and other computer-mediated networks regardless of the delivery method or the means of payment (OECD 2000).

Measures in Canada

To respond to policy needs in the area, Statistics Canada conducted the first economy-wide survey on the use of ICT and e-commerce, in collaboration with Industry Canada under the Connectedness programme (Statistics Canada 2000). The large-scale survey (21,000 enterprises) continues annually as the Survey of Electronic Commerce and Technology (SECT) and covers even very small firms⁸⁹. Findings reported below come from that source, and they feed into work on international comparisons, such as that undertaken by the OECD (2002) and studies of impacts (OECD 2004). Moreover, measurement and analytical work on the business side is coordinated with an e-commerce module in the Household Internet Use Survey. Findings confirm the high level of ICT presence in Canadian businesses and trace their hierarchical sophistication. More firms purchase than sell online, and all figures increase over time.

Exhibit 3.3-1: Use of ICT and e-commerce by Canadian enterprises, 2003



Source: Statistics Canada

The importance of industries

Findings confirm that e-commerce started small, but is growing at a very healthy rate. In 2003, it accounted for 0.8% of total operating revenues, up from 0.2 in 1999⁹⁰. In addition, 70% of that was estimated to be B2B, while 13% of Internet sales originated in foreign countries.

ICT became a truly powerful force once they got out of the ICT sector itself and diffused widely across the economy. Furthermore, their applications in businesses are as wide and diverse as the industries that use them. Therefore, industrial decomposition of statistics proves revealing, and this holds true for e-commerce.

⁸⁹ Depending on the industry, the threshold may be at \$150,000 or \$250,000 Canadian. This is the main reason why these data are not directly comparable to Eurostat’s survey which generally includes firms employing 10 or more people (Eurostat 2003).

⁹⁰ Sometimes the GDP is used as the denominator. This, however, is misleading as the measured value of Internet sales is a gross amount subject to multiple counting, whereas GDP is a value added measure. Exaggerating the importance of the phenomenon is something that e-commerce does not need.

More detailed statistical analyses by industry from Statistics Canada can be found in Peterson (2001) and Statistics Canada's compendia publications (2001, 2003).

Exhibit 3.3-2: Value of Internet sales, Canada

Industry	1999	2001	2003	2003
	millions of Canadian \$			% of operating revenues
Manufacturing	900	1,680	2,513	0.4
Wholesale trade	156	1,915	4,489	1.2
Retail trade	611	1,485	2,113	0.6
Transport and warehousing	164	937	3,437	3.7
Information and cultural	553	389	1,356	1.8
Finance and insurance	321	624	1,271	0.6
Professional, scientific and technical	406	424	1,076	2.2
Accommodation and food	429	259	279	0.6
All private sector	4,180	10,389	18,598	0.8

Source: Statistics Canada

Firm size

Findings also confirm the importance of firm size. While small firms do well in basic connectivity, they lag behind when it comes to more sophisticated applications. Certainly awareness seems to be a factor, as well as time and resource constraints to follow developments and act.

Exhibit 3.3-3: E-business by size, Canada, 2003*

	Computers	Internet	Websites	E-purchases	E-sales
Small	86	76	29	35	6
Medium	98	94	66	50	14
Large	99	97	77	61	16

In % of firms. *Enterprise size is based on employment (full-time equivalents) as follows: "small" 0-19 FTE for all industries, "medium" 200-499 in manufacturing and 20-99 in services, "large" 500+ in manufacturing and 100+ in services.

Source: Statistics Canada

However, size must be examined in conjunction with sector of activity. In some industries small firms are more connected than large firms elsewhere. A more detailed analysis by Statistics Canada on ICT and e-commerce by firm size and industry, as well as barriers to use, is contained in Charles et al. (2002).

More ahead

Considering the early emphasis on e-commerce, much has been learned in recent years thanks to conceptual work by the OECD's Working Party on Indicators for the Information Society (WPIIS) and the empirical efforts of practitioners. Moreover, as e-commerce is properly situated in the overall e-business processes much more is expected in the near future. Statistics Canada plans to test several questions on e-business processes recommended by WPIIS. In addition, work is underway on a research database that can support investigations of impacts at the firm and industry level, as well as potentially allow linkages of microdata between SECT and other data sources, such as tax data.

A related area, though, with considerable overlap has not yet challenged practitioners – that of electronically delivered products. While e-commerce refers to ordering online, regardless of the means of delivery, it is becoming increasingly important to study the electronic delivery of products in their entirety. This could include products that exist in digital form, whether or not they can also exist in physical media (i.e. books, tapes etc.). E-delivery of products and its relation to e-commerce is shown in the scheme in Exhibit 3.3-4. X refers to e-commerce as has been defined and measured, and Y refers to electronically delivered products.

Exhibit 3.3-4: Sales and delivery methods as constituents of e-commerce

	e-sales	conventional sales	
e-delivery	A	C	Y
conventional delivery / acquisition	B	"dd"	
	X		

Many of the legal debates during recent years concern such products, particularly music and pirated software, as the new modes of distribution upset and/or unsettle existing, long-standing arrangements. Such e-delivery of products is expanding, with games, casinos on-line and all kinds of much more mainstream services, such as banking and insurance. These will not be unrelated to WTO negotiations.

References

Charles S., Ivis M and Leduc A. (2002) "Embracing e-Business: Does Size Matter?", Connectedness Series, No. 6, Cat. 56F0004MPE, Statistics Canada.

EU (2003) "The European e-Business Report: A Portrait of e-business in 15 sectors of the EU economy".

Eurostat (2002) "E-commerce in EU enterprises"

OECD (2002) Measuring the Information Economy".

OECD (2004) The Economic Impact of ICT".

OECD (2000) "Defining and Measuring Electronic Commerce: A Provisional Framework and Follow-up Strategy"

Peterson G (2001) "Electronic Commerce and Technology Use", Connectedness Series, No. 5, Cat. 56F0004MPE, Statistics Canada.

Statistics Canada (1999) "A Reality Check to Defining E-commerce", Cat. 88F0006XIB-99006.

Statistics Canada (2000) "The Daily", August 10.

Statistics Canada (2001) "Beyond the Information Highway: Networked Canada", Cat. 56-504-XPE.

Statistics Canada (2003) "Canada's Journey to an Information Society", Cat. 56-508-XIE.

3.4 B2B Metrics: Measuring Forms, Content, Strategy and Impacts of B2B E-Commerce

by Hans Schedl, ifo Institute for Economic Research⁹¹

Background

This article summarises briefly the main objectives and conclusions of the B2B Metrics project (www.b2b-metrics.de). B2B Metrics was a joint initiative of five international research organisations funded by means of the European Union's IST Programme.⁹² It started in January 2002 and was recently finalised in July 2004. B2B Metrics set out to develop indicators for the measurement of forms, content, strategy and impacts of Business-to-Business e-Commerce (B2B). The main objectives were to benchmark development, identify enablers and barriers, test the applicability of the approach and develop toolkits for statistics.

Though a larger number of surveys has already been conducted in the field, a lack of clarity with respect to definitions of B2B, widely differing methods for data collection, an absence of comparability in questionnaires and samples, and marked inconsistencies in approaches to analysis are just some of the factors that have underlined the necessity for a new perspective.

The B2B Metrics study developed a clear definition of Business-to-Business electronic commerce and a questionnaire with the help of experts and practitioners. The results can help business users to define their own position by using the results from benchmarking. Statisticians can use the instruments developed by the project as tools to devise short and efficient questionnaires for several purposes. Politicians, finally, can cross-check their assumptions on B2B development and the efficiency of related policies.

The need for new indicators

Prior analysis has often neglected the preconditions of successful application: standardisation, organisational adaptation, process integration and data exchange between partners. Questions related to these aspects, together with the defined basic processes of the enterprise, form the structure of approach to indicator measurement. The proposed questionnaires are accessible on the website of the B2B Metrics project.

Benchmarking results: e-business in the automotive industry

One of the underlying assumptions of e-business was that new forms of e-transactions would rapidly displace traditional forms by offering richer information with wider reach.

Is this assumption valid for B2B? And if so, is it measurable?

Results of the project indicate that the use of specific Internet techniques such as demand aggregation, marketplaces or auctions is still not widely spread.⁹³ Diffusion in the B2B segment depends on standardisation. This also limits the richness of transmitted information and its reach.

What are the appropriate indicators for development phases?

As a starting point for analysis, the project defined three development stages based on the use of applications:

- early, based on the use of "simple" stand-alone transactions,

⁹¹ Hans Schedl is a senior researcher at the ifo Institute for Economic Research, Munich, in the area human capital and structural change.

⁹² B2B METRICS was a joint project of five institutes: ifo Institute for Economic Research, Munich, Nomura Research Institute, Tokyo, PREST, Manchester, RCS Conseil, Paris and VATT, Helsinki, commissioned by the Directorate General Information Society of the European Union in the context of the IST Programme.

⁹³ for details see the country reports on www.b2b-metrics.de

- enlarged, including first steps towards process automation, and
- advanced, comprising mainly collaborative networking use.

Based on this framework, the project found that there are 72% advanced users, 20% enlarged and 7% early users in the automotive value chain. On closer inspection of other indicators describing complementary innovation, for example, standardisation, process integration and external data exchange, the advanced group was further split into three stages of maturity: intermediate (47%), advanced (about 15% of respondents) and very advanced (about 10%).

Is there a “standard” developmental pathway or are there different ways and discernible strategies?

Results from in-depth interviews with decision-makers in companies suggest that there is no “standard” pathway. The pathway may depend on framework conditions – e.g. the absence of enterprises with formative power in a value chain – or the importance of partner firms for the processes. In a fragmented value chain development will tend to lag behind, small or less important partners will be connected via portals.

Different strategies could also be identified. A clustering of the applications in business processes led to three discernible groups in automotive which could tentatively be described as collaboration oriented, logistics and accounting oriented as well as information collection oriented. The first cluster indicated a significant correlation with an existing e-business plan. A clustering of complementary innovation and impacts of B2B application showed what we might call two different approaches to adoption: an “organisation oriented” approach and an “IT integration” approach.

What are the main barriers to a common B2B development?

Apart from cost, the relatively low diffusion of standards, organisational institutionalisation and controlling, the integration of processes and a reluctance towards external data exchange appear to be the main barriers. These barriers tend to be higher in fragmented value chains and – to a lesser extent – in co-operative networks and lower in hierarchically organised chains.

Impacts and enablers for B2B

Interview discussions of the questionnaire led to the conclusion that process related impacts and general impacts which could not be directly related to a process should be distinguished. The most frequent process related impacts measured so far could be observed in procurement, where process time and procurement price reductions were most frequently mentioned as impacts. Process time reduction was the most important impact if response frequencies for all other business processes are included. Sales applications and CRM impacts seem quite low in consideration of the significant system investments in this area. Collaborative development may need further inputs in complementary innovation in order to arrive at broader impact.

Among general impacts, which were separated into tangible and intangible, informational transparency is cited most frequently among intangibles. The most important tangible effects were savings from demand aggregation, standardisation and outline agreements. Disintermediation savings were rarely cited.

What are good indicators of successful B2B implementation?

The question arises whether adequate indicators should be related to IT “enablers”, as several studies and the IT integration cluster suggest, or whether factors of complementary innovation are decisive, as the Net Impact Study and the organisation oriented cluster suggest. The B2B Metrics project used regression analysis to test both hypotheses. Results indicate no significant correlation between successful implementation and broadband Internet access or IT personnel, whereas standardisation, B2B personnel and controlling show clearly significant correlation. The results on controlling confirm the findings of the Net Impact Study.

Applicability of questionnaires: Is there a one-size-fits-all approach?

Another important question in the search for new instruments to study e-business is whether there is a "one-size-fits-all" approach to B2B measurement. The pilot survey carried out by the B2B Metrics project has shown that there is probably no such optimal all-round tool. Different value-creation models and framework conditions, as well as sectoral specificities, necessitate modified modules for some business processes, for example in financial services sector or the pharmaceutical industry.

Purchasing and sales related questions seem to be widely applicable. Based on experiences from the pilot study, it can be assumed that the proposed questionnaire works well if the framework is characterised by the existence of enterprises with formative power inside a value chain, an exchange of physical products and an importance of logistics and a point of sales network. Fragmented value chains and the absence of standard-setting enterprises, as well as exchanges of virtual goods, need modified questionnaires.

If high response rates are the aim, the questionnaire has to be short. Different policy questions require different questionnaire approaches. The project therefore proposes several alternative tools.

Conclusions and recommendations

If complementary innovation is used as a criterion for differentiation, a great gap between small and large firms in B2B application is observable. The question arises whether this gap will be closed within the next few years or whether different developmental pathways will show up. Interviews carried out as part of the B2B Metrics project suggest that the latter is more probable.

At least two discernible pathways were discussed: The first is aimed at an overall process integration including all firms with process-critical knowledge. The second loosely links smaller firms through portal solutions of larger, central firms in the value chain.

It is still unclear what will happen in value chains where no firms with formative power exist, which could introduce standards and push process integration. If and how self organisation of small firm networks might work could not be derived from the pilot study. The only result visible from a comparison between a more hierarchically organised network – as in the automotive value chain – and a more self-organising network – as in co-operative distribution – suggests clear developmental advantages for hierarchical solutions.

It is also unclear if collaborative exchanges or the use of net-services and application service providers could offer a cost-efficient solution for small business in the medium term. For the moment, such a solution is not visible. A "lean approach", too, so far was not sufficiently discussed. "Lean approach" refers to simpler B2B solutions, using lower band Internet access (ISDN or DSL), simple and low-cost standard software and the development of an easy-to-use XML standard which does not rely on IT specialists.

From the results of this pilot study, combined with assumptions on non-respondents, the following tentative conclusions can be drawn:

- There is probably a digital divide between small and larger firms regarding B2B applications.
- This may lead to developmental disadvantages of small firms and structural change.
- If the share of "peripheral" firms not participating in B2B networks is high, this will probably lower the overall impact of B2B applications (and the success of eEurope).

Given the initially made reservations regarding reliability and the limited scope of the pilot study, further and wider research is necessary to validate these findings.

The B2B Metrics project suggests that technological factors thought to be enablers (IT personnel, broadband deployment and B2B software technology) do not play an important role in successful B2B implementation. It is not technology, but complementary innovation that appears to be decisive for the success of B2B.

The main success factors for B2B implementation found in statistical analysis were the introduction and the extent of use of standards, the institutionalisation of B2B in the organisation and the use of controlling. External success factors were – in contradiction to a long time cherished assumption on the superiority of flat, self organising structures – hierarchically dominated chains. Impacts – in those cases where they could be quantitatively measured – were quite often estimated considerably lower than optimistic forecasts would have them.

Regarding instruments to measure electronic business, the project recommends no single toolkit approach for all situations, but an approach adapted to the data situation and the political aims of data collection. In the light of the Lisbon objectives, the integration of SMEs into B2B networks may be very important. For future research, the following research objectives are important:

- Study the situation of SMEs in different value chains in more detail
- Find ways to overcome standardisation blockades in fragmented segments.
- Switch incentives to collaboration and organisation oriented approaches from a too strong technology orientation.
- Put more weight on lean approaches, as other approaches may be self promoting.

3.5 The E-Alignment of the New EU Member States: An Assessment Within the eEurope 2005 Framework

by Soumitra Dutta and Amit Jain, INSEAD⁹⁴

The European Union has outlined its aims and objectives for the ICT development of the Member States in its eEurope Action Plans. The eEurope 2005 Action Plan⁹⁵, which succeeded the eEurope 2002 Action Plan, aims to help Member States tap the vast potential of an Information Society. Stimulating services, applications and content based on a widely available broadband network infrastructure are regarded as important instruments to achieve these objectives.

This chapter presents a model to compute an "eEurope 2005 Index" based on the eEurope 2005 benchmarking framework⁹⁶ developed by the European Commission. This has been used to assess the comparative progress of the incumbent EU-15, the 10 New Member States (NMS), and the 3 candidate countries. The discussion in this chapter is divided into three main sections. Firstly, there is a brief presentation of the eEurope 2005 Action Plan Benchmarking Framework. Secondly, the results of the research and analysis are presented – the relative ranking of nations based on their degree of alignment to the EU-15 countries. Finally, the third section investigates the relationship of the eEurope 2005 Index with two key variables: GDP per capita and Internet Usage, in addition to presenting some of the key challenges faced while conducting the study.

3.5.1 The eEurope 2005 Benchmarking Framework

eEurope 2005

eEurope 2005 builds on the achievements of eEurope 2002: stimulating services, applications, and content that create new markets and reduce costs and eventually increasing productivity throughout the economy. The plan recognizes the important role of market mechanisms for developing content, services and applications, and for the rolling out of the underlying infrastructure. In this light, the Action Plan concentrates on those areas where public policy can provide added value and contribute to creating a positive environment for private investment.

In order to track the progress achieved, a benchmarking framework was developed by the Commission and presented in the Official Journal of the European Union (28/2/2003). The benchmarking indicators developed encapsulate the aims and objectives of the eEurope 2005 Action Plan and can be summarized in a hierarchical structure of component indicators. Five broad categories of indicators have been identified: Internet indicators, modern online public services, a dynamic e-business environment, a secure information infrastructure, and broadband. In total, 14 policy indicators and 22 supplementary indicators have been specified which provide information about the degree of alignment of a country or community within the objectives of eEurope. This framework has been used for computing the eEurope Index presented in this chapter.

⁹⁴ Soumitra Dutta is the Roland Berger Chaired Professor of Business and Technology, and Amit Jain is a Research Program Manager, both at INSEAD. The authors' research was supported by a research grant from SAP, based on which a comprehensive document on the alignment of accession countries was prepared: "eEurope 2005. A study of the degree of alignment of the New Member States and the Candidate Countries".

⁹⁵ COM(2002)263 final

⁹⁶ The eEurope 2005 Action Plan has been recommended for implementation in the Council Resolution of 18 February 2003 as seen in the Official Journal of the European Union pages C48/2 to C46/8.

Exhibit 3.5-1: Component indicators of the eEurope Index

Component Index	Sub-Index
1. Internet Indicators	Internet indicators capture the degree of access to the Internet by individuals. It is comprised of 3 main categories: <ul style="list-style-type: none"> • citizen's access to and use of the Internet • enterprises' access to and use of the Internet • Internet access costs
2. Modern online public services	This index aims to benchmark the different European countries based on the degree of availability of online public services, and the level of their usage by Europeans. Three broad categories of public services have been identified: <ul style="list-style-type: none"> • e-Government • e-Learning • e-Health.
3. A dynamic e-business environment	This index aims to capture the level of e-commerce and e-business in different European countries. It consists of two main components: <ul style="list-style-type: none"> • buying and selling online • e-business readiness.
4. A secure information infrastructure	This index aims to evaluate the level of security of Internet access and of online commerce across different European countries. It is mainly based on Internet users' experience regarding ICT security.
5. Broadband	Broadband aims to measure the level of availability and usage of broadband services across European nations.

Based on this benchmarking framework, an eEurope 2005 Index has been computed in order to obtain an understanding of the degree of alignment of the 10 New Member States (NMS) with respect to the incumbent EU-15 Member States.

3.5.2 Computing the eEurope 2005 Index

Indicators and data sources

The research project started with a set of over 130 different indicators, including data of two types: *hard* data and *soft* data. Subjective data gathered from survey questionnaires are termed "soft" data, and statistical data collected by independent agencies are termed "hard" data. The soft data initially selected for the study were extracted from the 2003 Executive Opinion Survey of the World Economic Forum (WEF), and research work in Europe.⁹⁷ Hard data were extracted from six different sources: World Development Indicators (WDI), the World Information Technology and Service Alliance (WITSA), the International Telecommunications Union (ITU), Pyramid, Eurostat and Eurobarometer.

These 130 variables were narrowed down by statistical analysis to a set of 39 variables, which were grouped amongst the 5 component indexes and their respective sub-indices – as per the eEurope 2005 benchmarking framework. The variables were transformed where necessary by dividing them by another variable such as GDP per capita, or the population of the country in order to compensate for size and income effects. These transformed variables were then normalized on a seven-point scale.

Following this, the score of each sub-index was computed as the average of the normalized scores of the variables present in it. Likewise, the score of the component indexes was computed as the average of the scores of the sub-indices under it. Finally, the eEurope Index was computed as an average of the scores of the 5 component indexes.

⁹⁷ For example the SIBIS project in the IST Programme or the European Union (www.sibis.eu.org).

eEurope 2005 Index Results

The overall results for the eEurope 2005 Index are presented in Exhibit 3.5-2. Denmark comes out on top with an index of 5.90, followed by Sweden (5.36) and the Netherlands (5.28). The United Kingdom, Finland and Germany occupy ranks four to six respectively. Austria, Belgium, Ireland and Luxembourg follow and complement the top ten. This is broadly in line with other studies on the ICT diffusion in European countries.

New Member States and Candidate Countries

The top ranked New Member States are Malta and Estonia, which are respectively ranked 13th and 14th with scores of 3.77 and 3.74 on the eEurope index.⁹⁸ These two countries show a higher level of ICT development based on the indicators used in this study, with respect to several current European Union members such as Portugal, Spain and Greece. Slovenia and the Czech Republic are respectively third and fourth placed among the NMS at the 18th and 19th places respectively, and Poland follows with a rank of 20. Cyprus, the Slovak Republic and Latvia follow. The last five NMS / Candidate Countries are Turkey, Lithuania, Hungary, Romania, and Bulgaria.

Alignment of the New Member States

The degree of alignment of the NMS with the current member states of the European Union is presented in Exhibit 3.5-3. The countries are classified into four distinct groups according to their performance on the computed index: Global leaders, Totally Aligned, Somewhat Aligned, and Development Required. The ranking results of the study are presented alongside those of the Networked Readiness Index (NRI)⁹⁹ 2003-2004.

Exhibit 3.5-2: eEurope 2005 Index

Rank	Country	Score
1	Denmark	5.90
2	Sweden	5.36
3	Netherlands	5.28
4	United Kingdom	5.24
5	Finland	4.92
6	Germany	4.85
7	Austria	4.64
8	Belgium	4.56
9	Ireland	4.41
10	Luxembourg	4.27
11	Italy	3.91
12	France	3.86
13	Malta	3.77
14	Estonia	3.74
15	Spain	3.65
16	Portugal	3.17
17	Greece	3.14
18	Slovenia	2.86
19	Czech Republic	2.78
20	Poland	2.78
21	Cyprus	2.72
22	Slovak Republic	2.67
23	Latvia	2.62
24	Turkey	2.43
25	Lithuania	2.40
26	Hungary	2.22
27	Romania	1.99
28	Bulgaria	1.82

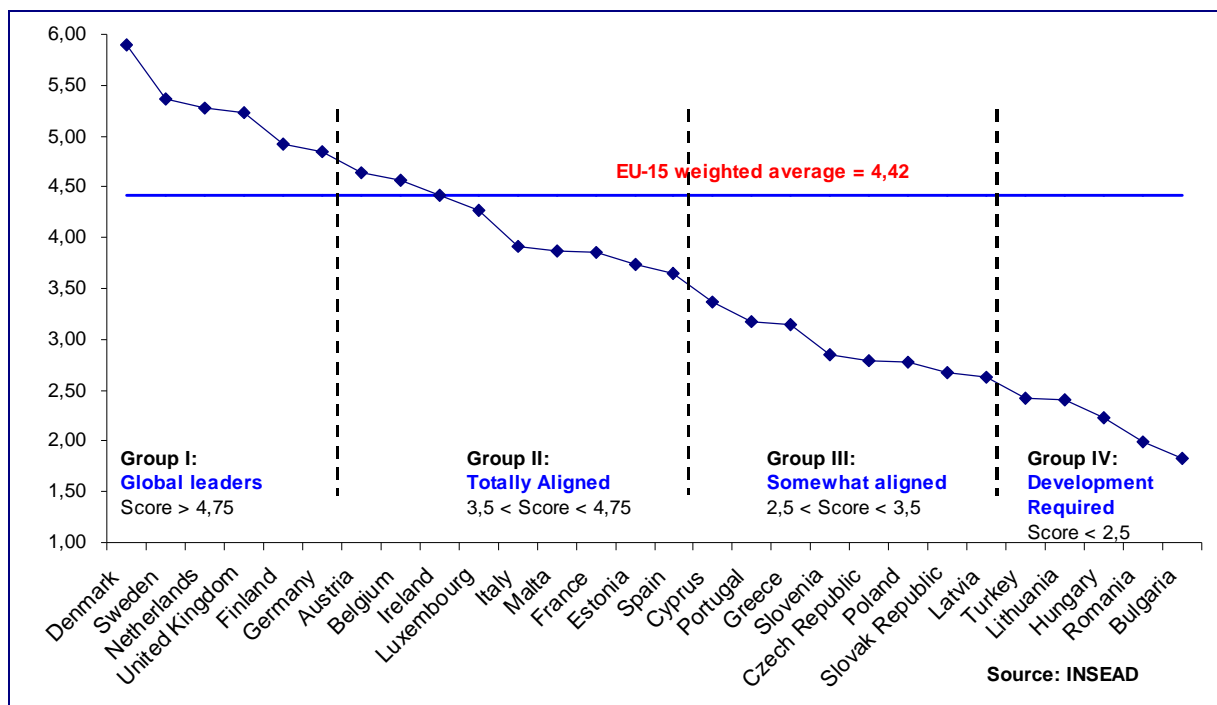
eEurope 2005 Index = (Internet Indicators + Modern Online Public Services + Dynamic E-Business Environment + Secure information infrastructure + Broadband) / 5

Source: INSEAD

⁹⁸ The results of three countries: Cyprus, Malta, and Turkey needs to be treated with relative caution. Substantially less data was available in order to determine their eEurope 2005 scores.

⁹⁹ The Networked Readiness Index (NRI) 2003-2004 benchmarks the Information and Communications Technology competitiveness of 102 countries in the world. It is one of the leading benchmarking frameworks for quantifying the ICT development of countries. The NRI 2003-2004 was computed as a part of a joint research project between INSEAD, The World Economic Forum and infoDev of the World Bank. The NRI is based on the Networked Readiness Framework of INSEAD, and it differs from the eEurope 2005 framework. For more information, please consult Dutta et al., 2004.

Exhibit 3.5-3: New Member State and Candidate Country Alignment Analysis



Group I: Global Leaders

Group 1 consists of countries that are global leaders – outstanding performers in the ICT domain at the international level. This group of countries has an eEurope index score greater than 4.75 on a seven-point scale. This group is comprised of six countries: Denmark, Sweden, Netherlands, the United Kingdom, Finland and Germany.

Country	Rank in eEurope 2005	Rank in NRI 2003
Denmark	1	5
Sweden	2	4
Netherlands	3	13
United Kingdom	4	15
Finland	5	3
Germany	6	11

As can be seen in the table above, these countries are also highly ranked on the Networked Readiness Index, with three of the countries in the top five ranks (out of a group of 102 countries). Due to their high level of ICT development, this group of countries provides a rich set of best practices and case studies that can be used by other nations seeking to improve their ICT development.

Group II: Totally Aligned (EU-15 Average)

Group II countries are countries that have the average European Union level of development with respect to information and communications technologies. These countries have an eEurope 2005 index score between 3.50 and 4.75. They have very good ICT infrastructures and a high degree of usage of ICT amongst the three stakeholders: individuals, businesses and the government. This group is comprised of nine countries: Austria, Belgium, Ireland, Luxembourg, Italy, France, Malta, Estonia, and Spain.

Country	Rank in eEurope 2005	Rank in NRI 2003
Austria	7	21
Belgium	8	24
Ireland	9	22
Luxembourg	10	14
Italy	11	28
France	12	19
Malta	13	27
Estonia	14	25
Spain	15	29

As for group I, these countries are also relatively high ranked on the Networked Readiness Index, all within the top thirty. While this group represents the EU-15 average, on a global basis their level of

development is relatively high. Of note in this group is Malta and Estonia, which are ranked 13th and 14th on the eEurope 2005 index out of 25 countries, and 25th on the NRI out of 102 countries. Malta and Estonia are the top ranked NMS, and are completely aligned with the EU-15 countries with respect to the eEurope 2005 benchmarking indicators and the level of ICT development.

Group III: Somewhat Aligned

Group III countries have a level of ICT development below the EU average level. They have eEurope 2005 scores between 2.5 and 3.5 as compared to the EU-15 average of 4.42. Group III represents a group of countries that are somewhat aligned with respect to the eEurope benchmarking indicators as compared to the EU-15. This group is comprised of 8 countries: Portugal, Greece, Slovenia, the Czech Republic, Poland, Cyprus, the Slovak Republic and Latvia.

Country	Rank in eEurope 2005	Rank in NRI 2003
Portugal	16	31
Greece	17	34
Slovenia	18	30
Czech Republic	19	33
Poland	20	47
Cyprus	21	-
Slovak Republic	22	41
Latvia	23	35

These countries all rank within the top fifty countries on the Networked Readiness Index 2003. Of note in this group is that there are two EU-15 countries – Portugal and Greece – that have the lowest level of ICT development in the European Union. In addition, there are six New Member States, and this group represents the average level of development amongst the NMS.

Group IV: Development required

Group IV countries are those that require significant development before they are aligned to the EU-15 set of countries with respect to the eEurope benchmarking indicators. This group of countries has an eEurope index score of less than 2.5 on a seven-point scale as compared to the EU-15 average of 4.42.

Country	Rank in eEurope 2005	Rank in NRI 2003
Turkey	24	56
Lithuania	25	42
Hungary	26	36
Romania	27	61
Bulgaria	28	67

Group IV is comprised of two NMS: Lithuania and Hungary; and three candidate countries: Turkey, Romania, and Bulgaria. One confirms this analysis of the level of ICT development by observing that these five countries have relatively lower ranks on the Networked Readiness Index 2003 as well. Group IV countries have significantly lower Gross Domestic Product per Capita as compared to the other NMS (Lithuania = 4,315 Euro; Romania = 2,144 Euro and Bulgaria = 2,154 Euro).

3.5.3 Understanding eEurope 2005 alignment

The degree of alignment with respect to the eEurope 2005 framework is the result of a multitude of effects. Our research started with a set of over 130 different variables or indicators for evaluating the eEurope index, which were narrowed down by statistical analysis to a set of 39 variables. This dataset provides us with an opportunity to study some of the inter-relationships across the variables and the components/sub-indexes of the eEurope 2005 framework.

GDP and eEurope 2005 alignment

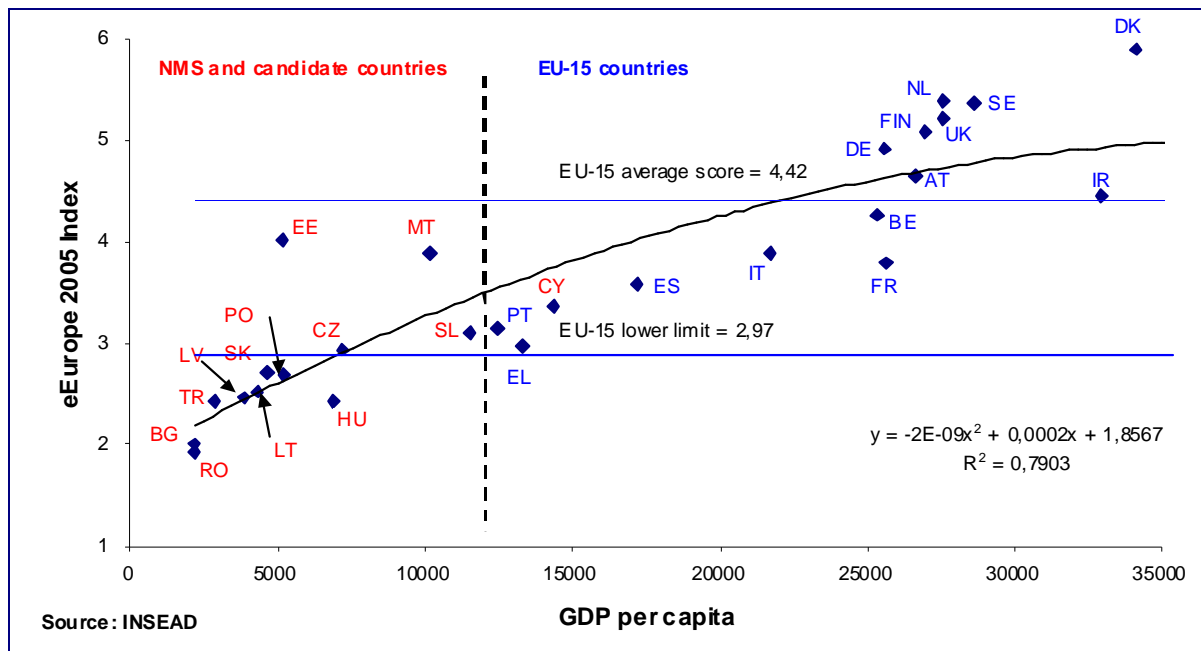
Any attempt to use a single measure to approximate the eEurope index would remain a simplification. One of the most intuitive and appealing measures that one may be tempted to use as a proxy is the Gross Domestic Product per Capita of a country. If one has a closer look at the eEurope results, one would find that Estonia with a GDP per capita of 5,143 Euro has an eEurope score of 3.74 and is ranked 14th overall. Poland with a very close GDP per capita of 5,176 Euro on the other hand has a score of 2.78 and an overall ranking of 20. One thus sees a wide spread in the eEurope score for a given GDP per capita.

Nevertheless, one could look at the relation between the eEurope and GDP in order to obtain a better understanding of trends, and also to identify over and under performers with respect to the trend. Per capita income of a country or the relative wealth of a nation influences the investment decisions made by policy-makers, the budget they have for ICT and the relative importance of ICT in their budget allocation. It would be expected that nations with high levels of GDP per capita would invest more in ICT in order to enhance their economic competitiveness. Exhibit 3.5-4 gives a plot between GDP per capita and the eEurope 2005 Index. One sees a strong second order relationship between GDP per capita and the eEurope 2005 index with a regression R2 value of 0,7903. One notes in addition:

- The 28 countries divide clearly into NMS and EU-15 countries based on GDP per capita. Apart from Cyprus (GDP/capita = 4,360 Euro), the country with the highest GDP per capita amongst the NMS and candidate countries (Slovenia) has a GDP per capita inferior to that of the EU-15 country with the lowest GDP per capita (Portugal).
- For a given GDP per capita, there is a spread in the eEurope scores around the regression plot as presented in Exhibit 3.5-4.
- The impact of GDP seems to be to linear for low to intermediate values of GDP per capita and then tapers off – which represents little increase in eEurope scores with increase in GDP per capita at very high GDP per capita.

Countries widely distanced from the regression plot could be examples of under performing or over performing countries. Thus one sees that Denmark leads the eEurope ranking and is a clear over-performer, whereas France under performs on the overall eEurope 2005 score. Similarly Estonia would be over performing on its eEurope score with respect to its GDP per capita.

Exhibit 3.5-4: eEurope 2005 Index and GDP per Capita



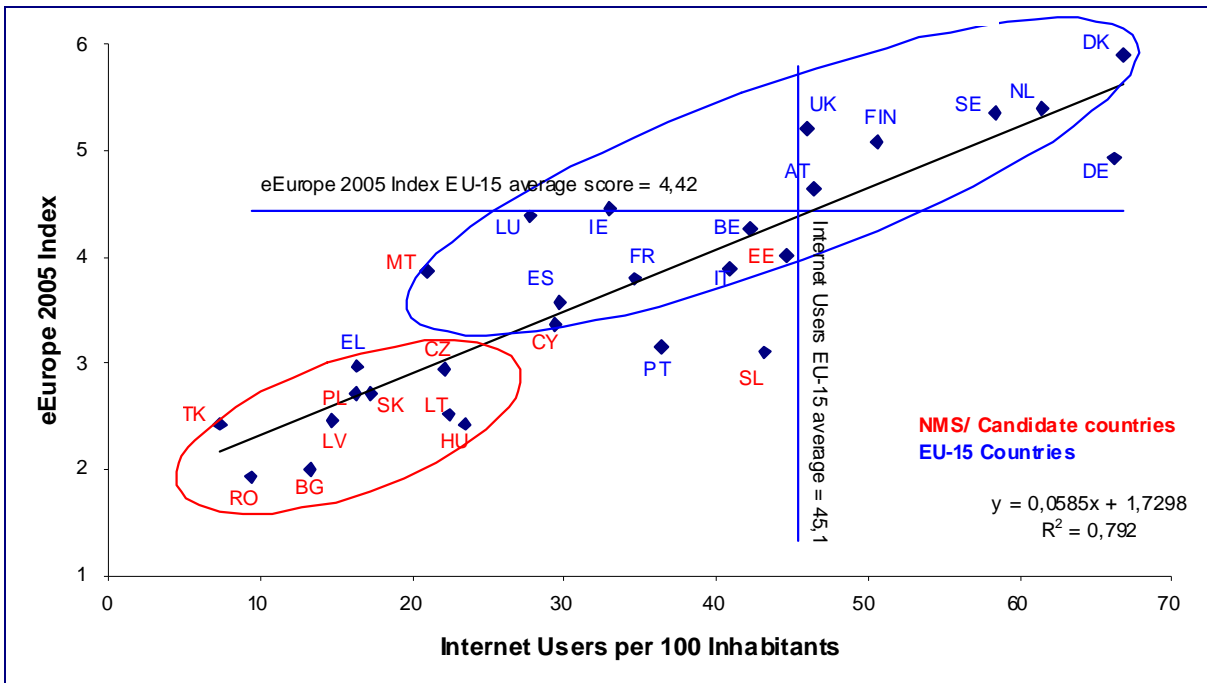
Internet users per 100 and Readiness Component Index

One could be tempted to use the number of Internet Users in a country as a proxy estimate of the eEurope Index of a country. Exhibit 3.5-5 shows a plot between the Number of Internet Users per 100 inhabitants and the eEurope 2005 Index. The existence of a significant relationship between these becomes apparent on observing that the linear regression plot has a high regression R2 value of 0.792. The eEurope Index is much richer than the Internet Users measure since it takes into account diverse factors such as online public services, e-commerce, online security and broadband. For

instance, two countries with the same level of Internet Users per 100 inhabitants may have a different index score if they are relatively different across other parameters of the index.

For the NMS, one can see the formation of the two distinct sets of countries, and the presence of Malta, Estonia and Cyprus amongst the EU-15 member countries. Likewise, Greece is seen to be more similar to the NMS than the EU-15 on these two dimensions. Portugal and Slovenia are two intermediate countries with characteristics of each of the groups.

Exhibit 3.5-5: eEurope 2005 Index and Internet users per 100 inhabitants



3.5.4 Summary

This article presents the eEurope 2005 Index, based on the eEurope 2005 Action Plan framework defined by the European Union, for 28 countries. The Index refers to their level of ICT development. The Overall Index is a summary measure of a nation's ability to participate in and benefit from the networked economy. In addition, the eEurope 2005 index provides guidance to business leaders and public policy-makers in order to enhance the impact of ICT – by providing a summary as well detailed analysis of a country's strengths and weaknesses.

Based on the calculated index, the level of alignment of the NMS was determined. Countries were divided into four distinct groups: global leaders, EU-15 average / aligned countries, somewhat aligned countries and countries needing to undergo some development. It was found that Malta and Estonia belonged to Group II countries that were totally aligned to the EU-15 countries. Partially aligned NMS (Group III) consisted of Slovenia, the Czech Republic, Poland, Cyprus, the Slovak Republic and Latvia. The remaining NMS/candidate countries fell in Group IV and need to work towards their ICT development. This group consists of Turkey, Lithuania, Hungary, Romania, and Bulgaria, and is characterised by countries with lower GDP per capita.

The essence of eEurope 2005 index extends beyond any single metric. High-performing countries have succeeded in going beyond individual measures of national income, or national ICT spending, in an effort to provide an optimal environment for ICT development, thus promoting high levels of readiness and usage within all three key stakeholders. Estonia amongst the NMS provides one such example. Among the former EU-15, Denmark, Sweden and the UK are such leaders and could serve as role models for other countries in their quest for ICT excellence. The eEurope 2005 Index allows a

nation to benchmark its ICT performance, and determine the effectiveness of policy. It also helps a country to learn from the policy and performance of other countries with similar profiles.

References

- Council Resolution of 18th February 2003 on the implementation of the eEurope 2005 Action Plan. Official Journal of the European Union. 28 February, 2003.
- Flash Eurobarometer 135 "Internet and the Public at Large". Eurobarometer. November 2002.
http://www.gesis.org/en/data_service/eurobarometer/
- Dutta, S., F. Puaa, and B. Lanvin, eds. 2003. The Global Information Technology Report 2002-2003: Readiness for the Networked World. New York: Oxford University Press.
- Dutta, S., F. Puaa, and B. Lanvin, eds. 2004. The Global Information Technology Report 2003-2004: Towards an Equitable Information Society. New York: Oxford University Press.
- eEurope+ 2003 Progress Report, February 2004.
http://www.emcis2004.hu/dokk/binary/30/17/3/eEurope_Final_Progress_Report.pdf
- INSEAD. 2004. eEurope 2005: A Study of the degree of Alignment of the New Member States and the Candidate Countries.
- Information Society Statistics, 2003 Edition. Eurostat. <http://europa.eu.int/comm/eurostat/>
- International Telecommunications Union. 2002. World Telecommunications Indicators. Online.
<http://www.itu.int/home/index.html>
- Online Availability of Public Services: How is Europe Progressing?. 2003. Cap Gemini Ernst & Young.
- Organization for Economic Co-operation and Development. Science, Technology and Industry Outlook: Drivers of Growth: Information Technology, Innovation, and Entrepreneurship. 2001.
- Sabol, Thomas. 2003. eGovernment in Selected EU Accession States. Prisma Strategic Guideline 8. April 2003.
- Sibis Pocket Book 2002/2003. Sibis. <http://www.empirica.biz/sibis/>
- The 2003 e-Readiness rankings. 2003. Economist Intelligence Unit.
- World Bank Group. 2002. World Development Indicators 2001. Online.
<http://www.worldbank.org/data/wdi/index.htm>
- SIBIS Project. WP4-D4.3.3: eEurope 2005 Key Figures for Benchmarking EU 15. Prepared by Databank Consulting. <http://www.sibis-eu.org>

3.6 A New Generic Statistical Measure in Dynamic Gap Analysis

by Pavle Sicherl, SICENTER¹⁰⁰

Introduction

Time, besides money, is one of the most important reference frameworks in a modern society. Yet the present state-of-the-art in comparative analysis and statistics does not fully utilise the information content with regard to certain aspects of the time dimension that are embodied in the existing data and could contribute to a better understanding of the situation. The art of handling different views of data is crucial for discovering the relevant patterns and for providing a broader framework for policy analysis. The new generic time distance approach (with associated novel statistical measure S-time-distance) offers a new view of data that is exceptionally easy to understand and communicate, and allows for developing and exploring new hypotheses and perspectives.

S-time-distance: concept and definition

Time distance analysis requires a radical shift in perspective with respect to time series data. Under the perspective dominating in literature, comparisons and evaluation of disparities (gaps) are made on the basis of absolute or relative values of a given socio-economic indicator for given points in time. The prevailing emphasis lies thus in the differences between two time series data at each point in time, respectively. The new perspective on time series, which for obvious reasons can be characterised as "temporal", has its main focus on the horizontal differences in time for each level of socio-economic indicators for the two or more compared units. Under the new focus, time distance concept measures the differences in time for specified levels of the indicator.

Time distance in general means the difference in time when two events occurred. So the concept, and the term time distance is used in many fields and applications. For instance, in spatial analysis time distance may mean the time needed to come from one point to another point in space. In our use of time distance as a measure of disparity, we define a special category of time distance, which is related to the level of the analysed indicator. The suggested statistical measure S-time-distance measures the distance (proximity) in time between the points in time when the two series compared reach a specified level of the indicator X_L . The observed distance in time (the number of years, quarters, months, etc.) for given levels of the indicator is used as a temporal measure of disparity between the two series, in the same way that the observed difference (absolute or relative) at a given point in time is used as a static measure of disparity. It is remarkable that this specific notion of time distance, which can in principle be developed from the same information embodied in the existing data, has not been developed earlier as a standard statistical measure.

For a given level of the indicator X_L , $X_L = X_i(t_i) = X_j(t_j)$, S-time-distance is the time difference between points in time when unit (i) and unit (j) reached the level X_L

$$S_{ij}(X_L) = \Delta T(X_L) = t_i(X_L) - t_j(X_L) \quad (1)$$

where T is determined by X_L . In special cases T can be a function of the level of the indicator X_L , while in general it may take more values when the same level is attained at more points in time, i.e. it is a vector which can in addition to the level X_L be related to time ($T_1, T_2 \dots T_n$). This special category of time distance is a generic concept like relative disparity or growth rate (for more details consult Sicherl, e.g. 1973, 1994, 1997, 1999, 2004a, 2004b and 2004c).

This innovation opens the possibility for simultaneous two-dimensional comparisons of time series data in two specified dimensions: vertically (standard measures of static difference) as well as

¹⁰⁰ Pavle Sicherl is Founder and Head of SICENTER (Socio-economic Indicators Center) and Professor of Political Economy at the University of Ljubljana.

horizontally (Sicherl time distance), providing a new dimension of analysis to a variety of problems. A new dimension is added while no earlier results are lost or replaced.

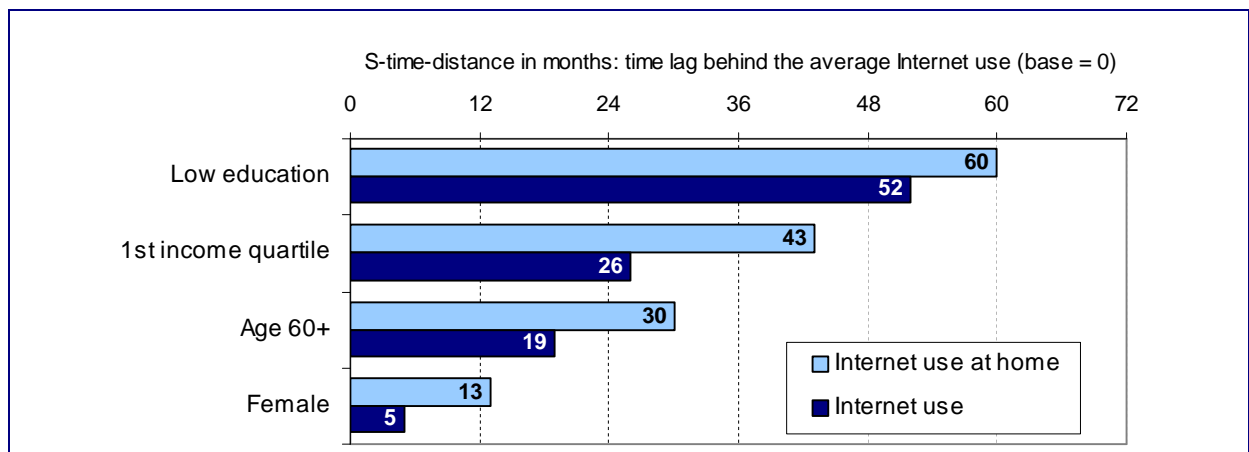
The time perspective, which no doubt exists in human perception when comparing different situations, is systematically introduced both as a concept and as a quantifiable measure in statistical and comparative analysis. Expressed in time units it is an excellent presentation tool easily understood by policy-makers, managers, media and general public and can support decision-making and influence public opinion.

A brief illustration of the application for analysing digital divide¹⁰¹

In analysing digital divide across various socio-economic groups, the exhibit below shows how the usual static measures of gaps such as percentages or indexes can be usefully complemented by the new approach. The magnitude of digital divides is here expressed in terms of the above defined time distances (lags), i.e. in terms of the time delay for particular sub-groups when compared with the same level of Internet usage of the benchmark (the population on the average) in the past.

S-time-distances in the graph show how many months earlier were the April 2002 values of Internet usage for the selected socio-economic and demographic groups achieved by the average Internet usage for EU15. The smallest time lag is that for gender, followed by age (+50), income (1stQ) and low education. While the gender time lag for “total Internet usage” behind the average usage is only about 5 months, for the low education group it is more than 4 years. Furthermore, one can compare penetration rates for different indicators and different categories, which may also be of interest for market analysis. The time lag for “total Internet usage at home” behind “total Internet usage” was about 8 months; for some groups it is slightly longer.

**Exhibit 3.6-1: Digital divide in the former EU-15 in time (S-time-distance):
How many months earlier was the level of selected socio-demographic groups in 2002
attained by average Internet usage?**



Source: SICENTER

Digital divide is only one example of the many fields in which the novel approach can bring about new understanding of the situation and additional elements for policy discussion and decision-making. It is also widely applicable beyond comparisons among countries, regions and socio-economic groups. For ideas and examples of extensions to measuring deviations between estimated and actual values in regressions and models, forecasting, error in timing and time causality, monitoring, business cycle analysis see Sicherl (1994, 1996, 1997); for variables other than time Sicherl (1999). Granger and Jeon (1997, 2003) further elaborated S-distance for a specific application as a criterion for evaluating forecasting models of leading and lagging indicators.

¹⁰¹ The numerical example in this section is based on data provided by the SIBIS project, for data source consult SIBIS (2003), p. 158. For a more detailed discussion on the new perspectives on the digital divide see P. Sicherl (2004a).

Conclusions and next steps

The novel time distance methodology proposes a new perspective to the problem, an additional statistical measure, and a presentation tool for policy analysis and debate that is readily understood by policy-makers, managers, media and general public. This is not a methodology oriented towards a specific substantive problem but an additional view to many problems and applications¹⁰². In an information age a new view of the existing databases should be evaluated as an important contribution towards a more efficient utilisation of the available information complementing, rather than substituting, the existing methods in extracting the relevant information content and new insights from available data.

The novel time distance methodology offers an improvement at both conceptual and application levels. This is not only a question of statistics and database analysis. It also profoundly affects the analytical and decision-making level by providing new insights for evaluation of policy and business alternatives. The understanding of the complexities of real life situation is not increased only by an increase of quantity and/or quality of empirical information. At least of equal importance are the concepts and tools of analysis that systematise and transform information into perceptions relevant for decision-making and influencing human behaviour. The perceptions formed and the decisions, behaviour and actions undertaken are also influenced by the quantitative indicators and measures used in the semantics of discussing the issues, in setting the targets and in following their implementation. The better the analytical framework the greater the information content provided to experts, decision-makers and general public.

References

- Sicherl, P. 1973. Time Distance as a Dynamic Measure of Disparities in Social and Economic Development. *Kyklos* XXVI, Fasc. 3, 559-575.
- Sicherl, P. 1994. Time Distance as an Additional Measure of Discrepancy between Actual and Estimated Values in Time Series Models. International Symposium on Economic Modelling. The World Bank, Washington D.C.
- Sicherl P. 1996. Time Distance in Business Cycle Analysis: Methodology and Examples for the USA, Japan and Germany, International Symposium on Economic Modelling. Statistics Norway, Oslo, 3-5 July.
- Sicherl P 1997. A Novel Methodology for Comparisons in Time and Space, East European Series No. 45. Institute for Advanced Studies, Vienna.
- Granger, C.W.J., Jeon, Y. 1997. Measuring Lag Structure in Forecasting Models – The Introduction of Time Distance. Discussion Paper 97-24, University of California, San Diego.
- Sicherl, P. 1999. A New View in Comparative Analysis. *IB Revija* XXXIII, 22-34.
- SIBIS, 2003. Measuring the Information Society in the EU, the EU Accession Countries, Switzerland and the US, SIBIS pocket book 2002/03. Empirica and EC, Bonn.
- Granger, C.W.J., Jeon, Y. 2003. A time-distance criterion for evaluating forecasting models. *International Journal of Forecasting* 19, 199-215.
- Sicherl, P. 2004a. Time-distance Analysis: Method and Applications. *eWISDOM 2a/2004*, collection of articles in a thematic issue on time distance, 1-99.
- Sicherl, P. 2004b. Comparing in Two Dimensions: A Broader Concept and a Novel Statistical Measure of the Time Dimension of Disparities. *European Societies*, 6(2), 181-203.
- Sicherl, P. 2004c. Foresight and Time Distance Methodology: A New Perspective related to Time. EU-US Seminar: New Technology Foresight, Forecasting and Assessment Methods, Seville, 13-14 May 2004, JRC Seville (forthcoming).

¹⁰² In comparative analysis a better integration of comparisons across time and space is needed. In the dynamic world of today it is hardly satisfactory to rely only on static measures of disparity. Among other problems, the static statistical measures of disparities like ratios or percentage differences (or Gini coefficient, Theil index or coefficient of variation for the case of many units) are insensitive to the changes in the absolute magnitude of growth rates of the indicator (or differences in growth rates among different indicators) and take into account only differences in growth rates between the units. They have to be supplemented by Sicherl distance to incorporate the temporal relative position of a given unit against the benchmark as an essential element of analysis (SIBIS 2003, p. 211).

3.7 E-Business W@tch Reports as a Resource in Student Projects – a Slovenian Case Study

by Jože Gričar¹⁰³, Gregor Lenart & Andreja Puciharn, University of Maribor

Introduction: Acknowledging the importance of e-commerce

It is important to consider e-commerce education and training as an integral part of a national development policy. As stressed by Peter G. W. Keen in “The Bled Manifesto” (June 2004, <http://www.BledConference.org>), e-commerce is the world’s growth engine now. Not to move with e-commerce is to limit nation’s growth. Therefore, a national growth policy must explicitly include e-commerce. The alternative is to be excluded from the mainstream of economic, organizational and market development over the coming years. As Keen suggests, there are three main priorities for a country to be accepted:

1. Commit at the national level to ensuring at least adequacy in the infrastructure base of e-commerce: Internet access, reliable phone, data communications and public utilities, and adoption at the policy level of the key technology standards and interfaces that link e-commerce players.
2. Provide policies for public education that help build distinctive specialist skill pools in such areas as customer service support, call centres, document management, back office administration, manufacturing research and development, IT operations, development and technical support, and engineering, at both high school and university level.
3. Avoid high risk capital investments in e-commerce and IT infrastructures and make use of regional resource-sharing and pay-as-you-go partnerships with leading providers of e-commerce technology capabilities.

Overall, the policy agenda is simple in concept, however complex it may be in implementation: e-commerce marks the shift from financial capital to intellectual capital as the driver of growth. It is now a talent hunt at all levels of process and service. It is the responsibility and opportunity of national leaders to help build that talent and provide the infrastructure base for it to be integrated into the e-commerce global space.

In the paper we describe experience of the Faculty of Organizational Sciences, University of Maribor in teaching e-commerce course with a particular focus on e-marketplace implementation. Experience in inter-university co-operation is presented and put into a broader context of cross-border e-commerce development in the region (e-region).

Teaching e-commerce at universities: The University of Maribor case

The students of the Faculty of Organizational Sciences, University of Maribor, who take e-commerce classes explore the possibilities of implementing an e-marketplace in an organization. Firstly, a course outline, methodology, literature, and students’ project are discussed. Students are encouraged to explore the latest *e-Business W@tch* Reports (www.ebusiness-watch.org) in order to get an insight in e-commerce development in the European Union. In particular, they are recommended to investigate the sector studies so that they are well informed about the current state of e-commerce usage in organizations in other countries, comparable to those involved in the students’ project in Slovenia. Students are encouraged to compare data collected in organizations in Slovenia against data in the Report. Continuous availability of *e-Business W@tch* Reports would thus be highly appreciated.

A group of three students choose two project sponsoring organizations – existing business partners, one being a buyer, the other being a seller. The organization may be a business company or

¹⁰³ Prof. Jože Gričar is Professor of Information Systems and Chairman, Department of Informatics & Director, eCommerce Center, Faculty of Organizational Sciences, University of Maribor.

government agency, small or big. In each organization, a problem owner (project sponsor) and a technologist (informatics specialist) are defined. By agreeing to work with the students, the two organizations are expressing interest in exploring the use of e-commerce for competitiveness improvement. Based on this, a course is run as a seminar, consisting of groupwork, visits to the organizations, student presentations and class discussions.

In the computer exercise sessions of the course, the students use latest e-commerce technology for e-marketplace development (hands-on). For the organizations selected, students develop a prototype e-solution in order to demonstrate a trading process on an electronic marketplace. A programme Exchange, a hosted application provided by Oracle, is available to the students. Students explore and present available e-marketplace services for various business scenarios, for example, e-auctions, e-tendering, e-catalogue trading.

The students develop an e-solution as a prototype providing a practical insight into a certain trading scenario. The firm's products or services (name, code, description) and basic trading conditions (price, quantity, costs) are used to develop a realistic scenario. Students do not engage in the order fulfilment process.

Since services provided by optional e-marketplaces are not dependant on a particular technology, the use of Oracle Exchange e-marketplace enables students and organizations to explore almost any service that is available on an e-marketplace. Students present the prototype solution to both organizations, preferably at a joint meeting of the representatives of both organizations.

In parallel, students explore available e-marketplaces by using the eMarketServices portal (www.emarketservices.com). Based on organization's expectations, its environment, type of business process, the students identify three available e-marketplaces applicable to each of the two organizations. From these three, they propose one as the most suitable marketplace to either of the two organizations.

Part of their examination is a 10-minutes prototype presentation to other student groups. Three to four groups, each consisting of 3 students, would be involved in presentation groups. Discussion follows after each presentation, seeking the most innovative ideas in the prototype as well as possible improvements for the prototype and its presentation to be improved.

The aims of this approach are creating awareness, demonstrating opportunities, presenting benefits and threats to the organizations of being present on an e-marketplace. An indirect goal of the student's project is to encourage the organization to consider e-marketplace implementation in order to enhance its competitiveness. By doing so, it is expected that e-marketplace implementation in the organizations be accelerated.

Assessing an organization's e-commerce readiness

Students are involved in assessment of e-readiness of the two organizations in which they run the students' project. Based on suggestions developed by the eBSN European eBusiness Support Network for SMEs, a questionnaire was developed which was used in organizations in Slovenia for the first time in the academic year 2003/04. The questionnaire was preliminarily tested with selected organizations in autumn 2003, testing being part of the students' project.

The questionnaire consists of two parts. Part one (A) relates to e-business technology availability, Part two (B) relates to e-business technology usage in the procurement and sales process of the organization. Based on the experience gained, the questionnaire was updated to its current level. So far, it has only been used in Slovenian organizations, but it may in future be used in organizations in the neighbouring countries. There is a growing interest in sharing experience with other universities and learning from others.

University students in e-commerce presenting eSolutions to business and government organizations

E-commerce related knowledge and experience are exceptionally important to new generations of university students, which is why it is useful to gather knowledge collected through the degree courses at one university and share it with students at other universities. It is also useful to present the innovative ideas of using e-technologies to organizations that have already implemented e-commerce solutions, or are looking for them. For students it is important to present themselves to business or government organizations, their potential employers. Business and government organizations are hunting for talented students and students are looking for promising job opportunities. From that perspective two established practices are worth a brief look: the Merkur Day and the Students Bazaar.

In the spring of 1999, the Faculty of Organizational Sciences, University of Maribor and organizations in Slovenia's e-commerce project have initiated an annual students' event Merkur Day – Undergraduate and Graduate Students in eCommerce Conference (<http://eCom.FOV.Uni-Mb.si/MerkurDay2004>). The one-day annual conference in October is hosted by Merkur, Trade and Services (<http://www.Merkur.si/ang/menu.html>). The conference objectives are: experience exchange, provision of a discussion forum on integrated projects (business chains, business-to-business, business-to-consumer, and business-to-government relationships), stimulating the undergraduate and graduate students in e-commerce research co-operation, stimulating collaboration between students and organizations, providing for universities, business, and government co-operation.

The ePrototype Bazaar is the undergraduate and graduate students' e-commerce prototype presentation of the annual Bled eConference (www.BledConference.org/StudentsBazaar). It is intended for students at honours, masters or doctoral level. A student, recommended by her/his professor, can present an e-commerce prototype, completed as a part of a diploma, and discuss ideas with other students and conference participants. Preference is given to prototypes proposing innovative or revolutionary e-commerce solutions and new ways to implement e-commerce, as well as new ideas for business in Cyberspace.

University cooperation with business and government in cross-border e-commerce development in the region

In Central Europe, a group of business, government, and academic organizations has been considering research and development opportunities in cross-border e-commerce in the region since 2001. It is an issue of doing existing business more efficiently by saving time and costs; it is also about creating additional business by exploiting opportunities offered by e-technologies applied in cross-border business and government processes. Over the years, a group of universities has formed eBusiness ALADIN - ALpe ADria INitiative involving the following universities: Graz in Austria, Rijeka in Croatia, Budapest in Hungary, Trieste in Italy, Novi Sad in Serbia & Montenegro, and Maribor in Slovenia. In 2004, a term "eRegion" was specifically proposed in order to focus attention on working together towards extensive e-technology usage in business and government organizations in the Region.

The universities indicated co-operate in an Executive Business, Government, and University Meeting on Cross-border eCommerce in eRegions. There have been two annual meetings since 2001.

The meeting in October 2004 will focus on eInvoicing issues in the region. However, the topic is considered an important challenge to EU as a whole. It is very much related to a Single European Electronic Market development as a part of the 2005 Action Plan of the European Commission. Since the eInvoicing is extremely critical to e-commerce of SMEs, it was suggested by eBSN – European eBusiness Support Network – that SMEs accelerate its development in all 25 EU Member States. In that regard, first steps have been made within Finland and Slovenia for co-operation in a cross-border eInvoicing effort. The two countries have a comparable level of ePayment systems and are ready for an international experiment.

Annex I: Glossary of Technical Terms

Term	Definition
Access	The ability to retrieve information and to communicate online through the use of digital information and communication technologies.
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 business processes 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 this report, broadband is defined as the capacity to transfer data at rates of 2Mbit/s (megabits per second) or greater.
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.
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.
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.
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. Besides saving paper, computers could save time by taking over transactions such as regular purchase orders that now require human intervention.
E-readiness	Readiness for e-business is defined as the capability to engage in electronic transactions. This comprises appropriate network access (including sufficient bandwidth), internal hardware and software solutions as well as the procedural and managerial readiness to deal with online transactions from simple web presence through to fulfilment of customer orders and related after sales services.

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, projects management, 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.
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, if non-proprietary networks are used.
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. ¹⁰⁴ 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.
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).
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).
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 less 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.
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.

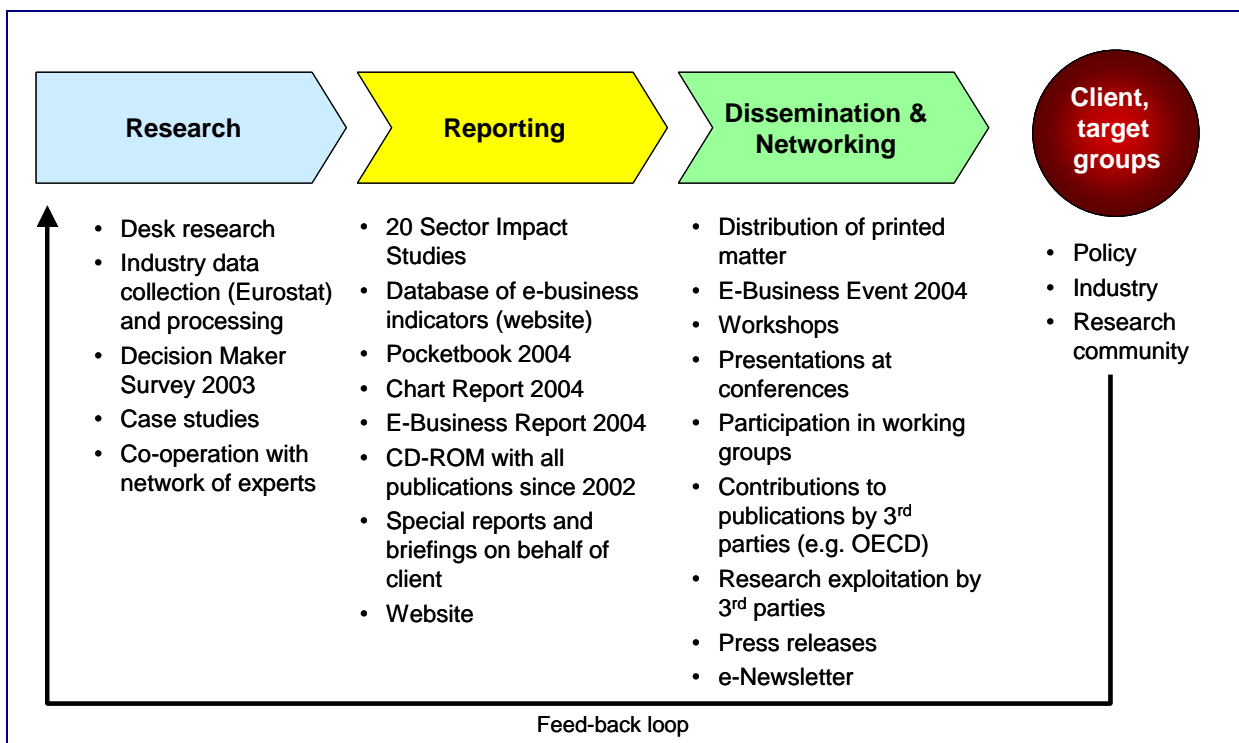
¹⁰⁴ Cf. Global Internet Statistics by Global Reach, www.greach.com

Remote access	The ability of a company computer network's transmission points to gain access to a computer at a different location.
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 classifications.
SME	Small and medium-sized enterprises with 0-249 employees. To be classed 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.
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.
Value added	Gross output minus intermediate inputs. It is valued at producers' prices and includes all indirect taxes, but excludes VAT and subsidies.
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.
Website	A related collection of World Wide Web files that includes a beginning file called a home page.
Wi-Fi	Short for "wireless fidelity", 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.
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.

Annex II: The e-Business W@tch 2003/04 – Activity Report

This Annex summarises the activities of the *e-Business W@tch* from July 2003 to September 2004.¹⁰⁵ Following a brief introduction, describing the context of the initiative, the annex is structured in three main parts. The first part summarises the research activities, particularly the representative survey in 2003 and the case studies. The second part provides an overview of reports and documents produced by the *e-Business W@tch*. The third part summarises the main dissemination and networking activities.

Research, reporting, dissemination: activities of the e-Business W@tch in 2003/04



A2.1 Research activities

Decision-Maker Survey on e-business

Most of the data presented in the reports of the *e-Business W@tch* are derived from Decision-Maker Surveys about the adoption of e-business among European enterprises. The 2003 survey was conducted in two parts. The first part was completed in March 2003, while the second part, carried out in November 2003, extended the sectoral and the geographic coverage by including the new EU Member States. The methodology of this survey is explained in Annex III.

Case studies

In order to complement the statistical picture gained from the e-Business Surveys with a more in-depth analysis on the use of specific e-business applications, the *e-Business W@tch* carried out about 40 case studies, based on interviews and desk research. A synopsis of these case studies is presented in

¹⁰⁵ This was the first period of the second contract between the European Commission, DG Enterprise, and empirica GmbH, following the completion of an earlier contract that run from December 2001 to June 2003.

the first part of this report. The full case studies are included in the second series of Sector Impact Reports (August 2004 – available under ‘Publications’ at www.ebusiness-watch.org).

Industry statistics from secondary sources

The *e-Business W@tch* uses the Eurostat New Cronos Database as its main secondary source of macroeconomic statistical data about the sectors covered. Data from New Cronos are used as background information and for the elaboration of sector profiles in the first part of the Sector Studies. New Cronos is structured in nine parts (“themes”). Most of the data used for the sector studies are derived from theme 4 “Industry, trade, and services”, and here from the collection sbs (structural business statistics). Statistics were prepared by DIW Berlin, which obtained the most recent data available from Eurostat in November 2003. 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. Official statistics for industry-wide macro-economic indicators are at best available for 2001. For the new EU Member States, the most recent national accounts are usually from 2000.

Co-operation with industry experts in 2003/04

As in 2002/03, the *e-Business W@tch* co-operated with a network of international experts possessing excellent knowledge either of one of the sectors covered or of a special area of electronic business. Experts were charged with providing critical and constructive support and input in relation to the various tasks which had to be carried out in 2003/04.

Experts with whom the e-Business W@tch has worked in 2003/04

Name	Organisation	Area of expertise
Dr. Dimitrios Buhalis	Director, Centre for eTourism Research (CeTR), School of Management Studies for the Service Sector, University of Surrey	e-Tourism
Dr. Enrico Colla	International Research Centre for Retail and e-Commerce (CERIDICE) of the European School of Management, Paris; Negocia – Centre International de Formation à la Vente et à la Négociation Commerciale	Retail
Prof. Claudia Gramaccia	University of Perugia, Faculty of Economics – SIGI	Legal issues related to e-business
Prof. Jozé Gricar	Department of Informatics & Director, eCommerce Center, Faculty of Organizational Sciences, University of Maribor	E-business in the new Member States
Prof. Giuliano Noci	Politecnico di Milano, Faculty of Engineering	Textile industries
Mr. Henry J. F. Ryan	Lios Geal Consultants (Irl)	Standardization issues
Mr. Pim den Hertog and Mr. Rob Bilderbeek	Dialogic (NL)	Business services
Mr. Freek Posthumus	NORMAPME (European lobby organization for SMEs at EEC level)	ICT in the craft & trade sectors
Dr. Thorsten Wichmann	CEO Berlecon Research	B2B marketplaces

A2.2 Publications of 2003/04

The main publications of the *e-Business W@tch* – apart from this report – are the e-Business Sector Impact Studies. In 2004, two studies were published on each of the 10 sectors covered during this period. Other publications include a pocketbook, a CD-ROM and the Chart Report. All publications are available at the website (www.ebusiness-watch.org).

Sector Impact Studies and Newsletters of the e-Business W@tch 2004

No.	Sector	Date
1	Textile, clothing and footwear industries <ul style="list-style-type: none"> Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe Report II: Key issues, case studies, conclusions 	May 2004 August 2004
2	Chemical industries <ul style="list-style-type: none"> Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe Report II: Key issues, case studies, conclusions 	May 2004 August 2004
3	Electrical machinery and electronics <ul style="list-style-type: none"> Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe Report II: Key issues, case studies, conclusions 	May 2004 August 2004
4	Transport equipment manufacturing <ul style="list-style-type: none"> Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe Report II: Key issues, case studies, conclusions 	May 2004 August 2004
5	Craft' and trade sectors <ul style="list-style-type: none"> Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe Report II: Key issues, case studies, conclusions 	May 2004 August 2004
6	Retail <ul style="list-style-type: none"> Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe Report II: Key issues, case studies, conclusions 	May 2004 August 2004
7	Tourism <ul style="list-style-type: none"> Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe Report II: Key issues, case studies, conclusions 	May 2004 August 2004
8	ICT services <ul style="list-style-type: none"> Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe Report II: Key issues, case studies, conclusions 	May 2004 August 2004
9	Business services <ul style="list-style-type: none"> Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe Report II: Key issues, case studies, conclusions 	May 2004 August 2004
10	Health and social services <ul style="list-style-type: none"> Report I: The Quantitative Picture: Diffusion of ICT and e-business in Europe Report II: Key issues, case studies, conclusions 	May 2004 August 2004

Other publications of the e-Business W@tch in 2004

Title	Description	Time
The European e-Business Report (2004 edition)	The European e-Business Report (2004 edition) is the third synthesis report of the <i>e-Business W@tch</i> . It features summaries of the 10 Sector Impact Studies from 2004 and contributions from e-business experts on specific issues. 1200 copies printed.	September 2004
CD-ROM 2004	Electronic archive containing all sector studies, reports and other publications of the <i>e-Business W@tch</i> from the period 6/2002 to 6/2004, and a short introductory video.	September 2004
Pocketbook of e-Business Indicators	Statistical pocketbook summarising the main findings of the e-Business Survey 2003. 68 p., 2500 copies. ISBN 92-894-7237-5.	May 2004
Chart Report 2004	The Chart Report 2004 summarises the main findings of the e-Business Survey 2003 in presentation format. It is available only electronically, as a complementary publication to the Pocketbook.	April 2004

A2.3 Dissemination and networking activities

In 2003/04, the *e-Business W@tch* organised the following workshops and events to discuss findings with target audiences from industry, policy and research:

e-Business W@tch Workshops and Events in 2003/04

Date	Place	Workshop / Event	Sectors / Focus
19 Nov. 2003	Montpellier	Workshop on e-standards at IDATE Annual Conference	Electronics; ICT services
10 Dec. 2003	Brussels	Workshop on e-Business in the Acceding Countries	new EU Member States
22 Mar. 2004	Brussels	Workshop on ICT use by craft firms at the UEAPME Construction Forum	Craft' and trade sectors
31 Mar. 2004	Brussels	Workshop on regional implications of electronic business (in co-operation with IANIS / eris@ Network)	Tourism; Health
18 May 2004	Athens	Workshop at the WCIT 2004 World Congress in Information Technology (during the Pre-Congress Forum)	Tourism ICT services
07 Jul. 2004	Brussels	Annual E-Business Event 2004: Implications of e-Business for Productivity and Competitiveness	Chemical industry; Transport equipment; Textile industry Retail

In addition, members of the *e-Business W@tch* team presented findings at numerous conferences, including international events such as the ITS International Telecommunications Society 14th European Regional Conference (August 2003), IST 2003 Conference, Canadian Telehealth Conference, eChallenges Conference e-2003, INFORMS Annual Conference of the Institute of Operations Research and Management Sciences in Atlanta, USA (all in October 2003), and Workshops of the e-Business Support Network of DG Enterprise (October 2003, February 2004).

The *e-Business W@tch* participated in and contributed to international working groups on e-business, for example on measurement issues (Eurostat Workshop, October 2003; OECD Workshop on Measuring e-Business, December 2003) and on legal aspects of e-commerce (Roundtable organized by DG Enterprise, December 2003).

The OECD has acknowledged work of the *e-Business W@tch* by using and referencing statistical data from the e-Business Survey 2002 in its Information Technology Outlook 2004.

Annex III: Methodology

Background

Most of the data presented in this report are results of a decision-maker survey about e-business in European enterprises in 2003. This is an annual survey carried out by the *e-Business W@tch* – the first one took place in 2002 – constituting a cornerstone of its monitoring activities. For organisational and contractual reasons, the e-Business Survey 2003 was split into two parts. The first part consisted of 3,515 telephone interviews which were conducted in March 2003 with decision-makers in enterprises from five EU countries. The second part had a scope of 4,570 interviews in the EU, 100 interviews in Norway and 2,632 interviews in the 10 new EU Member States (NMS), and was conducted in November 2003. The questionnaires used in the two parts of the survey were largely the same. A few new questions were added in the second part in order to cover issues of special topical interest for policy.

Fieldwork

The fieldwork of the surveys in the EU-15 and in Norway was carried out by Ipsos Germany in co-operation with its partner organisations on behalf of the *e-Business W@tch*. Fieldwork in the 10 new Member States was carried out by NFO Aisa (Czech Republic) and its network.

Country	Organisation	Country	Organisation
Belgium	INRA Belgium, Avenue de la Couronne 159-165, 1050 Brussels	UK	Continental Research, 132-140 Goswell Road, EC1V 7DY London
Denmark	Gallup TNS Denmark, Masnedogade 22-26, 2100 Copenhagen	Norway	Norfakta Markedsanalyse, Kjøpmannsgt. 5, 7013 Trondheim
Germany	INRA Deutschland GmbH, Papenkamp 2-6, 23879 Mölln	Cyprus	Synovate (member of the Aegis Group plc), Nicosia
Greece	Synovate, 24 Ippodamou St., 11635 Athens	Czech Republik	NFO AISA s.r.o., Slezská 113, 130 00 Praha 3, Česká republika
Spain	IPSOS ECO Consulting, Avda. de Burgos, 12-8a, 28036 Madrid	Estonia	Saar Poll, Veetorni 4, 10119 Tallinn, Estonia
France	Ipsos Insight Marketing, 99, rue de l'Abbé Groult, 75739 Paris Cedex 15	Hungary	MEDIAN, Opinion and Market Research, POB 551, BUDAPEST, H-1539
Ireland	TNS mrbi, Blackrock, Co. Dublin 2	Lithuania	BALTIC SURVEYS, 6A Šermukšnių str., Vilnius LT-2001, Lithuania
Italy	Ipsos-Explorer, Via Mauro Macchi 61, 20124 Milano	Latvia	TNS – baltic data house, Kronvalda Blvd. 3 – 2, Riga LV-1010, Latvia
Netherlands	INRA in Belgium, Avenue de la Couronne 159-165, 1050 Brussels	Malta	MISCO – Market Intelligence Services Co. Ltd., Valetta
Austria	Spectra Marktforschung: Brucknerstr. 3-5/4, 4020 Linz	Poland	CASE Consumer Attitudes & Social Enquiry, ul. Nowy Świat 64, PL 00-357 Warsaw
Portugal	Ipsos Portugal, Rua Joaquim António de Alguiar 43-5.º, 1070-15 Lisbon	Slovenia	CATI – Marketing, Media and Social Research & Consulting, Tržaška 2, 1000 Ljubljana
Finland	Taloustutkimus Oy, Lemuntie 9, 00510 Helsinki	Slovakia	NFO AISA s.r.o., Slezská 113, 130 00 Praha 3, Česká republika
Sweden	GfK Sverige, Box 401, 221 00 Lund		

Interview method

The fieldwork was carried out using mostly computer-aided telephone interview (CATI) technology. Face-to-face interviews were used in Lithuania, and a mixed approach in Malta. The decision-maker in the enterprise targeted by the survey was normally the person responsible for ICT within the company, typically the IT manager. Alternatively, particularly in small enterprises without a separate IT unit, the managing director or owner was interviewed.

Population coverage and sampling

The highest level of the population for the e-Business Survey was the set of all enterprises which are active at the national territory of one of the respective countries and which have their primary business activity in one of the

sectors specified by NACE Rev. 1 categories (see table). The selection and composition of sectors took into account their economic importance and the relevance of e-business activities.

The most important viewpoints used for breakdown of the population in the survey were (i) the economic activity, (ii) the national territory of the enterprise and (iii) the size in terms of employees. The survey was carried out as an enterprise survey, i.e. data collection and reporting focus on the enterprise (rather than on the establishment), defined as a business organisation of one or more establishments comprised as one legal unit.

The sample drawn was a random sample of companies from the respective sector population in each country where the respective sector was to be surveyed with the objective of fulfilling strata with respect to company size class. Strata were to include a share of at least 10% of large companies (250+ employees) per country-sector cell, 30% of medium sized enterprises (50-249 employees) and 25% of small enterprises (10-49 employees). Micro-enterprises with less than 10 employees were also included in the survey. Samples were drawn locally by fieldwork organisations based on acknowledged business directories and databases (see table).

Population coverage of the e-Business Survey (2003)			
No.	NACE Rev. 1		Sector Name
	Section	Division/Group	
01	D	17, 18, 19	Manufacture of textiles and textile products, leather and leather products
02	D	24, 25	Manufacture of chemicals and chemical products
03	D	30, 31 (except 31.3 - 31.6), 32	Manufacture of Electrical machinery and electronics
04	D	34, 35	Manufacture of transport equipment
05	D	Parts of (17-19), 20, (30-32), (34-35), 36, 45	Craft and trade. In addition to companies from sub-sections covered by other sectors: manufacture of wood products; manufacture of furniture; construction and site preparation. Only enterprises with 0-49 employees.
06	G	52.11, 52.12, 52.4	Retail
07	H / I / O	55.1, 55.2, 62.1, 63.3, 92.33, 92.52, 92.53	Tourism
08	K	74	Business services
09	I / K	64.2, 72	Telecommunications and computer-related services
10	N	85.11, 85.12, 85.3	Health and social services

Country	Directory / Database	Country	Directory / Database
Austria	Herold BUSINESS MARKETING database	UK	Dun & Bradstreet
Belgium	Dun & Bradstreet	Norway	Dun & Bradstreet
Denmark	KOB (Købmandsstandens Oplysnings Bureau)	Cyprus	Census of economic activity
Germany	Heins und Partner Business Pool	Czech Republic	Merit – CDF, Meritum Software, Enterprises database 2003
Finland	Blue Book - TDC Hakernistot OY	Estonia	Estonian statistical bureau + Kredinfo (register of taxpayers)
France	IDATA, based on INSEE Siren file (the National Institute of Statistics) and other directories	Hungary	Company Information Data Store, provided by Hungarian Central Statistical office
Greece	ICAP directory (the major database for Greece)	Lithuania	Department of Statistics and National Register at Ministry of Economics
Ireland	Bill Moss	Latvia	Business Register of Republic of Latvia
Italy	Dun & Bradstreet	Malta	National Statistics Office, Employment and training corporation
Netherlands	Dun & Bradstreet	Poland	REGON (GUS) data (National register of business)
Portugal	MOPE database	Slovenia	IPIS directory, published by Noviforum (list of active Slovenian enterprises)
Spain	Dun & Bradstreet	Slovakia	Albertina, Albertina Data, Enterprises database 2003
Sweden	Swedish Post Address Register (PAR)		

Scope of the e-Business Survey 2003: No. of interviews per country and sector

Scope	Part I (March 2003)	Part II (Nov/Dec 2003)
No. of sectors covered	7 sectors	10 sectors
No. of EU Member States involved	5 countries	25 countries
No. of sector-country-cells	35	98
No. of interviews	3515	4670 (EU+NO) + 2632 (NMS) = 7302

	Food, beverages and tobacco	Textile industries	Chemical industries	Electronics	Transport equipment	Crafts & trade (Construction ; Wood & furniture)	Retail	Tourism	ICT services	Health & social services	Business services	Total int.
Belgium			101				100				100	301
Denmark							67	67		66		200
Germany	100*	100	100*	100*	100*	100	100*	101*	100*	100	100	1101
Greece		84		76	89	75		75				399
Spain	100*	101	100*	100*	100*	108	100*	100*	100*	101	100	1110
France	100*	100	100*	100*	101*	101	101*	99*	100*	100	100	1102
Ireland			70					70	71			211
Italy	102*	100	101*	101*	100*	100	102*	102*	101*	100	101	1110
Luxembourg **												0
Netherlands		100							101	102		303
Austria					68			132		100		300
Portugal					104		100				100	304
Finland		75		75					76			226
Sweden			80	75	79						80	314
United Kingdom	100*	100	101*	101*	100*	100	101*	100*	101*	100	100	1104
Cyprus							64					64
Czech Republic			60		60			60	60	60		300
Estonia		50	50	50	21	65	50	50	50	50	50	486
Hungary				80	80						80	240
Lithuania							57					57
Latvia		51	49				51					151
Malta								51				51
Poland		80	80	80	80	80	80	80	80	80	80	800
Slovenia				56				51	53	55	58	273
Slovakia		50		50			50				60	210
Norway		30					70					100
TOTAL	502	1021	992	1044	1082	729	1193	1138	993	1014	1109	10817

* interviews carried out in March 2003 ** was covered in the e-Business Survey 2002

Problems encountered

No major problems were reported by the fieldwork organisations with respect to interviewing (e.g. comprehensibility of the questionnaire, logical structure). The overall feedback from the survey organisations was that fieldwork ran smoothly and that they had the impression that the questionnaire was well understood by most respondents. Some difficulties occurred, though, mainly with respect to the following issues:

- The main challenge was the fulfilment of quotas regarding company size-bands. In many countries, it was not possible to accomplish the objective of including a minimum share of large or even medium-sized enterprises in specific sectors. In such a case, these were replaced by interviews with smaller companies or from other sectors.
- Another well known issue in this type of survey stems from the difficulties of conducting research projects among ICT decision-makers in general. Dedicated ICT professionals are heavily researched and therefore securing their participation can be difficult. This is a particular problem in larger companies.
- In some countries it was difficult to carry out interviews within businesses and retailers not using or with a very basic use of computers, because of the number of questions on related issues. The French fieldwork

organisation, for instance, reported that the questionnaire was too specific for some organisations, for example for small companies in the health & social services sector. These are mostly doctor's surgeries, where it was felt that the e-business related questions were not applicable to them. Also, small companies from the craft & trade sector, which often have just a computer but no network at all felt that the questionnaire was not sufficiently adapted to their activities.

- A related issue is that there are some compromises to be made if the same questionnaire is used for micro-enterprises as well as for large companies. Some of the questions, while only scratching the surface of e-business activities in large companies, are hardly relevant for micro-enterprises with less than 10 employees. The Hungarian survey company, for instance, reported that some questions seemed to have little relevance for companies with only one or a few employees.
- Finally, an issue which was known in advance but is unavoidable in telephone interviews is that there is no "ideal target person" to be interviewed. Fieldwork organisations reported that sometimes a data processing manager is not very aware of the consequences of e-business on the whole company, on the personnel and on the financial level. On the other hand, the general manager may not always be aware of the technical implementation status. The Irish fieldwork organisation, for instance, reported that some of the smaller companies were not familiar with technical terms such as "EDI" or "EDifact".

Weighting principles

Two weighting schemes have been applied: weighting by employment and by the number of enterprises. Data are presented in either way depending on the kind of the analysis to be made.

- Values that are reported as weighted by employment figures should be read as "enterprises comprising x% of employees". To give an example: The indicator "percentage of companies selling online" – if weighted by employment – is defined as "companies comprising x% of employees sell online". The reason for using employment weighting is that there are very many more micro-enterprises than non-micro-enterprises. The unweighted figure would effectively represent mainly the smallest sizes of firm.
- Values that are reported as enterprise-weighted figures are to be read as "x% of enterprises", reflecting the number of enterprises as legal entities but not their relative economic importance in terms of employment.

Weighting was based on the latest available universe figures by Eurostat. Missing or undisclosed universe data had to be imputed. The imputation procedures depended on auxiliary or proxy data availability, taking into account where available information about higher industry aggregations, nearest neighbour data, turnover-employment correlation and secondary sources other than Eurostat. It also allowed for the constraint of predetermined ranges such that imputed data had to be contingent with published sectoral, national and European universe totals as well as for final plausibility checks for every single imputed data item. The weighting cells correspond to the data reporting pattern used as regards industries and employment size-classes. Uniform expansion factors are applied to enterprises within one of the three size-classes per industry per country. As for data that refer to a base other than the universe of all enterprises (e.g. indicators appropriately reported for online selling enterprises only), expansion factors are adjusted to the different shares of observations per cell that build the computation base.

Variables - indicators

The set of ICT and e-business indicators for which data were collected in this survey was organised into the following modules:

- Background information (basic company data, innovation activities)
- ICT infrastructure and e-skills development in the company
- E-commerce and e-business activities (internal business process automation, procurement and supply chain integration, exchange of standardised data between trading partners, marketing and sales activities, use of e-business software)
- Impact of e-business (impact of selling and procuring online, perceived effects on work processes, satisfaction with outcome)
- Assessment of future importance of various e-business technologies

The choice of indicators considers relevant statistical work by the OECD and Eurostat and includes a basic set of widely accepted measures for e-commerce and e-business, but also tries to introduce innovative indicators which have a pilot character and are not yet widely tested.

The full list of variables which was the basis for preparing the questionnaires can be downloaded (as a spreadsheet) from the *e-Business W@tch* website (<http://www.ebusiness-watch.org>).

Specific notes

1. Proxy to the eEurope 2005 benchmarking index ("E-Business Index"), based on employment-weighted survey data from the e-Business Survey 2003. The Index is composed of two sub-indices: (A) ICT infrastructure diffusion, and (B) ICT use for e-business. Component indicators used in this proxy are: (A): A1: enterprises that have access to the Internet; A2: enterprises that have a website; A3: enterprises enabling remote access to their computer system; A4: enterprises having a connection to the Internet with >2Mbit/s bandwidth; A5: enterprises using an Intranet; (B): B1: enterprises that have purchased products online; B2: enterprises that have received orders online; B3: enterprises whose IT system for managing orders is linked with the back-end system; B4: enterprises having integrated their IT system with that of a supplier for placing orders; B5: enterprises tracking working hours and production time online; B6: enterprises trading on special B2B electronic marketplaces. All component indicators have been computed as employment-weighted percentages.
2. The E-Business Scoreboard is based on indexed values. These take into account the percentages (diffusion rates) from all sectors and show how a specific sector differs from the all-sector-average. An index value is based on mean values and standard deviations (cf. Methodological Annex, specific notes, No. 2). Constituting values are z-values, i.e. $z = (x - \text{mean}(x)) / \text{stddev}(x)$. This procedure results in a distribution with $\text{mean}(z) = 0$ and $\text{stddev}(z) = 1$. 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, a value of +1 that the percentage is higher than the mean percentage of all sectors by the extent of the standard deviation. Negative values show that the percentage is lower than the mean percentage of all sectors.
3. A comparison of survey results from 2002 and 2003 on ICT infrastructure diffusion suggests at first sight that the general level of diffusion is lower in 2003 in some sectors. However, it is possible that there are slightly different compositions of samples with respect to sub-sectors within some of the sectors, foremost in very heterogeneous sectors such as retail, tourism or health, and particularly among the smallest companies (0-9 employees). Therefore, direct comparisons between years as well as between countries have to be made with due care. Deviations in the sector composition which can lead to apparently lower ICT adoption rates are particularly pronounced in the case of small enterprises from the retail sector in France.
4. Kendall's Tau is a nonparametric measure of correlation employed with ordinal data. It measures the degree of joint occurrence of two variables among the observations in a dataset. It can take values between -1 and 1. If two variables are totally independent, Kendall's Tau takes a value of 0. If two variables are identical (always occur together), Kendall's Tau takes a value of 1 and a value of -1, if they always occur together but with reversed signs. In technical terms, it evaluates the hypothesis if there is a significant monotonic relationship between two variables in the underlying populations represented by the sample.



...others decrease. Thus, co-operation between business services companies...
 ...operating with others significantly reduced...
 ...of business services, the services provided change by...
 ...components added to them. Such changes in the nature of a service...
 ...process can, first, imply cost savings for the service companies...
 ...higher value of the service and, third, increase the competitiveness...
 ...a strong link between ICT innovativeness and competitiveness...
 ...for...
 ...companies, for example, have developed Internet-surveys as a new...
 ...video surveillance systems, which...
 ...online dir...
 ...business such as online dir...
 ...quality of service. Companies from the exhibition and conference...
 ...in addition to their offline business. These new services are not only...
 ...virtual exhibitions. These new services are not only...
 ...the customer more closely to the...
 ...by tying the customer more closely to the...
 ...lowering costs and/or rise the product value and thus prices. They...
 ...customer relationships by tying the customer more closely to the...
 ...company

0-49 empl.	50-249 empl.	250+ empl.	20	25	30	35	40	45	50
Sector total									