



The European
e-Business
Market Watch
Sector Report
No.8 II/May 2003

8 II



ICT & e-Business in the Media and Printing Industries



European Commission
Enterprise Directorate General
e-Business, ICT Industries
and Services

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Acknowledgements

This report was prepared by *empirica GmbH* (Bonn, Germany) in co-operation with *Berlecon Research GmbH* (Berlin, Germany) on behalf of the European Commission, Enterprise Directorate General. It is part of a deliverable in the context of the European e-Business Market *W@tch* (short name: *e-Business W@tch*), which is implemented by *empirica GmbH* in co-operation with *DIW Berlin – German Institute for Economic Research* and *Databank Consulting* (Milan) on behalf of the European Commission based on a service contract running from January 2002 until June 2003.

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Bonn / Brussels, March 2003

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Introduction

European policy is in a number of areas, including economic, innovation and SME policies, increasingly focussed on promoting the business techniques and new ways of working which will strengthen the economic and social foundations of the information society in Europe. To help policy makers define their programmes, and to monitor the effectiveness of these policies, some indication of progress and of areas requiring active support is essential. At the same time, many areas of European business are lacking information about the speed of technological update in European markets, which they expect will have a strong impact on their global competitiveness.

Despite the increasing number of studies and market research on electronic business, and especially on electronic commerce, from a number of authors and research organisations in different European countries and world-wide, there used to be a lack of reliable empirical up-to-date information about the extent, scope, nature of and factors affecting the speed of e-business development in Europe at the sectoral level in an internationally comparative framework. It is the objective of this report to provide such information for the media and printing industries.

The e-Business W@tch

This report has been published in the framework of the European e-Business Market Watch. This is a market observatory established by the European Commission, DG Enterprise. Laying the groundwork for a continuous facility, the *e-Business W@tch* monitors and assesses the maturity of electronic business in 15 industry sectors across all EU Member States, comprising seven manufacturing and eight service sectors. At least two reports are being published on each sector during the 18-month lifetime of the *e-Business W@tch* (cf. publication schedule on the following page).

The research presented in these Sector Impact Studies is intended to help to benchmark progress and to assess how electronic business development can be further enhanced at the European level or at Member State level with the objective to strengthen the competitiveness of European businesses. Special attention is paid to the SME dimension of e-business.

All reports, as well as an extensive collection of statistics on electronic business, can be downloaded from the website of the market observatory at www.ebusiness-watch.org.

Methodological note

Most of the data presented in this report are based on the European e-Business Survey (2002), a cornerstone of the monitoring activities of the *e-Business W@tch*. The fieldwork of this enterprise survey was carried out by INRA Germany GmbH in co-operation with its international partner organisations in June and July 2002 using computer-aided telephone interview (CATI) technology. In total, 9,264 interviews with decision makers in European enterprises were conducted. The survey included all sectors and all Member States, but only in the four largest states (Germany, France, Italy and UK) were all sectors covered. The survey for the media and printing industries was carried out in the following seven countries: Germany, Greece, Spain, France, Italy, the Netherlands and the UK. More detailed information about the survey methodology is provided in the Annex to this report.

Acknowledgement of contributions

The work of the *e-Business W@tch* is supported by a network of experts who are charged with providing input on specific sectors or e-business topics according to their expertise. With respect to this report and the media & printing sectors, we gratefully acknowledge contributions from Monique van Dusseldorp, CEO, Van Dusseldorp & Partners, Amsterdam.

Sector Impact Studies of the e-Business W@tch: Publication schedule

No.	Sector	Date
1	Food, beverages and tobacco industry	
	• Report I: Economic background / e-business issues	July 2002
	• Report II: The statistical picture (Survey 2002)	Feb. 2003
	• Report III: Recent trends (Survey 2003)	June 2003
2	Chemical industries	
	• Report I: Economic background / e-business issues	July 2002
	• Report II: The statistical picture (Survey 2002)	Feb. 2003
	• Report III: Recent trends (Survey 2003)	June 2003
3	Transport equipment manufacturing	
	• Report I: Economic background / e-business issues	July 2002
	• Report II: The statistical picture (Survey 2002)	Feb. 2003
	• Report III: Recent trends (Survey 2003)	June 2003
4	Financial sector	
	• Report I: Economic background / e-business issues	July 2002
	• Report II: The statistical picture (Survey 2002)	Feb. 2003
5	Insurance and pension funding services	
	• Report I: Economic background / e-business issues	July 2002
	• Report II: The statistical picture (Survey 2002)	Feb. 2003
6	ICT services	
	• Report I: Economic background / e-business issues	July 2002
	• Report II: The statistical picture (Survey 2002)	Feb. 2003
	• Report III: Recent trends (Survey 2003)	June 2003
7	Health and social services	
	• Report I: Economic background / e-business issues	July 2002
	• Report II: The statistical picture (Survey 2002)	Feb. 2003
8	Media and printing	
	• Report I: Background, issues and key figures	Oct. 2002
	• Report II: The statistical picture (Survey 2002)	April 2003
9	Metal products manufacturing	
	• Report I: Background, issues and key figures	Oct. 2002
	• Report II: The statistical picture (Survey 2002)	April 2003
10	Machinery and equipment manufacturing	
	• Report I: Background, issues and key figures	Oct. 2002
	• Report II: The statistical picture (Survey 2002)	April 2003
11	Electrical machinery and electronics	
	• Report I: Background, issues and key figures	Oct. 2002
	• Report II: Recent trends (Survey 2003)	June 2003
12	Retail	
	• Report I: Background, issues and key figures	Oct. 2002
	• Report II: Recent trends (Survey 2003)	June 2003
13	Tourism	
	• Report I: Background, issues and key figures	Oct. 2002
	• Report II: Recent trends (Survey 2003)	June 2003
14	Real estate sector	
	• Report I: Background, issues and key figures	Oct. 2002
	• Report II: The statistical picture (Survey 2002)	April 2003
15	Business services	
	• Report I: Background, issues and key figures	Oct. 2002
	• Report II: The statistical picture (Survey 2002)	April 2003

The Media and Printing Industries: Sector Profile & e-Business

1 Economic profile

This chapter is based on the (more detailed) introductory chapter to the first report of the *e-Business W@tch* on the media and printing industries, published in October 2002. It summarises the most important economic data and current challenges. Readers who are interested in a more comprehensive macro-economic portrait of the sector are asked to look up the respective chapter in the first report, which is available at

<http://www.ebusiness-watch.org/marketwatch/ressources/ressources.htm>.

1.1 Definition and focus

Digitisation¹ is having a profound impact on the media and printing industry. As "content" is fully digitised, delivery channels and associated services become increasingly flexible and individually tailorable. The multimedia content convergence on digital representation has also resulted in the convergence of formerly independent industries (print, music, audiovisual). Previously clearly-defined industry structures are disappearing, and integrated media companies are emerging that cannot be defined within traditional sector boundaries. Traditional printing companies evolve into cross-media service companies and traditional publishers into new media ventures, which publish across various distribution channels, such as Internet, wireless devices or CD-ROM.

This report of the *e-Business W@tch* focuses on those industries whose main business is the creation and distribution of content, including the publishing and printing sector, and also the music and audiovisual industries incorporated in NACE 92.1 and 92.2. Not included in this analysis are all downstream distribution channels for content on physical media types (print, video, CD, DVD) such as wholesale or resale of such products (part of NACE 51 and 52, respectively) or video rental (NACE 71.40).

NACE Rev.1		Activity
division	group	
22		Publishing, printing and reproduction of recorded media
	22.1	Publishing
	22.2	Printing and service activities related to printing
	22.3	Reproduction of recorded media
92		Recreational, cultural and sporting activities
	92.1	Motion picture and video activities
	92.2	Radio and television activities

Some statistical problems result from the traditional organisation of the publishing industry. Individual authors, if they contribute as freelancers, are included in NACE 92.31 and are not part of the publishing industry. This must be kept in mind in the subsequent analysis, as freelance working is of significant importance in the sector considered in this report. Not included in this report, but an important creator of content, are news agencies (NACE 92.4).

¹ **Digitisation:** The process of creating digital files by scanning or otherwise converting analogue materials as well as the creation and availability of electronic content in general.

At the heart of this sector is the publishing industry (NACE 22.1), which includes the publishing of books, newspapers, journals and periodicals, sound recordings as well as other publishing (such as photos, timetables, posters etc.). It is therefore not confined to “traditional” print publications but also includes the publication of electronic content such as music or videos.

Another industry creating content is NACE 92.11 (motion picture and video production), which includes closely related activities such as editing, cutting and dubbing. The content created in this sector is typically sold to the publishing industry, which bundles it and puts it into its different distribution channels.

The third major activity in this sector is the physical production of content, i.e., the creation of physical products that serve as media for transporting content. Two major sub-sectors are included here, namely NACE 22.2 (Printing and related activities) and NACE 22.3 (Reproduction of recorded media).

All in all, the media industry is a multifaceted sector, with huge, internationally or even world-wide operating companies continuously standing in the limelight of publicity (which is being created – to a large extent – by themselves), but also a great number of small companies, operating on a regional or local level, or working as a supplier in the value chain of the manufacture of content.

1.2 Industry statistics

Production value and value added

In 2000, the publishing and printing sector in the EU (excluding Greece and Luxemburg) generated over 233 billion Euro of production value. Slightly more than 100 billion Euro of value added at factor cost was created. In the last few years the industry has been characterised by rapid growth. Between 1997 and 2000, the production value in the sector grew by 53%. Value added increased even faster, by 65%. Over 50% of the sector’s total production value can be attributed to the publishing sub-unit (NACE 22.1). This category, however, contains not only the publishing of books and papers, but also the entire music records industry. Its development is therefore closely linked with the very dynamic music market.

In general, the publishing and printing sector has a relatively small role in the national economies of the EU. On average the production value of the industry accounted for 4,6% of total manufacturing production (EU-13) in 2000 and for 5.1% of total employment in manufacturing EU-12). However, the special importance of the media industries is not only constituted by their economic activities but also by their important information function for supporting democracy and culture.

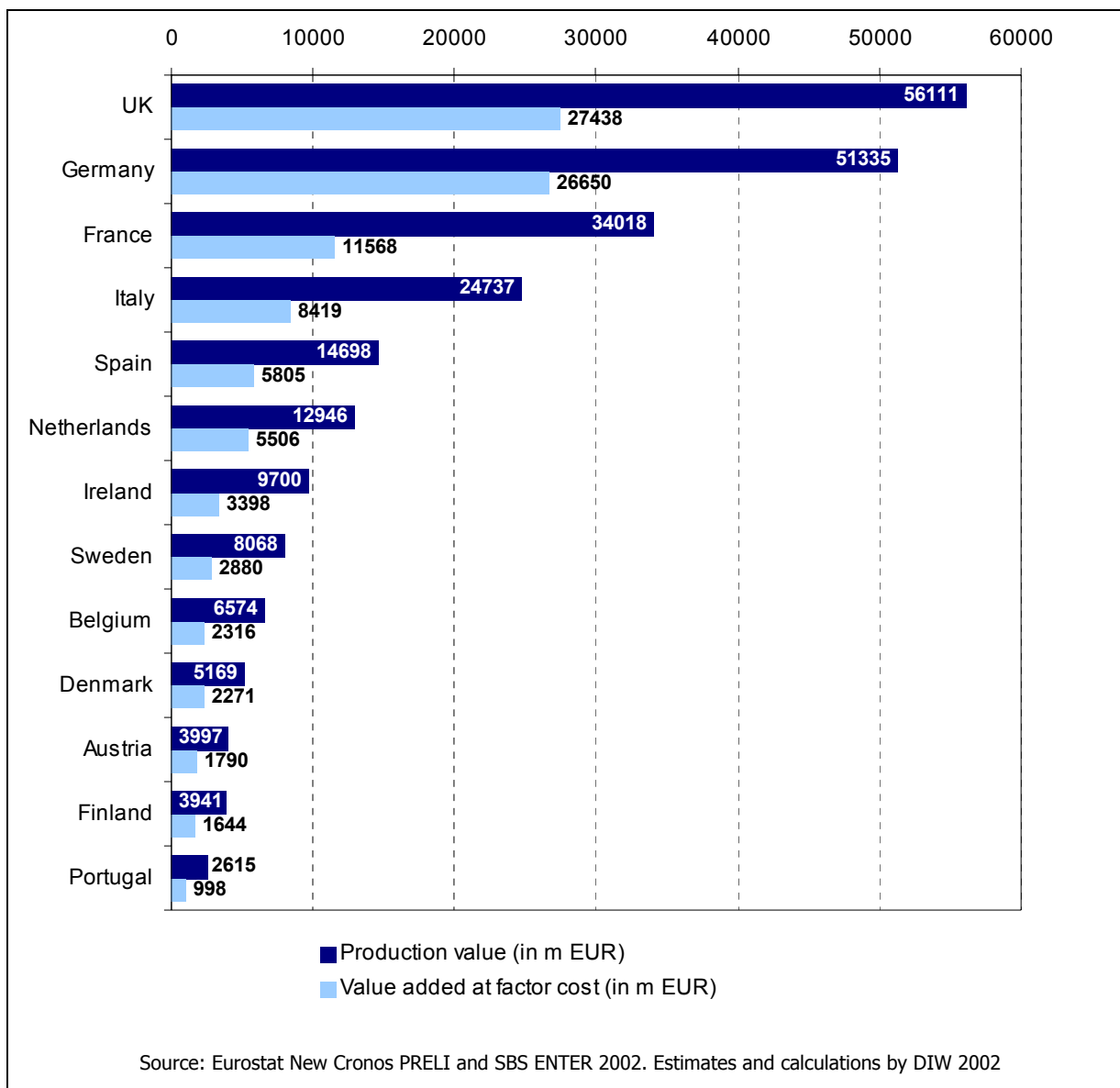
Table 1-1: Structure of the media and printing industry in the EU-13 (2000) by kind of activity

NACE Rev. 1	Production value		Value added at factor cost (est.)	
	EUR (m)*	%	EUR (m)*	%
22.1 Publishing	120,858.30	51.7	49,339.10	48.9
22.2 Printing and services related to printing	99,586.60	42.6	46,807.10	46.4
22.3 Reproduction of recorded media	13,463.90	5.8	4,709.80	4.7
22 Publishing, printing and reproduction of recorded media total	233,909.00	100.0	100,856.00	100.0

* EU-13, no data is available for Luxemburg and Greece.

Source: Eurostat New Cronos PRELI and SBS ENTER 2002. Estimates and calculations by DIW 2002.

Figure 1-1: Production value and value added at factor cost
in publishing, printing and reproduction of recorded media sector (2000)



Structure and employment

Publishing, printing and reproduction of recorded media tends to be dominated by small-sized enterprises. In 1999 over 97% of all companies employed less than 49 persons. However, firms included in this size class generated only 36.7% of total turnover of the sector and employed less than half of those working in these industries.

Table 1-2: Size class distribution in NACE 22 in the EU-11 (1999)

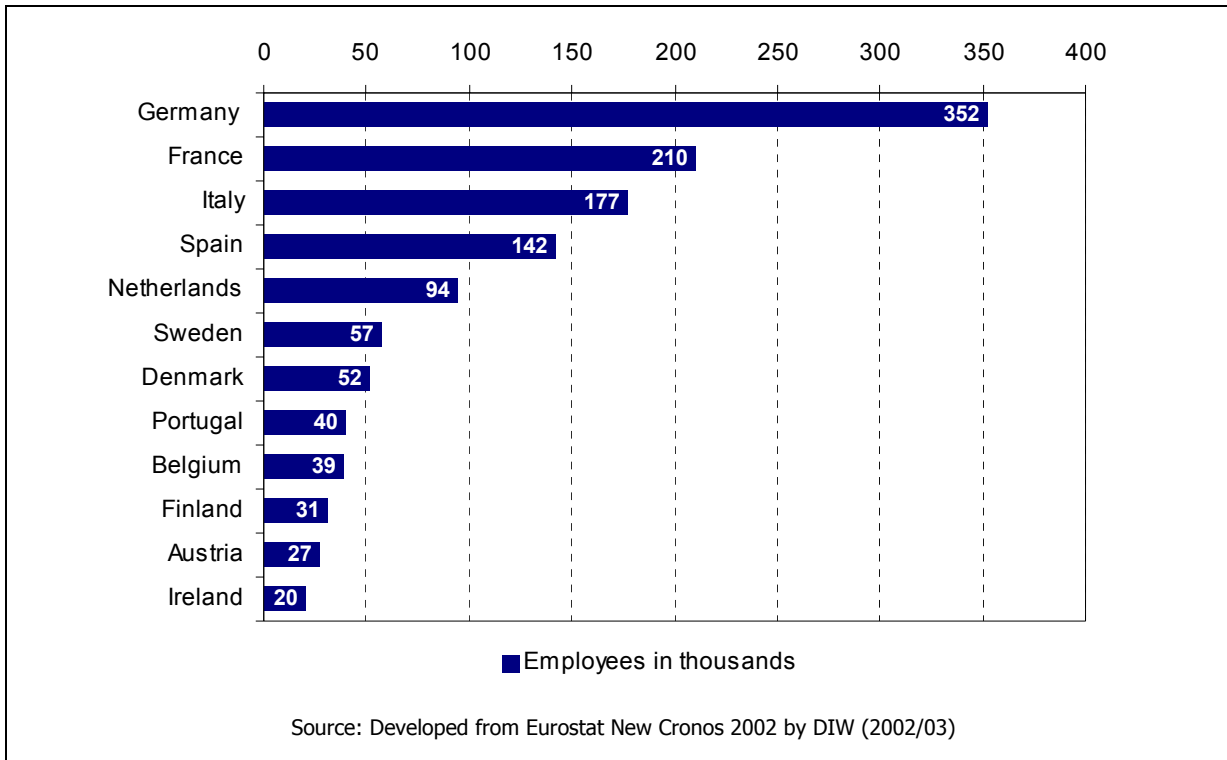
NACE 22: Publishing, printing and reproduction of recorded media	Number of Enterprises		
	1 to 49	50 to 249	>250
Number of enterprises (%)	97.2	2.4	0.5
Turnover (%)	36.7	26.6	36.7
Persons employed (%)	47.4	24.2	28.4

EU-11 1999 (latest available figures). No data were available for Greece, Luxembourg, Netherlands and UK.

Source: Eurostat New Cronos 2002. DIW 2002.

Data from European official statistics on employment in the printing and publishing sector is only available for twelve EU Member States, not including Greece, Luxemburg and the United Kingdom. In the available EU-12, more than 1.2 million persons were employed in the printing and publishing sector in 2000. On average, printing, publishing and related activities accounted for 5.1% of total employment in manufacturing in the twelve EU countries in 2000.

Figure 1-2: Number of persons employed in the NACE 22 sector in EU-12 (based on Table 1.4)



1.3 General economic trends and challenges

Economic slowdown and industry consolidation

The media and printing sector is not unscathed by the economic slowdown of the past two years. In particular, the sector has been hit by a decline in advertising revenues, with online advertising in particular developing well below expectations, despite the increase of Internet usage. The advertising slump resulted initially from a general cutback of advertising expenditure in the enterprise sector in the wake of the economic slowdown. Secondly, it resulted from the bankruptcy of many start-up-companies with overly high advertising budgets in the wake of the bursting dot-com bubble. Private consumption has been weak as well, resulting in slow demand for content products. Subscriptions for magazines and newspapers have been declining and several magazines – especially so called “new economy magazines” – had to be closed only a few months after their first publication. In addition the printing industry had to cope with high raw material prices.

Structural changes and the need for new business strategies

The ICT revolution has resulted in an erosion of traditional revenue streams, a substitution of traditional products and a replacement of whole steps in the value chain. Printers, for example, face the challenge that parts of the production process of printed goods are becoming obsolete through the increasing digitisation of the workflow. As a response, even small print companies are diversifying from traditional print products into crossmedia services, such as multimedia design and layout.

Digital products have specific economic properties that require the adoption of new business strategies. Digital information goods have high first-copy and low replication cost. A pop-song, for

example, might involve high production costs (composing, recording, licensing etc.) but the marginal cost to duplicate the song on CD or DVD tends to be very low (duplication cost over the Internet can even be zero). At the same time, digitisation allows for the production of different media from one single data source. If stored in certain file formats (e.g. XML), a news story, for example, can be sent to the printer's computer-to-press system (CTP) to be immediately printed, published on a website, sent to a wireless device or archived on a CD. Therefore, the most profitable way of exploiting digital content products is often described by the industry as "create once and distribute many".

In response to these changes, large, vertically integrated media groups were created that produce and own the content as well as the channels to distribute it. In some cases content producers have tried to become channel owners, as happened with Bertelsmann, which invested (and later divested) in Internet service provider AOL Europe. In other cases channel owners have attempted to take over content producers. The acquisition of television production house Endemol by telecom operator Telefonica is an example of the latter. The troubles that those merged companies have been facing lately has, however, led to a broad scale discussion about the sense of merging the creation and distribution of content. Recent changes in the strategy of media giants such as Bertelsmann and Vivendi suggest a return to a more focused approach.

Internationalisation

With the exception of parts of the music and movie industries and scientific publishing, the sector analysed in this report has traditionally been largely focused on local markets. The international trade of content goods and services has been limited by language and cultural barriers. However, over the past years, the publishing and printing, as well as the radio and television markets, have increasingly become international. One major factor contributing to this trend is that new distribution channels of digital goods such as the Internet or satellite do not have physical borders.

The growing use of English as an international language and a certain degree of convergence on Anglo-American culture have further accelerated the internationalisation of the media and printing sector. As a result, large international media conglomerates that follow strategies of transnational vertical and diagonal concentration have emerged. On the other hand, a number of smaller companies now specialise in the development of content formats that can easily be exported to other European countries as well as beyond. In the printing industry, the complete digitisation of production processes allows for easier outsourcing of parts of the process, including sometimes across borders. In addition, the catch-up process of Eastern European countries has resulted in an increase of the overall print capacity.

2 Usage of ICT & e-business

2.1 The role of ICT and e-business for media and printing companies

A description and analysis of how media and printing companies use e-business applications for conducting their business is available in the respective chapter of the first report on this sector which was published in October 2002. Background analysis in this report covers the following areas and provides illustrative examples:

- Internal processes
- Procurement processes
- Print transaction and production
- Content production and publishing
- Physical content products
- Online content
- Non content-related products and services

In this study, we want to focus instead on how the sector itself perceives the role and importance of e-business, and on the implications of these activities for future business activities of companies within the media and printing industry.

General importance of e-business for the media and printing industry

Many of the major challenges that media and printing companies have to deal with today could potentially be facilitated and coped with through the use of ICTs and e-business applications. However, there are still many uncertainties as to how the "electronic publishing"² landscape will develop, and which applications will finally reach market maturity. Uncertainties are mainly caused by the two big questions that are critical for any new media service to be introduced: first, whether consumers (or professional users) will like it, and second, whether they will also be willing to pay for the service the required amount of money to make the service profitable for the operator.

The past decade of the media industry can be described as a multi-billion-euro game in which all major stakeholders had to answer these questions for themselves and define their electronic business strategy accordingly. These are just a few examples:

- **Online information services:** Since the late 1990s, nearly all newspaper and magazine publishers have launched their websites and offer an enormous amount of information – in most cases for free, with little revenue from placing advertising banners. More and more companies are openly considering to cut back their online activities, as the quite substantial costs for maintaining the services are poorly justified by the return on investment. However, companies are in a way caught in a trap, as their readers (and subscribers) now expect to have (free) access to the electronic information as part of their deal with the service provider.
- **Interactive TV:** Since the mid 1990s, media giants have played around with ideas and concepts for launching interactive services on cable networks (e.g. video-on-demand, near-video-on-demand). Ideas are still around, but there are very few success stories yet (if any). The big debate whether television – the perfect interface for a passive consumer behaviour ("couch potatoes") – will also be used in the future to consume interactive digital contents has already been held in the 1990s and is still ongoing. Today, not even internet surfing via TV has gained a significant market, although the technology has long been around.

² The term refers to both the digitisation of the printing process (i.e. the technological advancement in the production of printed matter) and the digitisation of the delivery process to consumers (i.e. the delivery of information and entertainment services through electronic networks, in particular through the internet or via digital television).

- **Books-on-demand:** In the area of printing and book publishing, there are many initiatives to facilitate the distribution of low copy publications by enabling printing on demand, i.e. that a book will only be printed when a customer has ordered it. The hope is that digital printing could make the production of very small volumes (possibly single-copy) and personalised printing technically and economically feasible and thus be a viable method to overcome the high first-copy costs. While there are in fact some promising initiatives, it is still unclear whether this new production model will be wide spread or remain a niche model for very specific publications only.

These rather spectacular examples that have gained a lot of public attention in recent years illustrate that the media and printing industry is a very special sector with respect to electronic business. However, there are many other areas where ICTs and electronic business already play an important role in day-to-day business in the sector.

For instance, the efficiency and **speed of the pre-print process** have been significantly increased by the use of the Internet as the main communication channel between producer and customer as well as between different service providers. In fact, according to survey results presented in this report, to share documents and to perform collaborative work is by far the most important use of online technologies in the media and printing sector. Large files can securely be transmitted between all involved parties within seconds, and as a result, different service providers can easily collaborate (graphic designer, photographer, repro company etc.). This is especially important for complex projects, where the processing by a single company is no longer sufficient.

Another catch-word of recent years is **cross-media publishing**. As a result of digitisation, text-based content can be produced for various media from one single data source. Content management systems (CMS) allow content to be directly produced by editors in various formats (HTML, XML, WML) without additional technical knowledge. Text is simply inputted in templates and can then be published in different layouts and on different media as well as exported to other formats. In large publishing companies, CMS are supplemented by digital asset management systems (DMS) that manage the digitisation, storing, indexing and retrieval of content. While these systems are already at work, it is likely that we have only seen the beginnings, and that the implications of these technologies for the distribution of content are not yet fully understood.

The digitisation also greatly impacts on the **audiovisual industry**. The fights about appropriate mechanisms for copy-right protection (e.g. for recorded music or movies) between stakeholders involved, including world-wide operating media giants, and particularly between the music industry, consumer protection organisations, the hardware and software industry, causes challenges also for policy makers.

The networked society – a challenge for media companies

In fact, this example demonstrates that the fast emergence of the information society does not only provide opportunities for the media and printing sector, but also serious challenges and new competition – not only from entrants from other sectors, but from the network itself: Digitisation of content in combination with ever-more powerful computers, the emergence of the World Wide Web as well as the creation of powerful search engines and exchange services for audio and video content on the Internet have created a major challenge for the media and printing sector. The industry used to have a great deal of control over the distribution media (for instance CDs, broadcast) and distribution channels of its content. While in the past uncontrolled exchange of content (e.g. of tapes) took place only occasionally and between people who knew each other, this situation has changed considerably.

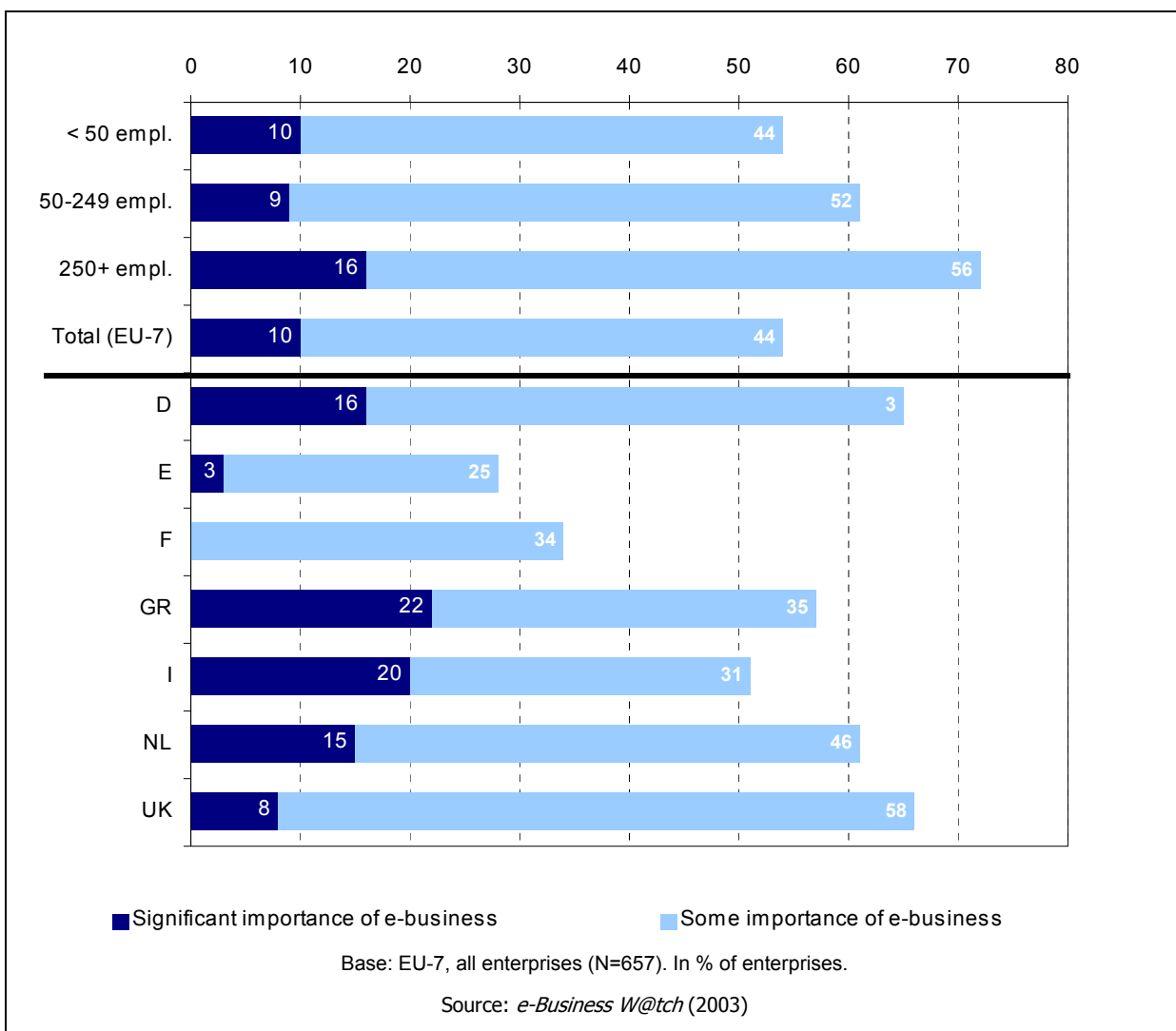
Two different regimes are possible for compensating copyright owners for the loss of sales (however large this may be). The first is a lump-sum charge on the sale of technical equipment necessary to reproduce digital goods (i.e., computers, CD or DVD drives) and on media (e.g., raw CDs or DVDs) as is the case currently with photocopiers or audio recorders and tapes in many countries.³ This sum can

³ In Germany, for example, currently 7.50 Euro are levied on each CD burner sold and 30 Euro on each personal computer. Cf. www.vgwort.de.

then be distributed to the copyright owners. The second regime consists of technical solutions for digital rights management (DRM). DRM systems identify and describe content and set rules for how the content is to be used while encryption makes it unusable to non-authorized users. DRM systems are, however, currently neither widely deployed nor widely accepted. Consumers in particular are not accepting them easily, since they often also limit the legal use of digital content.

Considering all these issues and the huge publicity which the discussion of these issues has in the public (note: the media have increasingly discovered themselves as a topic to report about in recent years!), one could assume that media and printing companies would outrank other sectors when it comes to how they perceive the importance of e-business for their sector. However, the empirical evidence is a different one. 54% of enterprises from this sector said in 2002 that e-business had at least some importance for the way they operate, and only 10% said e-business had significant importance. This very much in line with the industry average (12% "significant importance" / 36% "some importance").

Figure 2-1: Media and printing industry: Importance of e-business in 2002 as perceived by companies



Satisfaction with e-business and perceived beneficiaries

As in all sectors, a majority of companies from the media and printing industry believes that large enterprises are more likely to benefit from e-business than small companies. This assessment is, however, in contrast to the actual satisfaction with e-business in those companies that are active in e-business. Large and small companies are more or less equally satisfied with the effects of e-business.

Overall, about 85% of the companies in the media and printing sector which apply e-business are very or fairly satisfied with it.

Table 2-1: Media and printing: Perceived beneficiaries of e-business

Most likely to benefit from e-business:	All sectors	Media and printing			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
SMEs	13	11	11	15	7
Large enterprises	45	37	37	38	26
Equal	34	44	44	42	58
No one	2	2	2	2	2

Base: EU-4 (D, F, I, UK), all enterprises (N= 404). In % of companies. Figures don't add up to 100 because of "don't know" / "no answer". Reporting period: June/July 2002.

Source: e-Business W@tch (2003)

Table 2-2: Media and printing: Satisfaction with the effects and success of e-business (% of companies doing e-business⁴)

Satisfaction with e-business activities	All sectors ^o	Media and printing			
		All enterpr. ^o	0-49 empl.	50-249 empl.	250+ empl.
Very satisfied	14	14	11	15	16
Fairly satisfied	72	71	71	69	74
Fairly disappointed	12	14	18	16	10
Very disappointed	2	<1	<1	<1	--

Base: EU-4 (D, F, I, UK), all enterprises (N= 404). In % of companies, except ^o: Figures weighted by employment ("enterprises comprising ...% of employees"). Reporting period: June/July 2002.

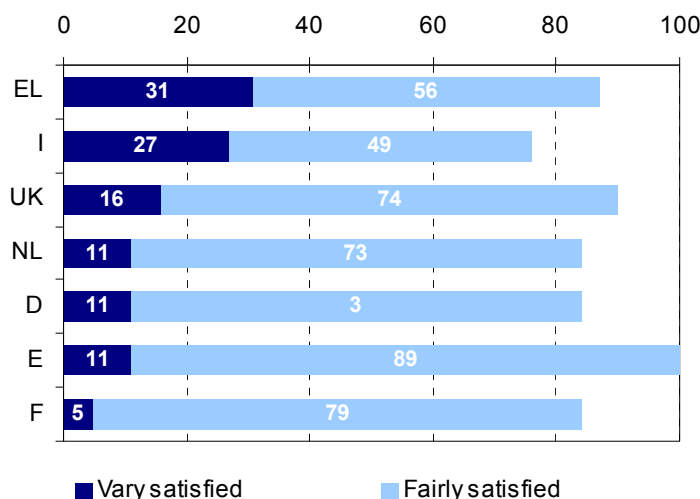
Source: e-Business W@tch (2003)

Figure 2-2: Media and printing: Satisfaction with e-business across countries

Base: EU-7 (D, E, EL, F, I, NL, UK), companies doing e-business (N=330), cf. footnote (1).

Figures weighted by employment ("enterprises comprising ...% of employees"). Reporting period: June/July 2002.

Source: e-Business W@tch (2003)



Planned expenditures on e-business technologies

The high level of satisfaction with e-business is also reflected in the ambitious plans of companies to further invest in e-business technologies within the 12 months period ahead. Only 2% of the companies in the sector admitted in mid 2002 that they intended to decrease their e-business expenditures, two thirds said they wanted to keep expenditures on the current level and about one third planned to increase the respective budgets. These figures are based on intentions and

⁴ Companies reporting that e-business constitutes some or a significant part of the way they operate today.

statements made during a telephone interview, and it is therefore not justified to draw conclusions about real subsequent investments. However, they can be regarded as an expression of the general attitude towards electronic business technologies in mid 2002. In spite of the general economic downturn and disillusionment in the wake of the new economy crisis, companies seem to be aware that electronic business will continue to be important and willing to make the necessary investments.

Table 2-3: Media and printing: Planned expenditures on e-business technologies for the 12 months period ahead

Expenditure on e-business technologies	All sectors°	Media and printing			
		All enterpr.°	0-49 empl.	50-249 empl.	250+ empl.
Increase expenditures	33	32	31	28	35
Decrease expenditures	3	2	4	2	--
Maintain current level	59	62	60	69	61

Base: EU-4 (D, F, I, UK), all enterprises (N= 404). In % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees"). Reporting period: June/July 2002.

Source: e-Business W@tch (2003)

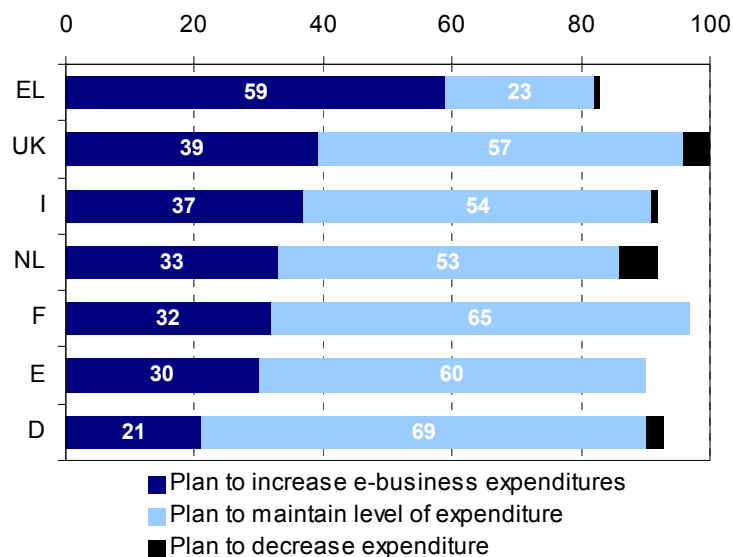
There are notable differences between media and printing companies from different countries with respect to their plans for e-business investments. Media and printing firms from Greece seem to be most enthusiastic to increase their budgets for e-business (59%, weighted by employment), while German businesses are most conservative and careful with their statements about future expenditures (only 21% say they will increase budgets). For the other countries results are similar, with 30-39% of firms saying they will increase their spending on electronic business. The share of firms openly admitting budget cuts on e-business is below 5% in all countries except the Netherlands (6%).

Figure 2-3: Media and printing: Planned expenditures on e-business technologies for 12 months period ahead

Base: EU-7 (D, EL, E, F, I, NL, UK), all companies (N=657).

Figures weighted by employment ("enterprises comprising ...% of employees"). Reporting period: June/July 2002.

Source: e-Business W@tch (2003)



2.2 ICT infrastructure and skills development

The following section discusses the diffusion of ICT and e-business in the media and printing sector. A number of methodological limitations have to be kept in mind in this analysis:

- Comparable data sets for *all* sectors are available for the EU-4 (Germany, France, Italy, UK); comparisons to the industry average are therefore based on EU-4 data. To give an indication of regional differences, though, a number of cross-country comparisons are provided for usage-oriented e-business indicators. These serve as a background for the more detailed comparison across size classes and with the average of all sectors conducted in this section.
- The composition of enterprises is different in different size classes. For example, those sub-sectors where enterprises are typically very small have a larger weight in size class 0-49 employees than in size class 250+ employees.
- Data is available in employment-weighted and enterprise-weighted form. Depending on the statistics, the more appropriate weighting-scheme has been used. The weighing applied is specified in the footnote to tables and charts.

2.2.1 IT and network infrastructure

Availability of general ICT infrastructure in media and printing companies

The digital transformation of products and production processes requires all companies in this sector to have a very well-developed IT infrastructure. In fact, survey results of the e-Business W@tch confirm that the IT infrastructure in the media and printing sector is significantly better developed than on average. This is true especially for the use of the World Wide Web and the implementation of Local Area Networks. Concerning computers, Internet access, e-mail and WWW usage, small companies are almost as well equipped as large companies. Other infrastructure, such as intra- and extranet, is clearly better developed in large companies. However, this reflects to some extent the greater benefits from employing such infrastructure in large companies. Small enterprises with only one or two computers do not have as much to gain from a LAN or Intranet.

Table 2-4: Media & printing industry: Availability of IT infrastructure

Available ICT infrastructure	All sectors° (EU-4)	Media and printing (EU-4)			
		All enterprises°	<50 empl.	50-249 empl.	250+ empl.
Computer usage	97	99	99	100	100
Internet access	91	97	95	99	100
E-Mail usage	87	96	93	99	99
WWW usage	84	94	88	98	100
Intranet	51	58	34	65	89
Extranet	20	25	8	31	45
LAN	67	74	50	91	100
WAN	34	37	9	35	83
Remote access *	39	43	23	53	68
Wireless access *	12	17	5	19	37

Base: EU-4 (D, F, I, UK), all enterprises (N= 404), except*: enterprises using computers (N=401). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees"). Reporting period: June/July 2002.

Source: e-Business W@tch (2003)

Table 2-5: Media and printing industry: Availability of IT infrastructure across countries

	D	E	F	GR	I	NL	UK	EU-7
Computer usage	99	100	99	99	100	100	99	99
Internet access	99	99	97	94	98	99	95	98
E-Mail usage	99	97	92	94	98	97	95	96
WWW usage	97	87	92	83	87	98	95	93
Intranet	64	45	52	56	55	55	56	56
Extranet	27	24	26	16	23	18	23	24
LAN	80	79	73	75	67	62	73	74
WAN	47	20	32	36	15	29	41	35
Remote access *	55	27	17	28	44	50	47	42
Wireless access *	31	16	2	7	8	10	17	16

Base: EU-7 (D, E, F, GR, I, NL, UK), all enterprises (N= 657), except*: enterprises using computers (N=653). Figures weighted by employment ("enterprises comprising ...% of employees"). Reporting period: June/July 2002.

Source: e-Business W@tch (2003)

Basic IT infrastructure is relatively well-developed in all countries, although the penetration with e-mail and WWW is significantly below 100% in countries like Greece, Spain and Italy. The use of Intranets is comparatively widespread in Germany (64%). All other countries show values around 50%. Lower average sizes of media and printing companies in these countries might be a potential explanation.

Internet connectivity

Resulting from the need to exchange larger files with business partners and customers, companies in this sector generally have more powerful Internet bandwidth than on average. While 57% of employees in this sector work in enterprises with DSL or other Non-ISDN fixed line, only 52% do so on average in the EU-4 (D, F, I, UK). The percentage of firms that still use analogue modems is higher for small than for large companies. Nevertheless, SMEs in this sector are well-equipped with powerful DSL connections. ISDN is also very popular, due to the early use of ISDN to transfer data directly between companies. Medium-sized enterprises have nearly as powerful Internet connections as large ones. This reflects that particularly "bandwidth-hungry" companies (e.g. in video production) often fall into this size class.

Table 2-6: Media and printing industry: Internet connection modus

Internet connection	All sectors °	Media and printing			
		All enterpr. °	0-49 empl.	50-249 empl.	250+ empl.
Analogue modem	19	19	31	12	10
ISDN	39	35	39	28	34
DSL	25	26	29	36	9
Other fixed	27	31	8	37	61
Other connection	3	3	1	3	5

Base: EU-4 (D, F, I, UK), enterprises with internet access (N= 391). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees")

Source: e-Business W@tch (2003)

Table 2-7: Media and printing industry: Internet connection speed

Internet connection speed	All sectors °	Media and printing			
		All enterpr. °	0-49 empl.	50-249 empl.	250+ empl.
< 2 Mbit/s	62	65	76	59	54
2-10 Mbit/s	17	22	9	22	40
>10 Mbit/s	8	6	3	12	6

Base: EU-4 (D, F, I, UK), enterprises with internet access (N= 391). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees")

Source: e-Business W@tch (2003)

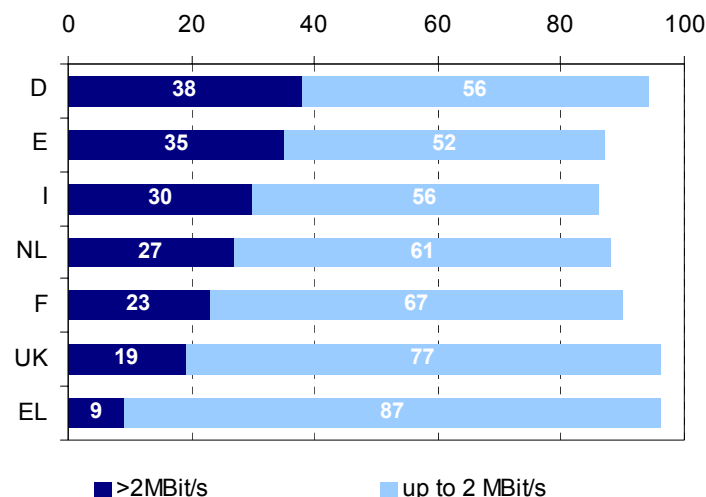
Figure 2-4: Media and printing: Bandwidth available to companies with Internet access across countries

Base: EU-7 (D, E, EL, F, I, NL, UK), companies with Internet access (N=637).

Figures weighted by employment ("enterprises comprising ...% of employees"). Figures don't add up to 100% because of "don't know" / "no answer".

Reporting period: June/July 2002.

Source: e-Business W@tch (2003)



2.2.2 IT skills

Access of employees to ICT networks and applications

The transformation of the media sector and specifically the digitisation of the workflow require the use of computers and electronic network applications by a large number of employees in this sector. About 80% of all employees in media and printing companies work in firms where the majority of office workers has access to e-mail for internal and external communication and to the world wide web. This is significantly above average, particularly with respect to web access (81% compared to 63% on average). More than 50% of employees (and 82% in large companies) work in firms where the majority of workers has access to the company intranet.

Table 2-8: Media and printing industry: Facilities available to the majority of office workers

The majority of office workers has access to ...	All sectors °	Media and printing			
		All enterpr. °	0-49 empl.	50-249 empl.	250+ empl.
... e-mail for internal communication	67	80	65	92	99
... e-mail for external comm.	74	86	83	95	89
... the WWW	63	81	77	81	90
... the intranet	44	51	28	56	82

Base: EU-4 (D, F, I, UK), all enterprises (N= 404). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees")

Source: e-Business W@tch (2003)

Demand for IT specialists

In mid 2002, about 14% of companies from the media and printing sector reported that they had searched for IT staff – if successfully or not – in the year before. About half of those said that they had experienced great or at least some difficulties in finding qualified staff. In other words, about 7% of enterprises had problems to fill positions available which had a strong focus on ICT.

Problems in finding qualified personnel seem to be more prevalent in the Southern European countries, as a significantly higher percentage of Italian and Spanish media and printing companies report "great difficulties". As the number of observations per country on which this percentage is based is rather small ($N_{(country)} \sim 15-30$), results should be taken as an indication only, though.

Figure 2-5: Media and printing industry: IT recruitment intensity and difficulties

*Difficulties in recruiting = companies having experienced great or some difficulties in recruiting staff with special IT skills.

Base: EU-7 (D, E, F, GR, I, NL, UK), all enterprises (N= 657). Figures in % of companies.

Source: e-Business W@tch (2003)

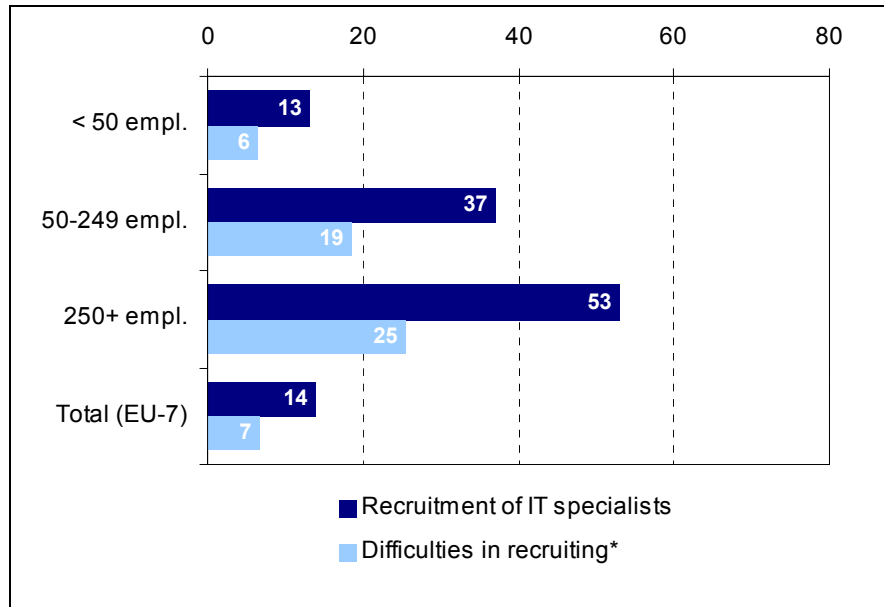
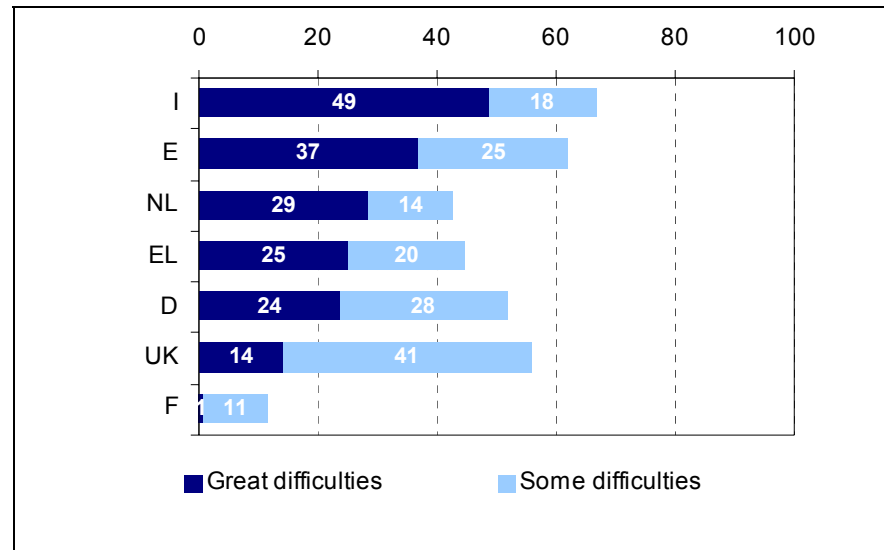


Figure 2-6: Media and printing industry: IT recruitment intensity and difficulties

*Difficulties in recruiting = companies having experienced great or some difficulties in recruiting staff with special IT skills.

Base: EU-7 (D, E, F, GR, I, NL, UK), enterprises having recruited or tried to recruit IT staff (N=162). Figures in % of companies.

Source: e-Business W@tch (2003)



ICT skills development

The generally high level of IT usage in this sector also places high demands on the IT skills of employees and should result in a comparatively large demand for IT education. However, data shows that in many enterprises employees are more or less left alone with the task of learning how to use the new technologies. Learning-by-doing on the job is regarded as the most important training scheme,

followed by self-learning activities. Formal training is not regarded as very important. SMEs in particular do not consider it as very important, and thereby possibly underestimate the necessity for training schemes. On the other hand, this empirical evidence is not specific for the media and printing sector, but is very similar to the overall picture – in fact, the rating for the importance of training schemes is even slightly higher in the media sector than on average (cf. figures for "all sectors").

Table 2-9: Media and printing industry: Importance of different training schemes for IT skills development

Training schemes rated as "very important"	All sectors°	Media and printing			
		All enterpr.°	0-49 empl.	50-249 empl.	250+ empl
On-the-job learning	59	66	62	65	72
Formal training schemes	25	21	14	27	29
Self-learning activities	38	44	42	46	45

Base: EU-4 (D, F, I, UK), enterprises using computers (N=5741 for all sectors, N=401 for media and printing).
 Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees")

Source: e-Business W@tch (2003)

Most media and printing companies in all countries for which data is available offer at least some support for the development of networking and IT skills. Companies in the UK and France are most supportive, while around one quarter of employees in Italy and Spain are working in enterprises where they receive no support and have to acquire the necessary skills on their own.

The differences in the provision of employee training between large and small companies, however, are confirmed by the following tables. While close to 100% of employees in large companies work in enterprises offering some support of IT and networking skills development, only about three-quarters of those in small enterprises do. The difference is most pronounced in in-house computer and IT training where the shares are more than twice as high for the group of large than for the group of small companies.

Figure 2-7: Media and printing industry: Companies supporting any kind of networking and IT skills development

Base: EU-7 (D, EL, E, F, I, NL, UK), all enterprises (N= 657).

Figures for countries weighted by employment ("enterprises comprising ...% of employment offer support").

Figures for company size-classes in % of enterprises in the respective size-band.

Source: e-Business W@tch (2003)

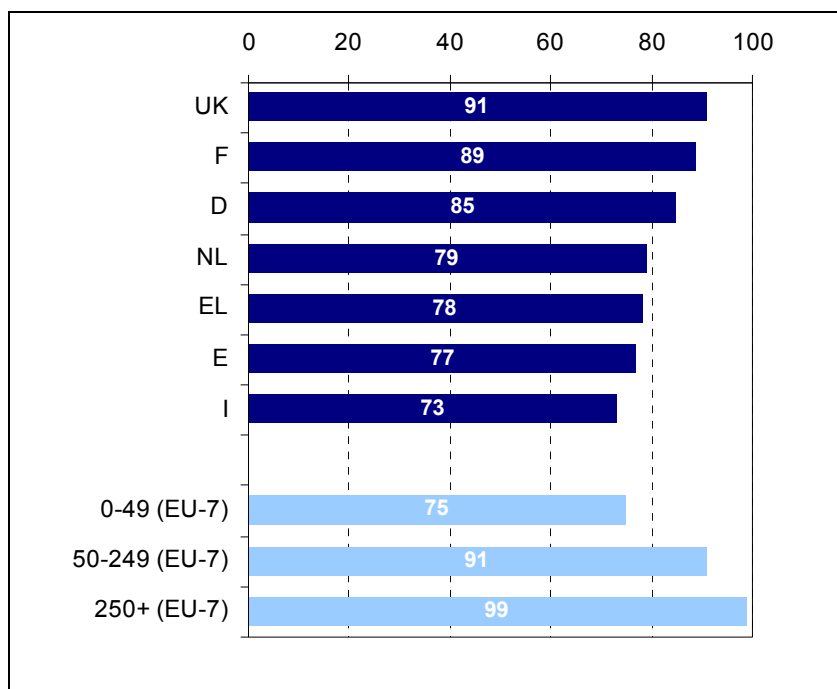
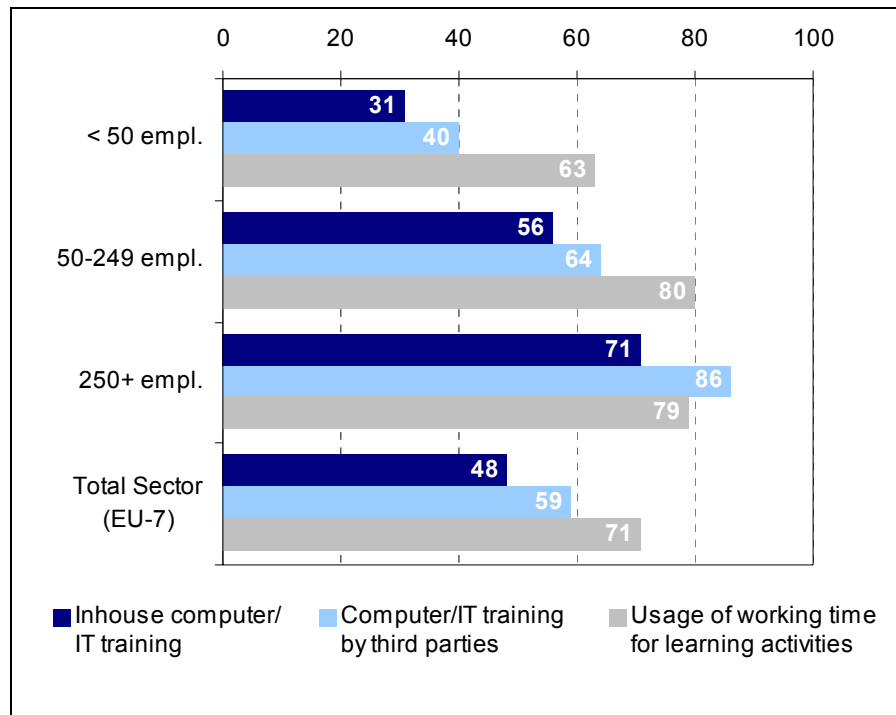


Figure 2-8: Media and printing industry: IT training offered to employees

Base: EU-7 (D, E, F, GR, I, NL, UK), all enterprises (N= 657). Figures weighted by employment ("enterprises comprising ...% of employment offer ...").

Source: e-Business W@tch (2003)



To summarise, the usage of IT equipment is more intensive in this sector than on industry average. This holds true for large as well as for small companies. However, there is some evidence that small enterprises in particular are putting less emphasis on IT skills development than larger firms. This could be an implication and target area for policy initiatives towards e-business development.

2.3 E-business activities and impacts

2.3.1 Internal processes

Internal collaboration

The increasing digitisation of the workflow makes collaboration between companies easier, because digital content can seamlessly be exchanged over the Internet. The media and printing sector is already characterised by a relatively high interlocking of different companies in the value chain. Data confirm that the use of e-business will push this development even further. Online technologies in media and printing are used for collaboration and sharing documents to a much larger than average extent. The usage of all other technologies is very close to the average in EU-4.

The use of online technologies for internal processes is significantly higher in large companies than in small ones. The large differences between size classes can be taken as an indication that SMEs need to improve their understanding of the potential of internal online technology use. In contrast to e-commerce, i.e. selling and buying online, the potential advantages of internal use have probably been underemphasized in small companies during the recent e-commerce boom.

However, there are only marginal differences between media and printing companies from different countries with respect to basic applications such as document sharing over IT networks (cf. figure below). This indicates that the diffusion of e-business functionalities for internal work processes is determined by company size more than by the overall information society maturity of the respective region.

Table 2-10: Media and printing industry: Usage of online technologies

Online technologies used	All sectors °	Media and printing			
		All enterpr. °	0-49 empl.	50-249 empl.	250+ empl.
To share documents/ to perform collaborative work	46	55	40	50	85
To automate travel reimbursement of employees	12	10	4	8	23
To track working hours and production time	26	21	11	33	34
To support the human resources management	23	21	9	21	39
For e-learning	19	23	12	27	42

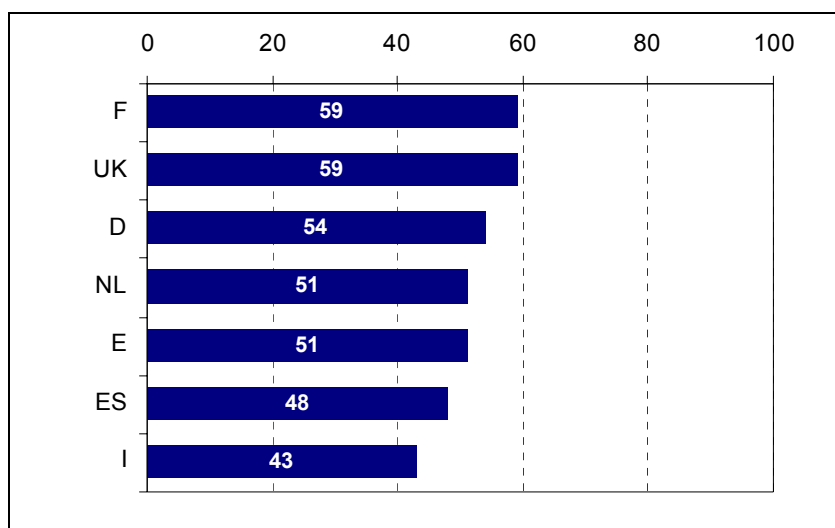
Base: EU-4 (D, F, I, UK), all enterprises (N=404). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees")

Source: e-Business W@tch (2003)

Figure 2-9: Media and printing industry: Usage of online technologies for sharing documents / collaborative working (by country)

Base: EU-7 (D, E, F, GR, I, NL, UK), all enterprises (N= 657). Figures weighted by employment ("enterprises comprising ...% of employment").

Source: e-Business W@tch (2003)



E-business integration

The importance of sophisticated e-business systems in the media and printing sector is comparable to other sectors. One exception is the use of **application service providers** (ASP) that offer software as a service to be used via the Internet. The use of ASP services is above average in this sector, which might be due to the use of ASPs for offering digital content to the public. Clearly all systems are much more important for large than for small companies, since they are often rather complex solutions that offer economies of scale and are therefore of specific value in large companies.

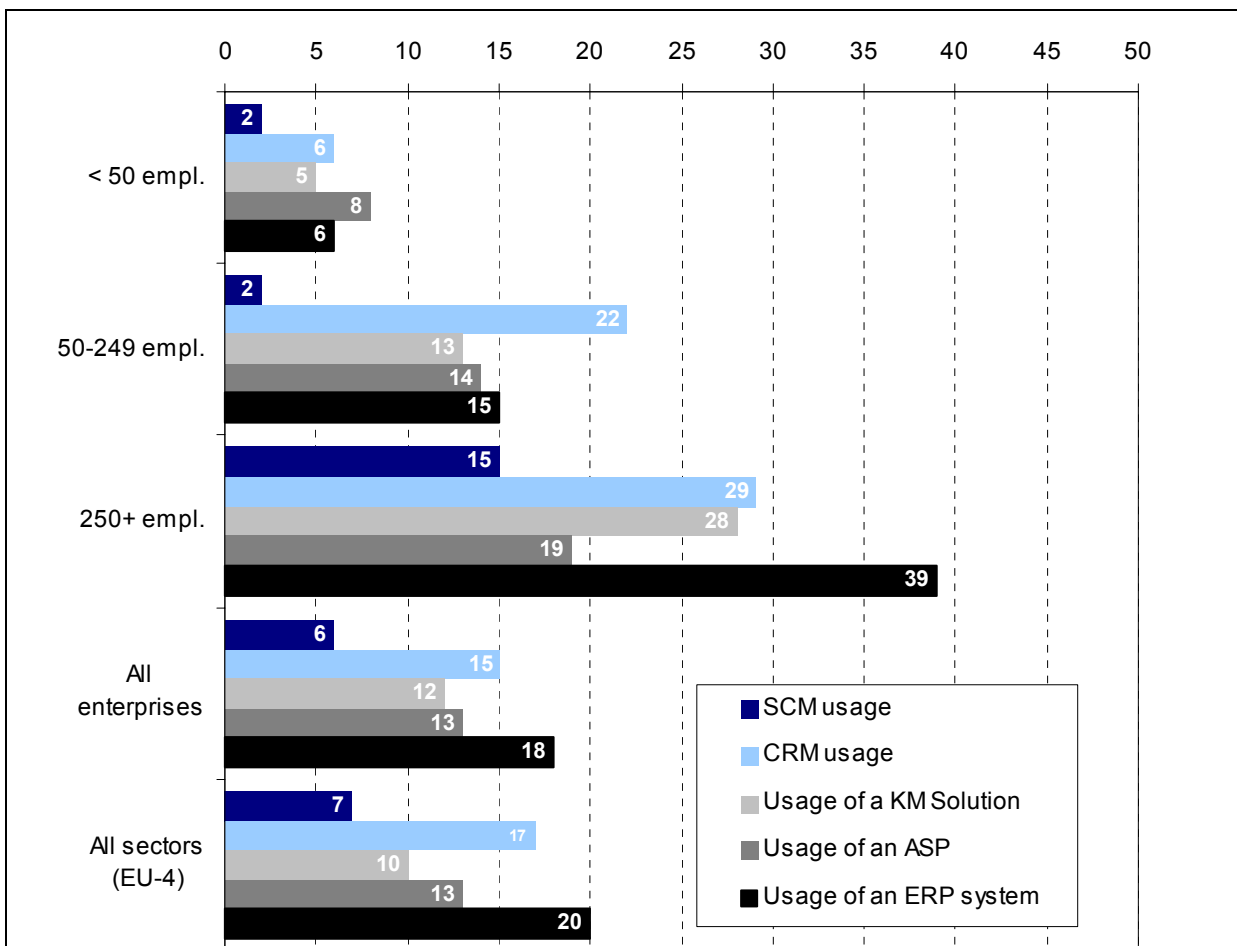
Even though **Enterprise Resource Planning** systems (ERP) have originally been primarily used by manufacturing or wholesale and retail companies, the use of such complex systems is also on the rise in the services sector. Enterprises accounting for 18% of employment in the media and printing sector use ERP systems today and an additional 3% plans to do so in the future. Since the implementation of complex IT systems is often not profitable for SMEs, more large than small companies use ERP systems. However, an increasing number of standardised software packages for key business processes are now offered at low prices that make them affordable also for smaller companies.

The increasing amount of information available on the Internet has made the efficient management of knowledge a key success factor for knowledge-intensive services. Many of the information and entertainment services offered by media companies are greatly facilitated by intelligent storage of previously processed information which can easily be accessed and repurposed. Accordingly, the sector should be an important target market for **Knowledge Management** systems. Knowledge

management describes the process through which organisations 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. 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. Particularly 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. The *e-Business W@tch* survey results show that 5% of the small and 28% of the large companies in the media and printing sector reported to use a knowledge management system in 2002. The gap is likely to increase, as only about 2% of SMEs, but 14% of large enterprises reported plans to implement such systems.

The diffusion of more sophisticated systems for integrating e-business processes (such as CRM or Knowledge Management) in the media and printing sector does not stand up to the expectation that this sector should be a primary user. In fact, adoption rates closely reflect the industry average, as the following figure shows.

Figure 2-10: Media and printing industry: Usage of specific IT systems and solutions



Abbreviations:
 SCM = Supply Chain Management system
 CRM = Customer relationship Management system
 KM = Knowledge Management system
 ASP = Services of an Application Services Provider
 ERP = Electronic Resource Planning system

Base: EU-4 (D, F, I, UK), all enterprises (N= 404). In % of companies, except figures for "all enterprises" and "all sectors": weighted by employment ("enterprises comprising ...% of employment")

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

2.3.2 Processes of the extended enterprise

The main idea behind the concept of an “extended enterprise” is that a company is not only constituted by its management, employees and means of production, but also by a functioning network of business partners such as its suppliers and its customers. In media companies, the coordination and management of third-party relationships in particular plays an important part of the production process. Third parties include, for instance, advertising agencies which place ads in print publications or TV programmes, the co-ordination of freelancers (e.g. photographers), print companies or wholesale retailers (e.g. for magazines).

The increasing digitisation of the workflow facilitates not only internal processes, but also the collaboration between these business partners, as digital content can seamlessly be exchanged over the Internet. The media and printing sector is already characterised by a relatively high interlocking of different companies in the value chain.

Data confirm that the use of e-business will push this development even further. Online technologies in media and printing are used for collaboration and sharing documents to a much larger than average extent. In particular, the survey findings confirm the extensive use of online technologies to cooperate with other companies within the value chain. Online collaboration with business partners for designing products and the electronic exchange of documents with suppliers and customers is significantly above average in this sector, which also holds true for small companies.

Table 2-11: Media and printing industry: Usage of online technologies within the value chain

Value chain activities	All sectors ^o	Media and printing			
		All enterpr. ^o	0-49 empl.	50-249 empl.	250+ empl.
Online collaboration with business partners for designing products	20	32	24	31	48
Online collaborating with business partners to forecast product demands	15	15	7	17	23
Online management of capacity / inventory	16	20	10	17	35
Electronic exchange of documents with suppliers	47	61	59	61	66
Electronic exchange of documents with customers	45	60	62	61	58
Online negotiation of contracts	16	18	24	14	15

Base: EU-4 (D, F, I, UK), enterprises with internet access (N=391). Figures in % of companies, except ^o: Figures weighted by employment (“enterprises comprising ...% of employees”). Reporting period: June/July 2002.

Source: e-Business W@tch (2003)

Customer relationship management

Maximising customer satisfaction and building long-term relationships with clients is a key success factor for any company, but for media companies in particular. This becomes clear when considering, for instance, the average duration of magazine and daily newspaper subscriptions which is normally more than 5 years. The marketing effort to gain new subscribers is enormous, often involving high costs for free introductory gifts, but companies are willing to take this effort as customers are likely to remain loyal for a long time.

In such a marketing environment, keeping a track record of customers and contacts made is of crucial importance. Customer relationship management (CRM) systems provide a central database containing all data related to the company’s prospective or actual clients. CRM systems track all contacts with the client and store information that can be used to evaluate future demand and business opportunities. While small companies usually have the ability to maintain effective personal

contacts with their clients, the management of customer relationships is often a rather complex task in large companies with a large customer base. Here, automating client interaction with the support of CRM systems can help to make processes more efficient. The survey results in the figure above show that media and printing companies representing 15% of employment (and 29% of the large enterprises) use a CRM system. This is slightly lower than the industry average.

B2B e-marketplaces

In general, the use of e-marketplaces is 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 media and printing sector – at least in those sub-sectors where services consist predominantly in the content generation and packaging. Within the printing industry (NACE 22.2), however, direct inputs are traded online to a larger extent. Inputs such as paper, paint, plates and film are increasingly traded online. Standardised paper products in particular are bought over the Internet. Several electronic marketplaces in Europe have emerged which support the paper procurement for the printing industry. Furthermore, printers can buy and sell used printing equipment on horizontal electronic marketplaces for used industry machinery (e.g. www.assettrade.com) or on marketplaces specialised on used printing equipment (e.g. www.pressXchange.com).

PaperSpace – Public Paper Exchange

PaperSpace’s global open marketplace is a full-service, end-to-end marketplace platform that supports complete transactions in all major grades of pulp and paper products worldwide. Here, members can browse or search product listings (using multiple criteria), post and respond to RFQs, make bids, monitor sales activity and more. The marketplace is multilingual, it supports metric and imperial units of measure, and it handles worldwide currencies.

The PaperSpace open exchange provides a channel to suppliers that can help them access new markets and find new business partners. With no upfront costs or risks to establish this channel, suppliers can take advantage of this opportunity for both prime and off-spec materials. PaperSpace provides buyers with a tool for finding new supply partners with ease. Buyers can also participate as sellers on the exchange in order to reduce inventories or recoup losses on cancelled orders. As of April 2002, the PaperSpace public marketplace consisted of more than 4,500 members.

Source: www.paperspace.com

For media companies, marketplaces can play a role for the procurement of MRO (maintenance, repair and operating) goods. On the output side, service companies can use the Internet as new sales channel by offering their services on media related marketplaces.

Table 2-12: Media and printing: Current and planned participation in e-marketplaces

	All sectors	Media and printing			
		All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
Participation in e-marketplaces	5.3	4.7	4.6	5.1	13.8
Planned participation in e-marketplaces	3.4	3.9	3.9	4.5	12.4

Base: EU-4 (D, F, I, UK), all enterprises. N=404 (for media and printing sector), N=5917 (for all sectors). In % of enterprises. Reporting period: June/July 2002.

Source: e-Business W@tch (2003)

Even though the potential for e-marketplaces is at first sight rather limited for this sector, survey results show that the participation in e-marketplaces is in line with the average of all sectors and future plans to use e-marketplaces are even above average in this sector.

E-marketplaces are commonly defined as platforms operated by independent third parties or a consortium of buyers and/or sellers, and, in fact, media companies are more likely than the industry average to use marketplaces run by third parties.

Their most important activities on e-marketplaces are catalogue-based buying or selling. This indicates that marketplaces are predominantly used to optimise existing forms of buying and selling rather than offering new forms of trading as in other sectors (where e.g. marketplaces for overcapacities or used machinery exist). The second most important activity on e-marketplaces is participating in calls for tender. Online requests for proposals or calls for tenders have become an increasingly important tool for governmental institutions and commercial clients. Calls for tender or proposals on the Internet offer especially smaller printing companies and those that are new to the market the opportunity to compete for orders without being well known or having established relationships with the ordering parties.

Table 2-13: Media and printing: Operators of relevant e-marketplaces

E-marketplaces operated by...	All sectors	Media and printing
a single buyer/seller	36	32
an industry consortium of buyers/sellers	14	11
an independent third party	31	41
Others	17	6

Base: EU-4 (D, F, I, UK) for "all sectors", EU-7 for media and printing, enterprises participating in e-marketplaces. N=33 (for media and printing sector), N=290 (for all sectors). In % of enterprises. Reporting period: June/July 2002.

Source: e-Business W@tch (2003)

Table 2-14: Media and printing: Activities on e-marketplaces

Activity on e-marketplaces	All sectors	Media and printing
Catalogue-based offering	41	45
Catalogue-based purchasing	36	43
Selling on auctions	16	20
Bidding on auctions	18	7
Launching calls for tender	15	20
Answering calls for tender	24	45

Base: EU-4 (D, F, I, UK) for "all sectors", EU-7 for media and printing, enterprises participating in e-marketplaces. N=33 (for media and printing sector), N=290 (for all sectors). In % of enterprises. Reporting period: June/July 2002.

Source: e-Business W@tch (2003)

2.3.3 Purchasing

Online purchasing

Online purchasing activities seems to be strongly developed in the media and printing sector. About half of all enterprises are engaged in buy-side e-commerce activities, which is clearly above average. Small companies are not trailing far behind with an adoption rate of 45%.

However, the share of online purchases in total procurement volume is relatively small, comparable to the industry average. These numbers also show more pronounced differences between small and large enterprises, with more of the latter showing relatively large shares of online procurement. 30% of the large media and printing companies reported in 2002 that they procure more than a quarter of goods and services (in terms of financial volume) online.

The term "procurement", however, may lead to some ambiguities if used by companies in this sector. As enterprises in the media and printing sector are tightly connected with each other and as they are using electronic networks to exchange content in different forms, some companies may consider the exchange of documents as e-procurement (and – in fact – it *can* be considered as procurement, if the documents are paid for and purchased from an external source, for instance from a freelancing

journalist), others will not think of e-procurement in this case. The borderlines are blurred, as in many cases the delivery of "supplies" occurs online, but not necessarily their acquisition.

Table 2-15: Media and printing industry: Buy-side e-commerce activity

Activity	All sectors [°]	Media and printing			
		All enterpr. [°]	0-49 empl.	50-249 empl.	250+ empl.
Make online purchases	43	53	45	66	60
Of those:					
... for > 2 years*	39	49	53	57	39
... for 1-2 years*	43	39	35	35	46
... for < 1 year*	14	9	11	8	8
Plan to procure online	7	8	7	3	9

Base: EU-4 (D, F, I, UK), all enterprises (N=404), except *: enterprises procuring online (N=194). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees")

Source: e-Business W@tch (2003)

Table 2-16: Media and printing: Share of online purchases in total purchases

Share in all purchases	All sectors [°]	Media and printing			
		All enterpr. [°]	0-49 empl.	50-249 empl.	250+ empl.
> 50%	5	4	2	3	5
26 to 50%	8	12	9	3	25
11 to 25%	17	11	21	12	<1
5 to 10%	24	24	27	34	15
< 5%	46	49	41	48	55

Base: EU-4 (D, F, I, UK), enterprises purchasing online (N=2384 for all sectors, N=194 for media and printing). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees")

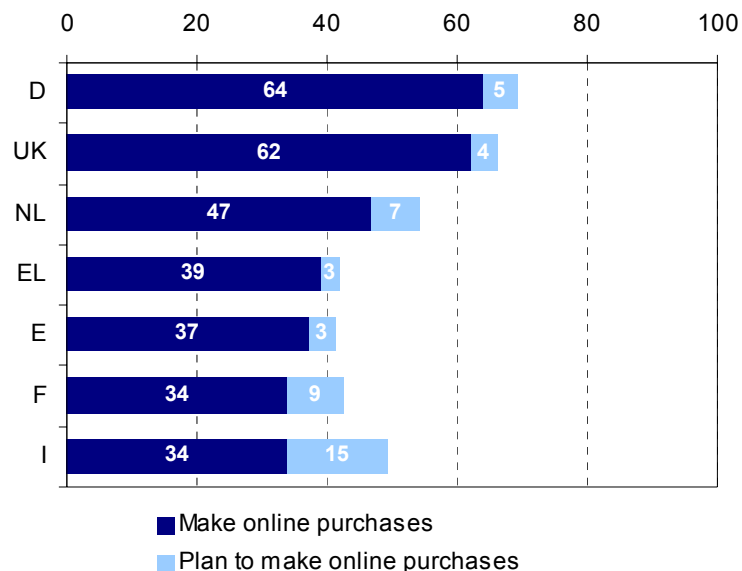
Source: e-Business W@tch (2003)

Figure 2-11: Media and printing: Current and planned online purchases across countries

Base: EU-7 (D, EL, E, F, I, NL, UK), all companies (N=657).

Figures weighted by employment ("enterprises comprising ...% of employees"). Reporting period: June/July 2002

Source: e-Business W@tch (2003)



The fraction of media and printing enterprises that already buy online differs considerably across the seven EU member countries for which data is available. Companies from Germany, the UK and the Netherlands are particularly familiar with online procurement. What most countries have in common is the gap between the rates for procurement of MRO (maintenance, repair and operating) goods and

direct production goods. Exceptions are France and the Netherlands where companies report that the procurement of direct inputs is more frequent than MRO procurement.

Table 2-17: Media and printing industry: Type of goods purchased online

Type of goods purchased online	Media and printing			
	All enterpr.	0-49 empl.	50-249 empl.	250+ empl.
MRO goods	70	70	62	80
Direct production goods	47	47	52	53

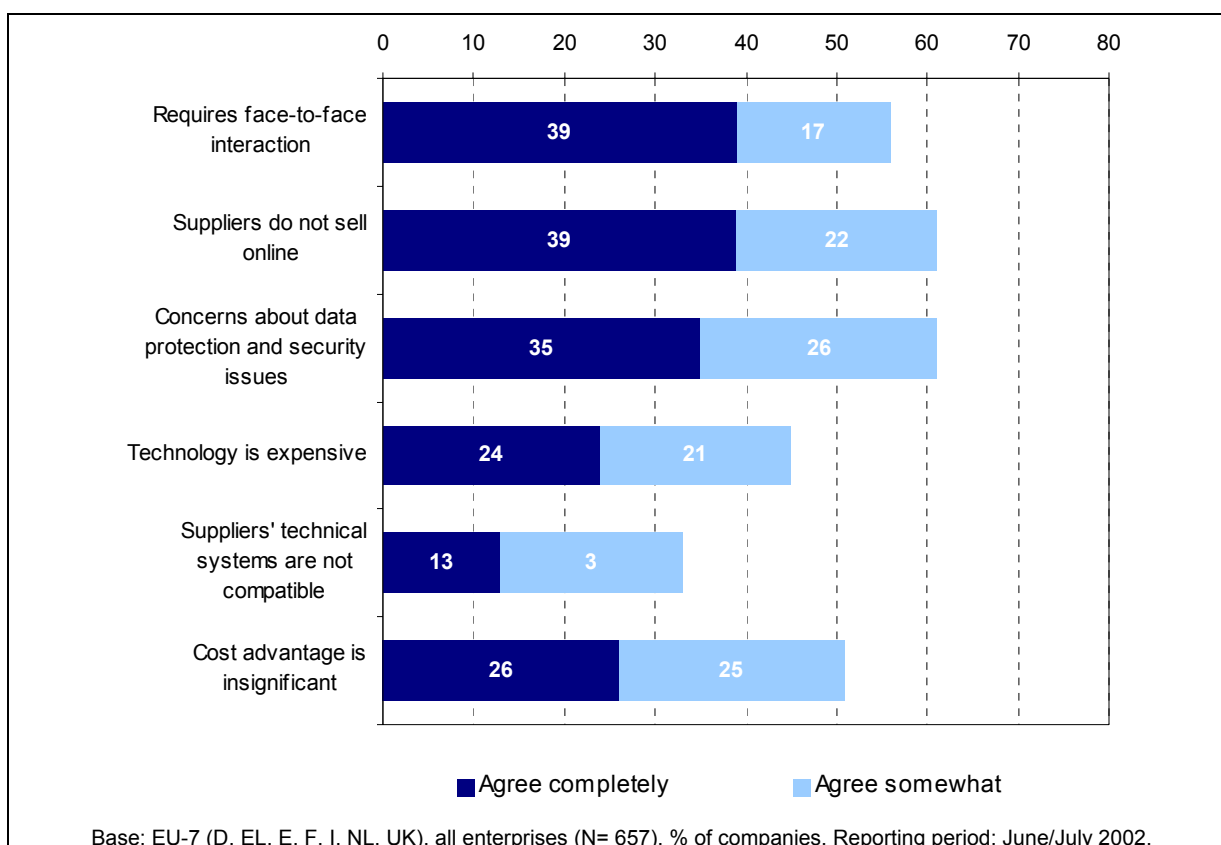
Note: enterprise-weighted, i.e. figures should be read as "% of enterprises ...". Computation base: enterprises procuring online. Regional coverage: EU-4.

Source: e-Business W@tch (2003)

Barriers to online procurement

Companies in the media and printing sector see as the main barrier for the further development of online purchasing that "suppliers do not sell online". 39% agree completely to this statement, 22% somewhat. An equally important barrier from a list asked in the e-Business Survey 2002 is that "online procurement requires face-to-face interaction", according to companies.

Figure 2-12: Media and printing industry: Barriers to procuring online



Source: e-Business W@tch (2003)

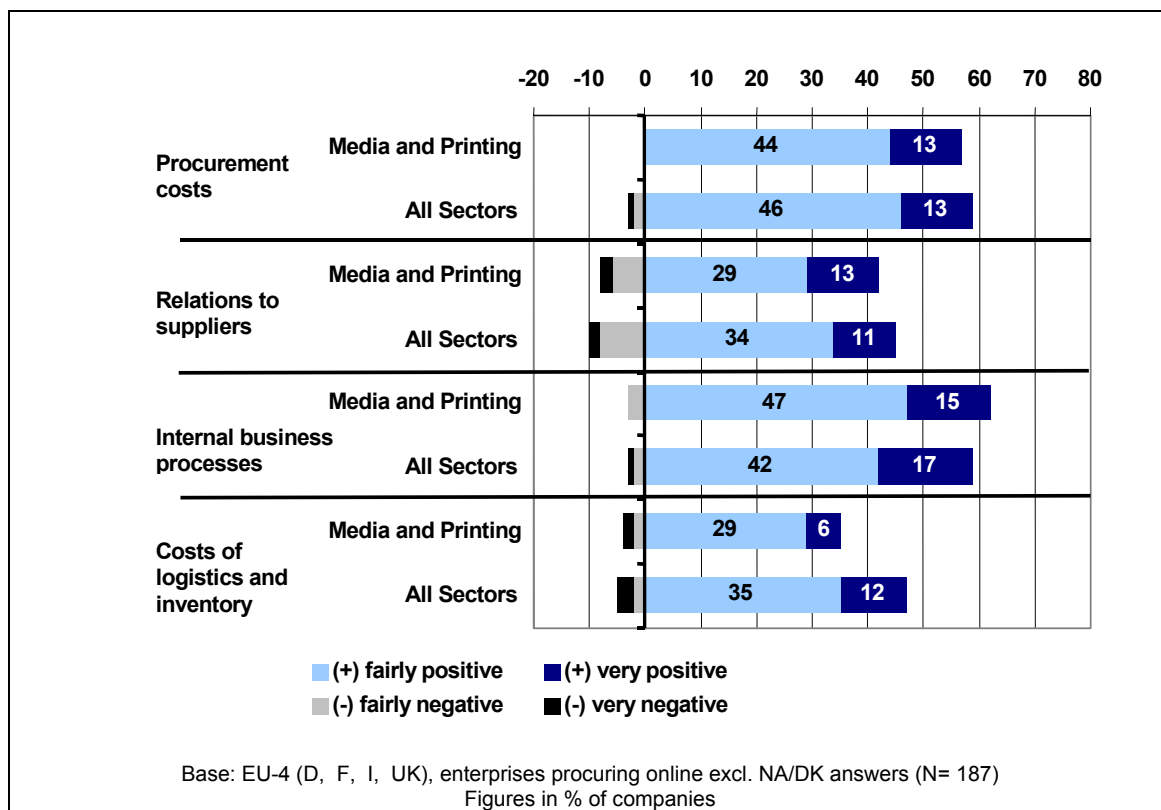
Insignificant cost advantages are perceived as a much more important barrier in this sector than in others. This is on the one hand due to the low standardisation of most inputs in this sector. On the other hand, this outcome is also influenced by the small-company bias of this sector: Large enterprises, for which the cost advantages of e-procurement are typically larger, are less common in the media and printing sector than in other sectors (e.g. in the chemical industry). In addition, e-commerce offerings by suppliers to this sector are below average.

Somewhat contradicting the evidence that e-procurement has gained momentum in all size-classes, barriers to procuring online play a larger role for SMEs than for larger companies. For instance, SMEs seem to have more severe technical problems, as technology is considered to be expensive and often incompatible. This is a typical phenomenon of new software technology. In early phases of introduction the software solutions are custom-manufactured (e.g. in large implementation projects) leading to high costs and incompatible solutions. As the technology becomes more widely used and more mature, standard software emerges, which is sold for much lower prices, is easier to use and more often compatible with other systems. Such developments can, for example, be accelerated by supporting standardisation activities.

Impacts of online purchasing

The impacts of online procurement activities which companies observe is very much in line with what companies from other sectors report. Logistics and inventory costs are influenced somewhat less positively than average. This can be explained by the digital nature of many products and by inventory costs not playing a large role in large parts of the sector.

Figure 2-13: Media and printing industry: Impact of procuring online on ...



Source: e-Business W@tch (2003)

Differences exist again between large and small enterprises. For the former, e-procurement has had very positive effects on internal business processes as well as on logistics and inventory costs. For the latter positive impacts resulted from an increased number of suppliers, improved relationships to suppliers and decreased procurement costs. These results (and those in previous sections) are an indication for e-business having significantly different impacts on small and large companies. Whereas e-business is a tool for improving internal processes in large companies, its positive impact for SMEs is seen more at the interface to suppliers and buyers.

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2.3.4 Marketing and sales

Marketing

Company websites have become a common element in the overall marketing strategy of media and printing companies. About three quarters of all enterprises in the sector had a website in 2002. While for large enterprises having a website is practically a must, there is still some catch-up potential for small enterprises: 59% had a site on the Internet in 2002 and 20% planned to have one by mid 2003.

It should be considered that "having a website" has – for many media companies – a different meaning and importance than for other companies, as the website is frequently not only a marketing tool to inform customers about the products available (and possibly enable ordering of these products), but equals in the case of online information or entertainment services the *product itself*.

This taken into account, the high percentage of medium sized and large companies in the sector which operate a website is to be expected. It comes rather as a surprise that "only" 34% of enterprises with a website say that they use a content management system (CMS) to maintain the site, although the share is significantly higher than on average in the 15 sectors monitored by the *e-Business W@tch* (22%). Certainly those companies selling content will use a CMS. Others, such as for instance printing companies, may be able to do without.

Table 2-18: Media and printing: Enterprises with a website

	All sectors [°]	Media and printing			
		All enterpr. [°]	0-49 empl.	50-249 empl.	250+ empl.
Having a website	70	75	59	88	96
Plans to have a website	11	12	20	7	1
Usage of content management systems (in % of enterprises with a website)	22	34	19	28	53

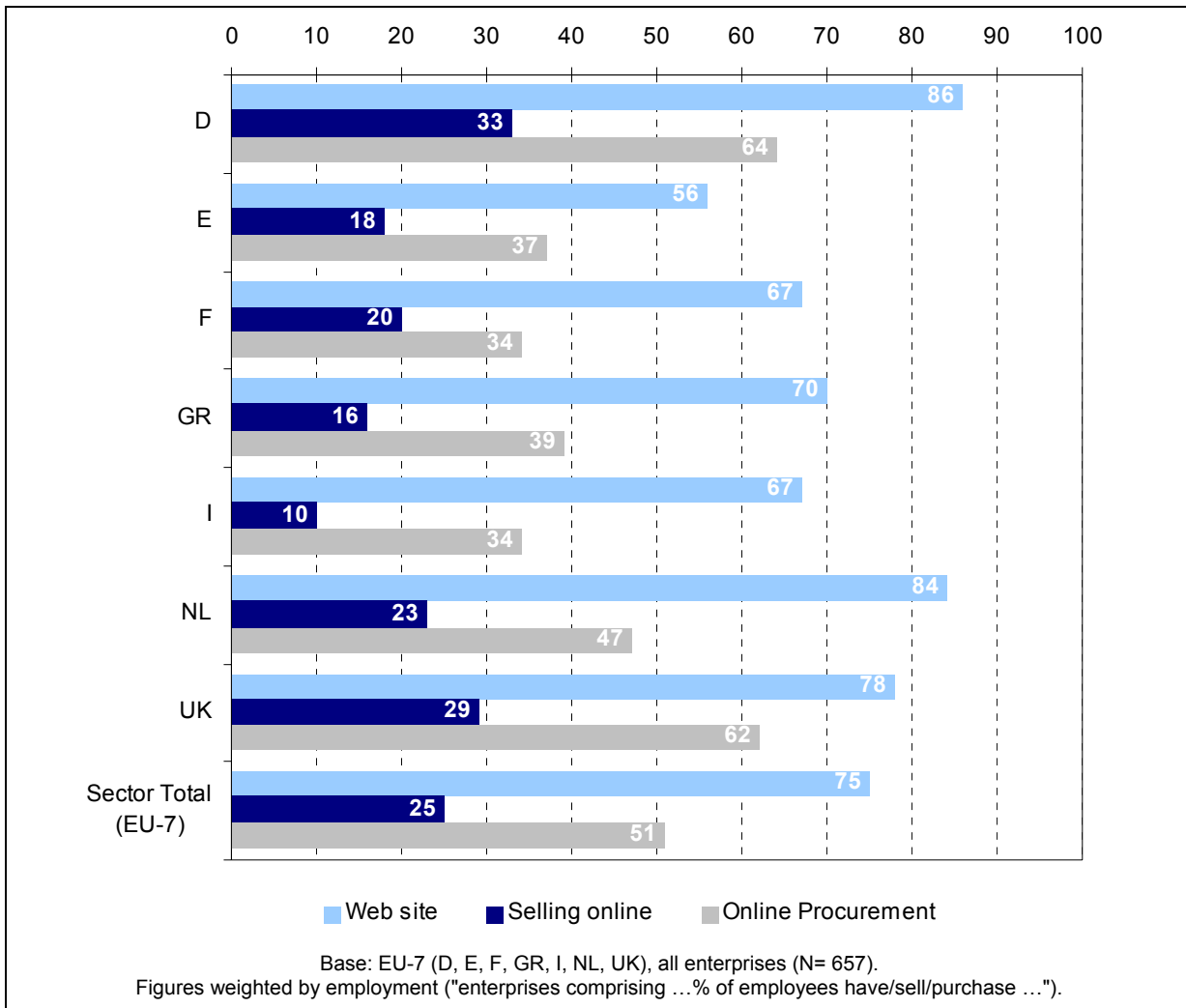
Base: EU-4 (D, F, I, UK), all enterprises (N=404) / enterprises with a website (for third item). Figures in % of companies, except [°]: Figures weighted by employment ("enterprises comprising ...% of employees"). Reporting period: June/July 2002.

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

The adoption of websites across different countries reflects to some extent the general progress of information society developments as reported in many business and consumer statistics. Media and printing enterprises in Germany, the Netherlands and the UK are more likely to have a website than their counterparts in France, Italy, Greece and Spain by a margin of about 10-15 percentage points.

It is difficult to estimate what will be the level of saturation, i.e. the share of companies which will remain non-adopters (as having a website may be irrelevant for their business operations). However, it is very likely that the regions currently still lagging behind will catch up with respect to setting up a site. This does not say anything about the quality and the scope of the website, and how sophisticated the maintenance of the site is (for instance whether a content management system is used to maintain and update the site).

Figure 2-14: Media and printing industry: Basic e-commerce activities of companies (2002)



Source: e-Business W@tch (2003)

E-commerce: selling online

From the perspective of media companies such as publishers or firms in the audio-visual industry, "to sell online" can mean two different things:

- First, "selling online" can mean to distribute and make available digital contents directly on the internet or via other communication networks. A typical example for this type of online sales are online information and entertainment services offered by publishers, in many cases by traditional print publishers.
- Second, "selling online" can mean – as in other sectors – to sell physical media products online, for instance CDs or books. However, in many cases the products are sold by retailers on behalf of the media companies producing them rather than by the publishers themselves.

With respect to the former, selling online often goes hand in hand with selling via other distribution channels. The digitisation of content has additionally enabled companies to distribute their products online at low marginal cost over various distribution channels such as the Internet, wireless networks, cable and satellite. The combination of offline and online content distribution potentially allows for an increase in profit margins by exploiting the concept "create once, distribute many".

A news article, for example, can generate revenue from subscription fees for the printed newspaper, from fees for online-download from an archive, and from selling it to a business partner within the

content syndication model. Publications can be offered in different online versions equipped with different usage rights or sold in a bundle with offline versions of the product, e.g. with a print or CD-ROM version.

These new forms of distribution, however, require completely new business strategies, since online content products are frequently not just a 1:1 copy of the traditional products. Furthermore, the big question is whether selling online leads to cannibalisation through substitution of existing channels, or whether it is an opportunity to exploit new markets and revenue streams. As normally both effects occur in parallel, it is difficult for companies to decide about the optimal business strategy.

From a customer's point of view, online content should offer new features and new value added services. Media companies, if they wish to service the emerging online markets, are challenged to respond to these customer demands in rather new ways, for instance by building interactivity into services that have traditionally been delivered as one-way communication.

This has implications for sell-side e-commerce in the media sector. Many publishing companies already have substantial experience with e-commerce. Not only is the fraction of enterprises engaging in such e-commerce activities larger than in the industry average, the fraction of companies having such plans is also larger. Thus the head start will increase, if these plans materialise.

Significant differences exist between the online sales shares of small and large companies. Large companies are twice as active in sell-side e-commerce than small companies. While this may be interpreted as a better e-commerce execution by large companies it can also be due to the inappropriateness of sell-side e-commerce for the SMEs in the sample (e.g., large companies are more likely to have a B2C business than small ones, which might have established B2B relationships to a small set of customers).

Table 2-19: Media and printing industry: Sell-side e-commerce activity

Activity	All sectors [°]	Media and printing			
		All enterpr. [°]	0-49 empl.	50-249 empl.	250+ empl.
Sell online	17	25	17	35	36
... > 2 years*	44	52	39	45	65
... 1-2 years*	35	26	43	37	8
... < 1 year*	18	13	17	18	9
Plan to sell online	10	12	12	12	13

Base: EU-4 (D, F, I, UK), all enterprises (N=404) / *: enterprises selling online (N=84).
% of enterprises, except °: figures weighted by employment ("enterprises comprising ...% of employees")

Source: e-Business W@tch (2003)

However, as with online procurement, the importance of online sales for those companies that sell online is still limited. 75% of companies conducting e-commerce say that they make less than 10% of their total sales online. Selling online is generally more important for large companies that are selling online than it is for similar small enterprises.

Figure 2-15: Media and printing industry: Share of online sales in total sales (2002)

Base: EU-7 (D, E, F, GR, I, NL, UK), companies selling online (N=117).

% of companies selling online reporting that they make x% of their total sales online. Reporting period: June/July 2002.

Source: e-Business W@tch (2003)



The vast majority of the companies that sell online in the media and printing sector do so through their company website (which is to be expected, considering that – as outlined above, and in contrast to other manufacturing sectors – the website is in many cases the "product" itself). While e-marketplaces are also used to sell online, particularly by smaller and medium sized companies, EDI does not play an important role in this sector.

Table 2-20: Media and printing: Online sales channels

Selling online...	All sectors°	Media and printing			
		All enterpr.°	0-49 empl.	50-249 empl.	250+ empl.
... through company website	84	92	91	91	94
... through e-marketplaces	35	29	31	20	41
... via extranet	12	16	5	14	24
... via EDI	15	3	5	5	7
... via mobile channels	6	7	4	1	13

Base: EU-4 (D, F, I, UK) / EU-7 for media and printing; enterprises selling online, N=134 (for media and printing), N= 805 (for all sectors). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees") Reporting period: June/July 2002.

Source: e-Business W@tch (2003)

Customer services related to online sales

Among those media and printing companies selling online, enterprises representing 45% of employment report that online orders automatically trigger business processes, which is true for 42% on average. This indicates that even though online sales systems are not always fully integrated with backend IT systems (only 29% of the companies selling online), they are at least integrated into overall business processes.

The Internet enables customer services that allow for a high degree of interactivity. The impact and potential of related functionalities are particularly important for media companies selling or offering content in digital format. Clients can, for example, set their own preferences for online information services, subscribe to online newsletters or mail alerts, or even customise the selection of content (e.g. by setting priorities for certain topics to appear first on the screen). While publishers have been playing around with all of these options for years now, they are still struggling with making a real business out of it.

Media and printing companies are more advanced than the industry average with respect to the systems used for making online transactions. Of those offering services online, 69% use secure servers (based on SSL technology) and 42% enable online payment for the goods or services customers want to purchase. Online after-sales-services are a less important element for media and printing companies that sell online than on average, but still enterprises representing 44% of employment report that they provide such services.

Table 2-21: Media and printing: Processing of online orders, related functionalities

Functionalities related to online selling	All sectors°	Media and printing			
		All enterpr.°	0-49 empl.	50-249 empl.	250+ empl.
Online orders are ...					
• ... are fully integrated with backend systems	26	29	9	15	55
• ... generate an automatic e-mail	52	58	71	71	39
• ... generate a fax informing about order	6	6	11	1	4
• ... trigger other forms of information	7	5	4	9	2
• ... trigger business processes	42	45	33	34	63
Online sales system with SSL is offered	61	69	50	61	91
Online payment system offered	35	42	36	47	44
Online after-sales-service is offered	50	44	45	31	51

Base: EU-4 (D, F, I, UK) / EU-7 for media and printing; enterprises selling online, N=134 (for media and printing), N= 805 (for all sectors). Figures in % of companies, except °: Figures weighted by employment ("enterprises comprising ...% of employees") Reporting period: June/July 2002.

Source: e-Business W@tch (2003)

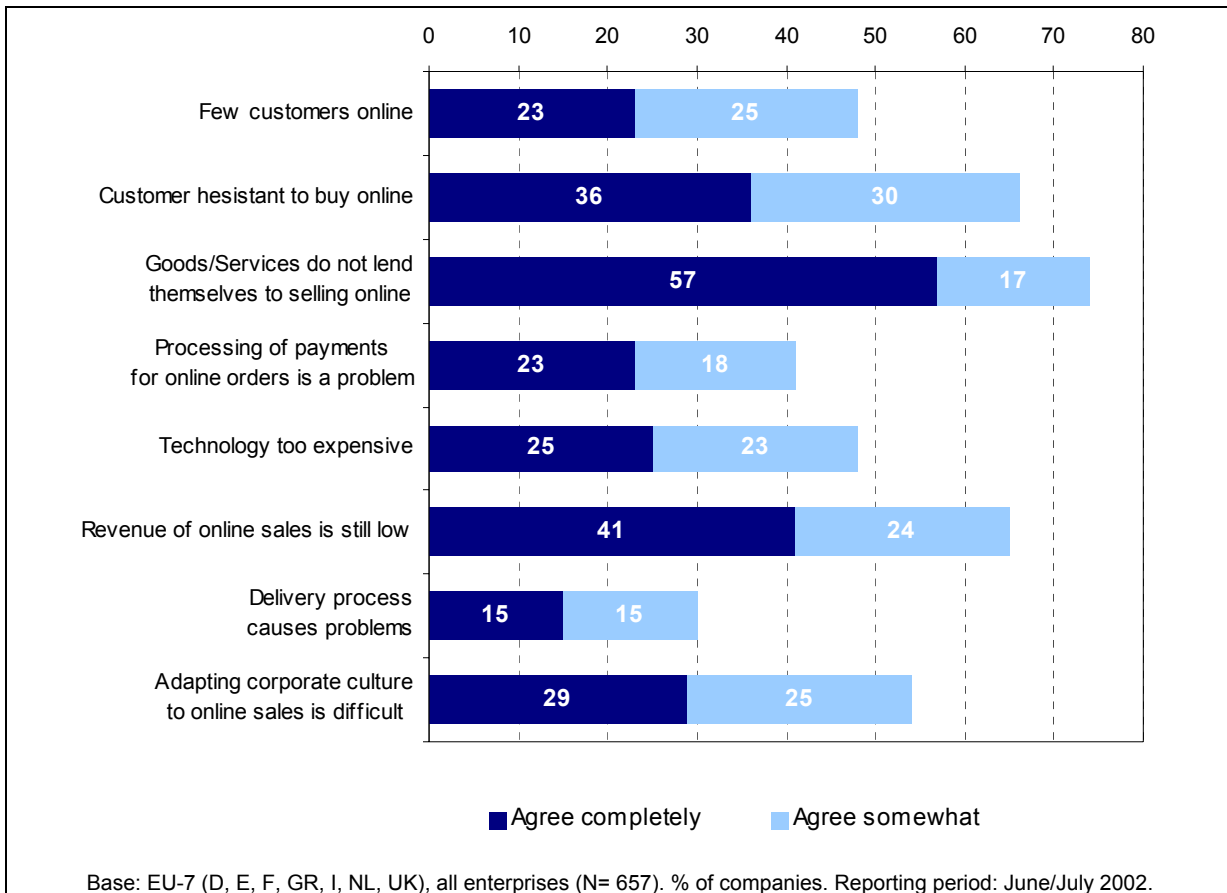
Barriers to selling online

In general enterprises in media and printing are as critical about selling online as companies from other sectors. A notable deviation from the average can be found in the statement "Goods / services do not lend themselves to selling online". This is at first sight astonishing, as digital goods can easily be sold online. However, the sector includes all sorts of different enterprises of which some produce goods and services that are indeed difficult to trade online. Furthermore, the deployment of broadband networks in households is still insufficient for many purposes. For instance, movie content, which could easily be (and in fact is being) digitised and sold online, is currently difficult to deliver to homes online due to the lack of bandwidth. Another example is individualised print products, which cannot sufficiently be standardised to be traded online.

The second major deviation from average is in the statement "Revenue from online sales is still low". This confirms the finding that up to very recently content was often provided for free on the Internet and new revenue models for selling content online are just being tested.

The different statements and perceptions of small and large companies are also interesting. "Principal" objections like "few customers online" are more often agreed to by small companies, whereas experienced business problems (payment processing problems, low online revenues) are more often considered as barriers by large enterprises. This might be seen as an indication that SMEs reject e-sales activities too early without actually having tested them.

Figure 2-16: Media and printing industry: Barriers to selling online



Source: e-Business W@tch (2003)

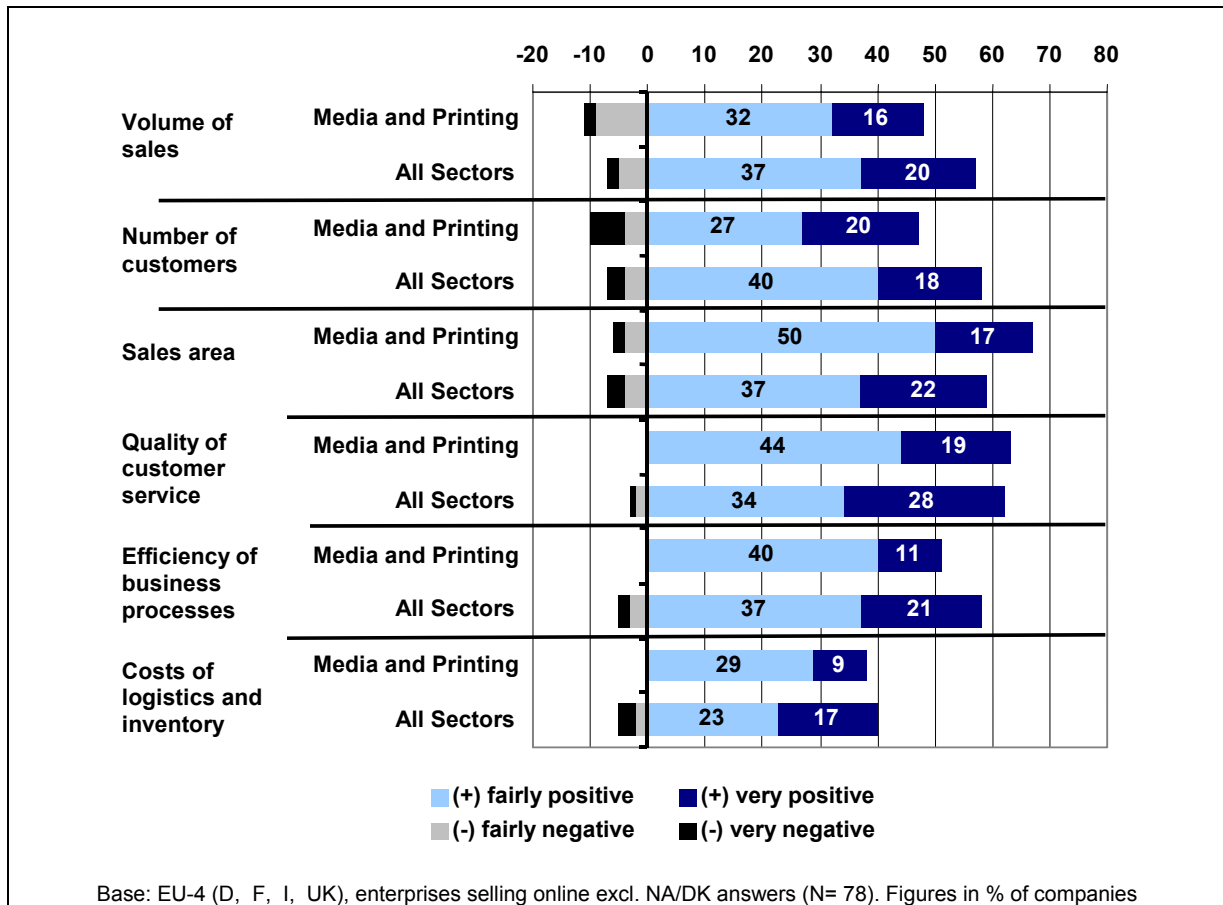
The impact of selling online

The impacts of selling online are generally regarded as being less positive in the media and printing enterprises than on average. Customer care and internal business processes in particular have been less positively influenced by selling online than in other sectors.

There is one notable exception, though. Media and printing companies report above average positive impacts of online selling on the development of their sales area. As many of their services can be digitised and be delivered on the internet, distance is a less costly factor than it is the case in the delivery of physical goods. Media content, but also other "digital goods" such as software, are therefore particularly suitable for international trade.

Large enterprises particularly indicate that the efficiency of internal business processes has been improved by selling online.

Figure 2-17: Media and printing industry: Impact of selling online on...



Source: e-Business W@tch (2002)

2.4 Standards

This section outlines two of the recent major standards developments which are destined to impact competitiveness and innovation within the media and printing industry. It also briefly summarises current European activities in what is perhaps the major open issue impacting electronic publishing business: digital rights management.

Printing is no longer considered an unpredictable craft where every job is different. Smart standardization based on process control, automation and constant measurement has proven otherwise to the business advantage of all concerned. Nonetheless the market structure is getting more complex. The structure of the market and business community engaged in media and printing graphic technology is estimated by ISO TC 130 (Secretariat DIN, Deutsches Institut für Normung), in its business plan, to comprise paper (40%), printing (30%), digital media and pre-press (15%), software providers (10%) and converters (5%).

This reflects the fact that graphic art work is increasingly computer aided and split up between several enterprises e.g. the creative side, the pre-press service provider, the printer and the print finisher. In this cross-media publishing environment consistent work is only possible when minimal sets of recognised compatible standards, that define in technical and unambiguous way the interfaces between cooperating enterprises, exist and are used. These minimal sets include e-business and automated process standards such as process control, data exchange, measurement methods, materials, terminology, ergonomics and safety. These standards are well established and at same time being constantly added to and improved.

Specific initiatives which need strong European industry support and adoption – particularly in the SME sector - include the following activities cumulatively spanning the entire business chain.

Printing processes

CIP4 (The International Cooperation for the Integration of Processes in Prepress, Press, and Postpress) has published its JDF1.1 (Job Definition Format) specification, based on XML (eXtensible Markup Language). The most significant capabilities of JDF1.1 are its ability to specify and complete every part of a print job and job workflow from start to finish, its ability to link management information systems and production, and its ability to perform the previous two tasks no matter what tools are used. It integrates production equipment with workflow and creates a digital workflow from prepress to press, to postpress.

Many printers see JDF as crucial to the survival of the printing industry. It has the potential to take printing into the computer integrated manufacturing model by making shop operations faster, more efficient and manageable with fewer skilled personnel. It can do this by automatically setting-up machines and eliminating multiple entry of the same job information. Customers will also be able to post job definitions online via the internet and once approved by the printer JDF can be used to trigger quote generation, print buying and job tickets.

Resources and business models will determine who adopts the JDF and how soon. However the speed of adoption will significantly influence the ability of European printers to survive and prosper in the decade ahead.

Exchange file formats

Three basic file formats address the encoding of content data: ISO 12639 (TIFF/IT) and ISO 15390 Parts 1 to 3 (the PDF/X family) for traditional printing, and CGATS.20 (Personalised Print Mark-up Language PPML/VDX) for variable data printing. The PDF/X (Portable Document Format for Prepress Digital Data Exchange) family of graphic technology standards is a specific adaptation of the Adobe PDF specification for use by the printing and publishing industry. PDF/X is increasingly used in print production, especially for the "blind exchange" of digital advertising material, and is gaining acceptance in other printing environments. PDF/X-1 standard (ISO 15930-1:2001), facilitates complete exchange of print-ready CMYK files. ISO 15930-3:2002 (PDF/X-3), covers complete exchange of print-ready material using colour-managed and CMYK data, and is based on the Adobe Portable Document Format (PDF) 1.3 Specification. (Revisions of both PDF/X-1 and -3 to incorporate PDF 1.4 are in ballot). A new initiative PDF/A is defining international standards that use PDF for long-term archiving of documents. Together these international standards already satisfy many of the data exchange needs of the printing and publishing industry.

The newer PDF/X-3 makes use of International Color Consortium (ICC) colour management to allow exchange of both three-component data (RGB, CIELAB, etc.) and CMYK data. Both PDF/X-3 and PDF/X-1a enable the exchange of spot colour data. PDF/X-2, which will allow image substitution, is still in development within ISO Technical Committee 130 (Graphic technology)

PDF/X-3 was developed by Working Group 2 of ISO Technical Committee 130 with assistance from the European Colour Initiative (ECI) and the American National Standards Institute's Committee for Graphic Arts Technologies Standards (ANSI CGATS) Subcommittee 6 Task Force 1 (SC6 TF1). These committees include representatives of many of the major industry vendors, trade associations, publishers, printers and prepress companies. All of the data content standards include the requirement that the data within a given file be prepared for a single identified output rendering definition. Since most output in the printing and publishing industry is CMYK ink on paper, relating CMYK to printed colour is the key definition of the content data and uses standards from ISO/TC130, ISO/TC42 (Photography), CIE and CGATS as well as a number of trade associations and graphics research groups across the globe.

It is expected that by end of 2004 PDF/X will move beyond the advertising/publication market and in many applications replace TIFF/IT and proprietary object-based formats in use today.

Digital Rights management

The future of electronic publishing as a business will depend on the ability to satisfactorily manage digital rights. CEN/ISSS has prepared and published a draft study into Digital Rights Management (DRM) as requested by the European Commission. It presents current status of DRM usage and when completed will include proposals on possible means to ensure effective implementation of DRM in the marketplace. These proposed recommendations are not yet established, let alone agreed. Participation in the DRM Study group is open to all interested parties.

See http://www.cenorm.be/iss/DRM/DRM_ToR.htm for details.

This is a very active area. New languages are emerging to express the rights in computer understandable form (e.g. Open Digital Rights Language (ODRL), MPEG-21 Rights Data Dictionary/Rights Expression Language (RDD/REL), eXtensible Rights Mark-up Language (XrML), Publishing Requirements for Industry Standards Metadata (PRISM)). Soon these acronyms will be as familiar as HTML and XML are today. In addition interest is also focussing on the application of semantic web approach through application of ontologies specific to DRM (e.g. see <http://dmag.upf.es/> for some pointers to the latest research). DRM is particularly important when dealing with all-electronic media accessible via the internet or on custom personalised CD/DVDs. Here the risk to intellectual property through misuse (whether accidental or deliberate) is at its greatest. Mastery of the technology of DRM and vigilant application will be the only way in which European industry will be able to manage the diversity of electronic warehouses of information. knowledge and entertainment effectively and with confidence. This is an area to which the entire media and printing/publishing community will have to give special attention in the years ahead so that they do not run the risk of antiquated systems failing them in their time of greatest opportunity and greatest risk.

3 Summary and conclusions

This sector report has analysed the use of ICT and e-business in the *media and printing sector*, which consists of those industries that focus on the creation and distribution of content. Major activities in this sector include content creation (motion picture and video production as well as publishing), content bundling (publishing), the production of physical content goods (printing and reproduction of recorded media) and the distribution of content (movie distribution and projection as well as radio and television activities).

In the last few years, the sector has been characterised by rapid growth. Between 1997 and 2000, production value in the publishing and printing industry alone grew by 53% to 233 billion Euro in EU-13 (excluding Greece and Luxembourg). Even though a large number of small-sized enterprises exist in this sector (97% employ less than 49 people), large companies play an important role. Companies with more than 250 employees make up only 0.5% of all companies but account for 37% of the sector's overall turnover and 28% of all employees.

Far reaching structural changes

As a result of the development of new ICTs, the sector is currently undergoing far-reaching structural changes, which are not only changing the organisational processes, but also the products and services produced by this sector. Apart from coping with cyclical issues, companies have to develop entirely new business strategies and have to adapt to increasing internationalisation of the industry. An additional major issue, especially for the audiovisual industries, are new measures for copyright protection of digital content goods.

Companies in this sector make extensive use of ICTs and e-business. Firstly, they use ICTs and e-business applications for the support of internal processes and B2B transactions such as procurement and production. Electronic procurement, however, is limited to a small fraction of inputs, since most inputs cannot be fully standardised and require face-to-face contact between buyer and seller. The use of ICTs plays a major role in the print transaction and production process. In text-based content production the use of ICTs is mainly confined to online content, in audiovisual content production the entire value-chain is increasingly impacted by the use of new technologies.

The internet as the new distribution channel in B2C markets – but some obstacles to overcome first

Secondly, companies use ICTs as new distribution channels on B2C markets. Traditional, physical content products are distributed and marketed over the Internet. More importantly, the new distribution channels are used to distribute online content products with new features and value added services, which form the basis of new sources of income in the sector. With rising availability of broadband connections audiovisual content will also increasingly be distributed over the Internet. In addition, the Internet enables companies from this sector to generate sources of income from not content-related sources, such as e-commerce.

In this context, however, a problem for all e-commerce activities is that internet users have learned to regard the internet as a free gift and are very reluctant to pay for content (see for example the attempts of the music industry to offer music files for download). Furthermore, it will still take some time before a critical mass of consumers will have fast access to the internet which is a requirement for a number of online services that could be sold online in theory (e.g. movies).

3.1 Economic implications

Digitisation and the availability of electronic networks have considerable economic implications for the media and printing industry in Europe. The impacts can be divided into those for individual enterprises and those for the entire industry.

3.1.1 Implications for individual enterprises

When asking companies about the perceived impacts of their e-business activities, the overall impact of implementing electronic business processes on the media and printing enterprises seems to be very much in line with the average of all industries. As digitisation changes the product characteristics and offers new possibilities for more efficient and faster workflows in this sector, the strongest impact of e-business is on internal work processes. Impacts on the organisational structure and internal work processes are considered more important in large enterprises. Obviously, e-business has opened up more opportunities for restructuring in large enterprises than in small ones and particular in very small companies with less than 10 employees. However, this outcome may also indicate that large companies have implemented e-business more thoroughly.

Changes in workflow, the value chain and products

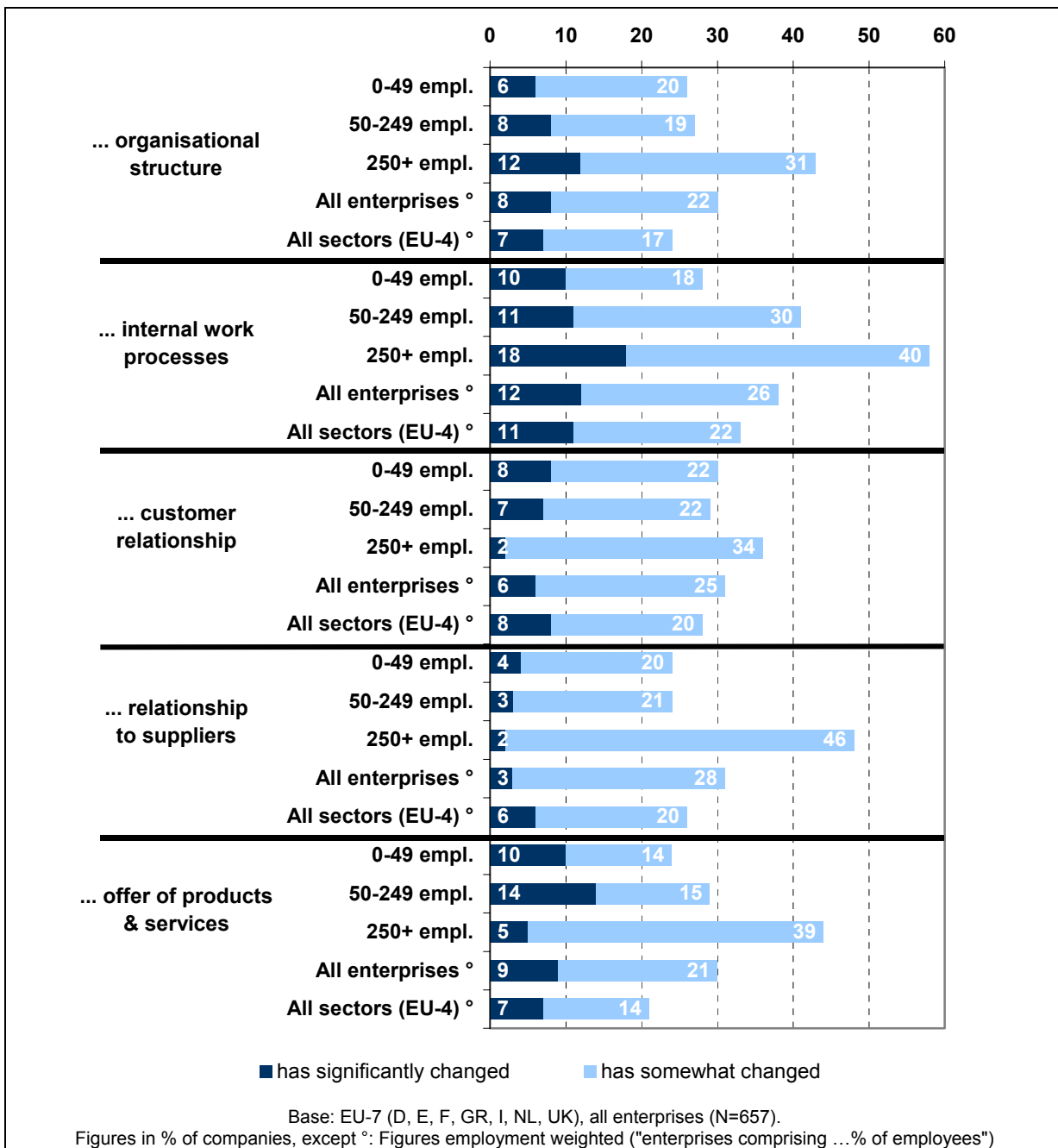
Firstly, digitisation considerably changes the workflow and value chain within companies. Steps in the value chain become obsolete or are conducted by other actors in the company. The editing of audio and video material in journalistic production is one example. While workflow changes reduce the need for employees with specific knowledge in some cases (e.g. editors in the newsroom), they require training in the new activities and the supporting technologies for other employees (e.g. the journalists themselves).

Secondly, digitisation and ICTs have significant impacts on the workflow with external business partners and customers. Again, certain steps in the value chain have become obsolete, e.g. through computer-to-print systems. In addition, the necessity of companies to collaborate and build networks with partner companies and sub-contractors has increased considerably. Digital printing, for example, extends the reach of the company mandating another company with a print job much further into the printing process than was the case previously. Digital technologies support this process and decrease the costs of collaboration.

Thirdly, products change, as well as the workflows within and between enterprises. Traditional products (e.g. classifieds in newspapers) are substituted by Internet-based ones (e.g. job search engines), which offer the same or even higher utility. These changes can have severe implications for traditional business models. This requires the development of new business strategies that will have (as yet unforeseen) consequences for the respective enterprises themselves as well as for the industry structure.

Typical strategies to cope with the new challenges are diversification or specialisation. For example, printers can diversify into cross media services by offering data management, logistics, layout, etc. and thereby extend their coverage of the value chain. This, however, requires strong IT skills and constant investment in new technologies. Such strategies are very difficult to achieve for those companies that do not have sufficient resources available, e.g. many SMEs. Specialisation, e.g. on printing specific products, is another strategy that is often more suitable for smaller companies, but also requires investment in specific knowledge.

Figure 3-1: Media and printing industry: Impact of e-business on companies



Source: e-Business W@tch (2002)

New business opportunities

Entirely new business opportunities come along with these new strategies. For example, printers can offer print on demand or small-scale printing. Publishers can and do diversify into content syndication, e-commerce, direct selling of content to consumers, including new features in their products or new sales modes (e.g. CD-ROM and online). Audio-visual companies have a variety of new distribution media and channels available such as video on demand, pay-TV or interactive-TV.

These new business opportunities transform the industry as they extend the companies' activities beyond the media and printing industry, as can be seen in section 3.1.2. In addition, new competitors from different industries have entered the content and printing markets. Access providers in particular

are moving up the value chain towards content and service provisioning. European telecom companies are positioning their Internet portals on the content markets. Whether these activities will continue or whether enterprises will move back to more well-known ground is as yet unclear.

Challenges

The realisation of these new opportunities, however, poses many challenges to companies in the media and printing sector. As these challenges relate to a large extent to investment requirements, many budget-tight SMEs are less prepared to cope with them than larger companies. Many of the opportunities are ventures in the strict sense of the word as the bursting dot-com bubble has shown. Most new media business models still have to prove their usefulness and profitability and it is not clear yet what customers really want and what they are willing to pay for. As customers typically do not know the answer to these questions either when they are asked, a process of trial and error is necessary to find it out the hard way. Large companies often have the financial strength to take this significant investment risk, while a failure of an investment can more easily break a small company.

The high speed of technical change in the current period of transition requires companies in the media and printing sector to constantly invest in new technologies – even if they do not invest in new business opportunities – simply to remain competitive. In addition, employees in this sector are under strong pressure to keep up with technological change. They must be able to constantly adapt to changing technologies and need strong IT skills to make use of the new opportunities. Constant retraining is therefore a major challenge for employees in the media and printing sector.

Apart from investment needs and risks, copyright issues pose a major new challenge for companies in this sector. As the new technologies make it possible to create perfect copies of digital content and as this content can easily be distributed via world-wide networks, several challenges for existing copyright schemes and copyright-related business practices arise. Adapting business models as well as legal environments to these challenges is a major task for enterprises as well as for policy institutions.

3.1.2 Implications for the industry structure

Concentration, vertical integration and cross-media ownership

Digital content goods have specific economic properties that imply strong economies of scale in producing and distributing such goods. Large content producing and distributing companies can exploit these economies of scale, which in turn favours industry concentration. As costs are to a large extent first-copy costs, enterprises have an incentive to “produce once and distribute many”. By doing so, large media groups are able to spread the high cost of content production across very broad distribution networks. They can efficiently distribute content via multiple channels, e.g. promote movies produced by the film company on access portals, show older versions on their TV-channels and release the soundtrack through the music company.

As this is easier when the companies also own the distribution channels, there is an additional incentive for vertical integration. As a response, new vertically integrated media conglomerates have emerged, which produce and own the content as well as the channels to distribute it. The most prominent examples and their various activities across different media channels are listed in table 3-1.

At the same time, large media groups have the power to build a strong brand, which is increasingly important in the age of information overload. Building customer loyalty is crucial for content, since content is an “experience-good”, i.e. its quality can only be judged *after* it has been consumed. In addition, large media conglomerates have the financial strength to take the significant investment risk that is associated with new media ventures.

Despite the trend for consolidation, media conglomerates have faced severe difficulties within the last years. Expectations concerning increased efficiency and cross-selling of diversified products have not become true in many cases. Therefore conglomerates are forced to disentangle part of their business and to focus on core competencies again.

At the same time, companies have had problems in integrating the new parts into the existing organisational structure. Thus, the expansion of business activities will often take more time than it was originally expected.

Table 3-1: Companies' main media operations

	Internet Portal	Broadcast TV	Cable TV	Tele-coms	Production		Music	Publishing	Radio
					Film	TV			
AOL Time Warner	X	X	X		X	X	X	X	X
Viacom		X	X		X	X		X	X
Vivendi Universal	X		X	X	X	X	X	X	
News Corporation		X	X		X	X		X	
Disney		X	X		X	X		X	X
Bertelsmann		X	X			X	X	X	X
Sony					X	X	X		

Source: The Economist (2002)

The new technical possibilities to produce different media formats from one single data source and the increasing use of a common infrastructure for the distribution of content across different channels have resulted in a strong trend towards cross media ownership. Companies are increasingly getting involved in the production and distribution of different media. In particular an increasing involvement of print media companies in the audiovisual sector can be observed.⁵ The example of Bertelsmann AG illustrates cross-media-ownership very well. However, its current change in strategy also illustrates the problems that such an approach can involve.

Polarisation

The tendency towards concentration is therefore strong in those areas of media and printing where content rights are owned, brands are important or other reasons for economies of scale exist. This does not apply to the whole media and printing sector, however. A large number of smaller companies have been trying to find specialist niches within the sector. Those companies are able to serve the demand for highly segmented, special interest information or other products and provide superior services to customers. Opposed to the large players that offer an often confusingly large amount of different products and services to choose from, those niche players are focused on a rather narrowly defined customer base. By increasing the reach to potential customers, the Internet provides specialists with a larger market and thereby enables an increasing degree of specialisation.

With companies either growing large to make use of economies of scale or staying small and focusing on a niche, there is a tendency towards polarisation in the media and printing sector. Enterprises offering only average products or services on a small scale are driven out of the market. In those parts of the industry where a large number of mid-sized average companies exist (e.g. in printing), this in particular implies significant structural changes over the next few years.

An additional advantage of diversified conglomerates is the fact that those companies have a better negotiation position compared to niche-players concerning advertisements. If these conglomerates can offer space for advertisements in different media, they become more attractive for the advertising industry. As advertising revenues are enormously important for the whole sector, conglomerates can achieve significant competitive advantage compared to smaller, more specialised and regional-oriented enterprises.

⁵ See for example in Germany, Kommission zur Ermittlung der Konzentration im Medienbereich (2001)

3.2 Policy issues

The economic implications for individual enterprises in this sector as well as for the industry structure lead to several policy issues. Three policy fields are listed below that require specific care and constant monitoring of their development.

SMEs must be able to cope with the technical and economic change in the sector

The need to keep up with technological change and key standards developments to remain competitive puts companies in this sector under strong pressure. They constantly have to invest in new technologies including hardware and software incorporating new standards capabilities and compatibilities as well as retraining and knowledge management. These high investment requirements are particularly difficult to bear for smaller and medium sized enterprises – specifically in the printing industry. As the survey results have shown, there is some evidence that SMEs lag behind large companies in issues regarding experience with e-business and training of employees. Further investigation can show which groups of companies need help and how this help can be provided.

Tendencies to concentration will remain an issue in large parts of the media and printing sector

There are several economic forces favouring large entities in the media and printing sector. These forces have been aggravated by technical changes such as digitisation. Concentration per se cannot be condemned but might be rather beneficial for consumers by providing new products and services, reducing prices and enabling the exploration of new, risky forms of products and services. However, policy institutions must continue to monitor these developments to avoid a degree of concentration that is detrimental to competition. Due to the specific role of the media industry in society, policy institutions must also ensure that concentration does not threaten programme variety and cultural and political diversity.

Internationalisation requires appropriate frameworks

Internationalisation enables content producers and owners to distribute the fixed costs of content production over a larger variety of consumers. It can thereby help reduce prices for content consumption and increase the available variety. Both effects are positive for consumers. To make internationalisation possible, however, the framework including the technical standards and their ease of implementation must be supportive. Harmonization of media, content and copyright legislation, international protection of copyrights and liberal ownership rules for media companies can all help in reducing the costs of internationalisation.

References

- The Economist (2002): "Tangled Webs", Special report on Media conglomerates. May 25, 2002.
- Pira International Ltd. (2001): "The Impact of Market and Technology Changes on Publishers and Printers".
- Pira International Ltd. (2000): "E-commerce for the UK Print Industry".
- Commission of the European Communities (2002): Commission Staff Working Paper "Digital Rights – Background, Systems, Assessment". 14.02.2002, SEC(2002) 197.
- Business Week Online (2002): "The Dinosaurs are taking over", in: Business Week Online, May 13, 2002.
- Bvdm – Bundesverband Druck und Medien e.V.: "E-Commerce-Studie 2001: Eine empirische Erhebung der Druck- und Medienverbände in Deutschland und Österreich".
- MUDIA - MultiMedia in the Digital Age (2002): "The European Multimedia News Landscape", June 2002
- Kommission zur Ermittlung der Konzentration im Medienbereich (2001): "Medienkonzentrationsbericht", www.kek-online.de.
- TAB – Büro für Technikfolgen-Abschätzung beim Deutschen Bundestag (2002):
"Innovationsbedingungen des E-Commerce – der elektronische Handel mit digitalen Produkten", Hintergrundpapier Nr. 8, March 2002.
- MUDIA – MultiMedia in the Digital Age (2001): "The European Media Landscape: Facts and Figures", November 2001.
- PricewaterhouseCoopers / Department of Trade and Industry (2002): "E-commerce Impact Study for the Printing Sector", Summary report, April 2002.
- European Commission (2001): "Detailed Tables. Special Feature on Publishing and printing". Eurostat, Unit D2. DG Enterprise Unit E4.
- Washington Post (2002): "Big Media Mergers Raise Big Doubts: Is 'Synergy' Achievable – or Even Desirable?", May 14, 2002.

Annex: Methodology of the e-Business Survey 2002

Background

Most of the data presented in this report are derived from the European e-Business Survey 2002, a cornerstone of the monitoring activities of the *e-Business W@tch*. In total, 9264 telephone interviews with decision makers in European enterprises in all EU Member States were conducted during June and July 2002. For the construction of the questionnaire and for underlying definitions, OECD recommendations were taken into account.

Field work

The field work of the survey was carried out by INRA Germany in co-operation with its partner organisations on behalf of the *e-Business W@tch*:

Country	Organisation	Country	Organisation
Austria	Spectra Marktforschung: Brucknerstr. 3-5/4, 4020 Linz	Italy	INRA Demoskopea S.p.A., Via Rubicone 41, 00199 Roma
Belgium	INRA Belgium, Avenue de la Couronne 159-165, 1050 Brussels	Luxembourg	ILReS Market Research, 46, Rue di Cimentière, L-1338 Luxemburg
Denmark	Gallup TNS Denmark, Masnedogade 22-26, 2100 Copenhagen	Netherlands	Blauw Contactcenter, Conradstraat 18, 3013 AP Rotterdam
Germany	INRA Deutschland GmbH, Papenkamp 2-6, 23879 Mölln	Portugal	Metris GfK, Av. Eng. Arantes e Oliveira 3-2, 1900-221 Lisboa
Finland	Taloustutkimus Oy, Lemuntie 9, 00510 Helsinki	Spain	INRA España S.A., C. Alberto Aguilera, 7-5, 28015 Madrid
France	CSA TMO, 22 rue du 4 Septembre, 75065 Paris Cedex 02	Sweden	GfK Sverige, Box 401, 221 00 Lund
Greece	MEMRB – K.E.M.E, 24 Ippodamou St., 11635 Athens	UK	Continental Research, 132-140 Goswell Road, EC1V 7DY London
Ireland	Lansdowne Market Research, 49 St., Stephens Green, Dublin 2		

Interview method

The field work was carried out in June and July 2002 using computer-aided telephone interview (CATI) technology. 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 which may not have 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 EU Member States and which have their primary business activity in one of the 15 sectors specified by NACE Rev. 1 codes. The most important used viewpoints 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 focuses 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 included enterprises from 15 sectors of the economy, defined by NACE Rev. 1 business activities (see table next page). The composition of sectors took into account their economic importance, homogeneity with respect to the analysis of e-business, and the relevance of e-business activities.

The sample drawn was a random sample of companies from the respective sector population in each Member State where the respective sector was to be surveyed with the objective to fulfil quota with respect to company size class. Target quota were to include a share of at least 10% of large companies (250+ employees) per country-sector cell and at least 30% of medium sized enterprises (50-249 employees).

Samples were drawn locally by the INRA partner organisations based on the acknowledged business directories and databases (cf. table next page).

Population coverage of the e-Business Survey (2002)

No.	NACE Rev. 1 Codes (Section – Division/Group)		Sector Name
01	D	15, 16	Manufacture of food products, beverages and tobacco
02	D / O	22, 92.1, 92.2	Publishing, printing, reproduction of recorded media, audiovisual services
03	D	24, 25	Manufacture of chemicals and chemical products
04	D	28	Manufacture of metal products
05	D	29 (except 29.6, 29.7)	Manufacture of machinery and equipment
06	D	30, 31 (except 31.3 - 31.6), 32	Manufacture of Electrical machinery and electronics
07	D	34, 35	Manufacture of transport equipment
08	G	52.11, 52.12, 52.4	Retail
09	H / I / O	55.1, 55.2, 62.1, 63.3, 92.33, 92.52, 92.53	Tourism
10	J	65.12, 65.2	Credit institutions, investment firms and leasing enterprises
11	J	66	Insurance and pension funding services
12	K	70	Real estate activities
13	K	74	Business services
14	I / K	64.2, 72	Telecommunications and computer-related services
15	N	85.11, 85.12, 85.3	Health and social services

Country	Directory / Database	Country	Directory / Database
Austria	Herold BUSINESS MARKETING database	Italy	Dun & Bradstreet
Belgium	SPECTRON database by Vicindo	Luxembourg	Répertoire des entreprises luxembourgeoises by STATEC (the official list of the National Statistic Administration).
Denmark	KOB (Købmandsstandens Oplysnings Bureau)	Netherlands	MarktSelect
Germany	Heins und Partner Business Pool	Portugal	Business directory by INE (the National Statistics Institute)
Finland	Blue Book - Salesleads database by the Helsinki Media Company Oy (Sanoma Magazines Finland)	Spain	Dun & Bradstreet
France	IDATA, based on "INSEE Siren file" (the National Institute of Statistics) and other directories	Sweden	Swedish Post Adress Register (PAR)
Greece	ICAP directory (the major database for Greece)	UK	Dun & Bradstreet
Ireland	Bill Moss / Dun & Bradstreet		

In total, 9264 interviews were carried out. The following table shows the breakdown by country and the average interview length:

Country	No. of interviews	Average length	Country	No. of interviews	Average length
Austria	308	17.0 min.	Italy	1517	22.5 min.
Belgium	300	18.2 min.	Luxembourg	102	17.4 min.
Denmark	304	20.2 min.	Netherlands	500	17.2 min.
Germany	1500	18.8 min.	Portugal	300	23.0 min.
Finland	308	20.6 min.	Spain	502	18.4 min.
France	1362	17.2 min.	Sweden	260	19.8 min.
Greece	308	16.5 min.	UK	1538	16.5 min.
Ireland	155	20.1 min.	TOTAL	9264	~ 18 min.

Problems encountered

No major problems were reported by the fieldwork organisations with respect to interviewing (e.g. comprehensibility of the questionnaire, logical structure). A statement from the institute that carried out the survey in the UK summarises this general assessment very well: "On the whole, the fieldwork went relatively smoothly. The questionnaire was logically structured and flowed naturally. Most problems stemmed from the difficulties of conducting research projects among ICT decision makers in general rather than from any specific flaws in design of this project itself. 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 not possible to accomplish the number of interviews envisaged, mainly in those cases where the total population of enterprises was relatively small (e.g. in the insurance sector in smaller countries). In some cases, the objective of including a share of 10% of large companies could not be accomplished; if possible, these were then replaced by interviews with SMEs.

An issue – which was known in advance but is unavoidable in telephone interviews – is that it is not always easy to find the right target person. Field work organizations reported that sometimes a data processing manager is not very aware of the consequences of e-business on the whole of the company, on the personnel level and on the financial level. On the other hand, the general manager may not always be aware of the implementation status and technical consequences.

Tabulations

Within the coverage specified above, and in line with the special task of the *e-Business W@tch*, results were compiled for mainly two sets of data:

1. An activity breakdown of the population of enterprises into 15 sectors. This breakdown is based on the aggregate of four countries (D, F, I, UK), as in these countries all 15 sectors were included in the survey and therefore comparability of the sample is given. These four countries represent more than 60% of the market volume in any of the 15 sectors and in most sectors actually more than 70%.
2. A size-class breakdown of the population of enterprises into three categories: small enterprises (including micro-enterprises, i.e. enterprises with 0-49 employees), medium sized enterprises (50-249 employees) and large enterprises (250+ employees).

A breakdown of the population by EU Member States is also available, but it is restricted to four countries (D, F, I, UK) for the same reason as explained in (1.) above. This implies that two different kinds of totals were calculated: (i) an EU-4 total consisting of the results from Germany, France, Italy and the UK and (ii) a sector total consisting of all countries included in the survey of a particular sector. For reasons of comparability and consistency, tables comparing sectors build on the EU-4 totals. Sector totals are composed of 6-8 countries per sector.

In addition, the activity breakdown was cross-tabulated with the country as well as with the size-class breakdown. These cross-tabulations are offered in special sector databases. However, depending on the indicator and the filter questions, the number of observations can become very small in many cells of this cross-tabulation. It is therefore recommended to limit the breakdown of data to one dimension (in the case of pre-filtered questions) or two dimensions (if all enterprises were asked).

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*" is – if weighted by employment – 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 and allowing 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 can be structured into five main modules:

- Module A: ICT infrastructure and e-skills development in the company
- Module B: E-commerce and e-business usage
- Module C: Barriers to e-commerce
- Module D: Impact of selling and procuring online
- Module E: Impact of and satisfaction with electronic business

The choice of indicators includes a basic set of widely accepted measures for e-commerce and e-business (as used in related surveys on e-commerce and e-business e.g. by Eurostat), but also introduces a few 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 questionnaire can be downloaded (as a spreadsheet) from the *e-Business W@tch* website at its "database" section (http://www.ebusiness-watch.org/marketwatch/database/survey_info.htm)