

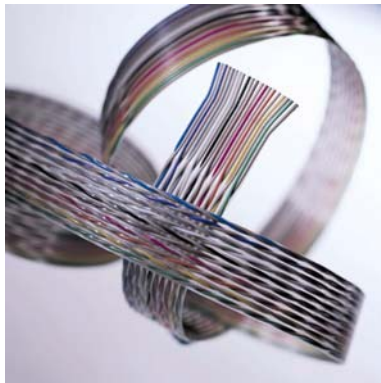
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## The role of new companies in e-business innovation and diffusion

*An e-Business W@tch Study*

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September 2007



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## About this Report

This report was prepared by empirica on behalf of the European Commission, Enterprise & Industry Directorate General, in the context of the *e-Business W@tch* programme. *e-Business W@tch* is implemented by a team consisting of empirica GmbH (co-ordinating partner), Berlecon Research, Databank Consulting, DIW Berlin, Lios Geal Consultants, RAMBØLL Management and Salzburg Research, based on a service contract with the European Commission.

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

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## Executive Summary

### Objectives and scope of the study

The objective of this study is to analyse the role of new companies for the introduction and take-up of new e-business applications, i.e. for e-business innovation and diffusion. The analysis has led to conclusions for business impacts with regard to single enterprises and industry structure as well as to policy implications. The report takes up on the importance of new companies for innovation and economic growth which has been commonly acknowledged by political decision makers and researchers. It is a cross-sector report that does not focus on particular industries. The analysis is based on literature findings, secondary statistical data, qualitative findings from case studies and a survey among the members of the e-Business W@tch 2006 Advisory Board as well as quantitative data from the e-Business Survey 2006.

### About the importance of new companies for growth and innovation

Various studies show that new companies contribute considerably to economic growth and employment. On a national level, research results indicate that in developed countries a high amount of nascent entrepreneurs and owners of young firms is positively associated with growth. There is also empirical evidence that small and new enterprises serve as an engine of employment creation in Europe. New firms may have various advantages over established firms in innovative activity, including organisational flexibility, interest in incremental innovations, and sustained excitement about innovation. In recent years, economic framework conditions are assumed to have changed in a way that innovative advantage has shifted towards new and small firms.

### Qualitative findings about the role of new companies in e-business

Findings from qualitative research for this report and from literature confirm the assumption that new companies play an important role in introduction and uptake of new e-business applications in many industries. However, some industry representatives indicated that there are no considerable differences between new and established companies in this respect. Furthermore, many new companies' innovations may not necessarily be visible and not widely known: the innovations of new firms may be incremental and modified by other firms, and innovative e-business ideas may also diffuse when established companies employ former freelancers, i.e. former one-man or one-women companies. Finally, many new companies are not innovative at all as far as e-business is concerned. At the firm's level, the impact of new companies on e-business innovation and diffusion obviously depends on the importance of e-business in their business model. At an aggregate level, the impact of new companies on e-business innovation and diffusion differs between industries, regions, types of technologies and stages of the innovation process:

- Differences between industries: In industries with strong supplier and customer relationships, new companies may play a less important role for innovation and diffusion than in industries with weak vertical integration. Further industry characteristics that shape the role of new companies include the innovativeness of the industry and the industry's type of products or processes
- Differences between regions: In regions with a high innovative performance, start-ups are more important for e-business innovation and diffusion than in generally less innovative regions.
- Differences between technology types: New companies may play a more important role for ICT-related product and service innovation than for process innovation.

- Innovation versus diffusion: Findings suggest that new companies contribute significantly to the diffusion of e-business applications, but they do not necessarily take up more innovative applications than established companies. Young companies may contribute to the diffusion of new e-business practices when a pioneering new company or a group of pioneers is copied by other firms or when an innovative new company is acquired by an established firm.

#### Findings from the e-Business Survey 2006

In 2006 the e-Business Survey offered for the first time the opportunity to analyse data about e-business infrastructure, use and impacts by the age of the company. Overall, 9% of the survey companies were founded between 2006 and 2003. For the purposes of the study in hand, this group is considered as “new companies”. 22% of the surveyed companies were founded between 2002 and 1997, a relative majority of 42% was founded between 1996 and 1981, and 26% were founded before 1981. This report is focusing on “new companies”, for which the survey findings indicate that, in general, they are important for e-business innovation and diffusion, but not necessarily more important than established ones. The analysis also indicates that there are considerable differences between industries. Core findings include the following:

- Product, service and process innovation: The survey distinguished, firstly, between product and service innovation on the one hand and business process innovation on the other hand. Secondly, for both product and service innovation as well as process innovation, the interviewees were first asked about general innovation and then, if applicable, about ICT-related innovation. Product and service innovation activity, whether general or ICT-related, was found to decline with company age. The differences between age groups for general product and service innovation were found to be only a few percentage points: 44% of the companies of the youngest age group and 39% of the oldest group reported general innovation activity. There were more distinct differences for ICT-related product or service innovation: 62% of the innovating new companies reported ICT-related product or service innovation and 49% of companies founded before 1981. As regards the introduction of new business processes, no clear patterns were identified. In general process innovation, the oldest companies reported the highest activity level (37%), and in ICT-related process innovation the youngest companies (79%) did so. In both cases, the companies founded between 1981 and 1996 reported the lowest innovation levels.
- Important industry differences: The overall importance of new companies for product or service innovation as well as for process innovation was found to differ very much by industry. New companies reported the highest innovation levels in some industries and the lowest levels in other industries: new companies appear to play a particularly important role for ICT-related innovation in the ICT manufacturing industry and also to some extent in the telecommunication and hospitals industries. In contrast, the role of new companies seems to be significantly less important in the pulp & paper, construction and tourism industries. This implies that the overall importance of new companies for e-business innovation depends very much on the composition of the sample and on the characteristics of the industries included. Further research could follow up these findings and provide more detailed analyses about innovation activity in new companies in particular industries.
- Innovative e-business solutions: Among the ICT applications and solutions which were covered by the e-Business Survey 2006, the following were considered as being particularly innovative: Voice over Internet Protocol (VoIP), Radio Frequency Identification (RFID), and e-Invoicing. Results show that start-ups tend to have the highest percentage of use of these applications. In fact, new companies have the highest use of VoIP across all age groups

(24%) and they are at the same level with companies founded before 1981 as regards e-invoicing (20%) and RFID (4%). Again there were large differences between the industries examined. However, in contrast to what one would expect, in industries in which new companies were found to be less important for ICT-related product and service or process innovation, the new companies reported higher levels of VoIP and e-invoicing use than the established firms.

- Other e-business solutions: In e-business applications that are already rather common, new companies were not found to have a clear lead. According to the survey results, new companies have the highest percentages for Wireless Local Area Network (33%), online applications other than e-mail to collaborate with business partners in the design of new products or services (22%), placing orders for goods and services online (62%), and specific IT solutions to support their marketing or sales processes (18%). Furthermore, the share of companies stating that e-business constitutes a significant part of the way the company operates was largest among new firms (26%). In all these cases, however, differences between age classes were not large. In contrast, new companies were found to be behind other age-classes in the use of Enterprise Resource Planning, Supply Chain Management and Customer Relationship Management systems. These ICT applications are more beneficial for large than for small companies.

### Business impacts for individual enterprises and industries

As new companies may have more organisational flexibility and more interest to introduce incremental inventions than established companies, new companies serve customisation and co-operation in innovative networks. To the extent that customisation and co-operation become more important for regional and national competitiveness, industries in certain regions or countries with a lack of new companies may lose competitiveness and productivity to industries in other areas with a larger number of agile start-ups.

### Policy implications

Knowledge and capital are particularly important resources for new companies that use or produce e-business applications (see section 2.4): New firms may need particular ICT skills for the production or use of e-business applications, and they may also need e-business management skills. They also need financial capital to the extent that the production or use of e-business applications requires considerable investment – in certain cases from specialised venture capitalists (see section 2.4, “access to finance”). Furthermore they need real estate with appropriate production and office space.

Decision makers in governments, industry associations and other organisations can facilitate the access to and the use of knowledge and capital. They can promote innovation and diffusion of e-business technologies through establishing and supporting related stakeholder networks. Such networks may include, above all, companies producing or purchasing ICT and e-business applications as well as firms offering related services. New companies should receive particular attention in such fora in order to exploit their innovative potential.

In terms of finance, the opportunities for “business angels” investments appear to be largely untapped. On the investors’ side, in order to increase the investment skills of active and potential business angels and thus to increase their readiness and capability to invest in new ICT firms, relevant academies can be created. On the companies’ side, new ICT firms should be informed about such funding opportunities from “business angels”. Furthermore, policy makers can facilitate the access of company founders to appropriate real estate. They can, for example, help to establish and foster business incubators that are specialised in hosting and consulting new companies that either produce ICT or have a business model based on e-business.

“Spin-offs” from universities and public research institutions should also receive particular attention from policy makers. There appears to be a large unused potential of commercialising inventions and knowledge from such spin-offs (see section 2.3, “growth and employment”), also related to e-business. Approaches for promoting these start-ups should be differentiated and involve, for example, relevant research institutes or clusters within the university, educational courses for e-business management, specialised finance providers, and university-related business incubators. Such measures should target not only graduates and students, but also professors as potential company founders.

# 1 Introduction

## Recognition of start-ups in research and policy

Since the mid-1990s, new companies have received particular attention from academia and policy makers in Europe. Today it is widely recognised that new companies – so-called “start-ups” – play an important role for growth, employment creation, innovation, and structural change. Similar to social policy makers discussing the necessity of a society to have enough newly born children in order to keep society vital and maintain social insurance systems, economic policy makers are seeking an economy that brings out enough businesses start-ups or, as they are called in some statistical documents, “business births”.

However, start-up activity in Europe is relatively low. In particular, there appears to be a gap between start-up activity in European countries and the US. The Global Entrepreneurship Monitor (GEM), a major research project aimed at describing and analyzing entrepreneurial processes within a wide range of countries, provides related data.<sup>1</sup> The GEM found that the percentage of people involved in early-stage entrepreneurial activity<sup>2</sup> in the US (12.4%) is much higher than in all European countries participating in the study. The related values in the largest EU Member States are as follows: France (5.4%), Germany (5.4%), Italy (4.9%), the UK (6.2%) and Spain (5.7%). Purpose of this report: tackling the “start-up gap” in e-Business W@tch studies

The operative thesis for the research of this report was that new companies are important for the uptake and diffusion of new e-business applications in many sectors of the economy. The objective was to describe and, to the extent possible, explain this role. In particular, differences between industries were to be described – an issue on which there are very few empirical studies available.<sup>3</sup> Technology-oriented companies in the ICT sector, i.e. companies for which the development and commercialisation of ICT products and services is the core business, may be particularly important for e-business innovation and diffusion. However, the research objective for this report was to deal not only with new companies *producing* e-business technologies or services but also with any new companies *using* such technologies.

Despite the assumed importance of new companies for e-business, the start-up issue has not been dealt with explicitly in previous e-Business W@tch reports. There was only implicit coverage of this topic through various case studies, e.g. PGS Software, Poland, and yourGreece. This special report is aiming at filling that gap.

## Methods applied: literature analysis, qualitative and quantitative research

In order to analyse the role of new companies for e-business innovation and diffusion, a multi-tier research approach was applied for this study, as practiced in *e-Business W@tch* sector reports. Findings in this report are based on literature analysis, qualitative methods, i.e. activity views and expert interviews, as well as results from the *e-Business W@tch* 2006 survey. The survey questionnaire<sup>4</sup> included questions about the year in which the company was founded so that any item of the questionnaire can be analysed with regard to the age of the companies, allowing conclusions for the importance of new companies. In this report, the answers to the following survey questions were analysed in detail: innovation activity in general, use of particularly innovative e-business solutions,

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<sup>1</sup> See Minniti (2005) and <http://www.gemconsortium.org>.

<sup>2</sup> In the definition of GEM, early-stage entrepreneurial activity combines nascent entrepreneurs and new business owners. Thereby, “nascent entrepreneurs are those individuals, between the ages of 18 and 64 years, who have taken some action toward creating a new business in the past year”, see Minniti (2005), p. 16.

<sup>3</sup> See Acs/Audretsch (2003).

<sup>4</sup> The questionnaire is available at <http://www.ebusiness-watch.org/about/methodology.htm>.

and use of already established e-business applications. Further survey items analysed include the hiring of ICT experts as well as ICT investment sources. Structure of this report

This report will first describe the background of an analysis of start-ups and e-business, presenting relevant definitions (section 2.1), secondary statistics about business births (section 2.2), an overview of state-of-the-art research findings about the importance of new businesses for economic performance (section 2.3), as well as a presentation of possible bottlenecks to new business creation and development and measures how policy can tackle them (section 2.4). Qualitative findings about the role of new companies for e-business innovation and diffusion are presented in chapter 3 and quantitative results from the e-Business Survey 2006 in chapter 4. Finally, some business impacts (section 5.1) and policy implications (section 5.2) are presented.

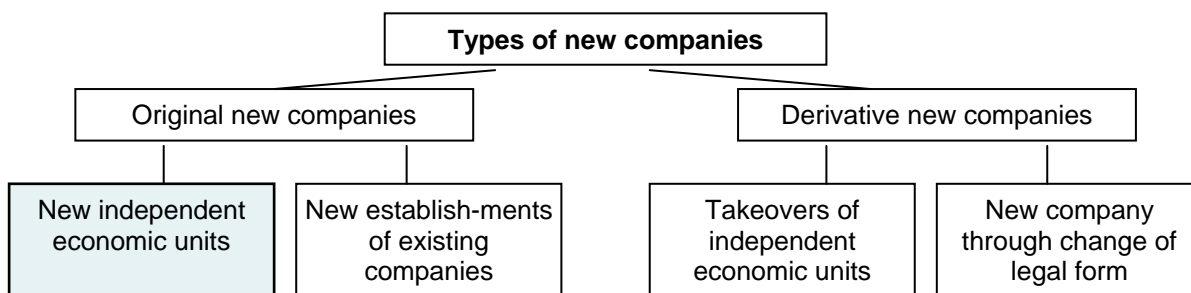
## 2 Context and Background

### 2.1 Definitions: new companies, innovation and diffusion

#### New companies

A new company is defined here as one that starts as an original, independent commercial unit from scratch. Only companies actually producing and offering goods are considered. "Independent" excludes new establishments of an enterprise that has been existing before. "From scratch" excludes companies that come into existence as so-called "derivative start-ups", for example in the course of a merger or through the changing of a previously existing company's legal form. The "actual production and offer of goods" excludes companies that only run research and development activities or do not or not yet operate at all. Exhibit 2-1 shows a diagram of the different types of new companies, highlighting the ones of relevance here.

**Exhibit 2-1: Types of new companies**



Source: Kistner (1988), modifications by empirica

In formal terms, the registration of the company at the authority in charge is the beginning of business. In case a business does not need to be registered, for example because it is too small, the beginning of the business operation is considered as being the start.

A particular form of a "new independent economic unit" is a "spin-off":<sup>5</sup> a new company based on knowledge or technology generate in a mother organisation, e.g. a large company, a university or a public research institute.<sup>6</sup> Spin-offs will receive some special attention in this report because they may be important for introducing e-business applications.

#### Innovation and diffusion

In this report, innovation is defined as the market introduction of a new product, service or process. In this sense, innovation is different from an invention, i.e. something new that is not necessarily being marketed.<sup>7</sup> A new product or service is only considered an innovation when it is new from a macro-economic point of view, i.e. for an industry or a geographic area, not only new for the company offering it.<sup>8</sup> The definition used in this report follows the Schumpeterian tradition, i.e. the school of thinking based on the works of the Austrian economist Josef A. Schumpeter (1883–1950). There are schools of thought defining innovation in a different manner.

<sup>5</sup> In some publications the term "spin-out" is used alternatively.

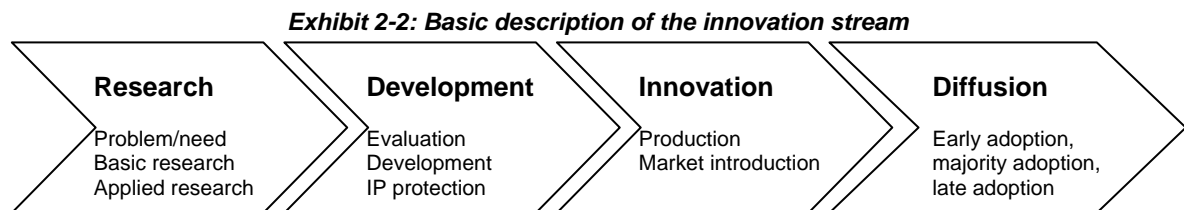
<sup>6</sup> See the definition by Mahar/Coddington (1965): "Spin offs [are] usually (...) formed by individuals who draw heavily on knowledge gained as employees of a university, government agency, of industrial firm."

<sup>7</sup> See Sundbo (1998), pp. 1–2 for definitions and theoretical considerations on the concept of innovation.

<sup>8</sup> Note: The *e-Business W@tch* Survey 2006 asked companies about products or processes new to their business, i.e. inter-firm innovation, because a question about products or processes new to the industry may have led to a considerable number of invalid answers.

Diffusion is defined as the uptake of an innovation by a certain number of buyers – people or organisations – in the market. Commonly a new product or service is at first only purchased by a small number of people, called the “early adopters”. There may be a break-through leading to the adoption of the product or service by the majority of potential users. Finally there are the “late adopters” who take up the innovation when the majority is already using it.

Innovation and diffusion are parts of a complex stream. It begins with a problem or need that someone identifies and tackles with basic and applied research. The stream may continue with product evaluation and development and in some cases intellectual property (IP) protection. In the case of an opportunity for commercial use, the product – or service or process – may be introduced into the market, i.e. innovation may take place. If the product is successfully sold, one may distinct between various groups of buyers in the diffusion phase: the first ones who are called “early adopters”, the majority of buyers who follow, and some “late adopters” who buy when most people already have the product. This stream is shown in exhibit 2-2.



Source: Rogers (1996), with modifications by empirica

Innovation in practice is a much more complex process than indicated in this sequence. Innovations are complex technological and economical processes, implying feedback from users and other people involved, ongoing learning and further research.<sup>9</sup> Nevertheless the two-dimensional flow diagram illustrates the core events.

## 2.2 Statistical background of enterprise births in Europe

### Enterprise births in Europe

The most recent European-wide data about enterprise births stem from a voluntary data collection of 2004 for the year 2002.<sup>10</sup> Data from 19 European countries are included, thereof 18 countries of the European Union plus Norway. The missing countries are Austria, France, Germany, Greece and Ireland from the EU-15 as well as the New Member States of Cyprus, Malta and Poland. Related figures are shown in Exhibit 2-3.

<sup>9</sup> See Kline/Rosenberg (1986), above all pp. 285–294, for a more complex model of innovation, the “chain-linked model”.

<sup>10</sup> The following data stem from Eurostat, published in Schrör (2005).

**Exhibit 2-3: Enterprise birth rates in Europe 1998 – 2002**

	Combined manufacturing, construction and service sectors (NACE C – K)					Manufacturing					Services				
	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002
BE	8.5	:	7.0	:	:	5.4	:	4.4	:	:	9.0	7.5	7.5	:	:
CZ	:	:	:	12.5	10.0	:	:	:	10.5	8.5	:	:	:	13.1	10.4
DK	10.1	10.9	10.0	9.3	:	5.9	5.9	5.6	5.1	:	10.9	11.9	10.6	10	:
EE	:	:	11.2	13.0	11.5	:	:	8.6	7.9	8.6	:	:	12.2	14.5	12.3
ES	9.7	9.6	9.7	9.1	9.3	7.7	7.3	7.1	6.6	6.3	9.6	9.3	9.4	8.8	9.1
IT	11.4	7.6	7.8	7.7	7.4	8.2	5.4	5.5	5.2	5.0	11.7	7.7	7.9	7.9	7.4
LV	:	:	16.2	10.2	21.8	:	:	13.6	9.4	32.3	:	:	16.7	10.4	20.1
LT	:	:	11.3	11.5	10.3	:	:	9.5	9.9	10	:	:	12.0	11.8	10.2
LU	13.2	13.4	12.4	12.2	11.4	8.1	7.4	7.5	6.8	6.7	13.7	14.1	13.0	12.8	11.8
HU	:	:	12.4	12.7	14.5	:	:	9.1	8.1	10.6	:	:	14.2	13.4	14.3
NL	:	9.6	9.4	9.6	:	:	6.8	6.3	6.3	:	:	9.8	9.5	9.6	:
PT	9.5	8.0	7.6	7.5	6.0	8.0	7.7	5.8	5.6	5.8	9.2	7.7	7.3	7.5	5.7
SI	:	:	6.4	6.5	7.1	:	:	3.6	3.8	4.2	:	:	7.1	7.2	8.2
SK	:	:	10.1	14.9	15.0	:	:	7.6	12	13.1	:	:	10.8	15.8	15.1
FI	8.5	7.6	7.3	7.2	7.2	6.6	5.5	5.4	5.2	4.6	8.7	7.7	7.3	7.4	7.6
SE	6.6	6.3	7.0	6.6	6.1	5.2	5.0	5.3	4.7	4.5	7.0	6.6	7.3	6.9	6.3
UK	9.1	9.6	8.9	:	:	6.7	7.2	6.9	:	:	9.6	10.0	9.4	:	:
RO	:	:	10.9	11.5	12.6	:	:	11.6	11.7	11.7	:	:	10.6	11.1	12.5
NO	12.3	11.4	10.3	10.1	:	7.7	7.7	5.8	5.3	:	13.9	12.8	11.5	10.9	:

Source: Schrör (2005), p. 2. “:” = not available

#### Enterprise birth and survival in the ICT sector in Europe

ICT was one of the most dynamic economic sectors at the beginning of this decade, which was reflected in the “new economy” and “dot.com” boom since the mid-nineties. The ICT sector as defined in the data collection discussed here comprises ICT manufacturing and ICT services (including ICT wholesale). Related figures are shown in Exhibit 2-4.

**Exhibit 2-4: Enterprise birth rates in the ICT sector in Europe 1998 – 2002**

	ICT total (manufacturing, wholesale, services)					ICT manufacturing					ICT services				
	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002
CZ	:	:	:	12.6	10.2	:	:	:	8.0	6.7	:	:	:	14.1	11.3
DK	18.5	18.6	20.1	17	:	7.5	7.9	6.9	6.8	:	19.2	19.2	20.8	17.5	:
EE	:	:	9.8	11	10.2	:	:	9.2	3.6	7.2	:	:	9.9	12.0	10.5
ES	13.5	12.5	14.8	13.5	13.0	:	:	:	:	8.1	13.7	12.7	15.2	13.9	13.3
IT	19.4	12.4	12.7	11.9	9.5	11.4	6.8	7.2	5.9	5.2	20.8	13.2	13.5	12.7	10.2
LV	:	:	21.4	12.6	18.2	:	:	10.7	4.3	4.3	:	:	22.5	13.3	19.2
LT	:	:	12.1	14.6	15.9	:	:	5.3	8.2	10.1	:	:	12.9	15.3	16.7
LU	18.6	17.9	17.1	16.4	12.0	7.1	0	0	7.1	6.7	18.7	18.1	17.2	16.5	12.0
HU	:	:	16.7	15.7	15.2	:	:	9.5	8.3	12.6	:	:	17.9	17.1	15.6
NL	:	15.3	16.2	15.1	:	:	11.3	10.0	7.5	:	:	15.5	16.4	15.4	:
PT	11.9	9.1	9.3	9.6	5.8	8.2	9.8	6.7	6.4	8.7	12.2	9.0	9.4	9.7	5.7
SI	:	:	8.3	9.0	10.3	:	:	2.9	2.4	3.2	:	:	10.5	11.4	12.6
SK	:	:	10.0	14.8	14.4	:	:	5.3	8.4	12.2	:	:	11.3	16.4	14.9
FI	9.2	9.7	10.7	10.5	9.2	6.2	4.2	5.5	5.5	4.0	9.5	10.2	11.2	11.0	9.6
SE	10.4	9.1	11.1	8.4	7.5	4.8	4.6	5.3	3.6	4.0	10.7	9.3	11.5	8.7	7.6
RO	:	:	20.9	21.7	20.7	:	:	12.9	14.9	14.0	:	:	21.9	22.4	21.4
NO	17.3	18.2	18.6	18.4	:	:	:	:	4.8	:	:	:	:	18.8	:

Source: Schrör (2005), p. 2. “:” = not available

In the ICT sector, enterprise birth rates in the year 2002 were above those of the whole business economy in most countries where these birth rates can be compared. Birth rates in ICT exceeded those of the business economy in ten of the 14 countries shown, while they were lower in four countries (Estonia, Latvia, Portugal and Slovakia). The highest birth rate in ICT was reported by Romania at 20.7 %.

Birth rates in the whole ICT sector, decreased in some countries from 1998 onwards (see "ICT total" in Exhibit 2-4). This was the case in Denmark, Italy, Luxembourg, Portugal and Sweden. In Finland, the birth rate rose from 9.2% in 1998 to 10.7% in 2000 and dropped again to 9.2% in 2002. In some of the new Member States, the birth rate rose (Lithuania, Slovenia) or stayed at a rather high level (Latvia, Hungary, and Slovakia).

ICT services accounted for the highest birth rates, above 20%, in all countries. Birth rates in ICT services were in some cases more than twice as high as in ICT manufacturing. In Denmark, this could be observed in all reference years from 1998 to 2001. However, there are various specificities of the data sources that need to be considered when interpreting the data: The merging of administrative registers in Denmark in 1999 may have resulted in the over-evaluation of enterprise births in that year. The quality of 1998 Italian data is generally low, reflecting changes made to the business register. Portuguese data from 2001 onwards do not include sole proprietorships. In Latvia, the exceptionally high birth rate of 2002 is due to the inclusion for the first time of natural persons and to difficulties of classification in the correct year of birth. In Slovenia, the reason for the large difference between 2001 and 2002 is an improved inclusion of some types of firms.

## 2.3 Importance of new companies for economic performance

### Growth and employment

New companies contribute considerably to growth and employment. New companies can create economic growth in various ways. They may enter markets with new or varied products or production processes,<sup>11</sup> and they may increase productivity by increasing competition.<sup>12</sup> New companies may create growth on the firm level as well as in certain industries, regions and nations.<sup>13</sup> The following findings apply to firm-level and industry-level data of North America as well as of Europe:<sup>14</sup> growth rates are higher for smaller enterprises and for younger enterprises, and growth rates are even higher for small and young enterprises in technology-intensive industries. However, the likelihood of survival is lower for smaller and for younger enterprises, and the likelihood of survival is even lower for small and young enterprises in technology-intensive industries. On a national level, results from the Global Entrepreneurship Monitor (<http://www.gemconsortium.org/>) indicate that in developed countries a high amount of nascent entrepreneurs and owners of young firms is positively associated with General Domestic Product (GDP) growth.<sup>15</sup> In less developed countries, high start-up rates may reflect a high number of "marginal" entrepreneurs, i.e. shopkeepers in small crafts, rather than innovative entrepreneurs seeking business opportunities.<sup>16</sup>

As regards employment, there have been numerous studies about the role of new and small companies in the past 25 years.<sup>17</sup> The "big bang" of the discussion was a publication by Birch (1979),

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<sup>11</sup> See Acs and Audretsch (1990) and (2003).

<sup>12</sup> See Geroski (1989), Nickel (1996), Nickel et al. (1997).

<sup>13</sup> See Carree/Thurik (2003) for a survey of studies of the impact of entrepreneurship on growth at various levels of observations.

<sup>14</sup> See Audretsch (2002), p. 18, summarising a variety of related studies.

<sup>15</sup> See van Stel/Carree/Thurik (2005), p. 318.

<sup>16</sup> See van Stel/Carree/Thurik (2005), p. 319.

<sup>17</sup> See for example Konings (1995) for the UK, Heshmati (2001) for Sweden, Hohti (2000) for Finland, Weigand and Audretsch (1999) for Germany.

stating that between 1969 and 1976, 80% of new jobs in the US were created by small and medium-sized companies. Current state-of-the-art is that “*small and new enterprises serve as an engine of employment creation on both sides of the Atlantic*” and that “*the weight of the empirical evidence on employment generation is remarkably robust*”.<sup>18</sup> However, Audretsch notes that the studies about the importance of firms of different size or age normally do not consider spill-overs between companies. Thriving of small and new firms may depend on business relations with a robust base of large and established firms.

Growth and employment opportunities through spin-offs from universities have gained special attention in recent years because of an assumed large unused potential of commercialising findings from public research.<sup>19</sup> Interest in university spin-offs increased in Europe in the late 1990s due to reports from US universities that created a large number of companies with considerable effects on growth. In 1997, a report about the Massachusetts Institute of Technology (MIT) stated that economic output of all MIT spin-offs taken together would form the 24<sup>th</sup> largest economy in the world.<sup>20</sup> Recent findings about research in Europe suggest that “*the number of spin-out companies created is significantly positively associated with total research expenditure, the number of employees engaged in spin-out activities, expenditure on intellectual property protection and the business development capabilities of technology transfer offices*”.<sup>21</sup> However, there is evidence that “*many university spin-outs (...) are limited in growth potential by the aspirations of the founders, the composition of the initial management teams and the resource endowments of the ventures*”.<sup>22</sup>

### Innovation and diffusion of technology products and services

New companies may contribute considerably to the innovation and diffusion of technologies. New firms may have various advantages in innovative activity over established companies. To some extent these advantages are similar to those of small firms over large firms:

- **Flexibility.** In large companies, the decision to innovate and to adapt workflows and power to the new product or process must survive layers of bureaucratic resistance and groups with different interests, whereas in small firms only a few people decide about innovation.<sup>23</sup>
- **Interest in “small fish”.** As Scherer put it, “many advances in technology accumulate upon a myriad of detailed inventions involving individual components, materials, and fabrication techniques. The sales possibilities for making such narrow, detailed advances are often too modes to interest giant corporations.”<sup>24</sup>
- **Sustained excitement.** Innovation motivation may be higher in small companies. To quote Scherer again: “It is easier to sustain a fever pitch of excitement in small organisations, where the links between challenges, staff, and potential rewards are tight.”<sup>25</sup>
- **“Not-invented-here” effect.** As regards inventions from public research organisations, established companies may not have an interest in marketing them because the inventions

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<sup>18</sup> Audretsch (2002), p. 15.

<sup>19</sup> See Shane (2004) for a comprehensive discussion about university spin-offs; also Slaughter/Leslie (1997) for an earlier but still worth reading work.

<sup>20</sup> See BankBoston (1997).

<sup>21</sup> Lockett/Wright, p. 198.

<sup>22</sup> Harrison/Leitch (2005), p. 271; results of a study of literature about university spin-outs as a technology transfer mechanism as well as of the post-start-up development of spin-outs from a regional research university in the UK. These results are similar to the ones in Lilischkis (2001) comparing start-up performance and promotion in a German and a US university.

<sup>23</sup> See Audretsch (2002), p. 22 with reference to Rothwell (1989) and Link/Bozeman (1991).

<sup>24</sup> Scherer (1988), p. 4 – 5.

<sup>25</sup> Scherer (1988), p. 4 – 5.

require knowledge and motivation the employees of established companies do not have. A new company may then be the only solution to commercialise the invention.

- **Cost effectiveness.** Large companies face a dilemma: Development of new products or services takes more time and money, while the period allowing to reimburse development costs becomes smaller. It may therefore be cheaper and less risky to outsource commercialisation of new products and services to new companies funded by external venture capital.

There is the assumption that the economic framework conditions in the past years have changed in a way that innovative advantage has shifted towards new and small companies: *“Technologies and products become obsolete at a much faster rate than a few decades ago. (...) We are entering the era of the young firm. The small firm will thus resume a role that (...) is greater than it has been at any time in the last seventy years.”*<sup>26</sup>

New companies may play a significant role in e-business innovation in particular. For example, a comprehensive study named “e-Startup” dealt with the development of new companies in the e-commerce and internet business in Germany. Between 1994 and 2000, some 20,000 such companies were founded in Germany. After the hype of internet and e-commerce companies ended, around 20% of these companies went out of business by the end of 2002.<sup>27</sup> While this may appear to be a high failure rate, it also means that 80% survived together with many innovative products and services.

However, new companies are not necessarily innovative. In fact, only a small percentage of new companies is really innovative and there are studies which indicate that the share of innovative companies increases with firm size.<sup>28</sup> Nevertheless, numbers of new companies are widely used as a degree of innovativeness. To some extent this is due to the fact that such numbers are measured in many countries and thus allow a comparison of countries over time.<sup>29</sup>

## 2.4 Resource bottlenecks and start-up promotion

### A resource-based approach

Economic success, innovativeness and competitiveness of new companies largely depends on the resources available and used.<sup>30</sup> Thereby, a resource is defined as a source of goods needed to fulfil certain objectives. Three basic types of resources for new companies can be distinguished, as shown in Exhibit 2-4: knowledge,<sup>31</sup> capital and incentives.

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<sup>26</sup> Jovanovic (2001), p. 54 – 55.

<sup>27</sup> The findings of this study named “e-Startup” can be accessed at <http://www.estartup.org>.

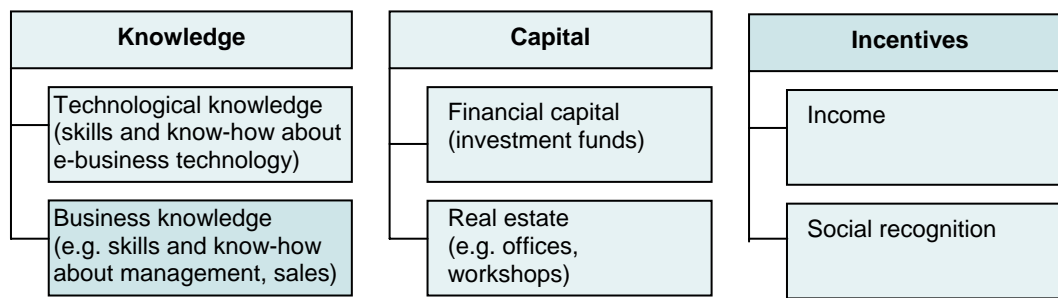
<sup>28</sup> See the study by Harhoff/Licht (1996) with findings from the “Mannheim Innovation Panel” by the Zentrum für Europäische Wirtschaftsforschung (Centre for European Economic Research), Mannheim, Germany.

<sup>29</sup> See Audretsch (2002), p. 4.

<sup>30</sup> For a resource-based view of the firm see Barney (1991) and (1996).

<sup>31</sup> There is no commonly acknowledged definition of knowledge. Knowledge can be defined as “a set of organized statements of facts or ideas, presenting a reasoned judgement of an experimental finding,” see Bell (1974), p. 175.

Exhibit 2-5: Schematic overview of resources for new companies



Source: Adapted from Lilischkis (2001), p. 67.

Each of these resources can be subdivided into two categories:

- **Technological knowledge** relates to skills and know-how about the technologies the company produces or applies. In the context of this report, knowledge about e-business technologies is of core interest.
- **Business knowledge** relates to skills and know-how about business necessities such as accounting, sales and marketing, management, including the assessment of the commercial viability of the product or service that is to be offered.
- **Financial capital** relates to investment funds, e.g. own funds, bank loans, venture capital or public subsidies a company needs to acquire in order to maintain and grow business.
- **Real estate** relates to offices, workshops, laboratories and other real capital facilities a company needs for developing and manufacturing products or offering services.
- **Income** is an incentive for entrepreneurial activity that may be an issue with regard to the balance between entrepreneurial opportunities and risks and to social insurance.
- **Social recognition** relates to the culture and entrepreneurial mindsets that fuel the motivation to start businesses. This issue includes social acceptance of entrepreneurial failure.

Knowledge and capital are of particular interest for e-business applications used or produced by new companies: technological knowledge to the extent that new companies may have to acquire ICT skills and know-how, business knowledge to the extent that e-business may require particular management skills, financial capital to the extent that the production or use of e-business applications may require considerable investment – in certain cases from specialised venture capitalists –, and real estate to the extent that business incubators hosting new companies may promote production and use of e-business.

### ICT and e-business skills

The production or use of e-business applications requires particular ICT skills. Companies can acquire such skills through learning-by-doing, training employees, employing ICT specialists, or acquiring ICT consulting services. While a report on behalf of the European Commission published in 2005 stated that there were “no widespread significant shortages of ICT practitioner skills in the EU” in 2004,<sup>32</sup> a number of sources point to significant e-skills shortages in Europe.<sup>33</sup> For example, an e-Skills Forum report found that “the level of competence in ICT-related skills in Europe remains too low”.<sup>34</sup>

<sup>32</sup> RAND (2005), p. xvi.

<sup>33</sup> The European Commission established the e-Skills Forum in March 2003 in order to develop cross-national solutions to these shortages. See the European Commission’s ICT and e-Business Skills website at <http://ec.europa.eu/enterprise/ict/policy/ict-skills.htm>.

<sup>34</sup> See The European e-Skills Forum (2004), p. 20.

New companies, in particular, may have difficulties in acquiring ICT skills when they lack funds. They may have difficulties to attract ICT personnel, if needed, because they may not necessarily be able to pay industry standard salaries and they do not necessarily offer a secure employment perspective. In fact, findings from the 2006 e-Business Survey suggest that difficulties in acquiring ICT skills differ by company age: The younger the company, the more difficult it seems to hire ICT specialists. The companies were asked whether they had “hard-to-fill vacancies for jobs requiring ICT practitioners or e-business professionals in 2005”. While differences between the four age classes were not large, the percentage of firms answering “yes” to this question was largest in companies founded between 2006 and 2003 (5.6% versus an average of 4.1% in all age groups). This finding does not reflect general hiring difficulties of small companies. In the e-Business Survey 2006, the percentages of micro (1.7%) and small firms (0.4%) reporting difficulties to fill vacancies for ICT experts were in fact smaller than in large firms (6%).

Finally, technological knowledge in e-business is not only a matter of e-skills. It is also a matter of knowledge creation, i.e. the creation of technical e-business knowledge that can be used to develop new e-business products, services and processes. Such knowledge may be created at formal research departments and institutes in companies and universities, or it may be created informally by innovative teams or single persons.

### e-Business management skills

The application and marketing of e-business technologies may require particular management skills. For example, these skills may be needed for successfully implementing systems for Customer Relationship Management, Knowledge Management or Enterprise Resource Planning within the company or for marketing e-business solutions to other companies. New companies may acquire related skills – similarly to technology-related skills – by learning on the job or on-the-job training, attending courses, hiring e-business managers or acquiring e-business expertise from consultants.

### Access to finance

Access to finance is crucial for new companies to set up, maintain, develop and grow their business. Various different sources of finance have to be distinguished. Some companies may be established with own funds and be maintained or grow with revenues from the cash flow. Others may seek bank loans. Technology-based companies with considerable growth perspectives may be looking for venture capital, i.e. “*equity for generally young (..) companies with high growth potential and high commercial uncertainty*”.<sup>35</sup> A further source of finance may be public subsidies that can take the form of direct grants, reduced interest rates for bank loans or deficit guarantees. The European Commission has published a variety of studies about this issue.<sup>36</sup>

New companies have to acquire funds in a complex and changing financial environment and they have to deal with an increasing complexity and extent of financial reporting to their debtors. A Eurobarometer telephone survey of slightly more than 3,000 SME managers in EU-15 countries in fall 2005 found that more than three quarters of the SMEs surveyed (77%) had sufficient financing at that time.<sup>37</sup> New companies faced stronger difficulties than established ones: While 72% of the companies not older than ten years said that their current financing is sufficient, 83% of the companies older than 30 years agreed to this question.<sup>38</sup> The Eurobarometer survey also found that banks were the

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<sup>35</sup> Definition in a report about risk capital measures in European Commission Community Research (2003), p. 4. Four types of venture capital can be distinguished: (1) seed capital to research, assess and develop an initial concept, (2) start-up capital for product development and initial marketing, and (3) early stage capital for existing new companies in need of greater investment.

<sup>36</sup> See Vanhanen (2006), [http://ec.europa.eu/enterprise/innovation/consultation/list\\_studies.htm](http://ec.europa.eu/enterprise/innovation/consultation/list_studies.htm) and [http://ec.europa.eu/enterprise/entrepreneurship/financing/publications\\_documents.htm](http://ec.europa.eu/enterprise/entrepreneurship/financing/publications_documents.htm).

<sup>37</sup> See EOS Gallup Europe (2005a), p. 7.

<sup>38</sup> See EOS Gallup Europe (2005a), tables p. 51. While the questionnaire distinguished between companies aged not more than two or five years which would have allowed to discuss the statements of new businesses, the survey results do not present such a distinction.

organisations SMEs used most to obtain finance (almost 80%).<sup>39</sup> About half of the SMEs said they cannot successfully complete their projects without a bank loan.<sup>40</sup> Nevertheless, 42% on average of the companies in the Eurobarometer survey said that it is not as easy to obtain a bank loan compared to a few years ago, while 33% said it became easier and 15% said that nothing has changed. The most important reason why companies perceive that obtaining loans had become more difficult was that banks request too much information (72%).

The e-Business Survey 2006 provides findings for ICT investments in particular. The survey found that for 84% of all companies cash-flow financing – which was not included in the Eurobarometer survey – was the major source of ICT investment (see Exhibit 2-6). The other sources were almost negligible: bank loans (5%), public funds (2%), venture capital (1%) and other sources (8%). Companies founded between 2006 and 2003 had the highest level of firms stating that it was difficult to receive funds from their major source of ICT investment. The level in young companies was 30% compared to an average of 21% in companies of all age classes. The difference of 9 percentage points may at first sight appear to be not large, but these figures imply that the share of new companies that reported funding difficulties was almost twice as large as the average of all age groups. This finding confirms the investment difficulties in young companies for ICT in particular.

**Exhibit 2-6: Companies' sources of finance by year of foundation in %**

Companies founded...	Difficulties to receive funds from major ICT investment source	Sources of ICT investment used				
		Cash flow	Bank loans	Public funds	Venture capital	Other sources
2006 - 2003	30	82	6	2	2	8
2002 - 1997	22	85	5	2	1	7
1996 - 1981	17	86	4	1	1	8
Before 1981	22	80	6	5	1	8
<b>Total</b>	<b>21</b>	<b>84</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>8</b>
Base (100%)	firms that have made investments in ICT					
Weighting:	% of firms, unweighted					
N	709	7310	422	207	120	672
Questionnaire reference	C4	C4	C4	C4	C4	C4

Source: e-Business W@tch

Of particular interest to policy makers is the provision of venture capital in order to develop young, often technology-oriented companies with a particularly high growth potential.<sup>41</sup> Venture capital can be provided by venture capital funds, corporate venture capitalists or private individuals, so-called business angels. In recent years, however, the availability of venture capital has been difficult in Europe. After the stock exchange crash in 2001, opportunities for venture capitalists to make profit from having young companies' shares traded at stock exchanges (the so-called "go public") have become difficult. Funding of university spin-offs may be particularly difficult due to a "clash of cultures" of academics and business people when it comes to negotiating investment details.

The Eurobarometer survey found that the use of venture capital among SMEs was rare (2%).<sup>42</sup> In the e-Business Survey 2006, 1% of the firms in the sample stated that VC was the major source of ICT investment (see Exhibit 2-6). However, there has been a turn upwards during the last couple of years: venture capital investments increased by 23% from 10.3 billion Euro in 2004 to 12.7 billion Euro in

<sup>39</sup> See EOS Gallup Europe (2005a), p. 12.

<sup>40</sup> See EOS Gallup Europe (2005a), p. 31 – 32.

<sup>41</sup> See European Commission Internal Market and Service DG (2006) for a recent discussion of the importance of venture capital. See also Meyer (2006).

<sup>42</sup> See EOS Gallup Europe (2005a), p. 41.

2005.<sup>43</sup> This equals the figure for 2001 but is less than the – exceptional – year of 2000, when 19.7 billion Euro of venture capital were invested.

### Business incubators

A certain type of start-up promotion is the offer of real estate for new companies in dedicated buildings. There is no agreed notion for such facilities. Common terms include technology, innovation, business, research or science as the first term and parks, centres or incubators as the second one. Notions may vary according to the focus of their business. In this report, the term “business incubators” is used.

While the core business of such incubators is to offer real estate in the form of offices, workshops, laboratories, and conference rooms, they normally also offer additional benefits. These may include business consulting, enhanced access to venture capital, and last but not least an entrepreneurial atmosphere and opportunities for informal exchange with other entrepreneurs. As regards consulting, a survey of business incubators in Europe with 76 responses found that 39 of the centres offer “*help with e-business and other aspects of ICT*”.<sup>44</sup> This can be considered quite a high figure, but other services such as help with raising finance (offered by 68 of the 76 responding incubators) and networking with other companies and customers (61 positive responses) are offered more often.

Many business incubators were established in the 1980s, at a time when technological innovation gained increasing importance on the agenda of policy makers. A study for the European Commission found that technology centres “*make a significant contribution to job and wealth creation*”<sup>45</sup> and that they are “*a very cost-effective instrument for the promotion of public policy objectives*”. According to the same study, some 40,000 new jobs were generated each year by new companies in technology centres. Some research findings have indicated that technology centres with close relations to universities are most successful.<sup>46</sup> In some countries such as Germany, Austria and Finland, business incubators are often part of a strategy for regional technology development and creating company clusters in certain industries.<sup>47</sup> On the other hand, there may be an oversupply of – publicly supported – business incubators in some regions leading to non-used space and thus inefficient use of resources.<sup>48</sup> Findings in Germany, for example, indicated that most companies would also have been started without the support of the incubator.<sup>49</sup>

According to the most recent available figures, in 2002, there were around 900 business incubators in Europe and the ratio of business incubators per SMEs differed largely between countries. It was highest in Austria (1:3000), Sweden (1:6000) and Finland (1:7000) and lowest in Greece (1:106,000), the Netherlands (1:91,000) and Italy (1:72,000). 18% of these incubators were found to have a focus on ICT.<sup>50</sup> Exhibit 2-7 presents an overview of a few selected incubators in various European countries that illustrate different specialties business incubators may have.

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<sup>43</sup> Figures according to European Private Equity and Venture Capital Association (2006), p. 7.

<sup>44</sup> Centre for Strategy and Evaluation Services (2002), Section 5, Table 28.

<sup>45</sup> See Centre for Strategy and Innovation Services (2002), p. ii-vi.

<sup>46</sup> See Sternberg/Behrendt/Seeger et al. (1996), p. 196, for Germany.

<sup>47</sup> See Centre for Strategy and Innovation Services (2002), p. 38.

<sup>48</sup> See Behrendt/Tamàsý (1997), p. 47 for Germany.

<sup>49</sup> See Sternberg/Behrendt/Seeger et al. (1996), p. 199, for Germany.

<sup>50</sup> See Centre for Strategy and Innovation Services (2002), p. 12-15 (using a broad definition) – available at the EC’s business incubator website, <http://ec.europa.eu/enterprise/bi/index.htm>.

**Exhibit 2-7: Selected business incubators in Europe**

Business incubator	Business focus	Sources
<p><b>St. John's</b> Innovation Centre, Cambridge, UK</p>	<p><i>Business activity:</i> Office and workshop accommodation for early stage knowledge-based companies. No public sector funding for core activities.</p> <p><i>Special features:</i> Service provision, e.g. free business advice; promoting technology; helping entrepreneurs access funding through business angels networks and venture funds. Strong links to University of Cambridge.</p> <p><i>Number of companies hosted:</i> 65 (over 500 employees)</p> <p><i>Company example:</i> CIRIS Healthcare Ltd, providing a web-based service designed to help healthcare providers comply with regulation.</p> <p><i>Year of foundation:</i> 1987.</p>	<p><a href="http://www.stjohns.co.uk">http://www.stjohns.co.uk</a></p>
<p><b>OWZ -</b> International Business Incubator, Berlin</p>	<p><i>Business activity:</i> Business space and supportive consulting for new companies in various fields of technology. Part of Adlershof, Berlin's largest science and technology campus.</p> <p><i>Special features:</i> Focused on supporting the foundation of multinational enterprises from all over the world, particularly from Central and Eastern Europe.</p> <p><i>Number of companies hosted:</i> 34 from 11 countries.</p> <p><i>Company example:</i> Germol GmbH, developing e-business software and services.</p> <p><i>Year of foundation:</i> 1997</p>	<p><a href="http://www.adlershof.de/index.php?id=232&amp;L=14">http://www.adlershof.de/index.php?id=232&amp;L=14</a>, <a href="http://www.izbm.de/german/pages/owz/content.htm">http://www.izbm.de/german/pages/owz/content.htm</a></p>
<p><b>I3P</b> Incubator of Turin Technical University</p>	<p><i>Business activity:</i> I3P offers equipped premises for new enterprises during their initial take-off, for a maximum of three years.</p> <p><i>Special features:</i> Support in creating new enterprises to students, young graduates and staff of the Politecnico, the University and regional research centres,.</p> <p><i>Number of companies hosted:</i> 73, 34 of them in ICT and telecommunications. More than 350 employees have worked for I3P's hosted enterprises.</p> <p><i>Company example:</i> Intellisemantic srl, developing a semantic content management platform.</p> <p><i>Year of foundation:</i> not available.</p>	<p><a href="http://www.i3p.it/in_side_presentation.htm">http://www.i3p.it/in_side_presentation.htm</a>, <a href="http://www.techno.policy.net/news.php">http://www.techno.policy.net/news.php</a></p>
<p><b>Symbion</b> <b>Science Park</b>, Copenhagen, Denmark</p>	<p><i>Business activity:</i> Specialised in assisting new companies working with knowledge intensive, high-tech or innovation products mainly within the areas of ICT and biotechnology.</p> <p><i>Special features:</i> Symbion Capital disposes of 300 million Danish Crowns for pre-seed investments.</p> <p><i>Number of companies hosted:</i> around 80.</p> <p><i>Company example:</i> Cryptico Ltd. invented a new encryption algorithm that can be used for all kinds of transmission and storage of digital data.</p> <p><i>Year of foundation:</i> 1986.</p>	<p><a href="http://www.symbion.org/">http://www.symbion.org/</a></p>

Sources: Cordis Business Incubators, July 2006.

**St. John's** Innovation Centre in Cambridge, UK, seeks to differentiate itself from other incubators by providing certain services such as free business advice, access to finance, and promotion of technology. As an example of success, the St. John's Innovation Centre in Cambridge states that "over a five year period the survival rate for companies is over 88%, compared to about 50% for other similar businesses in the Cambridge Area, and 45% for businesses generally in the UK"<sup>51</sup>. The **OWZ** International Business Incubator in Berlin, Germany, is an example of an incubator supporting the foundation of multinational companies. The **I3P** Incubator in Turin, Italy, focuses on fostering start-ups from a university. **Symbion** Science Park in Copenhagen, Denmark, provides considerable seed investment funds.

<sup>51</sup> See St. John's Innovation Centre homepage, <http://www.stjohns.co.uk>, 20 July 2006.

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## INTERVIEW: BUSINESS INCUBATION IN TECHNOLOGY CENTRE HERMIA, FINLAND

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### Company description

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Technology Centre Hermia Ltd in Tampere, Finland, “promotes the emergence of new technology-oriented business and the development of competitiveness in the fields of mechanical engineering, automation and in ICT clusters”.<sup>52</sup> It is part of the City of Tampere corporate group, employs 23 people and, in 2005, had a revenue of 6.5 million Euro. In November 2006, Hermia hosted around 150 companies. Around a quarter of them have been founded in the past three years, 95% of them were in the ICT business. Examples include Arch Red (<http://www.archred.com>) a company that provides secure communications and network solutions, and Rem Box, a company providing location-based services. Juha Miettinen, ICT Project Director at Hermia, was interviewed by e-Business W@tch about business incubation at Hermia Technology Centre.

### Interview

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#### What particular benefits does Hermia offer to new companies?

Beside workshops and office space, Hermia’s business development unit offers professional consultation services. This includes the opportunity to become involved in innovation networks. We aim to find and negotiate pilot cases, R&D partners, retailers or other business partners for the new companies. Hermia also offers finance; there is a firm named Hermia Ventures. We take stake in new companies and also put money into research and development (R&D).

#### How would you describe the role of new companies for ICT and e-business innovation and diffusion? In what respect may this role be different from established companies?

New companies are more flexible, quicker, they learn faster and show more initiative. However, they lack resources to step into the innovation system – I mean to collaborate with universities, to take part in public innovation programmes, and to collaborate with big companies. New companies do not calculate value added in years but in months. That is where Hermia Technology Centre comes in. We help new companies to become involved in innovation networks.

#### Can you name a new company at Hermia that has been particularly successful in introducing an e-business application?

Anilinker may be a good case. They are growing fast and were located at Hermia when they started in the early 1990s. Anilinker offers services for making companies’ business processes electronic. They operate in fields such as procurement, sales, finance, and logistics. The clients need an electronic connection to Anilinker’s services. The service then delivers all electronic messages, invoices for example, to the receiving companies in the format of their choice. Messages can be forwarded directly to the recipient’s system or the internet, or sent by e-mail, fax, or paper mail.

#### Do companies that are based on technologies developed at universities have an advantage with regard to becoming involved in innovation networks?

Start-ups from universities usually keep good contacts to the university and they know the professors. So when they grow they might have good contacts to networks. However, they are often technology-based in a problematic manner. The founders are usually engineers and their core competency is in technology as opposed to business, for example marketing and sales.

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<sup>52</sup> See [http://www3.hermia.fi/in\\_english/](http://www3.hermia.fi/in_english/).

### **When new companies introduce innovative ICT, are these technologies of a particular type, different from ICT introduced by established companies?**

In the case of university-based start-ups there is often research behind the ICT development. This allows those companies to be three to five years ahead of big companies. Furthermore, new companies tend to have a niche market focus.

### **What could policy makers do to support innovation activity of new companies?**

In Finland and also in the European Union, programmes and instruments are still focused on pure R&D. For us the future is in business, so we help the new companies to do business and become involved in business development projects. Each R&D project should have a business development element. European projects lack such elements, while projects in the US and Japan have them. Such elements could be, for example, marketing studies and participating in trade fairs.

### **References**

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*The interview was conducted by Stefan Lilischkis, empirica, on behalf of e-Business W@tch, in November 2006. Further sources:*

- Technology Centre Hermia Ltd website: [http://www3.hermia.fi/in\\_english](http://www3.hermia.fi/in_english).
  - Companies in Hermia: [http://www.tamperescienceparks.fi/in\\_english](http://www.tamperescienceparks.fi/in_english).
  - Hermia Business Development Ltd website:  
<http://www.hermiayrityskehitys.fi/english/index.htm>
  - Anilinker Oy: <http://www.anilinker.com>
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## Measures to support new companies

Supporting new companies has become a priority issue on the agenda of many policy makers in Europe. The European Commission is active in many ways. Entrepreneurship is recognised as an important driver of innovation in the European Commission's innovation strategy.<sup>53</sup> Following a Green Paper on Entrepreneurship in Europe in 2003,<sup>54</sup> the Commission published an Entrepreneurship Action Plan in 2004, stating that *"the European Union (EU) is committed to boosting entrepreneurship as part of its strategy to transform the economy and build its future economic and competitive strength"* and that *"the EU is not fully exploiting its entrepreneurial potential"*.<sup>55</sup> In particular, *"Europe, unlike the US, suffers from low expansion rates after start-up"*.<sup>56</sup> The Entrepreneurship Action Plan identified five strategic policy areas, all of which can be attributed a resource as described above.<sup>57</sup> Fuelling entrepreneurial mindsets through emphasising the need for better appreciation of entrepreneurs, encouraging more people to become an entrepreneur, gearing entrepreneurs for growth and competitiveness, improving the flow of finance, and creating a more SME-friendly regulatory and administrative framework<sup>58</sup>.

Following the Entrepreneurship Action Plan, the European Commission developed detailed "key action sheets" including good practice examples from various countries for implementing the Action Plan and the entrepreneurial strategy.<sup>59</sup> There is also a progress report on the implementation of these key actions, demonstrating that considerable efforts have been undertaken in all five key areas.<sup>60</sup> A final progress report will be published in 2006.

Furthermore, the European Commission is launching a new Competitiveness and Innovation framework Programme (CIP) in 2007.<sup>61</sup> Part of it is the promotion of entrepreneurship and innovation, in particular, by providing to innovative firms access to finance and to business support networks, and by exchanging best practices between Member States.

## 2.5 Summary of core background issues

Various studies show that new companies contribute considerably to economic growth and employment. On a national level, research results indicate that in developed countries a high amount of nascent entrepreneurs and owners of young firms is positively associated with growth. There is also empirical evidence that small and new enterprises serve as an engine of employment creation in Europe. New firms may have various advantages over established firms in innovative activity, including organisational flexibility, interest in incremental innovations, and sustained excitement about innovation. In recent years, economic framework conditions are assumed to have changed in a way that innovative advantage has shifted towards new and small firms.

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<sup>53</sup> See Commission of the European Communities (2005b), p. 17, chapter 3.4 on innovation management and social change. Further information about the European Commission's innovation policy activities are available at [http://ec.europa.eu/enterprise/innovation/index\\_en.htm](http://ec.europa.eu/enterprise/innovation/index_en.htm) and at <http://cordis.europa.eu/innovation/en/home.html>.

<sup>54</sup> See Commission of the European Communities (2003).

<sup>55</sup> Commission of the European Communities (2004), p. 3.

<sup>56</sup> Commission of the European Community (2004), p. 3, referring to Scarpetta et al. (2002).

<sup>57</sup> Commission of the European Community (2004), pp. 3 – 16.

<sup>58</sup> See Ekroth-Manssila (2006) for a recent discussion of the European Charter for Small Enterprises, which is designed to promote improvements in the legislative and administrative framework within which small businesses operate. See also Skaringer (2006) for a discussion of the EC's initiative to establish one-stop shops for new companies in all Member States by the end of 2007.

<sup>59</sup> The key action sheets are available at [http://europa.eu.int/comm/enterprise/entrepreneurship/action\\_plan.htm](http://europa.eu.int/comm/enterprise/entrepreneurship/action_plan.htm)

<sup>60</sup> See Commission of the European Communities (2005).

<sup>61</sup> See [http://ec.europa.eu/enterprise/enterprise\\_policy/cip/index\\_en.htm](http://ec.europa.eu/enterprise/enterprise_policy/cip/index_en.htm).

For discussing possible measures to promote ICT innovation by new firms, a resource-oriented approach is presented in this report. Acquiring knowledge and capital may be of particular interest for new companies that use or produce e-business applications. Findings from the e-Business Survey 2006 suggest that new companies have more difficulties in hiring ICT specialists and acquiring funds for ICT investment than established companies.

## 3 Findings from qualitative research and literature

### 3.1 Methodology of desk-top and qualitative research

#### Overview

The role of new companies in e-business innovation and diffusion is quite a special topic, located at the intersection of the subjects of e-business, entrepreneurship, and innovation. For all three subjects there is a vast amount of literature available, but the intersection under consideration here is small. Thus an extensive literature review was necessary, drawing from numerous sources.

Findings in this chapter are based on results of a literature review and of qualitative research, in particular on findings of a survey of the members of the *e-Business W@tch* Advisory Board. References are made where applicable to findings from the e-Business Survey presented in chapter 4.

#### Qualitative research

Various activity views were conducted for this study, comprising a more in-depth case study of the Munich region, a summary of cases from previous *e-Business W@tch* reports and business briefs about Amazon.com and OMX GmbH. The activity views were meant to cover different aspects of new companies and e-business, such as examples of innovators and diffusers, regional and specific industry examples, as well as start-ups from universities.

In July 2006, 20 members of the *e-Business W@tch* 2006 Advisory Board<sup>62</sup> were asked to contribute their expertise to the report about start-ups and e-business in an e-mail survey. They were asked four questions on the following issues:

- (1) **New versus established companies:** In what respect does e-business innovation in new companies differ from established companies?
- (2) **Innovation versus diffusion:** What role do new companies play for e-business innovation, what role do they play for diffusion?
- (3) **Innovation characteristics:** Do new companies play a particular role in introducing and taking up ICT-related products and services as opposed to ICT-related processes? Is there any other peculiarity?
- (4) **Differences between industries:** Are new companies in some industries more innovative with regard to e-business than in other industries? If so, how can the differences be explained – other than general differences in innovativeness between the industries?

14 board members replied. Ten provided detailed answers, three said that the start-up issue is not within their range of expertise – one of which nevertheless contributed valuable insights –, and one said that there are no start-ups in the industry of his expertise. Eight answers were received by e-mail and two telephone interviews were conducted. The complete statements are presented in an annex of this report. Altogether, statements for six of ten industries represented in the *e-Business W@tch* 2006 were received: food and beverage, consumer electronics, shipbuilding, construction, tourism, telecommunication services.

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<sup>62</sup> The e-Business Advisory Board is a group of business professionals and academics with expertise on the specific sectors studied every year. They are assigned to assist the authors of the *e-Business W@tch* reports. The complete list of Advisory Board members in 2006 is available at <http://www.ebusiness-watch.org/network/network.htm>.

## 3.2 Findings from literature and qualitative research

### 3.2.1 New versus established companies

#### Confirmation of the assumed importance of new companies

Findings from the Advisory Board survey mainly confirmed the assumption that new companies play an important role for e-business innovation and diffusion. They may in some industries and in some respect be more innovative about and adaptive to new e-business applications than established companies.

Several statements confirmed that the internal organisation of new companies may be more flexible and favourable for the adoption of new e-business processes. A statement for the construction industry: *“Construction needs information gathering and manipulation to achieve its goals. (...) The transition from paper to e-format, the preparation of the staff for the e-activities, the organisation of the information flow is smoother in new companies. The savings in time, money and human resources are more evident in new companies.”*<sup>63</sup> A similar statement was provided for the telecommunications sector. Since the *“adoption of e-business implies organisational change, it is easier to implement e-business in a new company than in an already established business”*.<sup>64</sup> In the food and beverages industry *“new companies have often a better strategy on e-business”*,<sup>65</sup> and they may use e-business right from the start, while established companies have to bear change costs which can be considerable.

In the tourism industry, legacy systems appear to be a core problem for established companies, as three independent statements indicate:

- “New companies are often ‘leap-frogging’ as they by pass legacy systems and go straight to cutting edge technology.”<sup>66</sup> An example is the airline Easyjet (<http://www.easyjet.com>), founded in 1995.
- “New companies are ready to set up the IT infrastructure without any ‘old’ systems and needs, they are able to define their processes. (...) Older companies can not adopt their IT as fast” because they often wait for amortisation of previous IT investment.<sup>67</sup>
- “In the travel industry, one of the biggest ICT challenges faced by companies is the presence of legacy systems. New companies do not have to work around these systems, so they can build their applications in a much more streamlined manner.”<sup>68</sup>

Nevertheless, findings from the e-Business Survey 2006 indicate that new tourism firms are less innovative with regard to ICT product, service or process innovation than established firms (see section 4.2).

#### New businesses not necessarily more important than established ones

The replies also confirmed that new companies do not necessarily play an important role in e-business innovation in their industry. In many new companies, ICT may not be important for their business model. Large and established companies may lead innovation due to their higher investment

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<sup>63</sup> Statement by Alfredo Soeiro.

<sup>64</sup> Statement by Jesús Galván.

<sup>65</sup> Statement by Ilias Vlachos.

<sup>66</sup> Statement by Dimitrios Buhalis.

<sup>67</sup> Statement by Markus Gratzner.

<sup>68</sup> Statement by Rachel Tym.

capability, their larger experience and know-how as well as tighter business relationships. In some industries there may not be many or any start-ups at all due to high market entry barriers.

The impact of new companies on e-business innovation and diffusion may largely depend on the importance of ICT in their business model. As noted by an Advisory Board member representing the telecommunications industry: *“New companies usually replicate the e-business adoption pattern of the industry, unless the business model implemented is heavily based on the use of ICT and Internet.”*<sup>69</sup>

There were statements from some industry representatives that small companies do not play a more important role in e-business innovation and diffusion than large companies. In the food and beverages industry, for example, there is *“no evidence about any major and broad based difference with regard to e-business innovation between new and established companies.”*<sup>70</sup> This statement is confirmed by a further expert from the same industry who said that *“the impact of new companies is mostly indirect. Usually large companies lead innovation as well as direct diffusion process.”*<sup>71</sup> An expert from the tourism industry indicated a possible explanation for this: *“Established businesses often have more capital to invest in new systems than new ones do.”*<sup>72</sup> Furthermore, new companies will also have to innovate constantly: *“Trends are adopted quickly, so new companies need new ideas and lots of them if they are to survive.”*<sup>73</sup> These findings from the Advisory Board survey are confirmed by results from the e-Business Survey 2006 which show that in many industries, the share of firms founded between 2003 and 2006 reporting ICT innovation activity was smaller than in the other age groups (see section 4.2).

In some industries, new companies do not play a role in innovation simply because there are no new companies at all. This applies for example to large shipyards. According to the Community of European Shipyards Association (CESA), there were no new large wharfs created at all in Europe in the past 20 years.<sup>74</sup> The reason is that the setup of a wharf requires very high investment costs. New wharfs were only created outside Europe. Nevertheless, according to CESA the industry was quite innovative. For many wharfs e-business plays an important role today, which shows that innovation may also take place without start-ups. This assessment is, however, not really reflected in findings from the e-Business Survey 2006. Only 4% of the medium-sized and large companies in the shipbuilding and repair sector said that e-business plays an important role for them, and 26% said that e-business plays some role. Small firms in this sector reported a larger importance of e-business.<sup>75</sup>

The appearance of differing assessments about the role of new companies in e-business innovation and diffusion led to the question how these differences can be explained. In the following, differences between industries and other parameters are discussed.

### 3.2.2 Differences between industries

#### Differing industry characteristics

Currently available *e-Business W@tch* findings show that the pattern of e-business adoption differs widely between industries. For example, some industries are generally more advanced in ICT and e-business use than others, and particular e-business applications may be more important in some

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<sup>69</sup> Statement by Jesús Galván.

<sup>70</sup> Statement by Nathalie Lecocq.

<sup>71</sup> Statement by Ilias Vlatchos.

<sup>72</sup> Statement by Rachel Tym.

<sup>73</sup> Statement by Rachel Tym.

<sup>74</sup> Statement by Paris Sansoglou. – However, while there were no new *large* wharfs founded in the past 20 years, *small or medium-sized* new firms actually were founded in the European shipbuilding and repair industry. The e-Business Survey 2006 also included small and medium-sized firms of this industry. See Exhibit 4-1 about company age by industry.

<sup>75</sup> See the sector report about the shipyard and repair industry, particularly chapter 5.1.1.

industries and less important in others. Findings from research for this report indicate that the role of new companies in e-business innovation and diffusion differs by industry, too.

To some extent, findings for differences between small and large firms also apply when comparing new to established firms. Audretsch (2002) suggested that differences between the innovation activity of small and large firms in certain industries can generally be explained by four variables: (1) the degree of capital intensity, (2) the extent to which an industry is concentrated, (3) the total innovative intensity, and (4) the extent to which an industry is comprised of small firms. Acs and Audretsch (1990) concluded that *“small firms tend to have the innovative advantage in industries consisting of predominantly large firms (...), that are highly innovative and that utilise a high component of skilled labour. By contrast, the large-firm innovative advantage is apparently greater in industries that are capital-intensive, advertising-intensive, but nonconcentrated.”*<sup>76</sup> The finding that new firms have an innovative advantage in industries with mostly large firms may be somewhat surprising. An explanation may be that in industries with many large, established firms, these firms may have become complacent and non-innovative, while new firms benefit from their flexibility and agility.

Industry characteristics discussed here include industry structure, industry's type of products or processes, and innovativeness of the industry. These were the characteristics to which some Advisory Board members referred.

### Industry structure

Results from the Advisory Board members' survey suggest that the intensity of business relationships between the companies of an industry is an important variable. In industries with strong supplier and customer relationships, i.e. with strong vertical integration, new companies may play a less important role for innovation and diffusion than in industries with weak vertical integration.<sup>77</sup> The reason may be that new companies have to follow the rules – including e-business practices – of the big players to which they sell or from which they buy.

For example, in the food and beverages industry, an assessment was that *“large companies play a more important role than new (usually small) companies in both innovation and diffusion”*.<sup>78</sup> In this industry, large companies orient e-business upstream with regard to relationships with suppliers and downstream with distributors. As regards suppliers, manufacturers lead the initiatives *“focusing in cost reduction, process simplification, efficient supply chain management, quality control management and supplier loyalty”*. As regards distribution, manufacturers depend on the initiatives and strategies of the distributors.

To give another example from previous *e-Business W@tch* research, small craft companies fulfilling construction or renovation services for a large company will have to adapt to online ordering processes of that large company, as the example of Airbus in Hamburg shows.<sup>79</sup>

Findings from the Advisory Board members' survey also indicate that in competitive industries with no dominant large companies, both new and established companies are forced to innovate: *“Highly competitive industries that sell ‘high volume - low margin’ products, such as travel and retail, need to be more innovative in order to achieve the desired results with smaller budgets”*.<sup>80</sup>

### Industry's type of products and services

New companies may play a particularly important role for e-business innovation in industries with products and services which can be digitised. For example, the tourism and travel industry is *“probably more innovative as far as e-commerce is concerned due to the nature of the product”* which is

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<sup>76</sup> Acs/Audretsch (1990), p. 147; see also Audretsch (2002), p. 21.

<sup>77</sup> See also Audretsch (2002), p. 21.

<sup>78</sup> Statement from Nathalie Lecocq.

<sup>79</sup> See the case study about the AirCrafft project in the *e-Business W@tch* craft and trade report, 2004.

<sup>80</sup> Statement by Rachel Tym.

*“intangible and does not need physical movement”*.<sup>81</sup> In combination with the previously mentioned flexibility advantage of new companies in this industry, it may be that new tourism companies play a more important role in e-business innovation and diffusion than in industries with products which can not easily be digitised. This assumption is however not confirmed by findings from the e-Business Survey 2006 which are presented in chapter 4. As the Exhibits 4-6, 4-9 and 4-11 show, new firms in the tourism industry rather lag behind firms in other age classes in this industry in terms of innovativeness.

In the food and beverages industry, the opportunities for introducing business-to-consumer e-commerce may be higher in sub-industries producing higher value products such as alcoholic beverages and chocolate confectionery. However, as stated above, there is no indication in this industry that new companies lead the way in e-commerce introduction.

### Innovativeness of the industry

Findings from other studies indicate that new companies are particularly important for innovation in industries that are highly innovative.<sup>82</sup> In contrast, some statements from Advisory Board members suggest that the importance of start-ups for e-business innovation and diffusion may also be high in not so innovative industries. In industries with a generally low level of innovation, start-ups may trigger e-business innovation and diffusion in case they have the power to impose how business is conducted. This may apply, for example, to the construction industry in which technological change is slower than in other industries: *“The new companies introduce e-business by forcing, or suggesting, that its clients use new methods.”*<sup>83</sup> For example, if the client uses electronic drawings and specifications of the object, the contractor *“will continue in the same process. And with the contractor there is a diffusion process with suppliers, manufacturers and subcontractors.”*

This is partly confirmed by the e-Business survey 2006. It showed that, in the construction industry, new firms are generally less innovative than established firms but do not considerably lag behind (see Exhibit 4-6 about ICT-related product and service innovation and Exhibit 4-9 about ICT-related process innovation). New construction firms in fact reported to be more innovative with regard to particular technologies such as Voice over Internet Protocol and e-invoicing (see Exhibit 4-11).

## 3.2.3 Differences between regions

### Characteristics of innovative regions

The importance of new companies for e-business innovation and diffusion may depend on the characteristics of the region they are located in. Empirical findings are quite unambiguous that the number of start-ups is positively related to regional population density, population growth, and levels of skills in the labour force.<sup>84</sup> Start-ups are more numerous and their innovations may have a larger impact in regions with high innovative capability – regions with universities and research institutes, innovative established companies, as well as importance of technology-oriented and relatively new industries, as opposed to old industrialised regions. In innovative regions there are more organisations from which spin-offs can originate and there are more opportunities for finding suitable resources and marketing channels as well as for establishing business networks.<sup>85</sup>

The region is not a priority dimension of the *e-Business W@tch* analysis. Nevertheless, there is considerable evidence from other sources about the importance of regional framework conditions and

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<sup>81</sup> Statement by Dimitrios Buhalis.

<sup>82</sup> See Acs/Audretsch (2004), p. 68 – 69.

<sup>83</sup> Statement by Alfredo Soeiro.

<sup>84</sup> See Audretsch (2002), p. 35.

<sup>85</sup> The importance of existing networks for spin-off success is noted, e.g. by Storper (1997), p. 158.

networks for innovative capability.<sup>86</sup> Innovation research and policy have focused on the region for several decades. In the 1990s, the concepts of “innovative milieus” and “learning regions” became prominent.<sup>87</sup> One of the most important aspects of regional innovation is the spread of “tacit knowledge” among innovators’ personal networks.

### Policy measures targeting regional networks

Some political measures to support start-ups targeted regional networks, such as the Pilot Action of Excellence on Innovative Start-ups (PAXIS) project of the European Commission<sup>88</sup> and the programme “EXIST – start-ups from universities”<sup>89</sup> of the Federal Ministry of Education and Research of Germany. Another example is the project “Networking ICT Clusters in Europe” (NICE) which aims to “*bridge between regions with highly innovative business environments using ICT innovations and clusters and the less advanced regions*”.<sup>90</sup> A further example is the Innovating Regions in Europe (IRE) network.<sup>91</sup> The European Commission’s Directorate General for Regional Policy carried out numerous innovation initiatives over the past years.<sup>92</sup>

The following case study illustrates the importance of regional framework conditions for a thriving start-up scene. It focuses on new companies in Munich, mainly but not exclusively in the ICT and media industries.

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<sup>86</sup> See for example Camagni (1995), Storper (1997).

<sup>87</sup> See for example Capello (1999), Morgan (1997).

<sup>88</sup> See <http://cordis.europa.eu/paxis/src/home.htm> for more information and Innovdetect Consortium (2002) for results and recommendations of the project.

<sup>89</sup> See <http://www.exist.de>.

<sup>90</sup> Information about the NICE project can be accessed at <http://www.europe-innova.org>, “cluster networks” / “ICT/Optics”.

<sup>91</sup> See <http://www.innovating-regions.org>.

<sup>92</sup> See [http://ec.europa.eu/regional\\_policy/themes/resear\\_en.htm](http://ec.europa.eu/regional_policy/themes/resear_en.htm) for a list of related activities.

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## CASE STUDY: NEW COMPANIES AND E-BUSINESS INNOVATION IN MUNICH

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### Abstract

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ICT companies play a prominent role in Munich, and start-ups are one source of the rise of Munich's ICT industry. Among these start-ups there are numerous university spin-offs, and many founders came from foreign countries. Innovations by start-ups tend to be incremental and may be modified by other companies, making it difficult to trace back which company introduced a certain innovation. Innovative e-business ideas also diffuse when large companies employ former free-lancers or when new companies are involved in innovation networks with large companies, which is frequently the case in Munich. The Munich region offers a sophisticated environment of organisations supporting new companies and promoting e-business innovation, including various types of venture capital sources.

#### Case study fact sheet

• Case description:	<i>Start-ups in Munich, with a focus on ICT-related companies</i>
• Location:	<i>Munich, Germany</i>
• Main business activities:	<i>Software and hardware production, advertising, media and market research</i>
• Number of companies in 2003:	<i>22,500</i>
• Number of employees (2003):	<i>395,000</i>
• Turnover (2003):	<i>70 billion Euro</i>
• Main customer area:	<i>Munich, national and world-wide</i>
• Main subjects studied:	<i>Regional characteristics of start-up support and e-business innovation</i>

### Background and objectives

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In recent years, Munich has been quite a fruitful breeding ground for new companies. The preferred industries for start-ups in Munich are internet, ICT consulting, multimedia, advertising, and environmental technologies. Almost 20% of all German internet start-ups are based in Munich. According to the City of Munich, an "ongoing wave of start-ups" is one source of the rise of the ICT industry in Munich. Two thirds of Munich's ICT companies were founded after 1989, 19% in the last three years. Among these start-ups there are numerous university spin-offs and firms with founders from foreign countries. With about 120,000 employees in the ICT business at the end of 2003, Munich is considered, together with London, as the most important ICT region in Europe. Including the advertising, media and market research businesses that are strongly related to ICT and e-business, the sector comprised 22,500 companies with a total workforce of 395,000 people at the end of 2003. However, the story of the Munich ICT cluster is also one of large companies. In 1954 the Siemens company launched the production of computers in Munich. Today, some of the world's largest ICT firms and most of the European headquarters of the global players are located in Munich, e.g. Microsoft, Compaq, Hewlett-Packard, NEC, Silicon Graphics, Seagate and Oracle. Munich is also home of a considerable biotechnology cluster, with 12,000 employees working in the life sciences sector in numerous major corporations or innovative start-ups.

The purpose of this case study is to describe how the Munich region fosters new companies and e-business, what characteristics e-business innovation has, and what lessons can be learned for ICT and e-business promotion in other regions.

### e-Business activities

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#### Framework conditions for new companies and e-business innovation

The Munich region offers a fertile environment for new companies and for e-business innovation. A study comparing business foundation in various German regions found that a strong entrepreneurial culture is key to the lively start-up activity in Munich, including a relatively high assessment of the individual capability to start a business and of business opportunities among the founders.<sup>93</sup> Munich also has a wide variety of organisations promoting new companies, including the following:

- **Research and education:** Munich hosts four universities, six other institutions of higher education, and numerous independent research institutes. The national headquarters of the Fraunhofer Society that conducts application-oriented research and of the Max Planck institutes conducting basic research are also located in Munich. Various research institutes deal with ICT, for example the business informatics institute (<http://www.winfobase.de>) and the Software Engineering for Business Applications institute (<http://www.matthes.in.tum.de>) at the Technical University. The Odeon institute (<http://www.odeon.uni-muenchen.de/>) at the University of Munich conducts research and education in entrepreneurship. The region also has a dedicated programme for creating start-ups from universities, named “GründerRegio M” (Founder Region M, <http://www.gruenderregio-m.de/>).
- **Business incubators:** Munich has several business incubators, among them the Munich Technology Centre (<http://www.mtz.de>) and GATE (<http://www.gategarching.com>) in the town of Garching in the Northern Munich region.
- **Knowledge transfer:** Organisations such as the Corporation for Innovation and Knowledge Transfer (<http://www.bayern-innovativ.de>) and BayernPatent (<http://www.bayernpatent.de>) support the innovation process in the region.
- **Finance:** Munich has a lively venture capital scene including various funds, some specialised in different stages of company development, suppliers of corporate venture capital and private investors in the Munich Business Angel Network.
- **Public support:** Various initiatives of the state of Bavaria seek to support ICT and e-business companies, including the Software Offensive Bavaria (<http://www.software-offensive-bayern.de/>), and Invest in Bavaria (<http://www.invest-in-bavaris.de>), the state’s business development agency whose tasks range from the provision of initial information to accompanying prospective investors on tours of potential sites. The City of Munich Department of Labour and Economic Development (<http://www.munich.de/business>) as well as the semi-public Chamber of Commerce and Industry for Munich and Upper Bavaria (<http://www.muenchen.ihk.de>) are also considerably involved in providing support to start-ups.
- **Private initiatives:** Various private initiatives promote entrepreneurship and innovation in Munich. The Munich Network (<http://www.munichnetwork.com>) is a personal network seeking very practical benefits by promoting ties between 400 members including technology developers, venture capitalists, and service providers. The members meet for example in special interest groups, “wake up” breakfast meetings, and entrepreneur interview events (“technopreurs live”). The Working Circle for IT and Media in Munich (<http://www.fiw.m.de>) stages projects and events promoting the flow of information among its corporate and self-employed members.
- **Events:** Furthermore, Munich hosts various international trade fairs related to ICT and e-business such as Systems World (<http://www.systems-world.de>) and the Semicon Europa (<http://www.semi.org>).

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<sup>93</sup> See Tamàs (2006).

A high income per capita, a large and well-educated workforce, an extended public transport system and numerous high-level leisure time opportunities create favourable conditions for developing new businesses in Munich. On the downside there are high costs of living, particularly for real estate, and frequent traffic jams in peak hours.

## Impacts

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Various sources were identified that highlight different aspects of the role of new companies for e-business innovation and diffusion in Munich. In the following, statements from two expert interviews and from secondary research are provided.

### Importance of incremental innovation and diffusion

According to Joachim Graf, Chief Executive of the Förderkreis IT- und Medienwirtschaft München e.V. (FIWM – Promotion Circle ICT and Media Business Munich), e-business development in Munich is largely driven by SMEs. There are hundreds of innovative new companies in Munich and thousands of “small animals”. Some of the new companies fail, others are successful and grow or are acquired by other companies. They try out many things and they rarely introduce standard solutions. Graf finds it difficult to name concrete examples of companies supplying e-business innovations that are particularly successful because “*this is not how this business works*”. Innovations by start-ups tend to be incremental, “*certain things penetrate the market gradually*” and may be modified by others. In the end, it is difficult to trace back which company introduced a certain innovation. Innovative e-business ideas also diffuse when large companies employ former freelancers, he says.

### Importance of start-ups in innovation networks

In a study about “the competitiveness of firm networks”, economic scientist Christian Lechner included a case study of ICT companies in Munich. Among the nine companies he studied, eight were less than five years old. Among them there were technology using, technology creating and technology implementing firms. One large established company, a European headquarter of one of the largest US software companies, was also included. The key question of Lechner’s research was whether a strategic network of companies can gain and sustain competitive advantage and if so, how it can achieve this. His main finding was that the Munich ICT company network was indeed able to gain and sustain competitive advantage. He found that firms in the ICT industry extensively rely on partnerships with other companies to realise their strategic goals.

A wide range of networks is important, comprising social, marketing, knowledge, and innovation networks. The significance of start-ups in these networks can be illustrated by statements from the large company that was interviewed. A manager of this large firm said that “*without our partners we would be a normally growing large firm. With our partners, we are an exceptionally growing and flexible firm*”. Thus, the increasing development of innovative and customised solutions by partners also enhances product innovation and competitive position of the large firm.<sup>94</sup> This shows that innovation in new and small firms diffuses to large firms and is vitally important for a regional industry’s competitiveness.

### Many new companies are not familiar with e-business

According to Bernhard Kux from the ICT Economy Department of the Munich Chamber of Commerce, e-business innovation activity does not depend on the companies’ age. His impression is that new companies tend to be more open-minded towards using e-business, but the question is whether they can afford it and make the right decision about it. Kux explained that new and small companies are often not familiar with e-business terminology - which is used by larger companies - and have difficulties to decide what e-business technology they should use. This applies at least to new companies that do not have e-business as their core business. Furthermore, both new and

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<sup>94</sup> See Lechner (2001), p. 315-322.

established companies face a growing need to comply with e-business requirements from public authorities. This applies, for example, to electronic transmission of social insurance data, data security and data storage. Especially for young companies this can be a challenging task if they do not have the necessary technology or skills.

### Lessons learned

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The Munich region offers various lessons about the role of new companies in e-business innovation and diffusion. There is no simple picture of an “innovation-everywhere” region but a more differentiated image.

- In Munich, e-business innovation by new, small ICT companies is normally incremental, not ground-breaking, and it is often modified and further developed by other companies.
- Through their ties with large ICT companies, innovative new companies promote innovation and growth in these large companies in Munich.
- Start-ups that do not have e-business as their core business are often not familiar with e-business terminology and challenged by e-business requirements.
- There is a very wide spectrum of public, private and public-private partnership organisations that can support new companies, including for example privately organised networks of innovators, entrepreneurship programmes at universities, business angel networks, and business incubators.

### References

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*Research for this case study was conducted by Stefan Lilischkis, empirica, on behalf of e-Business W@tch. Sources and references:*

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- Interview with Joachim Graf, Chief Executive, Förderkreis IT- und Medienwirtschaft München e.V. (FIWM) (Promotion Circle ICT and Media Business Munich, registered club), May 2006.
- Interview with Bernhard Kux, Department for Information and Communication in Business, Munich Chamber of Commerce, 31 July 2006.

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#### 3.2.4 Differences by characteristics of technology

The role of new companies for e-business innovation and diffusion may differ by type of e-business technology. The following statements by an Advisory Board member from the telecommunications services sector support the view that new companies may play a more important role for product and service innovation than for process innovation: *“New ICT related processes are better introduced by*

bigger companies in traditional industries due to the implementation costs”, while “new ICT related products and services might be an opportunity for newer companies in traditional industries”.<sup>95</sup> However, he further stated that when the business model of the new company is heavily based on ICT and the internet, newcomers, too, can “play a very important role in the introduction of ICT related processes”. Findings from the e-Business Survey 2006 presented in chapter 4.2 confirm these assumptions.

### 3.2.5 Diffusion of new e-business practices

#### New companies' contribution to e-business diffusion

Research findings for this report suggest that new companies also contribute significantly to the diffusion of new e-business applications in various industries. However, new companies are not necessarily more important in this respect than established companies.

Firstly, in some industries such as tourism, new and established companies may generally have similar roles in e-business diffusion: “The travel industry is very customer focussed, and innovation leads to increased customer expectations. When one company adopts a new e-business practice that benefits customers, their competitors will follow suit, regardless of whether or not that company is new or established. For example, once one airline offers online check-in, then the others need to do so as well because the customers will start to expect it as the norm.”<sup>96</sup>

Secondly, new companies do not necessarily take up applications that are more innovative than those taken up by established companies. This is, for example, shown by findings from the e-Business Survey 2006 about the use of Radio Frequency Identification (RFID), Voice over Internet Protocol (VoIP), and e-invoicing in section 4.3. Findings show that in some industries the percentage of new companies using these technologies is larger than the share of established companies, but in other industries it is the other way round. Furthermore, a competent Advisory Board member who was interviewed for this report suggested that new companies normally adopt e-business applications according to what is common, necessary and successful in the telecoms industry.<sup>97</sup>

This assessment is confirmed by case studies published in previous and current *e-Business W@tch* reports. The following box text provides some examples of new companies contributing to the diffusion of e-business applications in various industries. Thereafter, a business example illustrates how a company for which e-business does not belong to its core business model is using such tools and practices to support its main activities.

#### Business examples<sup>98</sup>

*e-Business diffusion through start-ups in various industries*

**IT services:** PGS Software is a Polish start-up that seeks to establish itself as a global provider of IT outsourcing and software development services. Future services may also include remote maintenance and support of IT networks. The company, founded in November 2004, has acquired first customers for its services. PGS, like many other IT services companies in Eastern Europe, sees its competitive advantages mainly in its technological expertise, as well as in the cultural and geographical proximity to Western Europe. The provision of basic ICT and e-business tools, e.g. PCs, Internet connection or a company website, is a necessary

<sup>95</sup> Statement by Jesús Galván.

<sup>96</sup> Statement by Rachel Tym.

<sup>97</sup> Statement by Jesús Galván, telecommunications industry.

<sup>98</sup> The source is indicated in brackets after the summary. All reports are available for download at <http://www.ebusiness-watch.org>.

pre-requisite. This does not appear to be a serious challenge for the company. A more essential challenge is to achieve the confidence of customers. Company websites are helpful tools for getting attention, but for winning customers in the offshore market the establishment of personal contacts remains crucial.

The case shows that for a new company, trusted customer relationships are crucial for success, while e-business applications are necessary but can be rather basic. Thus this is a case of diffusion of non-innovative e-business applications. However, the new company may introduce more sophisticated, innovative e-business applications later when the core business is stable and new services are introduced. (Sector impact study 10-I, July 2005, p. 20)

**Construction:** Termonica, established in 2003, designs and delivers heating technologies and components for heating systems used in residential and commercial buildings. The company's main office is in Warsaw with a production line in Mielec, southeast Poland. In order to achieve competitive advantage, the company implemented an e-business strategy throughout its business operations, from product design to customer and supplier management. Termonica's team has developed its own in-house software using Windows and MS Office applications like Excel and Access for generating proposals and managing company-specific activities and the specialist software AUDYTOR. Implementing these IT solutions has increased flexibility and efficiency by around 80%. This meant significant reduction in initial products development and start-up costs.

The case shows that a new company can gain competitiveness by introducing e-business applications made in-house. It may contribute indirectly to diffusion of e-business in the sector because other companies may have to follow in order to also reduce process costs and to stay competitive. (Sector impact study No. 8-I, July 2005)

**Tourism:** yourGreece is a small and independent online intermediary in Athens, Greece, founded in 2005. It promotes and mediates worldwide via the website [www.yourgreece.com](http://www.yourgreece.com) a network of 80 small and unique hotels and guesthouses in Greece. yourGreece uses two simple but effective e-business applications: an online payment system and a booking request system. The booking request system is a semi-automatic internet-based application. It allows yourGreece to process customer requests automatically and at the same time to address each request personally. Central to the business model of yourGreece is the use of automation technologies merely to assist human interaction: The personal interaction with the customers, mainly by e-mail, is still done by an employee of yourGreece. Automation mainly speeds up the manual processes of communication, identification of tailor-made accommodation packages and eventually booking. In a next step, the booking system is meant to be integrated with the accommodation suppliers. However, most of these hotels are very small and regard information technologies with suspicion. They hesitate to invest in IT and many of them do not have the funds for major investments. yourGreece's strategy to convince them to acquire relevant hardware and software is by bringing them additional business: the more business they get through yourGreece, the more receptive they will be to new ideas and investments.

The case shows how a new company introduces a not really innovative e-business application that may directly trigger the use of e-business technologies at business partners, thus contributing to diffusion of e-business in the industry. (Sector impact study No. 8, 2006)

Sources: e-Business W@tch, selected sector reports

### Business example

*e-Business at OMX, Munich, Germany*

OMX (<http://www.omx-online.com>) is a Munich-based company that develops and markets technology for biochemistry and mass spectrometry laboratories in the proteomics market. Core customers are pharmaceutical companies and universities. OMX has distributors in all major European countries and in the US and targets a worldwide market. The company was founded by Lutz Eichacker, a professor at the Ludwig Maximilian University of Munich, and Bernhard Granvogel, as a spin-off from the university. The idea to start the company was developed after successfully optimising certain processes in the university's proteomics laboratory. OMX representatives took part in a business plan course in 2001 and 2002 and received an award from the Munich Business Plan Competition in 2002. The company was founded in 2004; operative business began in early 2006 after sorting out financing issues. As the company required high investment, support from the Technologie-Beteiligungs-GmbH (Technology Equity Company) and the Seedfonds Bavaria, both public venture capital investors, was sought and approved. Today the company has seven employees.

*e-Business at OMX is currently quite basic. The company has a website with information about the company, its products, the market and the team and offers product descriptions for download. Electronic contacts within the company and with business customers are done by e-mail, routed via a web-based exchange server. Invoices are sent by normal mail, and the products for analysis need to be shipped by conventional post. The reason for not using more e-business applications is that OMX is still very much involved in developing its core business. According to OMX CIO Axel Masanek this is the common situation in small science-based spin-offs in the first years of operation. More sophisticated applications, such as an Enterprise Resource Planning system, may be introduced later. Nevertheless, he highlighted that website presence and e-mail communication are indispensable for any new company in the industry. OMX may thus be considered as a typical case of a science-based university spin-off in which ICT is not the core business activity. The company contributes to innovation first of all in technologies related to its core business – which is not e-business – and may contribute to innovation and diffusion of e-business applications later on.*

Sources: Interview with Axel Masanek, Chief Information Officer, OMX GmbH, 28 July 2006.

While new companies may not necessarily contribute to the diffusion of particularly innovative e-business applications, research for this report revealed various ways in which new companies may contribute to the diffusion of e-business practices that indeed are innovative: There may be one pioneer that is copied by other firms or there may be several pioneers; and diffusion may also take place when new companies are acquired by established ones. These forms are elaborated in the following.

### Diffusion by copying a single pioneering new company

A single new company may introduce an e-business practice that becomes so successful that other companies in the same industry or in other industries take up this practice, too. According to an Advisory Board member, “if e-business is part of the business model of the new company, it may introduce innovations” and “if a new company becomes a success it may contribute to the diffusion of e-business”.<sup>99</sup> Indeed, during the late 1990s, at the high time of the booming ICT economy, several

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<sup>99</sup> Statement by Jesús Galván.

new companies were able to introduce e-business practices which were subsequently adopted by other companies in the same industry and in other industries. These companies were able to grow very dynamically in a small period of time. Prominent examples are mainly from the US and include, for example, Amazon for internet bookselling or Google for internet search. Some of the features of Amazon's internet shop, e.g. the one-click ordering, were copied by other companies in various industries. The example of Amazon is described in the following box.

Business example:

*Online sales from start-up to world leadership: Amazon.com*

*Amazon.com, Inc., operates Web sites that sell various products and services, which primarily include books, camera and photography, apparel, shoes and accessories, health and personal care, baby care products, and consumer electronics. According to its self-description, Amazon offers the "earth's biggest selection" of products. The company and other sellers also offer various new, refurbished, and used items as well as auctions.*

*The company and its affiliates operate seven retail Web sites: [www.amazon.com](http://www.amazon.com), [www.amazon.co.uk](http://www.amazon.co.uk), [www.amazon.de](http://www.amazon.de), [www.amazon.fr](http://www.amazon.fr), [www.amazon.co.jp](http://www.amazon.co.jp), [www.amazon.ca](http://www.amazon.ca), and [www.joyo.com](http://www.joyo.com). It also operates [www.a9.com](http://www.a9.com) and [www.alex.com](http://www.alex.com) that enable search and navigation, and [www.imdb.com](http://www.imdb.com), a movie database Web site.*

*The company was founded in 1994 by Jeff Bezos and is headquartered in Seattle, Washington, with an additional office in Coffeyville, Kansas, US. Amazon's success was not immediate. It was not until October 2003 that Amazon.com posted a profitable quarter which was not driven by holiday shopping.*

*Amazon is offering online products in a consumer-friendly manner, including an extensive catalogue of products, a wide variety of other shopping services and partnership opportunities. Amazon.com's visitors can "search for books, music, videos, and more in a snap", and they only need to know one word related to the product they are looking for. The user can get "instant personalised recommendations based on your prior purchases the moment you log on", as well as "become an Amazon.com Associate and earn money by selling books, CDs, DVDs, videos, and many other products on your Web site". In case of questions, one can visit a help-desk or contact a 24-hour customer service department.*

*Amazon's website design and customer service has set standards for online shopping in many other industries. Amazon had online orders with one click patented in the US (US-Patent # 5.960.411) and successfully sued other US companies that also offered to buy online with one click.*

*Sources: wikipedia.de (translation by the author of this report), <http://www.amazon.com/exec/obidos/subst/misc/company-info.html/103-2603271-4873424>, <http://finance.yahoo.com/q/pr?s=amzn>, <http://www.ciainsight.com/article2/0,3959,1395735,00.asp>.*

### Diffusion triggered by a group of pioneering new companies

New companies may also trigger the diffusion of innovative e-business practices when several start-ups take up certain practices while established companies hesitate. This may be called "group pioneering". Established companies may then follow as "late adopters" when the e-business practices of the young companies have proved to be successful and established companies risk to lose competitiveness without taking up the practice. No concrete case for this mode was identified in

research for this report, but a fictive example may illustrate the issue: In a certain region a considerable number of new suppliers introduce electronic ordering of goods by customers. It turns out that many customers actually prefer to order online. Larger, established suppliers of the same good maintain their non-electronic ordering practice until they lose too many customers to the small competitors; the large firms then also introduce e-sales.

#### Diffusion by acquisition of new companies

An Advisory Board member pointed to a development that may be interpreted as a specific way of diffusion: *“established companies simply buy the innovative companies in order to stay innovative themselves”*.<sup>100</sup> By acquiring innovative start-ups, their innovations may be more likely to diffuse because the established companies use their market power to distribute the innovation. Recent examples include the acquisition of Skype Technologies SA, the global internet communications company, by eBay Inc.<sup>101</sup> and the acquisition of YouTube, the consumer media company for people to watch and share original videos through the internet, by Google Inc.<sup>102</sup>

### 3.3 Summary of findings from qualitative research and literature

All in all, findings from literature and the qualitative research conducted for this report confirm that the role of new companies is important for the introduction and uptake of new e-business applications in many industries. Yet, some industry representatives indicated that there are no considerable differences between new and established companies in this respect. Furthermore, many new companies' innovations may not necessarily be visible and widely known: the innovations of new firms may be incremental and modified by other firms, and innovative e-business ideas may also diffuse when established companies employ former freelancers, i.e. former one-man or one-women companies. Finally, many new companies are not innovative at all as far as e-business is concerned.

At the firm's level, the impact of new companies on e-business innovation and diffusion obviously depends on the importance of e-business in their business model. At an aggregate level, the impact of new companies on e-business innovation and diffusion differs between industries, regions, types of technologies and stages of the innovation process.

- **Differences between industries:** In industries with strong supplier and customer relationships, new companies may play a less important role for innovation and diffusion than in industries with weak vertical integration. Further industry characteristics that shape the role of new companies include the innovativeness of the industry and the industry's type of products or processes.
- **Differences between regions:** In regions with a high innovative performance, start-ups are more important for e-business innovation and diffusion than in generally less innovative regions.
- **Differences between technology types:** New companies may play a more important role for ICT-related product and service innovation than for process innovation.
- **Innovation versus diffusion:** Findings suggest that new companies contribute significantly to the diffusion of e-business applications, but they do not necessarily take up more innovative applications than established companies. Young companies may contribute to the diffusion of

<sup>100</sup> Statement from Andreas Labrenz, Fujitsu Siemens.

<sup>101</sup> See [http://about.skype.com/2005/09/ebay\\_to\\_acquire\\_skype.html](http://about.skype.com/2005/09/ebay_to_acquire_skype.html).

<sup>102</sup> See [http://www.google.com/press/pressrel/google\\_youtube.html](http://www.google.com/press/pressrel/google_youtube.html).

new e-business practices when a pioneering new company or a group of pioneers is copied by other firms or when an innovative new company is acquired by an established firm.

## 4 Findings from the e-Business Survey 2006

### 4.1 Sample characteristics

#### Characteristics of the e-Business Survey

*e-Business W@tch* collects data on the use of ICT and e-business in European enterprises by means of representative telephone surveys. The e-Business Survey 2006 was the fourth survey after those of 2002, 2003 and 2005. It had a scope of **14,065 interviews** with decision-makers in enterprises from 29 European countries.<sup>103</sup>

When analysing age group differences in this report, unweighted figures for all companies in the sample are presented because no accurate weights for companies by year of foundation are available. Further data from the e-Business Survey 2006 presented in this report, for example data by size class, feature a breakdown of the population of enterprises based on the aggregate of ten EU countries – the "EU-10".<sup>104</sup> In these countries the survey covered all ten sectors (at least to some extent) and therefore comparability of the sample across sectors is given. The EU-10 represent more than 80% of the total GDP and inhabitants of the EU-25 and are thus to a large extent representative for the whole EU. Differences between figures shown in the graphs and tables presented in the following sections of this report on the one hand as well as the individual sector reports and the Final Report on the other are due to the different weighting schemes used and to the different number of countries included.

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

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

#### Questions about year of company foundation

The e-Business Survey 2006 for the first time offered the opportunity to analyse data about e-business infrastructure, use and impacts by the age of the company. Hence the importance of new versus established companies in e-business application could be evaluated. In the survey, interviewees were asked the following question: "*When was your company founded, I mean in which year was it formally registered for the first time?*" (Question U2). In case the interviewee did not know the exact year, he or she was asked "*Would you be able to tell me in which of the following periods your company was founded?*" (Question U3). Four periods were mentioned, for companies not more than three, eight or 25 years old or for older companies.

<sup>103</sup> The survey was conducted in March-April 2006 using computer-assisted telephone interview (CATI) technology. Field-work was co-ordinated by the German branch of Ipsos GmbH ([www.ipsos.de](http://www.ipsos.de)) and conducted in co-operation with their local branches and partner organisations. The countries covered include EU Member States, Acceding and Candidate Countries, and countries of the European Economic Area (EEA).

<sup>104</sup> The EU-10 cover the Czech Republic, Germany, Spain, France, Italy, Hungary, the Netherlands, Poland, Finland and the UK. In contrast to this special report, most of the tables in the sector reports feature the "EU-10".

### Companies' age by sector

Overall, 9% of the surveyed companies said that they were founded between 2006 and 2003, 22% between 2002 and 1997, a relative majority of 42% was reported to be founded between 1996 and 1981, and 26% before 1981. The share of start-ups, i.e. of companies not older than three years, was highest in telecommunication services (21%), followed by consumer electronics (11%) and tourism (10%). The share of start-ups was lowest in food and beverages (5%), hospital activities (5%) as well as pulp, paper and paper products (6%). Exhibit 4-1 shows the distribution of companies by year of foundation in the dataset.

**Exhibit 4-1: Companies by sector and year of foundation in the e-Business Survey 2006**

No.	Sector	N	% of companies by year of company foundation			
			2006 – 2003	2002 – 1997	1996 – 1981	Before 1981
1	Food and beverages	1,701	4.8	15.6	40.0	39.0
2	Footwear	978	6.9	19.2	45.9	26.3
3	Pulp, paper and paper products	1,158	5.5	21.9	36.8	35.1
4	ICT manufacturing	1,687	9.4	22.8	50.9	16.2
5	Consumer electronics	665	10.7	23.6	52.0	12.9
6	Shipbuilding and repair	143	7.7	14.0	36.4	41.3
7	Construction	2,654	7.7	19.9	49.4	22.1
8	Tourism	2,665	9.8	23.8	40.8	24.7
9	Telecommunication services	1,580	21.3	37.4	32.7	7.8
10	Hospital activities	834	4.9	13.4	22.5	57.1
	<b>Total</b>	<b>14,065</b>	<b>9.2</b>	<b>22.3</b>	<b>42.1</b>	<b>25.5</b>

N = total number of enterprises interviewed per sector.  
Missing percentages (line sum <100%) due to answers of "don't know" (between 0.5 and 2.0 %).

Source: e-Business W@tch 2006.

### Companies' age by size class

Exhibit 4-2 shows the distribution of sample companies by size class and year of foundation. On the basis of the survey results, the highest share of very young companies was identified among micro-companies with 1–9 employees (16%). Only 3% of the large companies with more than 250 employees reported to have been founded in the past three years before the survey. Most of the large companies said that they were established before 1981 (54%).

**Exhibit 4-2: Companies by size class and year of foundation, e-Business W@tch 2006 data**

No.	Size class	N	Year of company foundation, in %			
			2006 – 2003	2002 – 1997	1996 – 1981	Before 1981
1	1 – 9 employees	5,254	15.9	27.9	42.4	13.1
2	20 – 49 employees	4,339	7.1	22.6	46.3	23.0
3	50 – 250 employees	3,221	3.5	16.1	41.1	38.2
4	> 250 employees	1,251	3.3	13.5	28.5	53.5
	<b>Total</b>	<b>14,065</b>	<b>9.2</b>	<b>22.3</b>	<b>42.1</b>	<b>25.5</b>

Source: e-Business W@tch

## 4.2 Findings about innovation activity

### 4.2.1 Product and service innovation

#### Innovation in the survey questionnaire

In the e-Business Survey 2006, the interviewees were asked the following questions: *“During the past 12 months, has your company launched any new or substantially improved products or services?”* (Question I1). If the question was unclear to the interviewee, the interviewer explained: *“We are interested in products or services new to your company – even if already on the market – as well as those that are new to your market.”* Thus the answers do not only cover genuine innovations, i.e. product and services new for the whole industry, but also activities contributing to the diffusion of already existing products and services. If the answer was “yes” to the question about product or service innovation in the past 12 months, the interviewees were asked: *“Have any of these product or service innovations been directly related to or enabled by ICT?”* (Question I2).

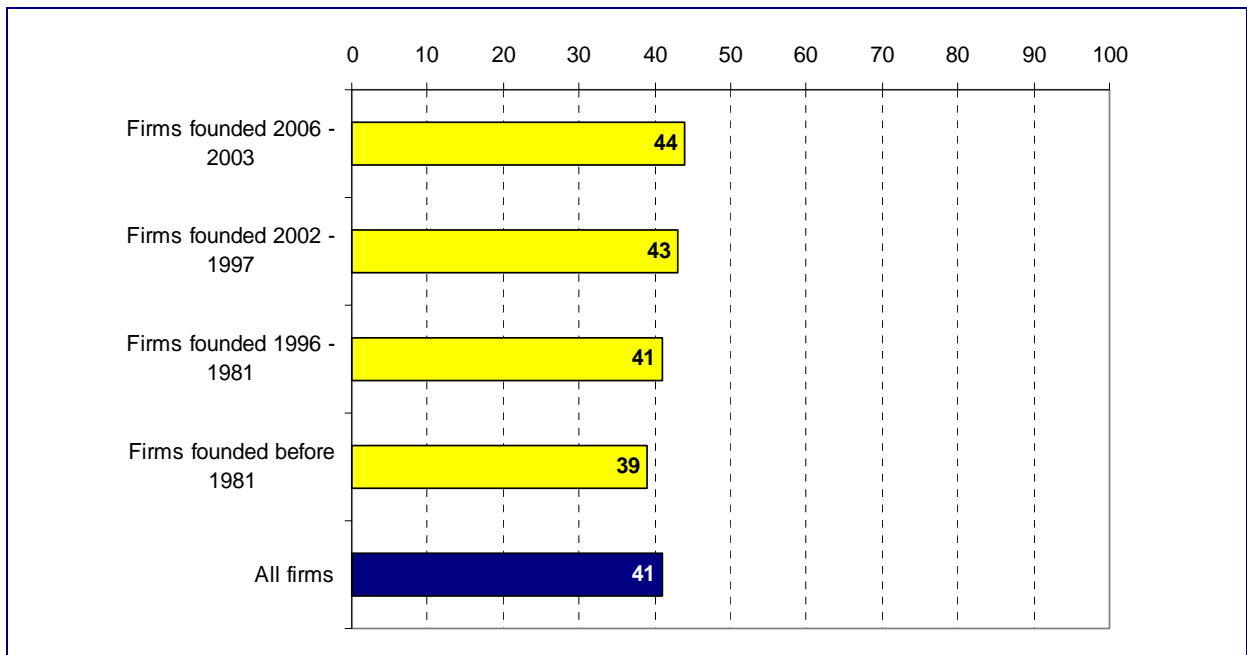
#### Product or service innovation

41% of the surveyed companies replied that they introduced new products or services in the twelve months before the survey and 59% said they did not do so (see Exhibit 4-3). With 44% of positive answers, companies founded between 2003 and 2006 appear to be slightly more innovative than companies founded in the other pre-specified periods. The percentage of companies reporting innovation activities declined slightly with age, i.e. from 43% for companies founded in 2002–1997, to 41% for those established between 1981 and 1996, and to 39% for the “oldest” ones which were founded before 1981. The differences are not large and the contingency coefficient (CC<sup>105</sup>) is only +0.03\*\*, even if on a considerable level of statistical significance. It may also be that some interviewees from firms founded within the past twelve months before the interview would tend to state that the products or services they offer are “new to the company” because the company simply did not exist before. Nevertheless, the findings offer a first, but weak, indication that new companies in the sample were more innovative than established ones.

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<sup>105</sup> The contingency coefficient (CC) is a measure for the strength of the interrelation of nominal data and can take values between 0 and +1. Three asterisks indicate a significance level of <0.001, i.e. the probability to claim contingency (i.e. statistical association) when in fact variables are statistically independent is smaller than 1/1000. Two asterisks indicate a significance level between 0.01 and 0.001, one asterisk between 0.05 and 0.01.

**Exhibit 4-3: Firms with product and service innovation in past 12 months by company age**



Base (100%): All companies. N = 13,627. Questionnaire reference: I1.

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

#### ICT-related product or service innovation

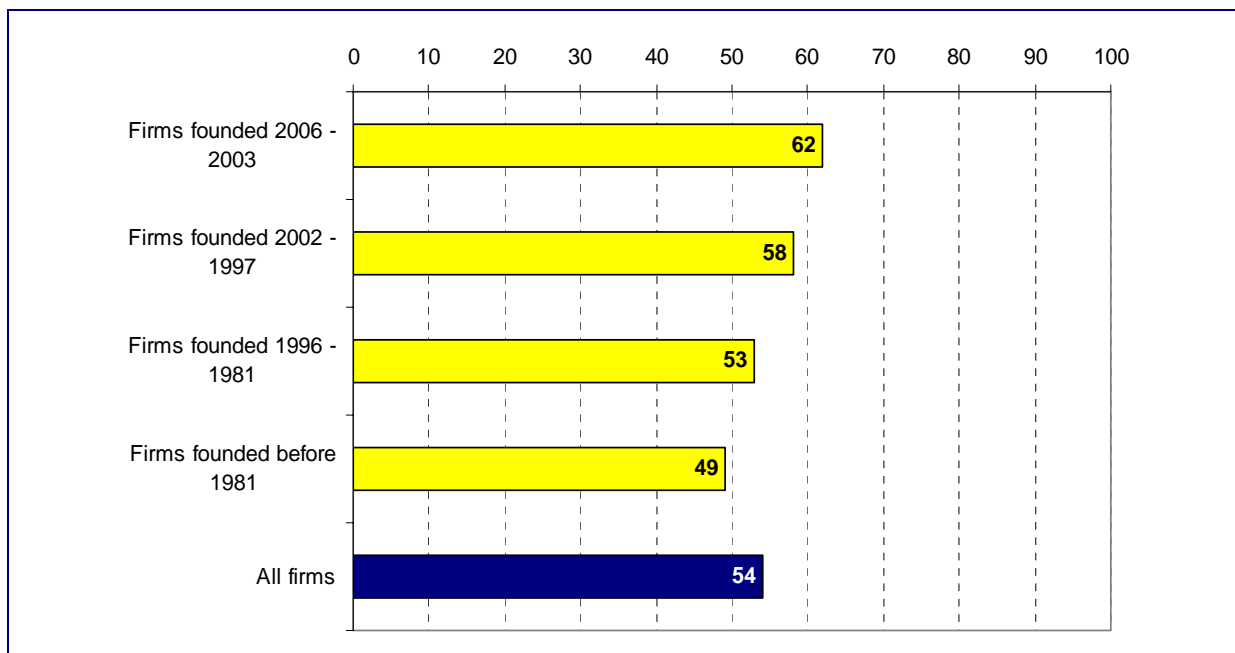
A similar picture emerged for product or service innovation that was distinctly ICT-related. Of those companies indicating that they introduced new products or services in the twelve months before the survey, 54% stated that these innovations were related to or enabled by ICT. Exhibit 4-4 shows the related results.

The share was highest in companies founded between 2006 and 2003 (62%), followed by the age classes of 2002–1997 (58%), 1996–1981 (53%) and before 1981 (49%). Thus, while the age class differences for general innovation were not large, there are more pronounced differences for ICT-related product or service innovation, with a contingency coefficient of at least 0.086\*\*\* on the highest significance level.

New companies in the sample appeared to be more prone than established ones to product or service innovation that is distinctly ICT-related. The survey questions about innovation did not go into further detail that could explain this finding. A plausible explanation, however, may be that the difference between age classes is due to innovation advantages normally attributed to small and young firms: organisational flexibility, interest in incremental innovations and excitement about innovations.<sup>106</sup>

<sup>106</sup> See section 2.3 above in this report.

**Exhibit 4-4: Firms with ICT-related product and service innovation by company age**



Base (100%): Companies stating product or service innovation in the past 12 months. N = 5,542. Questionnaire reference: I2.

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

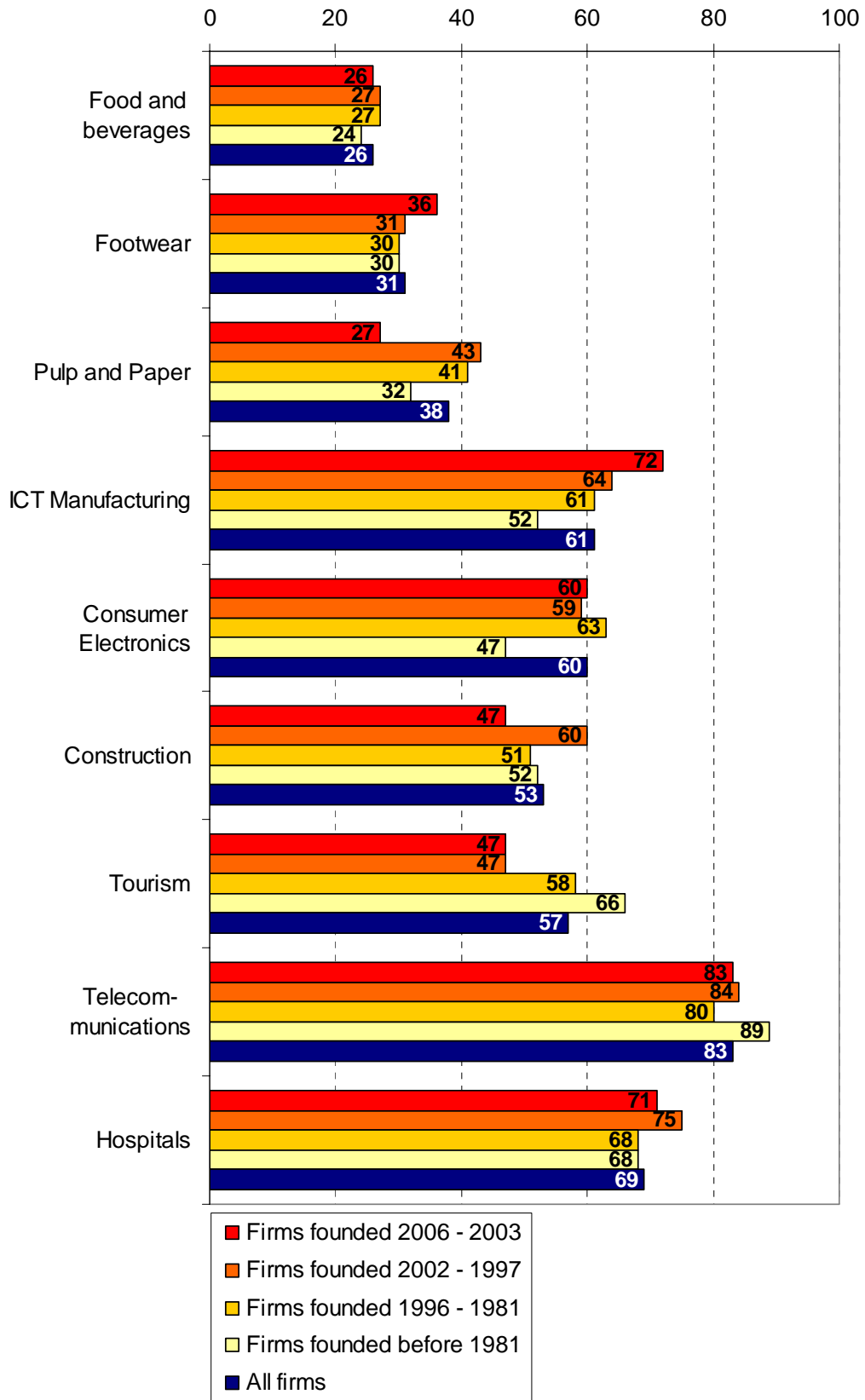
#### ICT-related product and service innovation by sector

The share of ICT-related product and service innovation, as well as the differences between age classes, differ largely between the industries included in the survey.<sup>107</sup> As far as age-classes are concerned, new companies reported the highest level of ICT-related product or service innovation in only two industries: footwear and ICT manufacturing.<sup>108</sup> In contrast, new companies reported the lowest levels of ICT-related product or service innovation in three industries, namely pulp & paper, construction and tourism. New companies were found to be about average with regard to ICT-related product and service innovation in the food and beverages, consumer electronics, telecommunications and hospital industries. This result implies that the overall importance of new companies for ICT product or service innovation depends very much on the composition of industries in the sample, as well as on the characteristics of the industries that determine the role of new companies in ICT innovation.

<sup>107</sup> A breakdown of ICT-related product or service innovation by age class and industry should be interpreted cautiously because the number of cases for the age class of 2006–2003 is below 50 in most industries. It is larger than 50 only in ICT manufacturing, tourism and telecommunications. The number of companies in the shipbuilding industry is too small to be included at all.

<sup>108</sup> At first sight one may question the compatibility of the data for the single sectors with the all-sectors average. In only three sectors (ICT manufacturing, telecommunications, hospitals) the reported shares of ICT-related innovation are higher than the all-sectors average. However, telecommunications and ICT manufacturing had a high share of new companies in the sample, so these sectors' results have a large influence on the all-sectors average.

Exhibit 4-5: ICT-related product or service innovation by company age and industry



Base (100%): Companies stating product or service innovation in the past 12 months. N = 5,542. Questionnaire reference: I2.

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

The interpretation of industry differences is not straightforward because there are no obvious commonalities of the industries in which young firms play an important role for ICT-related product or service innovation. According to *e-Business W@tch* findings in the related sector reports, ICT manufacturing is a fairly innovative sector dominated by large firms, footwear is a rather non-innovative sector with not so dominant firms.<sup>109</sup> *e-Business Survey 2006* findings indicate that the pulp & paper, construction and tourism industries are not among the top group of ICT and e-business users. This may be linked with the low importance of new firms for ICT product or service innovation in these sectors.

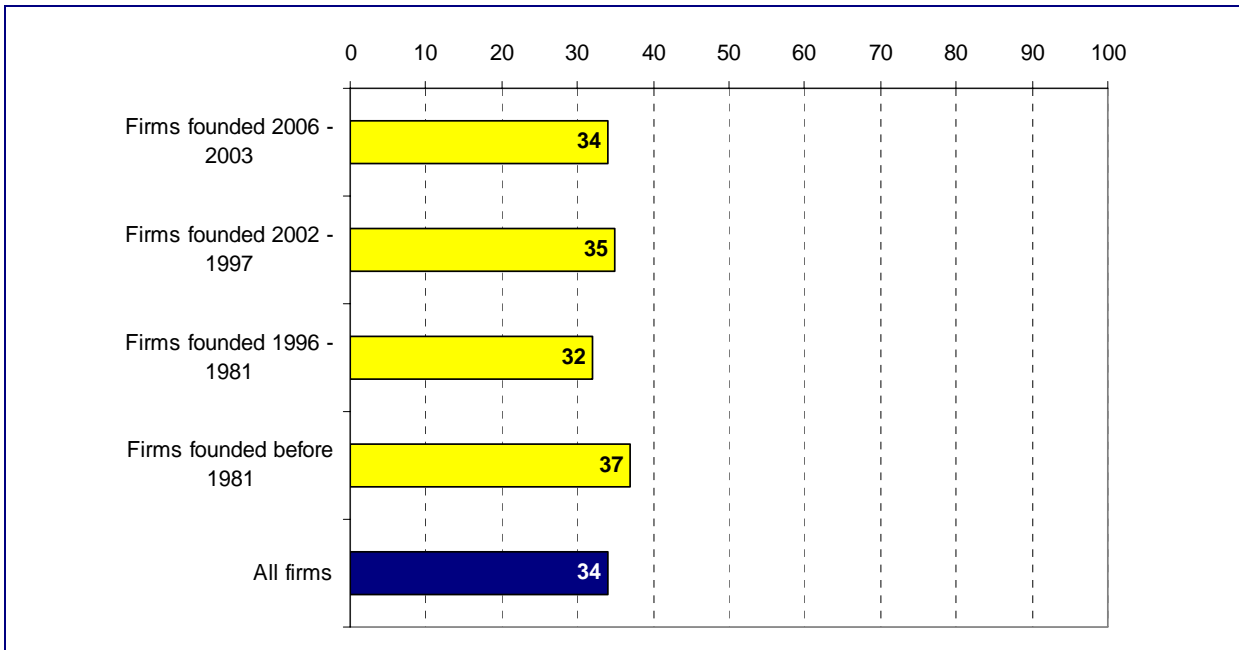
#### 4.2.2 Process innovation

##### Process innovation by age class

In two further questions, the interviewees were asked about process innovation: “During the past 12 months, has your company introduced any new or significantly improved internal process, for example for producing or supplying goods and services?” (Question I3). If yes: “Have any of these process innovations been directly related to or enabled by ICT?” (Question I4).

About a third of the surveyed companies replied that they had introduced new business processes in the twelve months before the survey – see Exhibit 4-6. The levels are quite similar across the different age groups.

**Exhibit 4-6: Firms with process innovation in past 12 months by company age**



Base (100%): All companies. N = 13,601. Questionnaire reference: I3.

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

Companies founded before 1981 reported the highest percentage (37%) of process innovation which may be related to streamlining pressure in established, larger firms. There is no linear sequence such as “the older the firms, the higher the percentage reporting process innovation”. The lowest figure (32%) was reported by firms founded between 1996 and 1981. Firms founded between 2003 and 2006 were found to be on a par with the average (34%) in terms of process innovation (CC: 0.044\*\*\*).

<sup>109</sup> Characteristics of these industries are described in chapter 2 of the respective sector reports that are available at [http://www.ebusiness-watch.org/resources/by\\_sector.htm](http://www.ebusiness-watch.org/resources/by_sector.htm).

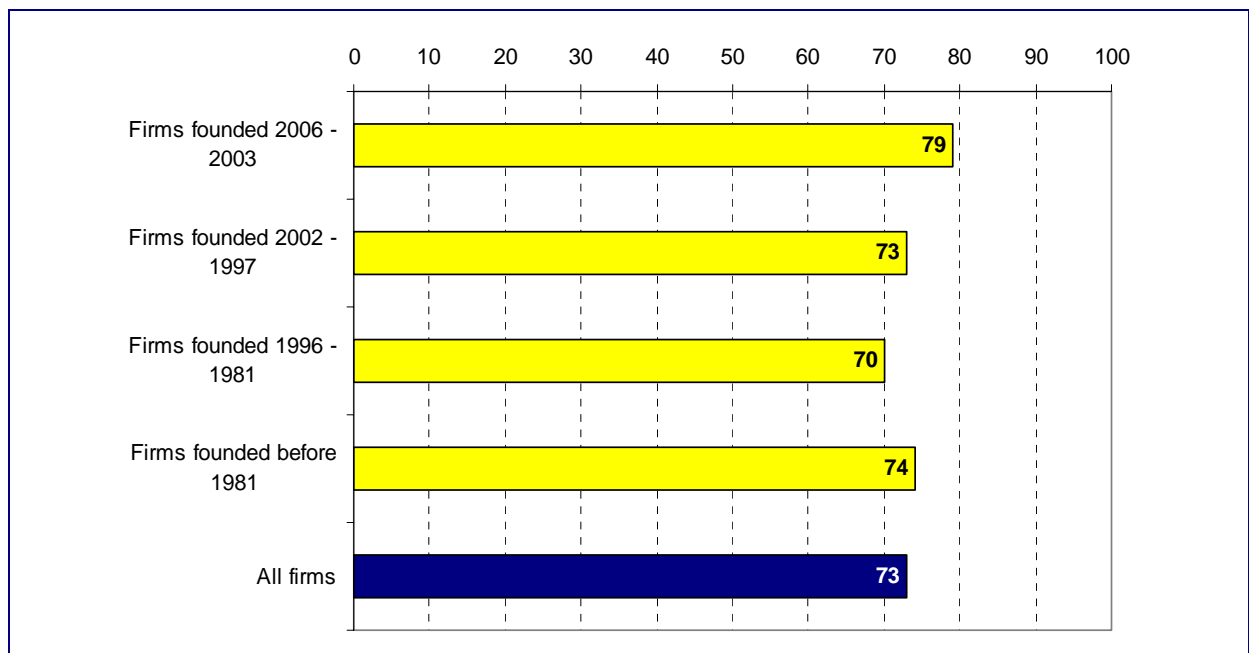
### ICT-related process innovation by age class

The question about new ICT-related processes is very important because it explicitly deals with e-business innovation in the firm. In almost three quarters (73%) of companies stating that they had introduced new business processes, these processes were enabled by or related to ICT (see Exhibit 4-7).

Companies founded between 2003 and 2006 reported the highest level of all age groups (79%), followed by those established before 1981 (74%), in 2002–1997 (73%) and in 1996–1981 (70%) - CC: 0.056\*\*.

All in all, new companies lead the way in ICT-related product, service and process innovation, even if the lead is not clear.

**Exhibit 4-7: Firms with ICT-related process innovation in past 12 months by company age**



Base (100%): Companies stating process innovation in the past 12 months. N = 4,599.  
Questionnaire reference: I4.

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

### ICT-related process innovation by age class and industry

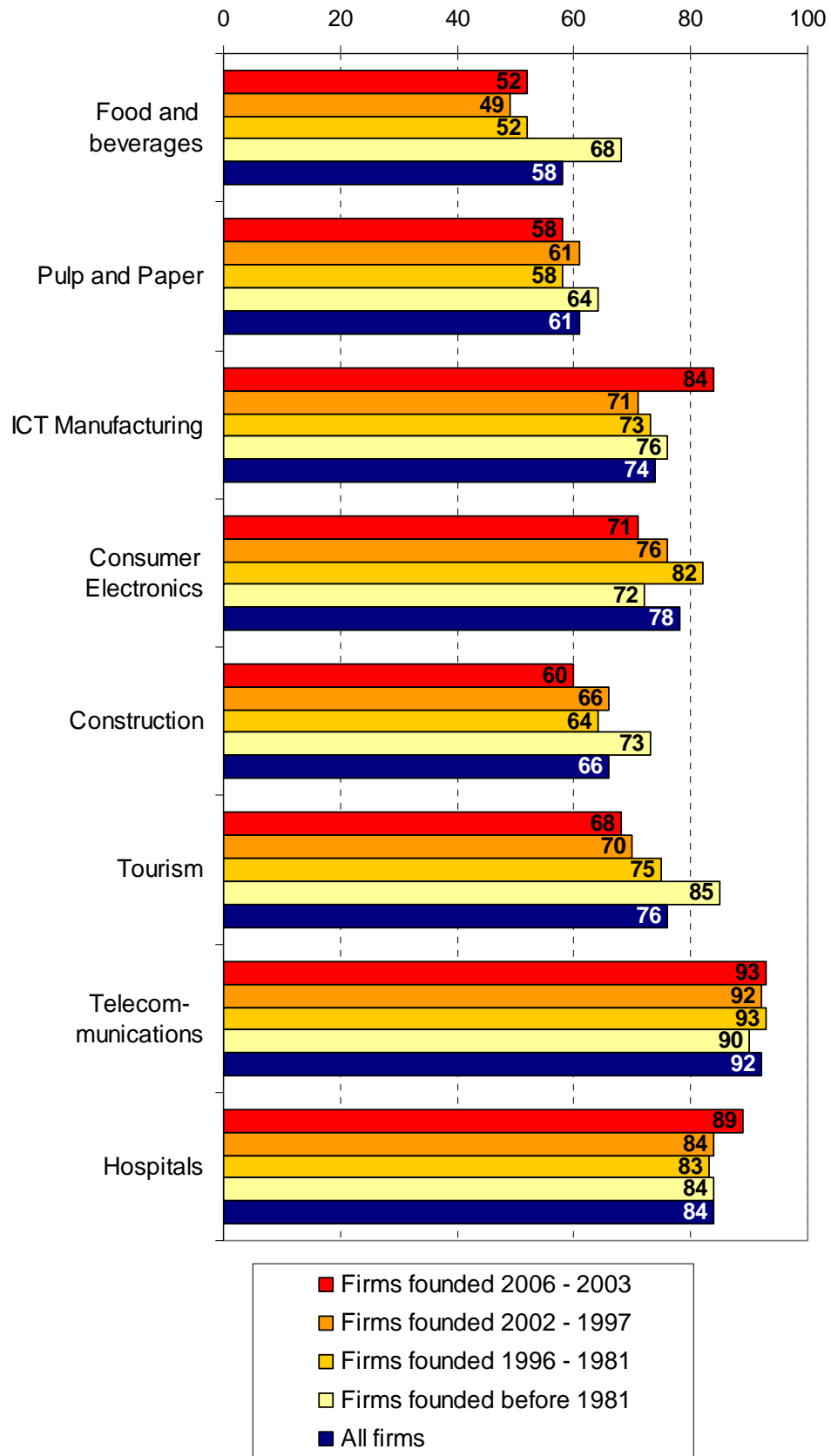
Similar to product or service innovation, the importance of new companies for ICT-related process innovation also differs largely between industries – see Exhibit 4-8.<sup>110</sup> The differences are even more pronounced. New companies reported the highest shares of ICT-related process innovation in the ICT manufacturing and hospitals industries. In telecommunications, companies from all age groups reported quite the same level of ICT-related process innovation. On the other hand, new companies reported the lowest shares in four of the remaining five industries for which data are available: pulp and paper, consumer electronics, construction and tourism.

As for product or service innovation, this finding implies that the overall importance of new companies for ICT-related process innovation relies very much on the composition of industries in the sample and the characteristics of these industries. Although the differences between age classes in the surveyed

<sup>110</sup> A breakdown of ICT-related process innovation by age class and industry should be interpreted cautiously because the number of cases for the age class of 2006 – 2003 is below 50 in most industries. It is larger than 50 only in ICT manufacturing, tourism and telecommunications. The number of companies in the footwear and shipbuilding industries is too small to be included.

industries appear to be more pronounced in some industries than in others, one may actually say that ICT-related process innovation activity is quite evenly distributed between the size classes. The largest difference between the age class with the lowest and the one with the highest value is 17 percentage points in the tourism industry (68% for new companies and 85% in the oldest company group).

Exhibit 4-8: ICT-related process innovation in past 12 months by company age and industry



Base (100%): Companies stating process innovation in the past 12 months. N = 4,599.  
Questionnaire reference: I4.

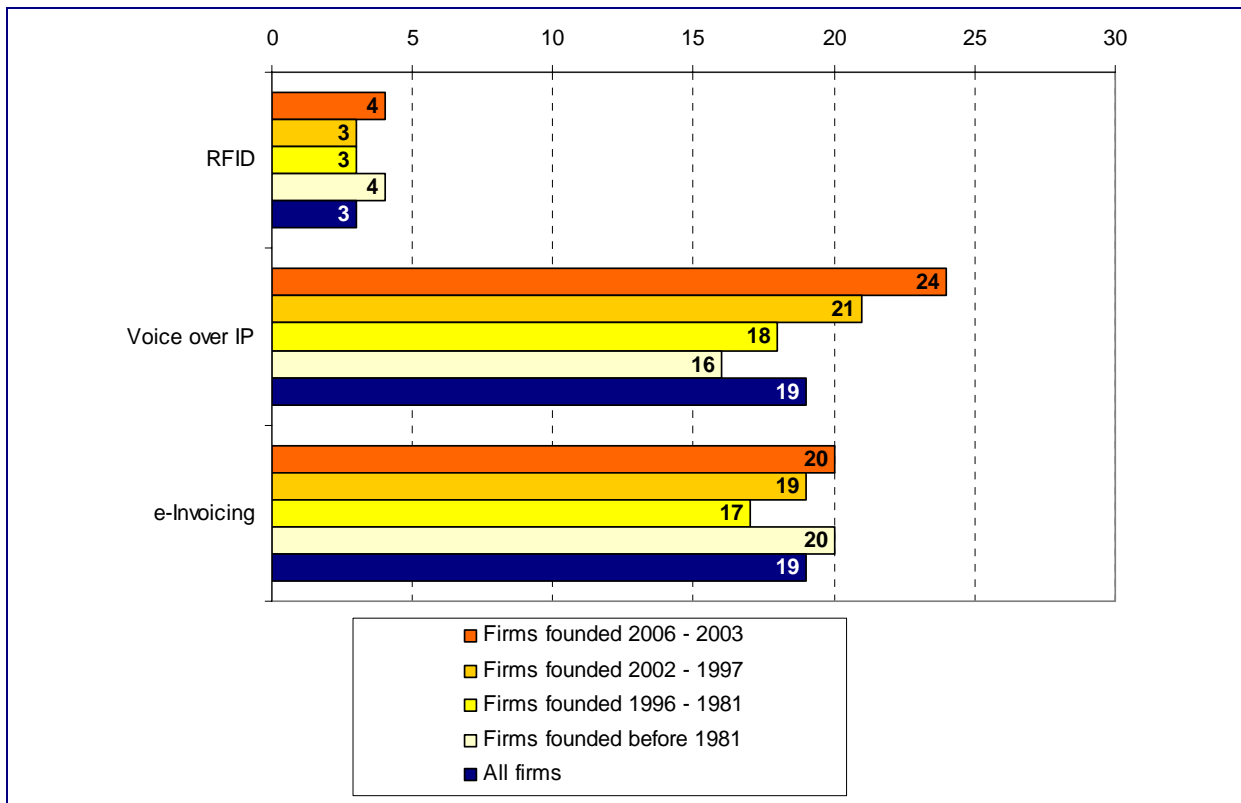
Source: e-Business W@tch (Survey 2006)

### 4.3 ICT and e-business use

#### Innovative applications

*e-Business W@tch* asks companies about the use of particular ICT applications, such as applications for online procurement and online sales or for internal and external collaboration. For the purposes of this report, the following solutions were considered as being particularly innovative: Voice over Internet Protocol (VoIP), Radio Frequency Identification (RFID), and e-invoicing.<sup>111</sup> Exhibit 4-9 shows the results by age-classes.

**Exhibit 4-9: Selected innovative e-business applications by company age**



Base (100%): All companies stating process innovation in the past 12 months. N = 13,558 (RFID), 13,508 (VoIP), 13,186 (e-Invoicing). Questionnaire references: A4c (Voice over IP), D3 (RFID), D6 (e-Invoicing).

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

According to the survey results, start-ups tend to be the companies with the highest percentage of use of the three applications, particularly with regard to VoIP:

- **Voice over Internet Protocol:** The reported average percentage of VoIP use was 19%. The highest percentage was reported by the youngest companies (24%), followed by the age groups of 2002–1997 (21%), 1996–1981 (18%), and before 1981 (16%) – CC: 0.068\*\*\*.
- **Radio Frequency Identification:** On average, only 3% of the surveyed companies stated to use RFID. The use was found to be highest in the oldest and in the youngest age group: before 1981 (4%) and 2006-2003 (4%), versus 1981–1996 (3%) and 2002 –1997 (3%) – CC:

<sup>111</sup> Interviewees were asked in the e-Business Survey 2006 about e-invoicing to customers in the private and public sector. Only answers about private customers are considered in this report.

0.025\*. The differences are however very small – only one percentage point – and within the range of statistical error.

- **e-Invoicing:** 19% of the companies stated that they use online applications to send electronic invoices to private customers. The levels were similar among start-ups (20%), companies founded before 1981 (20%), and firms founded between 2002 and 1997 (19%). The reported level was smaller in firms founded between 1996 and 1981 (17%) – CC: 0.03\*\*.

Exhibit 4-10 shows the percentages of companies which reported use of innovative e-business applications by age class and industry. These figures confirm that innovative activity by age classes differs across industries:

- As regards **VoIP**, new companies reported the highest level of use among all age classes in four industries: pulp and paper, consumer electronics, construction and hospitals. In no industry new companies reported the lowest level of VoIP usage.
- As regards **RFID**, the only industry for which new companies reported the highest level of usage is pulp and paper. New companies reported the lowest level of RFID use in the food and beverages, ICT manufacturing, consumer electronics, construction and tourism industries. These levels are however quite close to those for other age classes.
- As regards **e-invoicing** to private customers, new companies reported the highest percentages in the pulp and paper as well as the construction industries. In the ICT manufacturing, consumer electronics and tourism industries, new companies reported the lowest level of e-invoicing to private customers.

Some of these findings are in contrast with the findings about product or service innovation (see section 4.2.1) as well as process innovation (see section 4.2.2). While new firms in the pulp and paper and also in the construction industry reported the lowest levels in both ICT-related product and process innovation in general, they appear at the top with regard to the particular applications examined here. On the other hand, new companies in the ICT manufacturing industry, which reported the highest levels of ICT-related product and process innovation in general, appear to be particularly slow adopters of RFID and e-invoicing.

These apparently paradox findings are difficult to interpret. It may be that findings actually reflect age-group differences between innovation activity in general and innovation in terms of particular applications in certain industries. It may also be that the number of companies surveyed was too small to produce consistent figures. In either case, further research could follow up these findings and provide more detailed analyses about innovation activity in new companies in particular industries.

**Exhibit 4-10: Innovative e-business applications by year of foundation and industry in %**

		RFID	VoIP	e-Invoicing
<b>Food</b>	<b>Total</b>	3	14	17
	2006 – 2003	1	14	17
	2002 – 1997	2	15	18
	1996 – 1981	3	13	12
	Before 1981	3	13	21
<b>Footwear</b>	<b>Total</b>	1	17	13
	2006 – 2003		19	13
	2002 – 1997	3	20	15
	1996 – 1981	1	18	12
	Before 1981	1	14	13
<b>Pulp and paper</b>	<b>Total</b>	3	13	14
	2006 – 2003	5	25	17
	2002 – 1997	1	14	13
	1996 – 1981	2	11	11
	Before 1981	4	13	16
<b>ICT manufacturing</b>	<b>Total</b>	4	26	21
	2006 – 2003	3	26	19
	2002 – 1997	4	27	25
	1996 – 1981	4	25	20
	Before 1981	7	28	22
<b>Consumer electronics</b>	<b>Total</b>	3	22	18
	2006 – 2003	1	27	15
	2002 – 1997	1	25	19
	1996 – 1981	3	21	17
	Before 1981	5	18	19
<b>Construction</b>	<b>Total</b>	3	12	14
	2006 – 2003	2	14	17
	2002 – 1997	3	10	14
	1996 – 1981	2	12	14
	Before 1981	3	12	13
<b>Tourism</b>	<b>Total</b>	2	14	16
	2006 – 2003	2	12	12
	2002 – 1997	2	11	14
	1996 – 1981	2	16	16
	Before 1981	3	15	21
<b>Telecommunication</b>	<b>Total</b>	7	41	28
	2006 – 2003	8	41	28
	2002 – 1997	5	44	28
	1996 – 1981	7	37	28
	Before 1981	12	45	25
<b>Hospitals</b>	<b>Total</b>	5	14	24
	2006 – 2003	5	24	18
	2002 – 1997	4	20	17
	1996 – 1981	5	13	23
	Before 1981	6	12	27

Note: e-Invoicing to private customers only, not to customers in the public sector.

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

## Common e-business applications

In e-business applications that are already rather common e.g. basic applications for e-sales or e-procurement, the e-Business Survey 2006 showed that new companies do not have a clear lead. The picture is rather mixed. For some indicators, the values for the different age classes are almost equal, for other indicators the new companies lag behind, and for some the new companies lead. Exhibit 4-11 shows the e-Business Survey 2006 findings for 23 selected ICT and e-business indicators.

According to the respective survey results, new companies demonstrated the highest percentages for Wireless Local Area Network (33%), followed by the age classes of 2002–1997 (32%), 1996–1981 (30%) and before 1981 (26%). New companies also reported the highest percentages for “online applications other than e-mail to collaborate with business partners in the design of new products or services” (22%), placing orders for goods and services online (62%), and support marketing or sales processes by using specific IT solutions (18%). Furthermore, the share of companies stating that e-business constitutes a significant part of the way the company operates is largest among new firms (26%). In all these cases, differences between the age classes are not large and the maximum difference between the age classes with the top and the second highest level is seven percentage points.

New companies are behind other age classes in Enterprise Resource Planning, Supply Chain Management and Customer Relationship Management applications. Since these systems are, in general, more beneficial for large than for small companies, this finding is no surprise. However, the share of new companies that reported having an own website was also much lower than the respective share among the older companies: 61% among new companies versus 75% in companies founded before 1981. This is a rather surprising finding, contrary to what would intuitively be expected. One reason may be that business in new, small companies relies on personal relationships with customers relatively more often than in large, established firms.

**Exhibit 4-11: e-Business applications by year of foundation**

e-Business application	Answers of "yes" by year of company foundation, in %				
	Total	2006 – 2003	2002 – 1997	1996 – 1981	Before 1981
<b>Infrastructure</b>					
Internet access	96	96	96	95	98
Wireless Local Area Network	29	33	32	30	26
Remote access to company's computer system	35	34	35	33	39
<b>e-Skills development and outsourcing</b>					
Current employment of ICT practitioners	28	27	28	25	35
Hard-to-fill vacancies for jobs requiring ICT practitioners or e-business professionals in 2005 (in firms employing ICT practitioners)	4	6	5	4	3
Outsourcing of ICT services which were previously conducted in-house to external service providers.	20	17	21	18	22
<b>ICT expenditures and investments</b>					
Investments in ICT during the past year 2005, for example for new hardware, software or networks	67	67	65	66	72
Difficult to draw or receive funds from the major source of finance (in firms using bank loans, venture capital or public funds)	20	29	21	16	37
<b>Internal networks and systems</b>					
Intranet	38	34	36	35	45
Knowledge Management software	13	13	13	12	14
Enterprise Resource Planning system	22	17	18	21	28
Supply Chain Management system	14	12	13	14	16
<b>External e-collaboration</b>					
Online applications other than e-mail to...					
share documents between colleagues or to perform collaborative work in an online environment	29	30	30	26	30
track working hours or production time	19	18	18	17	24
collaborate with business partners to forecast product or service demand	20	21	21	18	19
collaborate with business partners in the design of new products or services	17	22	19	17	15
<b>Online sourcing and procurement</b>					
Place orders for goods or services online	58	62	60	56	59
Support the selection of suppliers or procurement processes by using specific IT solutions	13	13	12	12	14
<b>Online marketing and sales</b>					
Own website on the internet	68	61	68	65	75
CRM system	15	15	16	13	18
Allow customers to order goods or book services online	29	31	31	30	27
Support marketing or sales processes by using specific IT solutions	14	18	15	14	14
<b>ICT impacts</b>					
e-Business constitutes a significant part of the way the company operates	21	26	24	19	20
Items for which new companies have the highest values are marked bold.					

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

#### 4.4 Summary of findings from the e-Business Survey 2006

Findings from the e-Business Survey 2006 indicate that, in general, companies founded between 2006 and 2003 are more innovative than established ones with regard to ICT and e-business use. However, the analysis also indicates that there are considerable differences between industries. Core findings include the following:

- **Product, service and process innovation:** Product and service innovation activity, whether general or ICT-related, was found to decline with company age. The differences between age groups for general product and service innovation were found to be only a few percentage points. There were more distinct differences for ICT-related product or service innovation. As regards the introduction of new business processes, no clear patterns were identified. The oldest companies reported the highest activity in general process innovation, while the youngest companies did so in terms of ICT-related process innovation. In both cases, companies founded between 1981 and 1996 reported the lowest innovation levels.
- **Important industry differences:** The overall importance of new companies for product or service innovation as well as for process innovation was found to differ very much by industry. New companies appear to play a particularly important role for ICT-related innovation in the ICT manufacturing industry, and to some extent also in the telecommunication and hospital industries. In contrast, the role of new companies appears to be particularly small in the pulp & paper, construction and tourism industries. This implies that the overall importance of new companies for e-business innovation depends very much on the composition of the sample and on the characteristics of the industries included.
- **Innovative e-business solutions:** Among the ICT applications and solutions which were covered by the e-Business Survey 2006, the following were considered as being particularly innovative: Voice over Internet Protocol (VoIP), Radio Frequency Identification (RFID), and e-Invoicing. Results show that start-ups tend to have the highest percentage of use of these applications. Again there were large differences between the industries examined. However, in contrast to what one would expect, in industries in which new companies were found to be less important for ICT-related product and service or process innovation, the new companies reported higher levels of VoIP and e-invoicing use than the established firms.
- **Other e-business solutions:** In e-business applications that are already rather common, new companies were not found to have a clear lead. According to the survey results, new companies have the highest percentages for Wireless Local Area Network, online applications other than e-mail to collaborate with business partners in the design of new products or services, placing orders for goods and services online, and specific IT solutions to support their marketing or sales processes. Furthermore, the share of companies stating that e-business constitutes a significant part of the way the company operates was largest among new firms. In all these cases, however, differences between age classes were not large. In contrast, new companies were found to be behind other age-classes in the use of Enterprise Resource Planning, Supply Chain Management and Customer Relationship Management systems. This is not surprising, as these ICT applications are – usually – more beneficial for large than for small companies.

## 5 Conclusions

### 5.1 Business impacts

#### Basic conclusions

The analysis of findings from the *e-Business W@tch* Advisory Board survey (see section 3.2) and from the e-Business Survey 2006 (see sections 4.2 and 4.3) suggests three basic conclusions with regard to the role of new companies for e-business innovation and diffusion:

- New companies play an **important role** for e-business innovation and diffusion **in all sectors**. An exception may be sectors that consist almost exclusively of large, established units such as the shipbuilding industry. New companies are, however, *not necessarily more important* for e-business innovation and diffusion than established companies. Furthermore, the innovations of new companies are not necessarily “visible” in the sense that new firms and their products are not widely known. Many innovations by new firms may be adopted by established firms and modified without leaving a trace of their origin.
- The level of importance of new companies for e-business innovation and diffusion **differs between economic sectors**. In some industries, new companies appear to be more important in this respect than in others. Thus, the overall findings for innovation by year of foundation depend very much on the composition of industries in the sample as well as on the characteristics of the industries that determine the importance of new companies.
- The role of new companies in e-business innovation and diffusion also **differs between technologies**. New companies may be important for the introduction and diffusion of some innovative applications – for example VoIP or e-invoicing – but less important for others, such as RFID. Sectors in which new companies are important for the introduction and uptake of certain new applications are not necessarily the same sectors in which new companies are important for e-business innovation in general.

#### Impacts on competitiveness and productivity

It has been suggested that, currently, a new business paradigm of global competition is emerging. This paradigm seems to be based on relationships, customisation and collaborative alliances, which are all fostered by the use of ICT and e-business.<sup>112</sup> The traditional economic perception of stand-alone competition between companies may shift towards “competing by collaborating”.<sup>113</sup> Competitive advantage may thus be created through advantageous collaborative relationships.

Considering that the particular innovative strength of new companies may be, firstly, to be flexible in deciding about innovations<sup>114</sup> and, secondly, to introduce incremental inventions,<sup>115</sup> these companies serve customisation and collaboration in innovative networks. In such a situation, industries in certain regions or countries with a lack of new companies may lose competitiveness and productivity to industries in other regions or countries with a larger number of agile start-ups. Considering further that the role of start-ups for innovation and diffusion differs between industries, their importance for competitiveness and productivity may also be larger in some industries and smaller in others. Findings

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<sup>112</sup> See Dana/Etemad/Wright (2004), p. 30.

<sup>113</sup> This assumption was confirmed by a study about the competitiveness of regional firm networks that was evaluated for the Munich case study above in this report. See Lechner (2001).

<sup>114</sup> See the findings presented in sections 2.3 and 3.2 of this report.

<sup>115</sup> See, for example, the statement by J. Graf in the case study about Munich in section 3.2.3 of this report.

from the e-Business Survey 2006, as presented in sections 4.2 and 4.3 of this report, suggest that new companies are particularly important for ICT and e-business innovation in industries producing ICT-related products, services and process applications, namely ICT manufacturing and also to some extent telecommunications.<sup>116</sup> In contrast, the same findings indicate that the role of new companies is not so important for ICT and e-business innovation in other, usually traditional industries, such as pulp & paper, construction or tourism.

## 5.2 Policy implications

### Promoting new companies

New companies appear to play an important role for e-business innovation and diffusion in many industries. The question, therefore, is what policy measures may be helpful to support start-ups or at least not constrain their activity in this respect. There is a wide range of possible policy measures to support new companies in their role as e-business innovators.<sup>117</sup> Policy may target, for example, certain industries, technologies, types of companies (e.g. companies with high growth perspectives), geographic areas (e.g. regions with below-average growth), specific groups of people (e.g. ethnic minorities) or companies with a certain origin (e.g. from universities or public research institutes). All such policy measures may directly or indirectly foster e-business innovation and diffusion.

In order to reasonably confine the discussion in this report, most of the following policy implications are focusing on measures directly affecting e-business innovation and diffusion. Some of the identified implications have a more general “innovation orientation”. Thus, they tend to be confined to resources that can be directly related to e-business, namely technological knowledge, business knowledge, finance and real estate (see chapter 2.4). Exhibit 5-1 provides an overview of identified implications for policy and suggests possible measures, initiators and their potential leverage. The leverage scores are tentative; they are not based on any model but on a qualitative assessment, reflecting the impression the study team gained from analysing the survey results, as well as from interviews, case studies and the literature review conducted for this report.

**Exhibit 5-1: Measures to support new companies related to e-business innovation**

	Policy issues	Possible initiators	Policy leverage opportunities <i>low &lt; &gt; high</i>
1	e-Business innovation networks	Regional, national and international <b>technology</b> policy makers	
2	Investments knowledgeable in e-business	Regional, national and international <b>finance and technology</b> policy makers	
3	Business incubators' competence in e-business	Regional, national and international <b>technology</b> policy makers	
4	Spin-offs from universities and public research	Regional, national and international <b>education and technology</b> policy makers	
5	Promoting companies with high	Regional, national and	

<sup>116</sup> The findings for the Consumer Electronics industry are mixed: While new companies in this industry were found to be of average importance for ICT-related product and process innovation, their importance in ICT-related process innovation was found to be smaller than firms in the other age groups.

<sup>117</sup> See for example the results of the European Conference on Innovation and e-Business in Allinson/Rammer/Boekholt et al. (2005a) and (2005b); more information about the conference is available at [http://ec.europa.eu/enterprise/innovation/e-business\\_en.htm](http://ec.europa.eu/enterprise/innovation/e-business_en.htm).

	growth perspectives	international policy makers in <b>various</b> fields	
6	Promoting producers and users of e-business solutions	Regional, national and international <b>entrepreneurship and ICT</b> policy makers	
Maximum: 3 points (  or  )			

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

### Promoting e-business innovation networks

Innovation policy makers can promote innovation and diffusion of e-business technologies by supporting the establishment of related stakeholder networks. Such networks may include companies which produce or purchase ICT and e-business applications, as well as firms offering related services, e.g. for finance, patenting and legal issues. The networks may also include researchers, consultants, and policy makers in the field. They may promote the exchange of “tacit knowledge” about e-skills, e-business management or finance for e-business ventures, through related presentations and discussions.

New companies, their products and services usually receive particular attention in such fora in order to develop and exploit their innovative potential. An example of such a forum is the Förderkreis IT- und Medienwirtschaft München e.V. (FIWM – Promotion Circle ICT and Media Business Munich).<sup>118</sup> A further example, not particularly related to e-business but to technology in general, is the Munich Network.<sup>119</sup> Such networks are also well-known in the US, for example the Technology Alliance in the Seattle region. This partnership of technology-oriented companies and public authorities in the region pays considerable attention to ICT and e-business.<sup>120</sup>

Therefore, such networks may be of particular value at the regional level, but it might also be worth establishing national and cross-country networks with similar objectives. Moreover, taking into account the identified considerable differences of e-business innovation and diffusion between sectors (see sections 4.2 and 4.3), industry-specific networks would also be meaningful.

### Finance: promoting investments knowledgeable in e-business

In the e-Business Survey 2006 (see section 2.4, “access to finance”) the percentage of new companies reporting difficulties in ICT investment funding was found to be considerably larger than in the other age groups. A start-up’s access to finance can be facilitated in various ways. Banks can specialise in supporting new companies and they can specialise in ICT and e-business. New firms in the field of ICT and e-business with particularly high growth expectations can benefit from specialised venture capital firms and alliances of “e-business angels”. Many European countries have business angel networks which may introduce branches specialised in e-business investments.<sup>121</sup> Furthermore, targeted subsidies can be granted to ICT and e-business companies with high research and development intensity.

Findings from the e-Business Survey 2006 and from literature suggest that opportunities for business angels’ investments are largely untapped. A major reason suggested by some researchers is that potential business angels may lack knowledge about the investment process. Therefore, the creation of business angels’ academies may be useful<sup>122</sup> as, for example, the academy offered by the Business

<sup>118</sup> See <http://www.fiw.de> and the case study about Munich in section 3.2.3 of this report.

<sup>119</sup> See <http://www.munichnetwork.com>.

<sup>120</sup> See <http://www.technology-alliance.com>.

<sup>121</sup> See the European Business Angel Network (EBAN) website at <http://www.eban.org> for national networks.

<sup>122</sup> As suggested by San José Riestra/Roure/Aernoudt (2005).

Angel Network Deutschland in Germany.<sup>123</sup> In order to promote e-business innovation, such academies may offer special training to potential and actual business angels for investments in the ICT and e-business market. On the companies' side, there may be a lack of awareness about business angels' investment offerings. Thus, new ICT firms should be kept informed about such funding opportunities from "business angels" and put into contact with potential investors.

#### Real estate: promoting business incubators' competence in e-business

Policymakers can facilitate the access of company founders to appropriate real estate, for example by supporting the building of suitable premises or the provision of building grounds for new companies in the field of ICT and e-business. Real estate agencies that run business incubators often also offer consulting services to the businesses they host. A survey of business incubators in Europe with 76 responses found that 39 of the centres offer "*help with e-business and other aspects of ICT*".<sup>124</sup> While this can be considered quite a high figure, other services such as help with raising finance (offered by 68 of 76 responding incubators) and networking with other companies and customers (61 responses) were reported to be offered more often. There appears to be a potential of extending the provision of ICT and e-business services in business incubators. This could enhance the ICT and e-business innovation capability of new companies. Some new companies, for which e-business is their core business, may be "incubated" this way, i.e. they may receive "birth assistance" by special ICT services. Other new firms for which e-business is not crucial may also benefit from support of their e-business use. Policy makers can help to establish and foster business incubators which are specialised in hosting and consulting new companies that either produce ICT or have a business model which is based on e-business.

#### Promoting spin-offs from universities and public research institutions

"Spin-offs" from universities and public research institutions also need particular attention from policy makers. There is an assumed large unused potential of commercialising inventions and knowledge from universities (see section 2.3, "growth and employment"). However, such spin-offs constitute one of the most complex forms of technology transfer. Hence, concepts for promoting such start-ups should be differentiated. Universities and public research institutions can establish networks of organisations that provide resources to new companies. These organisations can facilitate the access to e-business related resources of new companies that either produce ICT and e-business applications, or use e-business solutions. Such new ICT and e-business applications can be developed by related research institutes or clusters, while e-business management can be taught in dedicated courses or education programmes within the university. Finance for ICT and e-business start-ups can be provided by specialised venture capitalists with close ties to the university, and real estate can be provided by e-business incubators close to the campus.

An important aspect that should not be underestimated in this context is the great potential of university faculty – not only graduates and students – to become involved in start-ups. In fact, available studies have shown that some of the most successful new companies may be based on research and support from university professors.<sup>125</sup> This does not necessarily imply that professors should take leading positions in the management of the new company; they may be scientific advisors. Therefore, as regards e-business innovation in particular, start-ups' promotion could focus also on professors in the fields of informatics and business studies. Thus, policy makers should pay attention to the importance of university professors' involvement – and not only of graduates and students – in start-ups from universities.

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<sup>123</sup> See <http://www.business-angels.de>.

<sup>124</sup> Centre for Strategy and Evaluation Services (2002), Section 5, Table 28.

<sup>125</sup> See Lilischkis (2001), p. 151.

### Promotion of “gazelles” by fostering framework conditions

It may appear to be rewarding for policymakers to promote new ICT and e-business companies with particularly large growth perspectives, the so-called “gazelles”. However, correctly identifying such firms at an early stage would imply a level of knowledge that even private capital providers normally do not have. The uncertainty about market perspectives of technology-oriented start-ups is the very reason for the existence of venture capital funds (see section 2.4, “access to finance”). These funds seek to select a number of promising new companies for funding and accept that only a few of these firms will be highly successful (e.g. one in ten). Returns from these successful firms would, in turn, compensate lost investment in other companies.

At a time when exceptional growth is already visible, the successful companies hardly need further public promotion. Instead, policymakers may pave the way for companies with exceptional growth by improving the framework conditions for their inception and development. This may, for example, include the promotion of R&D clusters in certain regions and at certain universities, the promotion of entrepreneurship and business education at universities and even at schools, the promotion of technology transfer between public research facilities and private businesses, as well as the creation of favourable tax conditions for venture capital funds and business angels.<sup>126</sup>

### Promoting producers and users

The process of innovation and diffusion of ICT requires companies that produce e-business applications, as well as companies that take up and use such applications. Findings in this report suggest that new companies are important for both the introduction of new e-business applications, as well as for the take-up and widespread use of such technologies (see sections 3.3 and 4.4). It may, thus, be important to promote both new companies that produce e-business and those that use e-business.

The policy measures addressed to each of these types of companies should, however, focus on different aspects. “Producers” may require particular support for developing and financing their business, as well as for finding adequate real estate (see section 2.4, paragraphs on “ICT and e-business skills”, “access to finance” and “business incubators”). The *e-Business W@tch* 2006 included three ICT-producing industries, i.e. consumer electronics, ICT manufacturing, and telecommunication services, for which these implications may apply. e-Business in ICT-“user” companies, on the other hand, may be more effectively supported by fostering access to e-business management skills, for example. Seven ICT-user industries were covered by the *e-Business W@tch* in 2006, i.e. food & beverages, footwear, pulp & paper, shipbuilding & repair, construction, tourism, and hospitals.<sup>127</sup> Companies from these sectors, therefore, could be helped to develop their business concept with regard to internal applications and their relationships to suppliers and customers (see section 2.4, paragraph on “e-business management skills”).

### Promoting further research about new companies and e-business

The analysis in this report shows that the role of new companies for e-business innovation and diffusion is a subject that deserves further research. In particular, differences between industries would need to be analysed further. For example, the e-Business Survey 2006 indicated that new firms in the pulp & paper, construction and tourism industries are generally less innovative than established firms (see section 4.2), but more innovative with regard to particular e-business applications (see section 4.3). This finding could be followed up in further studies about e-business use in economic sectors, leading to more in-depth insights into the role of new companies for e-business innovation and diffusion in certain industries. Policymakers would, thus, be better equipped in their effort to design appropriate support measures for new companies.

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<sup>126</sup> See Twaalfhoven/Wilson (2004) for proposals about improving university research and teaching for “breeding gazelles”.

<sup>127</sup> All ten sector reports are available for download at [http://www.ebusiness-watch.org/resources/by\\_sector.htm](http://www.ebusiness-watch.org/resources/by_sector.htm).

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## Annex I: e-Business Survey 2006 methodology

### Background and scope

*e-Business W@tch* collects data relating to the use of ICT and e-business in European enterprises by means of representative surveys. The e-Business Survey 2006, which was the fourth survey after those of 2002, 2003 and 2005, had a scope of 14,081 telephone interviews with decision-makers in enterprises from 29 countries, including the 25 EU Member States, EEA and Acceding / Candidate Countries.<sup>128</sup> Interviews were carried out in March and April 2006, using computer-aided telephone interview (CATI) technology.

### Questionnaire

The questionnaire is similar to those used in the previous surveys from 2002 to 2005 in order to ensure a basic continuity of the research approach. The module on ICT impact was substantially extended compared to 2005, in response to current policy interest, in exchange for some questions from other modules.

Some questions which were also used in previous surveys were slightly modified. The most important change in this context concerns questions on e-commerce: up to 2005, companies were asked whether they "purchase / sell online"; in 2006, companies were asked whether they "place / accept orders online". This is a more precise question, since the terms "purchasing" and "selling" leave it open whether ordered goods also have to be paid online in order to qualify for "online purchasing / selling".

Some specific topics were added or expanded in the questionnaire in order to reflect the latest e-business developments; examples are the new questions on the use of RFID and Voice-over-IP.

The questionnaires of all four surveys (2002, 2003, 2005, 2006) can be downloaded from the *e-Business W@tch* website ([www.ebusiness-watch.org/about/methodology.htm](http://www.ebusiness-watch.org/about/methodology.htm)).

### Population

As in 2005, the survey considered only **companies that used computers**. Thus, the highest level of the population was the set of all computer-using enterprises which were active within the national territory of one of the 29 countries covered, and which had their primary business activity in one of the 10 sectors specified on the basis of NACE Rev. 1.1.

Evidence from previous surveys shows that computer use can be expected to be 99% or more in all sectors among medium-sized and large firms. Differences are more relevant, however, for micro and small enterprises, in particular in the food and beverages industry, the textile and footwear industries, construction and tourism. In these four sectors, 10-30% of micro enterprises and 4-15% of small firms (depending on the country and sector) do not use a computer.<sup>129</sup> This should be considered when comparing figures over the years, as figures either represent a percentage of "all companies" (as in 2002 and 2003) or a percentage of "companies using computers" (as in 2005 and 2006). Differences are minimal, though, when figures have been weighted by employment.

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<sup>128</sup> The EEA (European Economic Area) includes, in addition to EU Member States, Iceland, Liechtenstein and Norway. Acceding Countries with whom an Accession Treaty has been signed are Bulgaria and Romania; Candidate Countries, which are candidates for accession into the EU, are (as of September 2006) Croatia, the former Yugoslav Republic of Macedonia, and Turkey. In most of these countries, interviews and/or case studies were conducted.

<sup>129</sup> Non-computer users include typically small craft firms (textile, construction), bars, restaurants or pensions (in tourism), and small food producing companies.

The 10 sectors which were selected for the 2006 survey are extremely heterogeneous in terms of their size. Construction and tourism are by far the largest with about 1.5 million enterprises in each of the EU-25.<sup>130</sup> At the other end of the range is the consumer electronics industry with about 5,400 enterprises; this is a factor of about 280 between the largest and smallest sector. This imbalance has inevitably a substantial impact on weighting and thus on aggregate results, which are dominated by figures from construction and tourism.

**Table 1: Population coverage of the e-Business Survey 2006**

No.	NACE Rev. 1.1	Sector name	No. of enterprises in EU-25 *	No. of interviews conducted
1	DA 15 (most groups)	Food and beverages	282,000	1,709
2	DC 19.3	Footwear	13,700	980
3	DE 21	Pulp, paper and paper products	18,400	1,158
4	DL 30, 32.1+2	ICT manufacturing	31,800	1,687
5	DL 32.3	Consumer electronics	5,400	665
6	DM 35.11	Shipbuilding and repair	7,200	150
7	F 45.2+3 (selected classes)	Construction	1,546,000	2,655
8	H 55.1/3, I 63.3, O 92.33/52	Tourism	1,500,000	2,663
9	I 64.2	Telecommunication services	12,900	1,580
10	N 85.11	Hospital activities	(e) 13,000	834

\* mostly based on Eurostat SBS, latest available figures

(e) = estimated on the basis of figures for the former EU-15 (no figures available for EU-25)

### Sampling frame and method

No cut-off was made in terms of minimum size of firms. The sample drawn was a random sample of companies from the respective sector population in each of the seven countries, with the objective of fulfilling minimum strata with respect to company size class per country-sector cell. Strata were to include a 10% share of large companies (250+ employees), 30% of medium sized enterprises (50-249 employees), 25% of small enterprises (10-49 employees) and up to 35% of micro enterprises with less than 10 employees. Samples were drawn locally by fieldwork organisations based on official statistical records and widely recognised business directories such as Dun & Bradstreet or Heins und Partner Business Pool (both used in several countries).

The survey was carried out as an enterprise survey: data collection and reporting focus on the enterprise, defined as a business organisation (legal unit) with one or more establishments.

Due to the rather small population of enterprises in some of the sectors, target quota, particularly in the larger enterprise size-bands, could not be accomplished in each of the countries. In these cases, interviews were shifted to the next largest size-band (from large to medium-sized, from medium-sized to small), or to other sectors.

### Fieldwork

Fieldwork was coordinated by the German branch of Ipsos GmbH ([www.ipsos.de](http://www.ipsos.de)) and conducted in cooperation with its local partner organisations on behalf of *e-Business W@tch*.

The survey had a scope of 14,081 interviews, spread across the 29 countries and 10 industries covered. In 10 countries ("EU-10"), all 10 sectors were covered; in the other countries, selected industries were surveyed. In most countries, between 400 and 750 interviews were conducted. Pilot

<sup>130</sup> Construction (NACE Rev. 1.1 F 45) in total has about 2.3 million enterprises. The sub-sectors covered in 2006 (see Table 1) account for about 1.5 million out of these.

interviews prior to the regular fieldwork were conducted with 23 companies in Germany in February 2006, in order to test the questionnaire (structure, comprehensibility of questions).  
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## Annex II: Statements from a survey of the *e-Business W@tch* Advisory Board

Advisory Board member	(1) e-Business innovation in new versus established companies	(2) New companies' role in innovation versus diffusion	(3) Characteristics of innovations new firms introduce or take up	(4) e-Business innovations of new firms in different industries
<b>Food and beverages</b>				
<p><b>Nathalie LeCocq</b>, Confederation of the Food and Drink Industries in the EU, CIAA (European Union)</p>	<p>We have no evidence about any major and broad-based difference with regard to e-business innovation between new and established companies in the food and drink industry sector.</p>	<p>Our assessment is that large companies play a more important role here in both innovation and diffusion than new (usually small) companies. Large companies orient e-business in two different approaches.</p> <ol style="list-style-type: none"> <li>1. e-business upstream (relationship with suppliers): manufacturer leads the initiatives focusing in cost reduction, process simplification, efficient supply chain management, quality control management and supplier loyalty.</li> <li>2. e-business downstream (relationship with distribution companies): manufacturer companies have a huge dependency on the initiatives and strategies of the distributors.</li> </ol>	<p>There is no information available to us that would indicate a particular role of new companies in this field or a preferred area of focus.</p>	<p>Differences between industries of the food and drink sectors will emerge due to several factors: whether the industry produces intermediate goods or final goods for the consumer, whether it uses mainly one ingredient or many different ones that are subject to traceability (meat, GM and non GM goods, like cereals or oilseeds) whether there are strict hygiene requirements (meat, dairy). Apart from certain overall developments, drivers of ICT innovations are likely to differ according to the sector. For example, in general, B2C for manufacturing companies are just an additional channel inside the consumer's communication strategy, usually a complementary channel of media environment (TV, Radio, Press, etc). Hence e-marketing remains very limited both for large and small companies. However, it is likely that industries producing higher value-added food and drink products (alcoholic beverages, chocolate confectionery, and other goods containing a specific "service") may see opportunities for</p>

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<p><b>Ilias Vlatchos</b>, Athens Agricultural University (Greece)</p>	<p>To my knowledge, new companies often have a better strategy on e-business than old companies. The structure of the business may reflect this: communication, data exchange, marketing etc functions may be electronic. By contrast, 'old' businesses have to bear the cost of change which in some cases is considerable. An e-business strategy also helps to recruit the right staff etc.</p>	<p>This is hard to say because the impact of new companies is mostly indirect. Usually large companies lead innovation as well as direct diffusion processes. If new companies are also large then it could be a significant effect. New companies need time to become an 'exemplary' (best practice) firm, so their role should be limited in this respect.</p>	<p>Yes, a fresh start is always better for ICT products. Top management plays a critical role in choosing products and services such as in the model of e-procurement, e-sales etc.</p>	<p>more innovative B2C electronic marketing compared to other food and drink industries.</p> <p>Having studied the food industry for more than 8 years, I can say that new food companies are not more innovative with regard to e-business than other industries. However, latest developments in areas such as food traceability, quality and safety open up many opportunities for e-business innovation. Differences between industries can be attributed to many factors: the rate of growth, innovativeness in general and structure (i.e. percentage of SMEs). ICT infrastructure is also critical (i.e. advanced services require specific bandwidth), the role of large companies (often competition drives large companies to impose their technology on small suppliers – 'hub and spokes effect') and of course the critical role of local governments and EU in creating a consensus about e-business both for society in general and for business communities.</p>
<p><b>Consumer electronics</b></p>				
<p><b>Andreas Labrenz</b>, Fujitsu Siemens (Germany)</p>	<p>What does e-biz mean? Looking back to its invention by IBM in the 90s, the creation of strategic business processes to address new markets sounds like process innovation. I think it has become clear that now the processes have</p>	<p>When thinking about new e-biz, companies like Amazon, Ebay, Google and Yahoo come to my mind. They have very different strategies but share the common goal of creating virtual market places. In the meantime, one could</p>	<p>Innovative companies like Skype that do not have a profound business background often try to surf a hype discussion (e.g. Gartner's hype-cycle shows very colourfully the degree of maturity for innovation). In the meantime the</p>	<p>Regarding innovation characteristics, more and more service orientation can be observed (e.g. VoIP, WLAN routing). I think in investment-driven industries e-biz has a minor role, while in consumption-driven industries e-biz will continue to</p>

Advisory Board member	(1) e-Business innovation in new versus established companies	(2) New companies' role in innovation versus diffusion	(3) Characteristics of innovations new firms introduce or take up	(4) e-Business innovations of new firms in different industries
	been optimized, industries have started to work differently (e.g. marketing, trading etc.)	tend to rate them as 'established' companies compared to formally known e-biz companies like IBM, Compaq, HP, Microsoft - companies which deal with the electronic handling of data, content and processes.	'new' established companies simply buy the innovative companies in order to stay innovative themselves.	increase.
<b>Georg Lütteke,</b> Philips (Netherlands)	In the media sector there are a number of new products needed in order to satisfy customer needs, but established companies cannot figure out such solutions or are too inflexible to provide them.			
<b>Shipbuilding</b>				
<b>Paris Sansoglou,</b> Community of European Shipyards Association (CESA)	There have been no new companies in the European shipyard industry to the best of our knowledge in the past 20 years. Nevertheless, the industry is very innovative.			
<b>Construction</b>				
<b>Alfredo Soeiro,</b> University of Porto (Portugal)	E-business in construction is essentially different due to the characteristics of the industry. It is basically an assembling industry where each product is different from the previous one. Construction needs information gathering and manipulation to achieve its goals. That is happening while producing the drawings, specifications, procurement, quantities, contracts, biddings, subcontracting, controlling, invoicing, quality evaluation, etc. It is due to this dependency on information that e-business creates a	New companies in construction try to affirm their status in a conservative environment where change and innovation are slower than in other industries. In fact this is one reason why construction has lower productivity than other industries. Although highly based on human labour it is, however, an industry where innovation is not a major priority. The new companies introduce e-business by forcing, or suggesting, that its clients use new methods based on the information and communication technologies.	In construction the new companies act on processes and products, while products are described as the means necessary to complete the construction work as planned. The products referred to here are all documents that contain information necessary to define the future construction. The processes are defined as the tasks necessary to manipulate and manage the information. Both become entangled in the project as a whole. The way the process manages the information is certainly conditioned	In construction the innovation is conditioned by several factors. One is the low level of training and professional development of most agents in the area of ICT. It is difficult to expect workers to be capable of consulting the safety plan of the site where they are working using the web when they have functional illiteracy. The preparation of most workers is not up to the requirements for rapid innovation. Another factor is the investment needed for change. Most of the construction companies have little or

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	<p>strategic and effective advantage for new companies. The transition from paper to e-format, the preparation of the staff for e-activities and the organization of the information flow is smoother in new companies. The savings in time, money and human resources are more evident in new companies. Productivity also increases, merely due to the type of information gathering and management.</p>	<p>For instance, if the designing office that starts the process of initiating a construction uses electronic versions of drawings, of specifications and of quantities it is natural that the contractor that wins the bid will continue in the same process. And with the contractor there is a diffusion process with suppliers, manufacturers and subcontractors.</p>	<p>by some agents like the designers or the project managers. For instance, if the project manager decides to use a data bank to concentrate and limit access to the project information, this implies innovation in the products and in the processes. The idea is that some of the actors do not need, and also are not supposed, to know some information (financial details, decisions taken involving competitors, etc.). Also there is a great deal of information that is irrelevant and may confuse users. There is a need for selection of info for management purposes. New companies that are familiar with ICT tools are an important factor of innovation.</p>	<p>no investment in innovation since it is an industry where methods have not changed much for many years. A third reason deals with the fact that it is a complex universe with hundreds of different types of employees in a singular construction site. To have most of these working with standards and guidelines that are compatible is a difficult task. For instance in the EU there are several information systems for classifying construction materials and activities. Therefore the recommended measures to increase innovation would comprise training in ICT, dedicated funds for innovation and a compatible information system (or a series of specific protocols).</p>
<p><b>John Saborg Pedersen,</b> Confederation of Danish Industries, ITEK (Denmark)</p>	<p>Are new companies smaller than established companies? If this is the case you will find the differences between new and old companies similar to those between small and large companies. There is no doubt that small companies are taking up e-business at a slower speed than big companies. To a greater extent than small companies, large companies will be able to achieve more efficient organisation by the use of e-business etc.</p>			
<p><b>Arturas Kaklauskas,</b> Vilnius Civil Engineering Institute (Construction)</p>	<p>Many e-business systems for construction sector have emerged in the past eight years. The development of new e-business products, services, processes, organisation, management or</p>	<p>e-Business innovation and diffusion in new construction sector companies is most often viewed at a product or process level, where product innovation satisfies a customer's needs, and process</p>	<p>The construction industry is one of the most significant industries in Europe, representing about half of the total investment made within the European Union. The Architecture, Engineering and Construction sector</p>	<p>The construction industry is emerging as the next frontier for e-business technologies, just as the manufacturing industry did some time ago. New companies in some other industries (e.g. the banking</p>

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	<p>marketing practices and strategies is quite difficult in construction firms. New construction companies have less experience, contacts, financial and human resources. The innovation process incorporates R&amp;D development, commercialisation and technology diffusion. An essential element for innovation is its application in a commercially successful way. Innovations are intended to be useful (though a number of unsuccessful innovations can be found throughout the construction sector history). Many financial and human resources are needed for the innovation process.</p>	<p>innovation improves efficiency and effectiveness.</p>	<p>(AEC) in Europe is one of the most important worldwide, with 26 million workers in the EU depending directly or indirectly on the AEC sector. Construction is a huge sector, which includes construction, alteration, decoration, restoration or demolition of buildings, structures, roads, sewers, water or gas mains, pipelines, dams, tunnels, bridges, railways, canals or other works. Some new companies play a particular role in introducing and taking up ICT-related processes, products and services.</p>	<p>sector) are more innovative with regard to e-business than in the construction industry. The reasons are as follows:</p> <ul style="list-style-type: none"> <li>• lack of standards, norms;</li> <li>• the construction object (building's life cycle) is very large and complex, involving a lot of stakeholders and therefore is very difficult to integrate to single e-business process;</li> <li>• usually internet connection is absent in construction sites;</li> <li>• e-signature is absent, etc.</li> </ul>
<b>Tourism</b>				
<p><b>Dimitrios Buhalis,</b> eTourism centre (UK)</p>	<p>New companies are often leap-frogging as they bypass legacy systems and go straight to cutting edge technology Example – easyjet</p>	<p>They use innovation for their internal operations and they push consumers/customers to diffusion</p>	<p>(see answers to questions 1 and 2)</p>	<p>Tourism / travel is probably more innovative as far as e-commerce is concerned, due to the nature of the product, which is intangible and does not need physical movement.</p>
<p><b>Markus Gratzner,</b> Österreich Werbung (Austria)</p>	<p>New companies: ready to take up the IT-infrastructure without any "old" systems and requirement; they are able to define their processes. Established companies: problem of established infrastructure, systems and different platforms. They mostly have established processes and business rules, e.g. in tourism the established distribution channels.</p>	<p>New companies will focus on innovation, so for the diffusion of e-business innovation they are very important, e.g. in tourism it depends from what sector they are coming. Older companies cannot adopt IT as quickly and so they will not be able to invest continuously in innovations. They have amortisation periods.</p>	<p>Not really, but new companies have the advantages of defining their processes according to the products. Within the tourism sector ICT supports all processes</p>	<p>Yes, some industries e.g. hotel industries have well established processes. ICT can support these, but there is not so much space for innovation. For intermediaries the innovation process is very important, and they therefore try to invest more in ICT etc.</p>
<p><b>Rachel Tym,</b> European Tour</p>	<p>In the travel industry, one of the biggest ICT challenges faced by</p>	<p>There is no clear distinction in the travel industry between the role in</p>	<p>Not really. See response to question 1.</p>	<p>The need for innovation in e-business is directly related to the</p>

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Operators Association (European Union)	companies is the presence of legacy systems. New companies do not have to work around these systems, so can build their applications in a much more streamlined manner. They can also do it more efficiently, quickly and cost-effectively. We have also learned about building in scope for future development, so new companies will not have to change systems as they grow, as older companies have had to do. This saves them money in the long term. On the other hand, established businesses often have more capital to invest in new systems than new ones do, so they can afford new technology sooner.	diffusion played by new companies and by established ones. When one company adopts a new e-business practice that benefits customers, competitors will follow suit, regardless of whether or not that company is new or established. For example, once an airline offers online check-in, the others need to also do so, because customers will start to expect it as the norm. The travel industry is very much customer-focussed, and innovation leads to increased customer expectation, i.e. once one company offers a new product or service, customers expect it universally, so other companies are forced to adopt it in order to hold onto their customer base.		need to win and service customers online. The more customer-facing you are, the more innovative you need to be to attract consumer attention. Innovation is more short-lived than it used to be, with rival companies being able to follow suit online much more quickly than, say, a printed brochure. Trends are adopted quickly, so new companies need new ideas and lots of them if they are to survive. Innovation also stems from the need to be cost-effective, so highly competitive industries that sell high volume-low margin products, such as travel and retail, need to be more innovative in order to achieve the desired results with smaller budgets.
<b>Telecommunications</b>				
Jesús Galván, Schiller University Madrid (Spain)	In general, new companies are created after identifying new market opportunities provided by the non coverage of customer needs by competitors. This is the traditional competitive advantage strategy supplied through differentiation, responsiveness or cost. E-business can contribute positively to these three traditional approaches. Thus, start-ups are more favourable to e-business uptake from the beginning. Moreover, e-business has to do mainly with the organization of internal business processes. It is easier to set up new business	New companies adopt existing innovations that as tools for running their companies. This is true except when the innovation itself is a substantial part of the new offer. That is, when the innovation is included within the business model itself, it comes with the new business. Otherwise, new companies adopt what they see might be used successfully by others. New companies may act as diffusers of e-business once adopted. Others may try to imitate them if they are successful and become well known.	If we consider Internet based or virtual companies, the business is the process, so that in this particular case the role of new companies is very important in introducing these ICT-related processes. In more traditional cases the important issue is the amount of financial resources needed to implement the internal processes using ICT based products. To give an example: we can seldom observe a new company in a traditional industry adopting SAP initially as a management tool, because it might be too expensive.	Every type of industry will favour certain specific features regarding e-business adoption. When the different industries are compared using, for example, the e-Business Scoreboard, it is obvious that some industries will always be more advanced in any of the four axes considered (Basic ICT infrastructure, Internal processes, Supply side e-business activity and Electronic marketing and sales). Examples: Tourism is always more biased and above the mean towards adopting e-business that allows better electronic marketing and sales, whilst

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	<p>processes from scratch than to change how organizations have been doing things. Change management can be clearly identified as a key issue in e-business uptake processes in already existing companies.</p> <p>Conclusion:</p> <ul style="list-style-type: none"> <li>• Adoption of e-business implies organizational change</li> <li>• It is easier to create a new organization from scratch than to change an already existing organization</li> <li>• It is easier to implement e-business in a new company than in an already established business</li> </ul>	<p>Conclusion:</p> <ul style="list-style-type: none"> <li>• New companies adopt what they have available and what they see works</li> <li>• If e-business is part of the business model of the new company, it may introduce innovations</li> <li>• If a new company becomes a success it may contribute to the diffusion of e-business</li> </ul>	<p>Conclusion:</p> <ul style="list-style-type: none"> <li>• New ICT related processes are better introduced by bigger companies in traditional industries due to the implementation costs</li> <li>• New ICT related products and services might be an opportunity for newer companies in traditional industries</li> <li>• When the business model relies heavily on ICT and Internet, the newcomers play a very important role in the introduction of ICT related processes.</li> </ul>	<p>aeronautics has a more advanced approach to internal processes and supply side e-business activities, because it does not have a significant number of individual customers.</p> <p>Conclusions:</p> <ul style="list-style-type: none"> <li>• The development pattern of adoption of e-business should be considered to be industry-specific, differing widely between industries and depending, among other variables, on the standard number of customers and suppliers of a mean company</li> <li>• If e-business were already a mature tool, the differences of adoption between industries would be also observed. Companies do not invest in what they do not feel is necessary for the development of their business</li> <li>• New companies within an industry usually replicate the e-business adoption pattern of the industry, unless the business model implemented is heavily based on the use of ICT and Internet</li> </ul>

The original statements were slightly edited without altering their content.

Source: e-Business [W@tch](#)