



Federal Ministry  
of Economics  
and Technology

Nationaler IT Gipfel  
Stuttgart 2009

## Information Society 2010

Convergence of Media

IT-Based Public Services

Security and Trust

High-Tech Strategy

ICT in SMEs

ICT and Health

Consumer-Friendly IT

E-Justice

Fourth National IT Summit

# Monitoring Report – Digital Germany

An International Comparison of the ICT Industry in 2009

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**Editor**

Federal Ministry of Economics and Technology (BMWi)  
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**Design and Production**

viaduct b.  
PRpetuum (cover)

**Printer**

Hansa Print, Munich

**Picture credits**

oxigenow – iStockfoto (Title), BMWi, Fotolia (Photosani,  
Key Findings / Chapter 4; V. Yakobchuk, Chapter 1; Nmedia,  
Chapter 2 / Chapter 3; Francesco Bisignani, Appendix)

**Publisher**

Federal Ministry of Economics  
and Technology (BMWi)  
Public Relations/L2  
10115 Berlin  
Germany  
[www.bmwi.de](http://www.bmwi.de)



The Federal Ministry of Economics and Technology was awarded the audit berufundfamilie® for its family-friendly staff policy. The certificate is conferred by the berufundfamilie gGmbH, an initiative of the non-profit Hertie Foundation.

**Dated**

November 2009



Federal Ministry  
of Economics  
and Technology



Fourth National IT Summit

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## Forewords



Dr Bernd Pfaffenbach,  
State Secretary at the Federal Ministry of Economics and Technology (BMWi)

Despite the difficult global economic climate, the German information and communications industry (ICT) is still relatively healthy compared to other industries. With the ICT industry on the cusp of a new strategic direction, the question of which strengths must be leveraged, and which weaknesses with respect to competing industries need to be addressed as a matter of urgency, is even more relevant now than before the economic crisis. The German ICT industry will not be the only sector keen to know the results of this analysis, as it will form the basis for the competitiveness of other industries and stimulate growth markets. As a cross-sectoral technology, the ICT industry can be the “locomotive” for productivity and innovation in all other economic sectors.

According to the experts, the productivity gains that can be achieved by ICT in Germany are still not being fully exploited. The “Monitoring Report – Digital Germany”, the first report of a three-year German ICT benchmark commissioned by the Federal Ministry of Economics and Technology, reveals that the performance of Germany’s ICT industry is only average compared to the world’s leading ICT regions. That is disappointing, and we will be drawing up a new ICT strategy for the new legislative period. It is essential that we successfully position Germany as an innovative industry in today’s globally competitive market. We need to show that Germany is capable of world-class performance with cutting-edge technologies in as many promising growth areas as possible.

The foundations we have already laid for the German ICT industry will ensure that the information and communication industry is able to tap into future-oriented growth sectors. One mainstay of these foundations is the expansion of a high-performance ICT infrastructure. Broadband must be widely available to both the commercial sector and the population. This will open up new growth sectors and enable significant increases in productivity.

In the coming years we will have to focus even more on the growth sectors of tomorrow. One of the keys to achieving this goal is the targeted promotion of innovations in promising sectors, and in so doing we must pay particular attention to our small and medium-sized companies.

Germany is currently in the middle of its transition to the mobile Internet. The “Internet of Things” and “Internet of Services” will see the creation of new intelligent products and services, which will further increase the user-friendliness, security, efficiency and international competitiveness of Germany. In the future, information and communication technologies will play a leading role in increasing energy efficiency in our country. We will also be doing our best to encourage as many international ICT companies as possible to choose Germany as their business location and breathe new life into the job market. To this end, we need to improve our international marketing of the German ICT industry in the coming years.

The IT summit will see high-ranking delegates offering analysis-based recommendations for a new ICT strategy for the coming legislative period. The aim is to bundle the many outstanding initiatives, ideas and concepts and use them to leverage the position of the German ICT industry in the global marketplace.

However, it is ultimately the commitment of every single company, administrative unit and individual that will count if we want to make it to the top. This being the case, I hope that after the 4th IT Summit you will continue to work to make Germany a strong and highly innovative business location.

A handwritten signature in black ink, appearing to read "Bernd Pfaffenbach".

Dr Bernd Pfaffenbach



Bernd-Wolfgang Weismann,

Head of the Information Society, Media, Cultural and Creative Industries Policy  
Division of the Federal Ministry of Economics and Technology (BMWi)

The aim of the “Monitoring Report - Digital Germany” is to determine and analyse the state of the German information and communication industry compared to the international competition as of the end of 2009. Based on assessments by national and international experts, recommendations for action have been proposed to make the German ICT industry the world leader.

The “International Comparison of the Status and Prospects of the German Information and Communication Industry 2009-2011”, commissioned by the Federal Ministry of Economics and Technology, is a new research project that builds on the TNS Infratest reports produced since 2000 as part of the “Monitoring the Information and Communication Industry” project. It enables companies, economic policy and science to draw on figures and analyses relating to the German ICT industry that provide a longer-term comparison. Furthermore, with the IT summit in mind, the current reporting period deliberately focusses on a global benchmark comparison of the German ICT industry with other leading countries in the field. The aim of the IT Summit is to identify and define promising growth areas in the ICT sector and consolidate and implement measures in politics, business and science that will actively promote them in order to position Germany as a world leader in key technologies.

In the run-up to 2011, we therefore propose that the annual report includes the following key improvements:

- ▶ Firstly: in order to quantify the strengths and weakness of the German ICT industry, the key indicators used will not only be compared with European countries, but also, and for the first time, with the 14 main competitor countries worldwide. These include the global market leader, the USA, leading European ICT countries Great Britain, France, the Netherlands, Spain, Italy and the Scandinavian countries, as well as Japan, China, India and South Korea for the rising East Asia.

- ▶ Secondly: for the first time, these results will be augmented by qualitative interviews with both nationally and internationally renowned ICT experts. A direct comparison between our own self-perception and the perception others have of us will allow us to achieve a broader framework for possible courses of action.

- ▶ Thirdly: the top decision-makers of the German ICT industry will attend workshops, assess the results previously obtained and supplement them with their own judgements and recommendations.

This will further enhance our ability to carry out a well-founded assessment of the German ICT industry as part of a global comparison, as well as anticipate development risks in good time and, if required, implement preventative economic policy strategies.

I am confident that at the 4<sup>th</sup> IT summit in Stuttgart, in collaboration with all key players from the political, economic and scientific arenas, we will be able to determine the crucial steps required to make Germany a top global player in the world of information and communication technologies.

Bernd-Wolfgang Weismann

## Key findings and recommended actions

## Key findings and recommended actions

*“Economic policy needs to reflect the real significance of information and communication technology as a cross-sectoral for all industries. While there is no shortage of recommended actions and ideas, this is not reflected in the fast launch of innovative products on markets with strong sales potential or in terms of entrepreneurship.”*



Dr Sabine Graumann,  
Director,  
Business Intelligence  
TNS Infratest Forschung GmbH

### How Germany compares to the world's top 14 ICT nations

This global benchmark report compares the performance of Germany's information and communication industry with 14 top ICT locations using the latest development figures in 21 key performance indicator areas. In the course of two workshops, the results of the global benchmark were analysed and supplemented by experts from the Executive Board and management of leading provider and application companies in the ICT industry. Leading foreign experts were also asked for their assessments within the framework of a direct comparison between Germany and the world leader, the USA, and between Germany and the aspiring ICT location, China. All experts identified 13 areas requiring action by the ICT industry and the national economic policy if Germany is to take up permanent pole position in global ICT developments. The measures recommended by this team of experts for the individual fields of action combine to form a strategy for Germany as an ICT location.

### The performance of ICT location Germany is mediocre

In the overall benchmark of the 15 ICT locations, Germany, together with Norway, is in the middle, ranked seventh. It is 14 index points below the leader, the USA. In 2008, Germany was able to improve its

position, rising from ninth to seventh place. Germany has the top spot in one of the 21 key performance indicators, “Purchases by companies via the Internet”.

Breaking down the overall benchmark into the categories: “Market Development”, “Infrastructure” and “Applications”, produces the following picture: in the category “Market Development”, Germany holds fifth place, with an average performance of 46 index points, which makes it above average among the leading 15 ICT locations. In the category “Infrastructure”, ICT location Germany has 79 index points, putting it in eighth place, nine points above the global average. Germany traditionally has its best performance in the category “Applications” where, with 86 percent, it boasts the best possible performance. This improved Germany's ranking from seventh to fourth place – the highest jump in ranking among the benchmark countries.

### ICT strategy must be focussed by 2013

For ICT location Germany to become world leader, it is essential to clearly define goals and measures within the framework of an ICT strategy by 2013. This would involve eliminating the weaknesses of ICT location Germany, minimising risks, utilising promising new application areas to drive growth and, once a strong position is reached, expanding and building on existing location benefits.

## 1. Elimination of the weaknesses / disadvantages of the ICT location

### Fields of action

- ▶ Innovation policy
- ▶ Invention/innovation gap
- ▶ Location marketing

#### Research and Development

**Status quo:** At 0.29 percent of the GDP, the R & D quota of expenditure for ICT in Germany is too low (sixth place in the index ranking of the top 15 ICT nations). The federal government currently contributes 650 million euro annually in state aid to the ICT sector.

**Field of action – innovation policy:** Any future innovation policy must create improved state conditions for innovations in the ICT location Germany. This should include: an increase in R & D expenditure to approx. 4 percent of the GDP by 2015 (i. e. an annual increase of approx. 15 percent), tax deductibility of R & D applications – already standard in virtually all OECD member countries - and greater transparency in the granting of funds for R & D purposes, while maintaining the level of public research funding. As well as the development and further development of Germany's own technologies, it is important not to overlook the early import of promising foreign technologies. We also need to ensure that the conversion of such technologies into marketable products is carried out in Germany.

#### Location image

**Status quo:** Experts in the United States and China interviewed by TNS Infratest in the course of this study confirmed that the ICT location Germany does not have the image abroad that it could and should have.

**Field of action – location marketing:** Interviews with these experts showed that, outside the domestic market, the ICT location Germany is perceived as a nation of "BMWs and Porsches". It is not widely known that Germany also sells high-quality hardware and software. We should therefore ensure that all future marketing of the ICT location Germany incorporates the globally recognised strengths of the German economy. We should be striving to position Germany as one of the world's leading innovative locations, as well as ensuring that it is also recognised as a market leader.

#### Innovation

**Status quo:** With the exception of Sweden, none of the major industrial nations is capable of producing such economically viable results from a given research input as Germany. However, we lack the ability to convert this superior "inventor efficiency" into marketable products.

**Field of action – invention / innovation gap:** Future R & D projects should be more strongly oriented towards various implementation aspects, such as technical feasibility, the checking of commercial viability, promotion of market entry and promotion of the opportunities for sustainable market success.

## 2. Elimination of key location risks

### Fields of action

- ▶ Education policy: Education, further education, international recruitment
- ▶ Financing
- ▶ Data security

#### Skills shortage

**Status quo:** In 2008, the proportion of skilled ICT staff among employees subject to social insurance contributions was 3.1 percent (ranking eighth by international comparison). In 2009, approx. 830,000 persons were employed in the ICT sector and approx. one million in the application sectors. Tight immigration laws have meant that only around 1,302 highly qualified employees from abroad found work in Germany. In the summer of 2009, there were more jobs available for university graduates of Maths, Information Technology, Natural Sciences and Technology (MINT) than MINT graduates registered unemployed. The current skills shortage threatens to worsen as a direct result of the present demographic development.

##### Field of action – education policy:

Education: Reduction of skills shortage through improved education options, such as reforms in the MINT subjects at schools and universities, more lessons, more practice-oriented training, internationally comparable educational standards / qualifications, promotion of ICT subjects among school pupils and students, increased spending on education from 5.1 to 6.1 percent of the GDP by 2015. Part of this increase should be used to provide resources specifically for MINT subjects. Several experts were of the opinion that investments in education were even more important than investments in networks.

Further education: Further education of ICT employees should be encouraged by means of private tax breaks. It is essential that companies continue to carry out further training in spite of the economic downturn. Universities should make themselves more available for further training in ICT subjects.

International recruitment: Reducing skills and management shortages through changes to the Immigration Act and the creation of attractive location conditions for employees, thus encouraging national and international talent pools to remain in Germany.

#### Financing options

**Status quo:** 49 percent of the German Gross Value Added (GVA) is generated by small and medium-sized businesses. In 2008 there were 78,000 medium-sized ICT companies and 742 large companies with 250 or more employees. In 2009, the annual turnover of 56,500 ICT companies was less than 250,000 euro. In recent years, Germany has seen the number of ICT start-ups and high-tech companies being founded growing ever smaller. In 2006, only 268 million euro of venture capital was available to ICT companies in Germany. In terms of "Availability of private venture capital", Germany ranks 22nd among the other 27 EU member countries.

##### Field of action – Financing:

There is a need to improve the fiscal conditions for investors with regard to the provision of risk capital, e.g. the regulations for payments to individuals if their participations are sold at a profit. It is also important to continue to make credit available to companies in spite of the economic crisis.

#### ICT crime

**Status quo:** According to the data of the Federal Bureau of Criminal Investigation (BKA) dated October 2009, 37,900 cases of ICT crime were registered in 2008. Of these, 167,000 were Internet crimes. 77 percent were fraud crimes. 43 percent of the cases were commodity fraud. In total, ICT crime recorded in the 2008 crime statistics accounted for losses of 37 million euro. The estimated number of unreported cases is probably considerably higher.

**Field of action – data security:** The experts recommend a revision of data protection laws. Protection for data transmission for individuals, companies and public bodies needs to be graded, as well as updated to meet the requirements of the digital age. ICT markets will only continue to expand when individuals and companies have complete confidence in the Internet.

### 3. Prompt exploitation of opportunities

#### Fields of action

- ▶ Telecommunications policy: Broadband expansion, price policy
- ▶ Regulatory policy
- ▶ Standardisation
- ▶ e-Government, government

#### Broadband

**Status quo:** 28 percent of Germans use a broadband connection. This means that Germany has caught up with its competitors and is now ranked seventh in the global benchmark in terms of broadband penetration. In Germany, nine out of ten broadband connections are DSL-based. Six percent of all German broadband connections are implemented over TV cable. Higher band widths form the basis of newer, more innovative and user-oriented services. Germany aims to achieve nationwide broadband penetration with 1 Mbit/s by 2010, and high-speed networks of up to 50 Mbit/s in 75 percent of German households by 2014. For the nationwide provision of the next generation of high-speed and fibre optic networks, investments of up to 50 billion euro will be required in the coming years. BITKOM estimates that this will also create 250,000 new jobs.

**Field of action – telecommunication policy / broadband:** Investments in networks are the prerequisite for more broadly ranging innovations. The frequencies being made available within the framework of the “digital dividend” should be allocated so as to enable broadband internet coverage in rural areas.

#### Regulation

**Status quo:** Of 17 nations, Germany subjects corporate service providers to the third highest degree of regulation.

**Field of action – regulation policy:** Regulation has provided a noticeable boost to the development of the market and competition. With the next network generation in mind, Germany needs to focus more on investment and innovation-friendly goals in regulation policy.

#### Global standards

**Status quo:** In Germany, 51 ICT patents were registered per one million residents (fourth place in the top 15 ICT locations). Globalisation means that standardisation is an increasingly important competitive factor.

**Field of action – standardisation:** Germany must do everything in its power to set its own standards or, at the very least, play a role in the setting of global standards. One alternative would be state aid for this purpose, as is the case in China.

#### Price erosion in the telecommunications sector

**Status quo:** In 2008, the turnover of telecommunications companies sank by 3.3 percent. In order to enable the provision of innovative services, fixed line and cable providers are investing in fibre optic cable and mobile phone providers in interfaces for high-speed data services.

**Field of action – telecommunications policy / price policy:** The federal government must do its utmost to prevent any further allocation of regulatory powers to institutions at European level.

#### e-Government services

**Status quo:** With regard to the availability of e-Government services, Germany ranks eleventh among the top 15 ICT locations. 45 percent of sales in the security technologies sector are government-generated.

**Field of action – e-Government / government:** Government procurement policies restrict innovation and prevent optimum availability of e-Government. The government should lead by example as both buyer and provider of innovative services.

## 4. Further expansion of key strengths

As well as maintaining strengths, such as excellent research and development, experts are focussing primarily on areas of growth.

### Growth sectors

**Status quo:** In 2008, German ICT turnover was 132 billion euro. This corresponds to a global market share of 5.9 percent and, in terms of sales, makes Germany the fourth largest country among the top 15 ICT locations. Germany was overtaken by China in 2008. In 2009, German sales in the information technology sector sank by 2.6 percent, to 65.4 billion euro, and by 2.2 percent in the telecommunication services sector, down to 64.3 billion euro.

#### Field of action – development of growth opportunities:

In future, commercial enterprises should be orienting themselves more strongly towards the potential demand for innovations. According to the team of experts, the business and ICT location Germany should also investigate a new approach, one of pursuing a more demand-oriented innovation policy.

R & D should endeavour to focus on the most promising growth sectors with high sales potential. It is possible to promote strong demand for new highly innovative products with strong commercial viability among both individuals and public authorities. “ICT made and applied in Germany” must remain an integral part of the success story. Demand can be stimulated over the promising application sectors of the future. Within these sectors, it is essential to define key projects for which sufficient resources are available and which are suitable for export.

Emerging growth sectors include the following: “Embedded Systems”, “Cloud Computing”, “Internet of Things”, “Internet of Services”, “e-Mobility” and traffic telematics, climate protection (Green IT, e-Energy), “e-Health” and IT Security.

### Fields of action

- ▶ Exploitation of growth opportunities

### Prospects

Appraisals and assessments of the ICT location Germany should continue to form the basis for a continual dialogue between players from the spheres of politics, industry and science.

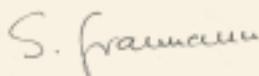
The 4<sup>th</sup> IT summit will provide the opportunity for discussions on the results presented in this report.

I would like to extend my warm thanks to the experts who made such a huge and decisive contribution to the overall content of this report!

*“Coming together is a beginning. Keeping together is progress. Working together is success.”*

(Henry Ford)

Regards



Dr Sabine Graumann

## 1.

# Goals and methods

## 1. Goals and methods

From a general economic perspective, the information and communication industry (ICT) plays a key role. Specifically, the industry affects various technological segments of the economy. The aim is to make Germany a global market leader with cutting-edge technologies in as many segments as possible.

### Goals

In the years ahead, the goal is for the German ICT industry to establish itself as a global leader on the international market. The annual "Monitoring Report – Digital Germany" will contribute to this by answering the following questions:

- 1. The German ICT industry against the global benchmark:** how is the German ICT industry developing compared to its major competitors? What have the German ICT industry and economic policy achieved in recent years compared to its competitors? What are the current key trends and likely developments in the years ahead, and what is the strategic growth potential in the medium-term?
- 2. Assessment of the global benchmark from an expert perspective:** what is the significance of the results (1.) in terms of the competitiveness of the domestic industry and adoption of the strategy for the German ICT industry to meet current challenges? To what degree do the results need to be confirmed, qualified or supplemented by the decision-makers of the German information and communication industry?
- 3. Conclusions and recommendations for Government action:** what must the ICT industry and economic policy do to actively promote its ascendancy to world leader? What do the results mean for the ICT policy of the Federal Government, in particular for the IT Summit process and a possible successor programme to "iD2010"?

The "Monitoring Report – Digital Germany" analyses the performance of the German information and communication industry (ICT), and draws comparisons with key competitive countries in Europe and Asia, as well as with the global market leader, the USA.

### Methods

In order to calculate the performance of all 15 countries in a comparable manner, "key performance indicators" were used to position Germany in relation to 14 other countries in a quantified "industry positioning report". A total of 21 key indicators were used to measure performance in a global comparison. These indicators include "Broadband penetration", "Internet penetration in the population" and "ICT turnover as a proportion of GDP". A quantitative global comparison of the performance of the German information and communication industry is calculated for all key indicators. The 15 ICT nations are then ranked according to performance and the leading country in each class is awarded 100 index points. The other countries are then positioned relative to the global market leader.

However, it is not enough just to make a quantitative measurement of performance. An "industry assessment" is also required, which is achieved by incorporating the opinions of top ICT experts. In the course of two workshops, the results obtained for this reporting period were investigated and updated by the decision-makers of the German information and communication industry.

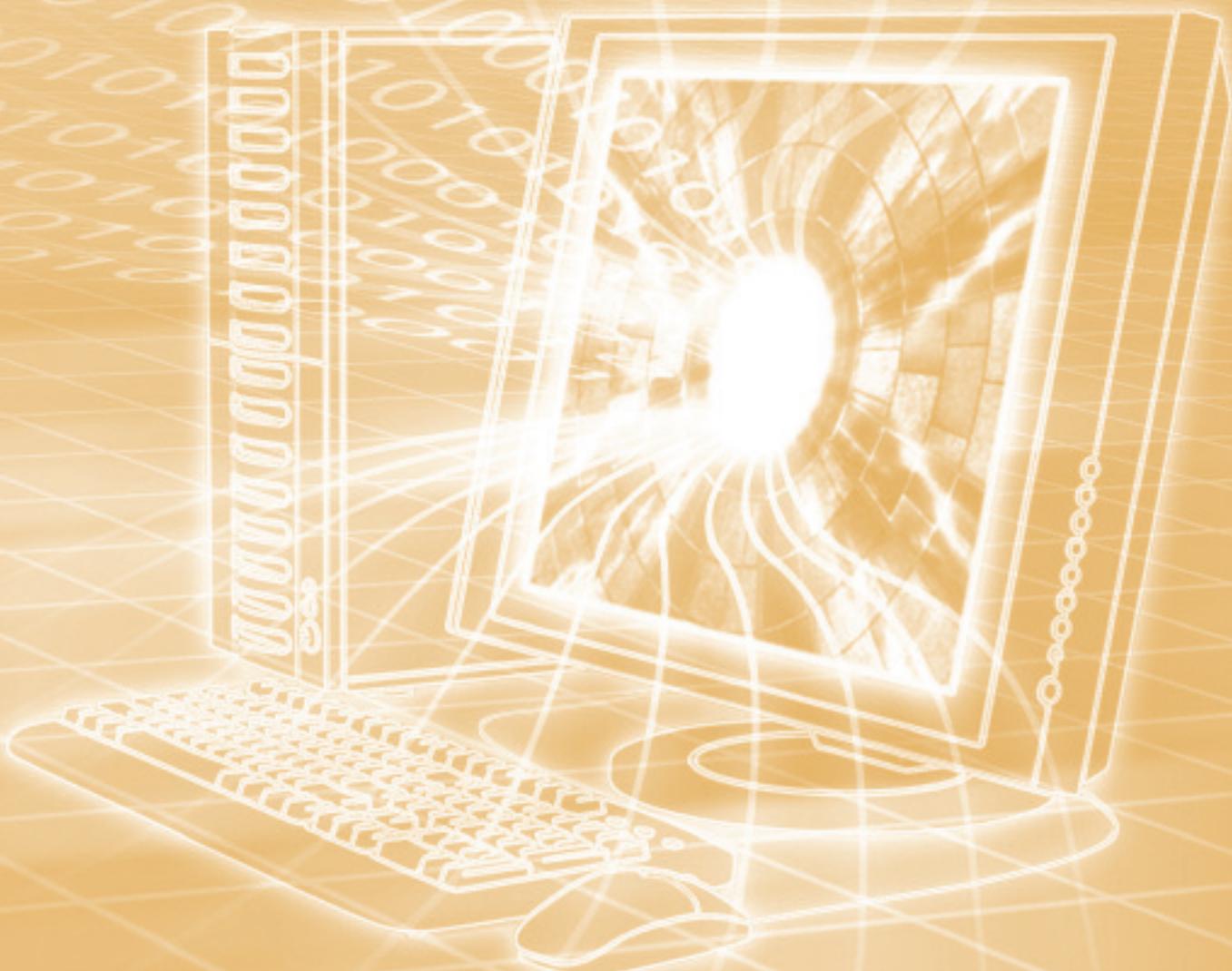
International expert opinion was also sought for specific country comparisons (such as Germany v. China, Germany v. global market leader, the USA) and expert interviews were conducted in China and the USA.

Industry positioning and industry assessment data provide a strengths/weaknesses profile of the German ICT industry. These data enable the determination of fields of action for politics and the economy that are relevant to the "ICT industry strategy".

To download further details, please visit our website at [www.tns-infratest.com/monitoring-deutschland-digital](http://www.tns-infratest.com/monitoring-deutschland-digital).

## 2.

# An international comparison of the German ICT industry



## 2.1 Germany's performance against the global benchmark

How competitive is the German ICT industry? Is the German ICT industry optimally positioned to deal with the increasingly tough global competition? Are the conditions right for the German ICT industry to establish itself as world leader?

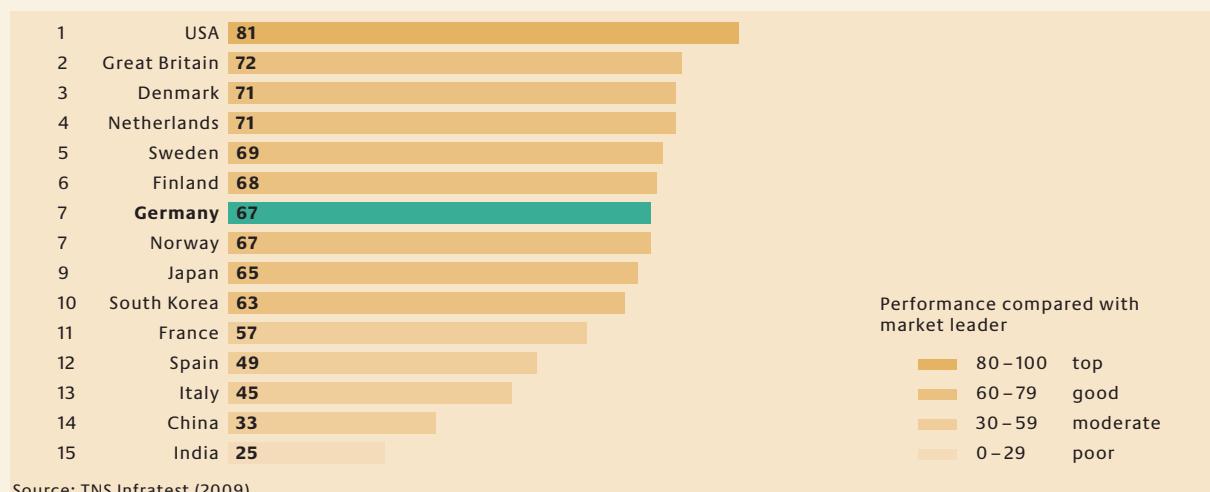
### **Germany ties with Norway in an average seventh place in the middle of the overall ranking of the 15 ICT industries.**

As expected, the USA maintained its number one position as global leader on the ICT markets in 2008. With an average performance of 81 points (or 81 percent) in 21 key performance indicators, it achieved the best possible performance of 100 points (or 100 percent). This places the USA well ahead of the other ICT nations. The performance of Great Britain (72 points) was nine points below the US, putting it in second place, with Denmark and the Netherlands taking third place at 10 points below (both with 71 points respectively). These three countries form the second top group, with an average overall performance of more than 70 index points. The middle-rankers achieved between 63 and 69 index points. These included the Scandinavian countries Sweden (69 points) and Finland (68 points) in fifth and sixth place. However, their performance is still up to 32 percent below the best possible performance.

Germany achieved 67 percent of the best possible performance, placing it firmly in the middle of the range, sharing seventh place with Norway. The gap between Germany and the global market leader was 14 index points. Compared to the best possible score of 100 points in all key performance indicators, Germany trails by 33 percent. Furthermore, Germany has only a slight lead over Japan and South Korea (65 and 63 points respectively).

However, the other Western European countries ranked below Germany have some serious catching up to do: France (57 points), Spain (49 points) and Italy (45 points). Bringing up the rear in the global benchmark are China with 33 points and India with 25 points. However, while both countries have made truly impressive headway, they still have a long way to go to catch up with the world leaders.

**Fig. 2.1a: TNS benchmark – average performance by country in 2008  
Germany in the middle of the range**



### Germany is global market leader in only one of 21 key indicators

In the ranking of the top ICT nations, Germany was the world market leader in only one of the 21 key performance indicators. In other key performance indicators it was ranked third twice, fourth once and sixth four times. It was also ranked fifth, seventh and eighth for three key performance indicators respectively, and tenth and eleventh for two key performance indicators respectively.

These rankings can be broken down as follows:

- ▶ 1<sup>st</sup> place: "Purchases by companies via the Internet"
- ▶ 3<sup>rd</sup> place: "Mobile phone penetration in the population" and "Market share of ICT turnover in the global market" (tied with China)
- ▶ 4<sup>th</sup> place: "Exports in the ICT sector"
- ▶ 5<sup>th</sup> place: "Growth in IT turnover", "Sales by companies via the Internet" and "Internet use in companies"
- ▶ 6<sup>th</sup> place: "ICT patent applications", "Internet access", "Computer penetration in households" and "E-commerce users"
- ▶ 7<sup>th</sup> place: "Proportion of R & D expenditure on ICT as a proportion of GDP", "Broadband connections in the population" and "Use of social networks"
- ▶ 8<sup>th</sup> place: "ICT expenditure as a proportion of GDP", "SSL server penetration" and "Internet use in the population"

**Fig. 2.1b: Ranking of countries – comparison of 2007/2008  
Germany's performance improved by two places**

Country	Rank in 2008	Rank in 2007	Change in index
USA	1	1	± 0
Great Britain	2	4	+2
Denmark	3	2	-1
Netherlands	3	2	-1
Sweden	5	5	± 0
Finland	6	6	+1
<b>Germany</b>	<b>7</b>	<b>9</b>	<b>+2</b>
Norway	7	6	± 0
Japan	9	8	-1
South Korea	10	10	+1
France	11	11	+3
Spain	12	12	± 0
Italy	13	13	+1
China	14	14	± 0
India	15	15	+1

Source: TNS Infratest (2009)

- ▶ 10<sup>th</sup> place: "ICT expenditure per inhabitant" and "Maturity of telecommunications"

- ▶ 11<sup>th</sup> place: "Companies with broadband connections" and "Availability of e-Government services"

### Despite climbing from ninth to seventh place in a single year, Germany still languishes in the middle of the ranking of top ICT countries.

Closer examination of the performance of the ICT industries compared to the previous year reveals the following:

#### Improved ranking

In 2008, Germany rose 2 places, from ninth to seventh. This was largely due to achieving world leadership for the first time in the key performance indicator "e-Procurement – purchases by companies via the Internet". The significant increase in broadband penetration in the population by approximately five percentage points to 28.3 percent and the eleven percent increase in mobile phone penetration to 128 percent also played a major role in this improvement. However, this should not be taken to mean that there is no room for further improvement, particularly in the broadband sector. In the application sector, the rate of internet use in the population rose by a further 3.5 percent to 76 percent. The use of social networks rose by 19 percentage points to 67.3 percent. However, Germany still has some way to go to become world leader.

Great Britain also improved its performance by two places in 2008, breaking into the top three for the first time, behind the USA and ahead of Denmark in second place. This is primarily due to improvements in the infrastructure sector, in particular to increased broadband penetration in the population (up two percentage points) and in companies (up nine percentage points). Internet use in the population rose by almost eight percentage points. For the first time, Great Britain became world leader in a key performance indicator, "Sales by companies via the Internet".

#### No change in the ranking for the USA, Finland, South Korea, France, Spain, Italy, Sweden, China and India

Nine other countries successfully maintained their previous rankings. These included the USA as world leader, Sweden in fifth place, Finland in sixth place, and South Korea in tenth place. France, Spain, Italy, China and India are ill-prepared for the increasingly tough competition. However, China and India have shown significant growth rates and considerable potential in markets with strong demand.

#### Denmark, Norway, the Netherlands and Japan suffered a drop in ranking

Four of the 15 ICT industries suffered a drop in ranking. While **Denmark** remained global market leader in "Availability of e-Government services", in "Sales by companies via the Internet", it passed the crown to Great Britain.

The performance of the **Netherlands** in "ICT expenditure as a proportion of GDP" fell by 15 index points. **Norway** fell from sixth to seventh place, which it shares with Germany having lost global market leadership in "Purchases by companies via the Internet" to Germany. **Japan** fell from eighth to ninth place, ceding its global market leadership in "ICT expenditure as a proportion of GDP" to South Korea.

#### Considerable success in four key indicators, dramatic drop in one key indicator

In 2008, Germany was successful in the following key performance indicators:

There was an improvement in eleven performance indicators. A **success** is considered **significant** if the index figure improves by eight or more index points. This was the case for **four key performance indicators**:

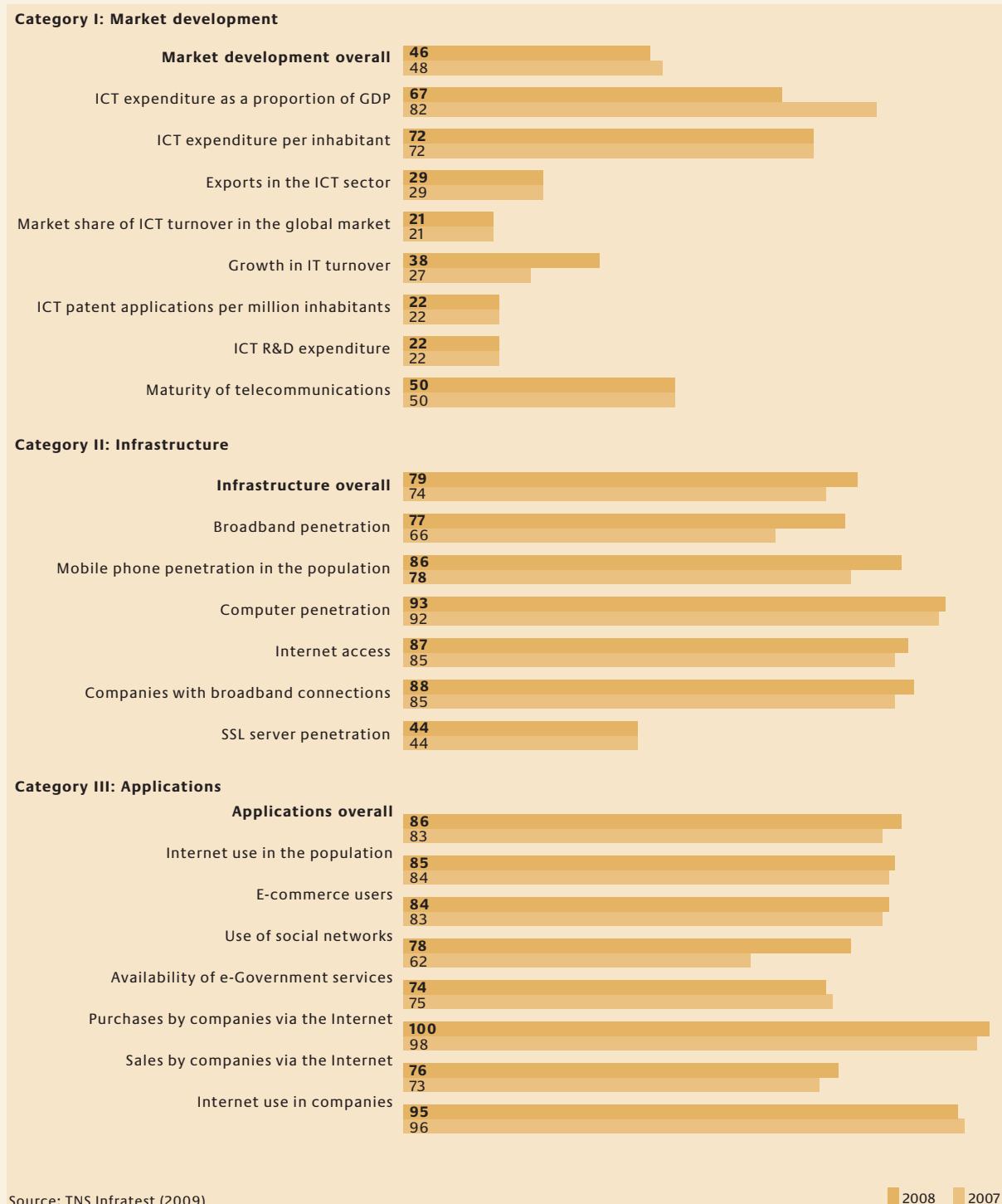
- ▶ Broadband connections (up eleven points – from 66 to 77 index points)
- ▶ Use of social networks (up 16 points – from 62 to 72 index points)
- ▶ Mobile phone penetration (up eight points – from 78 to 86 index points).
- ▶ Growth in IT turnover rose eleven points to 38 index points. However, there were significant drops in turnover in real terms. There was an even greater drop in turnover for other ICT industries, with the exception of South Korea. When compared with the competition, this can therefore be regarded as a success.

**Successes** with improvements of between one and three index points were also recorded for **seven key performance indicators**:

- ▶ Sales by companies via the Internet (up three points, 76 index points).
- ▶ Companies with broadband connections (up three points to 88 index points)
- ▶ Internet access in households (up two points to 87 index points)
- ▶ Purchases by companies via the Internet (up two points to 100 index points, global market leader)
- ▶ Computer penetration in households (up one point to 93 index points)
- ▶ Internet use in the population (up one point to 85 index points)
- ▶ E-commerce users (up one point to 84 index points)

Against the international benchmark, Germany is in fifth place in the category "Market Development", in eighth place in the category "Infrastructure" and fourth place in the category "Applications".

Fig. 2.1c: Comparison of the digital performance of the German ICT industry 2007 - 2008



There were **no changes** in performance according to index points for **seven key performance indicators**:

- ▶ ICT expenditure per inhabitant (72 index points),
- ▶ Maturity of telecommunications (50 index points)
- ▶ SSL server penetration (44 index points)
- ▶ Exports in the ICT sector (29 index points)
- ▶ ICT patent applications (22 index points)
- ▶ ICT R&D expenditure (22 index points)
- ▶ Market share of ICT turnover in global market (21 index points)

There was a **slight deterioration** in performance in the case of two key indicators, of one index point each:

- ▶ Internet use in companies (95 index points)
- ▶ Availability of e-Government services (74 index points)

A **dramatic deterioration** of minus 15 index points was recorded for one key indicator, ICT expenditure as a proportion of GDP (down from 82 to 67 index points).

## 2.2 Germany's competitiveness in the category "Market Development"

Information and communication technologies are a driver for increased productivity, growth and employment. As key technologies in an increasingly knowledge-based economy, ICT acts a catalyst for growth in almost all industries.

### The performance of ICT industries on foreign markets in the category "Market Development"

The performance of the 15 leading ICT industries in the category "Market Development" is measured in a global comparison using eight key indicators. On the supply side: "Market share of ICT turnover in the global market", "Growth in IT turnover", "R & D expenditure", "Number of patent applications" and export volumes. On the demand side: "ICT expenditure per inhabitant", "ICT expenditure as a proportion of GDP", "Maturity of telecommunications services" measured in terms of turnover and penetration of fixed and mobile phone respectively.

Data that are not available for all of the top 15 ICT industries are analysed separately. On the one hand, these include an analysis of "Growth in e-Commerce turnover".

On the other hand, qualitative analyses have been performed to show current developments in "The job market and development of skilled employees" and "Education and further training" for the German ICT industry.

### Germany and the Netherlands share fifth place in the category "Market Development"

In the text which follows, the average performance of the 15 top ICT industries is measured across all eight key indicators as an aggregate national index.

Each country is positioned according to its mean value. Ideally, the world's best country would obtain one hundred points in all key performance indicators in the benchmark, thus achieving a national mean value of one hundred index points. The national index measures the average gap between the country concerned and the respective world leader for all eight key performance indicators in the category "Market Development" in a single value. For further details of the procedure used, please refer to the Appendix "Methodology".

The aggregate index value for all countries for the category "Market Development" was down slightly against the previous year. While the ICT markets managed to achieve an average 46 points for their market progress in 2007, this fell to 44.6 index points in 2008. However, this meant that the average performance of all 15 countries included in the benchmark was still more than 50 percent under the ideal top performance (hundred points) and that, on average, the respective front-runners slightly extended their lead.

The only country to gain slightly on the world leaders was **South Korea**. For **Great Britain**, **France** and **Sweden**, the national average remained unchanged. It also stayed the same for India, which nevertheless still rose one position to take 14<sup>th</sup> place, thus bringing it level with Italy (drop from 31 to 30 index points).

With a national average of 46 index points each, **Germany** and the **Netherlands** just managed to come in above the average overall performance of all countries of 44.6 points. This put them in fifth place. However, neither country was able to reach the 50 percent mark, which was only achieved by **Japan** (53 points), **Great Britain** (52 points) and **Finland** (51 points).

Compared to the other top 15 ICT nations, the USA is clear leader across the entire range of key performance indicators, with an aggregate national average index of 77 points. It is worth noting, however, that in spite of its leading position, the **USA** is still 23 percent below the best possible performance of one hundred points in the average index.

**Fig. 2.2a: National average figures in the category „Market development“ – 2007/2008**  
Only South Korea was able to improve its national index compared to previous year



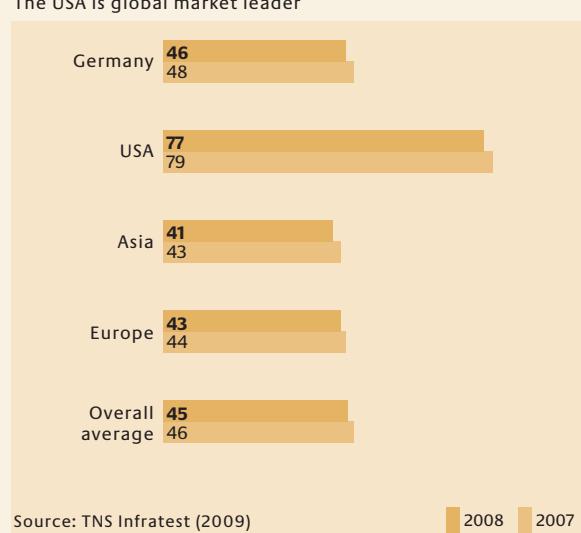
### USA way ahead in region index of “Market Development”

All the European countries included in this benchmark study achieved a below average performance. In fact, compared to the global market leader, the average European region index actually fell by one point to 43 points, so that Europe continues to lag far behind the USA.

While this is currently even more true of the Asian countries, who achieved an average of 41 index points in the region index, they are expected to make up considerable ground in the years ahead.

With 77 index points, the USA as global market leader achieved 33 index points more than Germany and the Netherlands, who shared fifth place.

**Fig. 2.2b: Region index in the category „Market development“ – 2007/2008**  
The USA is global market leader



### Only South Korea able to increase its national average index, but remains tenth in the top 15 ICT nations

The USA achieved an average of 77 of one hundred possible points. This gave it a lead of 24 points over Japan in second place and 25 points over Great Britain in third place. Compared to the previous year, the performance of the USA fell by two index points compared to the other 14 ICT nations included in this benchmark study.

**South Korea** was the only country able to catch up slightly with the USA, reducing its lead by two index points.

The aggregate index values remained unchanged for **India, Great Britain, France and Sweden**.

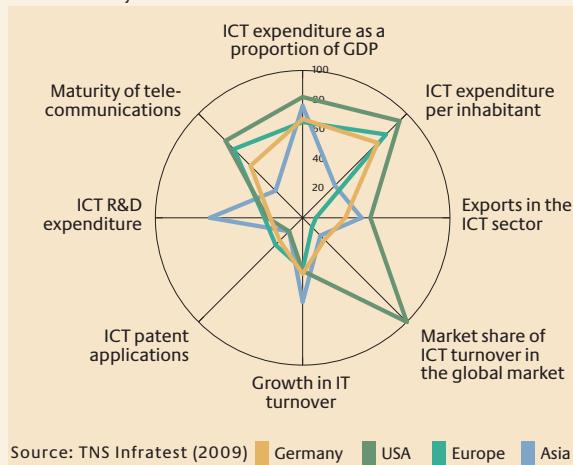
The performances of **Norway, Italy and Finland** all fell by one index point. This resulted in Finland falling one position in the index ranking to fourth place.

**Spain's** index values fell by four points and **Japan's** by five points. Nevertheless both ICT industries were able to maintain their ranking.

### Germany fails to lead in a single key indicator in the category "Market Development"

The USA has an across-the-board lead, with the exception of three key performance indicators: "Proportion of ICT R&D expenditure", "Growth in IT turnover" and "ICT patent applications". Asian countries lead on "Growth in IT turnover" with an average value of 57 index points. In the case of "R&D expenditure" for ICT, the Asian countries achieved 63 points, compared to the European countries (26 points) and the USA (24 points). Germany achieved 67 index points for "ICT expenditure as a proportion of GDP", placing it slightly above the European average of 65 points, and 21 points for "ICT turnover as a proportion of GDP", which was still higher than the average performance of Asian countries (17 points).

Fig. 2.2d: Average performance of key performance indicators in the category "Market Development" as of 2008  
USA and Asia dominate the global ICT market – Germany fails to lead in any sector



Source: TNS Infratest (2009)    Germany    USA    Europe    Asia

Fig. 3.1c: Rankings in the category "Market Development" – 2007/2008

**Only South Korea able to improve its average performance**

Country	Rank in 2008	Rank in 2007	Change in index
USA	1	1	-2
Japan	2	2	-5
Great Britain	3	3	±0
Finland	4	3	-1
Netherlands	5	5	-2
<b>Germany</b>	<b>5</b>	<b>5</b>	<b>-2</b>
France	7	8	±0
Sweden	7	8	±0
Denmark	7	7	-2
South Korea	10	10	+2
Norway	11	12	-1
China	11	10	-3
Spain	13	13	-4
India	14	15	±0
Italy	14	14	-1

Source: TNS Infratest (2009)

## Expert opinion on “Market Development”



*“From a general economic perspective, ICT plays a key role. Specifically, the industry has a cross-sectoral affect on various technological segments of the economy. It is the locomotive for productivity and innovation in virtually all other economic sectors and the key to ensuring our future competitiveness. However, this is only possible with high-quality, first-class innovative products.”*

Hans-Peter Bauer, Vice President Central & Eastern Europe, McAfee GmbH



*“The German R & D industry is second to none and renowned around the world. However, we need to invest more in future-orientated projects in which Germany can make its mark in the long term. We need to develop 100 companies in the German ICT industry with more than 100 million euros turnover.”*

Ulrich Dietz, CEO & Chairman of the Board, GFT Technologies AG



*“Innovation is based on invention – and inventors should be celebrated like pop stars. We should be considering how to create an innovation-friendly environment. We are world champions at evaluating risks, but we are also world champions at standing in the way of opportunities.”*

Peter J. Bisa, Managing Director, Tactum GmbH



*“It is essential for the German ICT industry to begin developing and promoting national and international talent pools to ensure that they stay in Germany!”*

Marie-Therese Huppertz, Vice President Government Relations, SAP AG



*“ICT must remain an integral part of Germany’s success story. We are striving to consistently implement ICT innovations in our companies. As a strong ICT industry with marketable products, we will be able to further expand as an export nation – both with ‘IT made in Germany’ and ‘IT applied in Germany’.”*

Dr Thomas Endres, CIO Deutsche Lufthansa AG and President CIO Colloquium



*“Information and communication technology is the only locomotive that will drive the growth of the general economy and employment. Unfortunately this goes largely unrecognised by both the public and the decision-makers.”*

Dr Andreas Boes, Chairman of the Institute for Social Science Research e. V.



*“Companies operating solely on a national level have no hope of achieving a world market position in the telecommunications sector. This is clear from the way the market is developing. At the very minimum, a European dimension is required.”*

Jochen Schwarz, Vice President Public Affairs, Alcatel -Lucent Holding GmbH



*“Education spending in Germany is below the OECD average. This jeopardises the future of the ‘federal state of education’ in the face of global competition. We need concrete measures, such as the promotion of higher education and research, if we are to move up into the top group in the next four years.”*

Prof Dr Lutz Kolbe, Georg August University, Göttingen

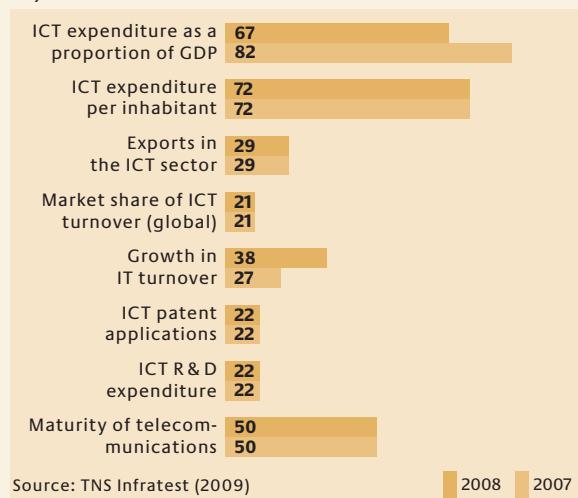
### Germany stagnating in six out of eight key indicators

Of the eight key indicators examined in this report, Germany's development remained static in six indicators. In two key indicators, "ICT expenditure as a proportion of GDP" and "ICT expenditure per inhabitant", Germany is well above average, with 67 and 72 points respectively. One key indicator value is exactly 50 points, and in five key indicators Germany is significantly below average. It is in these areas in particular that Germany must seek to improve if it is to manage the leap to world leadership.

The only indicator to show signs of a positive development was "Growth in IT turnover". While the figures show an increase from 27 to 38 index points, in real terms there was actually drops in turnover. However, as other countries suffered even greater falls in turnover, measured against the benchmark it could be recorded as a relative success.

A drop of 15 index points in "ICT expenditure as a proportion of GDP" can only be described as dramatic, and clearly indicates a weakening of the German ICT industry.

**Fig. 2.2e: Germany: Changes in performance for key indicators in the category "Market Development" – 2007/2008**  
Stagnation in six out of eight key indicators – growth in one key indicator and downturn in another



### Growth of German ICT market too slow

In terms of turnover, Germany fell to fourth place among the 15 countries being examined, ranking it below China. China is the leader in exports, and in 2009 is set to depose Germany, the previous "World Champion Exporter", for the first time.

It can therefore be concluded that the German ICT market is expanding too slowly. Even in innovative fields, such as "Turnover with mobile data services", Germany languishes in tenth place with a performance significantly under par. We now need to ensure rapid expansion in growth areas.

**Fig. 2.2f: Germany's performance compared with market leader as of 2008**  
We are growing too slowly, particularly in areas of innovation.

ICT expenditure as a proportion of GDP	Market leader South Korea Germany ranked eighth
ICT expenditure per inhabitant	Market leader Denmark Germany ranked tenth
Exports in the ICT sector	Market leader China Germany ranked fourth
Market share of ICT turnover (global)	Market leader USA Germany ranked fourth
Growth in IT turnover	Market leader China Germany ranked fifth
ICT patent applications	Market leader Finland Germany ranked sixth
ICT R & D expenditure	Market leader Finland Germany ranked seventh
Maturity of telecommunications	Market leader Netherlands Germany ranked tenth

Source: TNS Infratest (2009)

### Summary of “Market Development”

In summary, we can conclude the following:

- ▶ Compared to the world's leading ICT industries, Germany's performance in the category "Market Development" is comparatively poor, with an average index of 44.6 points, it is not even achieving 50 percent of the best possible performance.
- ▶ With 77 index points, the USA is 32 points ahead of runner-up Japan.
- ▶ While the USA has a considerable lead, it is still 23 points away from the ideal top performance.
- ▶ With an average of 43 index points, the European ICT industries are trailing far behind, as are the Asian countries, with an average of 41 index points. However, there is little doubt that the absolute and relative performance of the Asian ICT industries will improve significantly in the not too distant future.
- ▶ Germany's performance deteriorated from 48 to 46 index points, placing it only slightly higher than the overall average of the 15 leading ICT industries (44.6 points). This means that Germany stayed at fifth place in both 2007 and 2008, although in 2008 this position was shared with the Netherlands.
- ▶ Germany fails to make global market leader in any of the key performance indicators.
- ▶ The drop of 15 index points in "ICT expenditure as a proportion of GDP" can only be described as dramatic.
- ▶ If Germany is to manage the leap to world leadership, it needs to make rapid improvements, particularly in the category "Market Development".

## 2.3 Germany's competitiveness in the category "Infrastructure"

"A technologically highly developed infrastructure based on broadband networks is the backbone of Germany as a business location. Only a network with sufficient transmission capacities can really enable innovative services and more efficient processes in companies."

(Darmstadt Declaration, Third National IT Summit 2008)

### Performance of ICT industries on national markets in the category "infrastructure"

The performance of the top 15 ICT industries in the category "Infrastructure" is measured by means of six key indicators. These are "Broadband and mobile phone penetration in the population", "Computer penetration", "Internet access in households", "Penetration rate of companies with broadband connections" and "SSL server penetration".

Furthermore, in order to assess infrastructure conditions, individual in-depth analyses were also performed and illustrated according to broadband technologies, i. e. DSL and cable. However, in order to prevent double counting, these figures were excluded from the global benchmark and should be regarded as a subset of "Broadband penetration in the population". A further qualitative analysis examined current developments with regard to IT security. Failure to include these aspects would have delivered an incomplete assessment of infrastructural conditions.

The average performance of the 15 top ICT industries is measured below as an aggregate national index across all six key indicators.

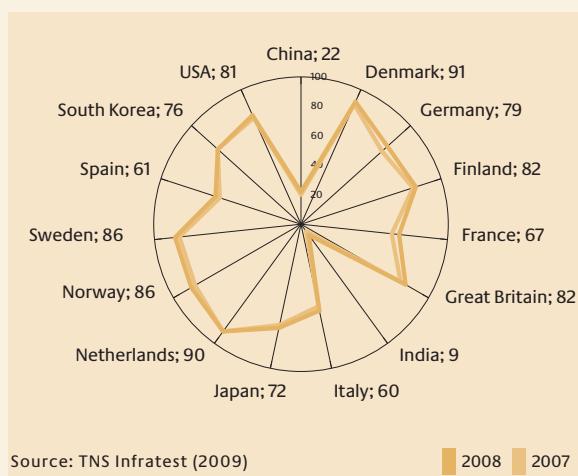
Each country is positioned according to its mean value. Ideally, the world's best country would obtain one hundred points in all key performance indicators against the benchmark, thus achieving a national mean value of one hundred points. However, this was not achieved by any of the countries included in this survey. The national index measures the average gap between a given country and the respective world leader for all six key performance indicators in the category "Infrastructure" in a single value. For further details of the procedure used, please refer to the Appendix "Methodology".

### Relative to the respective market leader, technical infrastructure has improved in all countries – with Germany in eighth place

While the average aggregate performance of telecommunication services measured quantitatively against the benchmark (broadband, mobile phones, Internet access) and hardware (computer, SSL server) reached 67 index points across all countries in 2007, 2008 saw this increase by three points, to 70 index points. However, this means that the average performance of all 15 countries measured against the benchmark is still 30 index points below the ideal top performance (100 points).

An examination of the developments in all key performance indicators shows that the index values have risen in 13 of the 15 countries. Germany is in eighth place.

**Fig. 2.3a: National average figures in the category "Infrastructure" – 2007/2008**  
Performance only unchanged in the Netherlands and South Korea



### **Denmark market leader in the category “Infrastructure” – Germany moves up from ninth to eighth place**

The performance of the Scandinavian countries lies above the European region index of 78 index points. Close on the heels of market leader Denmark with 91 index points are Norway and Sweden, each with 86 index points, followed by Finland with 82 points, all significantly higher than the European region index.

In 2008, Denmark achieved an average 91 index points, thus beating the Netherlands, whose performance was unchanged at 90 index points. This means that Denmark has nudged ahead as market leader, forcing the Netherlands into second place in the category “Infrastructure”.

The performance of South Korea remained unchanged at 76 index points. In spite of this, South Korea still fell from eighth to ninth place in the 2008 overall ranking because the other countries had improved in the same period.

The greatest growth was achieved in the national indices of Germany and France, which each improved by five index points. Germany's index value rose from 74 to 79, while France's rose from 62 to 67

index points. Germany's performance of 79 points places its national index just above the European region index of 78 points. In 2008, Germany achieved eighth place in the category of “Infrastructure” conditions, which meant it moved up a place in the ranking. France's ranking was unchanged and it stayed in eleventh place.

Compared to the previous year, Great Britain improved its performance by four points, taking it to 82 index points. This put Great Britain in fifth place.

Germany positioned itself just behind the USA which, despite an improvement of two points to 81 index points, fell to seventh place in the ranking.

India, Italy, Sweden, Spain and Norway all improved their national average indices by three points. However, this only had a positive effect on Norway's ranking. In 2008, Norway was able to improve its national index to a total of 86, placing it level with Sweden in third place.

While China, Japan and Finland all improved their average performance by two index points in the national index, this did not affect their ranking, with China placed second to last, Finland staying in fifth place and Japan in tenth place.

**Fig. 4.1b: Rankings in the category “Infrastructure” – 2007/2008  
Only the indices of the Netherlands and South Korea remained unchanged**

Country	Rank in 2008	Rank in 2007	Change in index
Denmark	1	2	+2
Netherlands	2	1	±0
Norway	3	4	+3
Sweden	3	3	+3
Great Britain	5	7	+4
Finland	5	5	+2
USA	7	6	+2
<b>Germany</b>	<b>8</b>	<b>9</b>	<b>+5</b>
South Korea	9	8	±0
Japan	10	10	+2
France	11	11	+5
Spain	12	12	+3
Italy	13	13	+3
China	14	14	+2
India	15	15	+3

Source: TNS Infratest (2009)

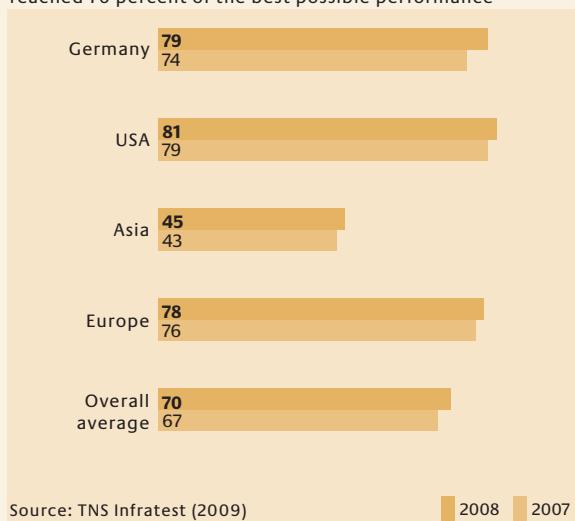
### A regional comparison with the USA and Europe shows that the Asian ICT industries still have some catching up to do

In the category “Infrastructure”, the USA has an average region index of 81 points, placing it only slightly ahead of Europe's average of 78 points. The Asian ICT industries struggle behind with a region index of only 45 index points, which shows that they have a lot of ground to make up in the area of infrastructure.

With an average performance of 79 index points, Germany is nine points above the global region index (70 index points) and one point above the European region index (78 index points).

**Fig. 2.3c: Region index in the category “Infrastructure” – 2007/2008**

Average performance in the category “Infrastructure” reached 70 percent of the best possible performance



### Germany fails to take the lead in any of the six performance indicators

The USA is global market leader in only one key performance indicator, “SSL server penetration”.

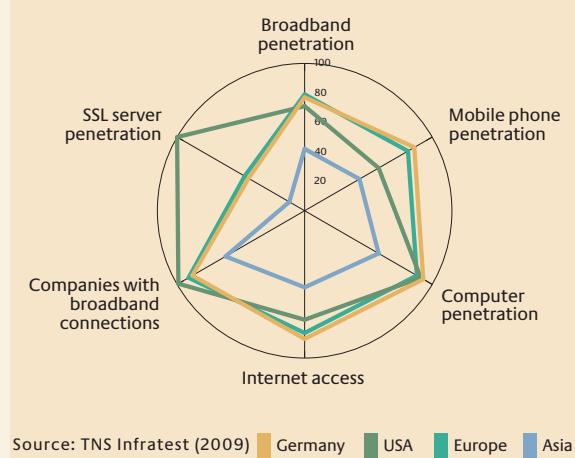
Global market leadership for four other key performance indicators is held by European countries, while South Korea is the market leader for “Companies with broadband connections”.

In “Mobile phone penetration”, Germany's 86 index points place it above all the region indices. It also outperforms all the region indices for penetration rates for “Computer penetration in households” (92 points) and “Internet access in households” (87 points).

However, in “SSL server penetration” (44 points), Germany clearly still has some catching up to do.

**Fig. 2.3d: Average performance of key indicators in the category “Infrastructure” as of 2008**

Germany better than every regional average in three out of six key indicators



## Expert opinion on “Infrastructure”



*“We must not allow ourselves to be satisfied with the current level of broadband penetration. We now need to ensure rapid implementation of the modern investment and innovation-friendly regulation policy proposed by the coalition agreement and the relevant provisions of the New European legal framework, in order to provide security of investment for private investors in high-speed networks.”*

Dr Wolfgang Kubink, Political Lobbyist for Germany, Commissioner for Association Matters, Deutsche Telekom AG



*“In recent years, ICT technologies have generated considerable increases in productivity, not just in OECD member countries, but also in the emerging nations. There is clear empirical evidence of the positive effects of ICT on labour productivity.”*

Prof Dr Dietmar Harhoff, Ph.D. – Dipl.-Ing., M.P.A., Ludwig-Maximilians University, Munich



*“In recent years, mobile communication has become an integral part of our lives. We are further developing the systems involved, and the next step towards Long Term Evolution (LTE) in particular, will ensure nationwide coverage for mobile users.”*

Lydia Sommer, CEO, Nokia Siemens Networks GmbH & Co. KG



*“In Germany, the potentials of the information society have not yet been fully realised. In particular, we need to focus on giving much higher priority to the expansion of a suitable ICT infrastructure and the targeted promotion of electronic applications. Even the latest economic stimulus package offers far too little in the way of resources.”*

Dr Ferdinand Pavel, Manager, DIW econ GmbH



*“Broadband provision is now a crucial economic and location factor. In order to remain competitive on an international level, Germany therefore needs broadband for all – open access business models will play a key role in achieving this.”*

Dr Stephan Albers, Managing Director, BREKO – Federal Association for Broadband Communication e. V.



*“It is not enough to simply provide individuals with broadband connections, we also need to encourage them to use high-quality applications.”*

Christoph Keisers, Vice President IT Systems Marketing Mail, Deutsche Post AG



*“The cornerstones for the responsible handling of technologies are security and trust.”*

Fabian Bahr, Manager, Berlin Branch, Giesecke & Devrient GmbH

### In five out of six infrastructure categories, Germany is catching up with market leader Denmark

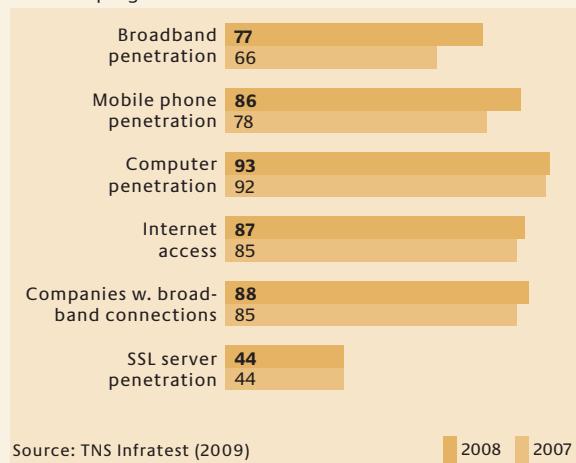
Compared with the respective global market leaders, the German ICT industry has improved in five out of six infrastructure categories. The only category where there was no improvement was “SSL server penetration” (index value stayed the same at 44 points).

The greatest improvement was in the provision of broadband connections where, compared to the world leader, Germany’s performance rose by eleven index points, to 77.

In the provision of mobile phone connections, Germany’s performance improved by eight index points to 86 points.

Germany’s best performance was 93 index points, in “Computer penetration in households”, bringing it closer to the global market leader.

**Fig. 2.3e: Germany: Changes in performance against key indicators in the category “Infrastructure” – 2007/2008**  
Greatest progress in broadband sector



### Lagging behind in the supplying of “Companies with broadband connections”

Germany’s best position in the ICT industry rankings was achieved in “Provision of mobile phone connections” (third place behind Italy and Finland).

In both “Computer penetration” and “Internet access in household” it took sixth place among the 15 nations included in the benchmark study.

Germany’s lowest ranking was in the supplying of “Companies with broadband connections” (eleventh place).

**Fig. 2.3f: Germany’s performance compared with market leader as of 2008**  
Market leader in “Mobile phone penetration” only

Broadband penetration	Market leader Denmark Germany ranked seventh
Mobile phone penetration	Market leader Italy Germany ranked third
Computer penetration	Market leader Netherlands Germany ranked sixth
Internet access	Market leader Netherlands Germany ranked sixth
Companies with broadband connections	Market leader South Korea Germany ranked eleventh
SSL server penetration	Market leader USA Germany ranked eighth

Source: TNS Infratest (2009)

### Summary of “Infrastructure”

In summary, we can conclude the following:

- ▶ In view of the diminishing leads of the respective leading ICT industries, the provision of ICT infrastructures is now on a more even playing field. The exceptions here are the Netherlands and South Korea, who, with a performance of 90 and 76 index points respectively, have maintained a constant national average.
- ▶ With 91 out of a possible hundred index points, Denmark is market leader in the ICT infrastructure category, closely followed by the Netherlands with 90 index points.
- ▶ The European countries achieved 78 index points in the region index (compared to the USA: 81 index points). The Asian countries achieved only 45 index points in the region index.
- ▶ Germany was in eighth place, which represented an improvement of one place over the previous year.
- ▶ Germany improved its performance, gaining five points to reach 79 index points. The only other country to match that level of improvement in the national index was France.
- ▶ This was largely due to a considerable expansion in broadband connections and a continued increase in mobile phone penetration.
- ▶ Germany was unable to take the leadership in any areas in the category “Infrastructure”. The closest Germany came to catching up with the market leading ICT industry was in “Computer penetration in households”.
- ▶ With regard to “SSL server penetration”, Germany clearly still has some catching up to do.

## 2.4 Germany's competitiveness in the category "Applications"

ICT is used as cross-sectoral technology in a wide range of industries and applications. The applications of the new technologies and media in the information and communication industry are broken down into private use, corporate use and public authority use.

### The performance of ICT industries on national markets in the category "Applications"

The performance of the top 15 ICT industries in the category "Applications" is measured by means of seven key indicators. As well as private use, these include "Internet use in the population", "e-Commerce – user penetration as a proportion of all Internet users" and "Use of social networks". Further categories are "Internet use by companies", "Sales by companies via the Internet" and "Purchases by companies via the Internet". Use by public authorities is measured in "Availability of e-Government services".

"Mobile Internet use" is also examined. Additional qualitative analyses also show current developments in the growth and innovation sectors for the Germany ICT industry.

### Germany improves ranking in "Applications" climbing from seventh to fourth place

The following shows the average performance of the top 15 ICT industries measured across all seven key indicators as an aggregate national index.

Each country is positioned according to its mean value. Ideally, the world's best country would obtain one hundred points in all key performance indicators, thus achieving a national mean value of one hundred points. However, this does not apply to any of the ICT countries included in this benchmark study. The national index measures the average gap between the country concerned and the respective market leaders for each of the seven key performance indicators in the category "Applications" in a single value. For further details of the procedure used, please refer to the Appendix "Methodology".

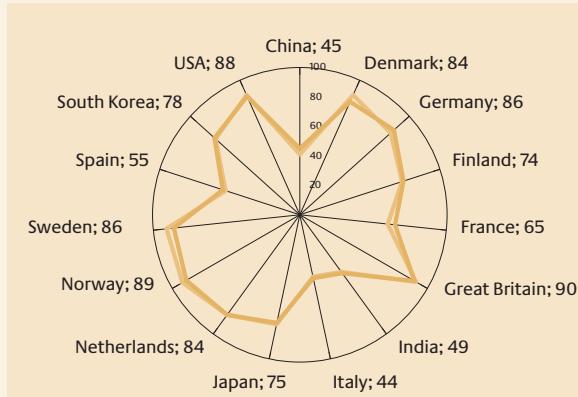
In 2008, the aggregate index value for all countries in the category "Applications" remained unchanged at 73 index points. This means that the average performance of each of the 15 countries included in this benchmark study is still 27 percent below the maximum possible performance of one hundred points.

In 2008, Great Britain took the market lead with 90 index points, pushing Norway into second place.

While Germany showed the greatest improvement in terms of ranking, France improved most in terms of index points. Germany achieved a national average of 86 points. France achieved 65 index points in the national index (up five points). In terms of index point development, Sweden and Denmark suffered the greatest deterioration in their average national performance (both down five points).

**Fig. 2.4a: National average figures in the category "Applications" – 2007/2008**

Germany's national index rose to 86 index points, representing a rise of three places up to fourth place



Source: TNS Infratest (2009)

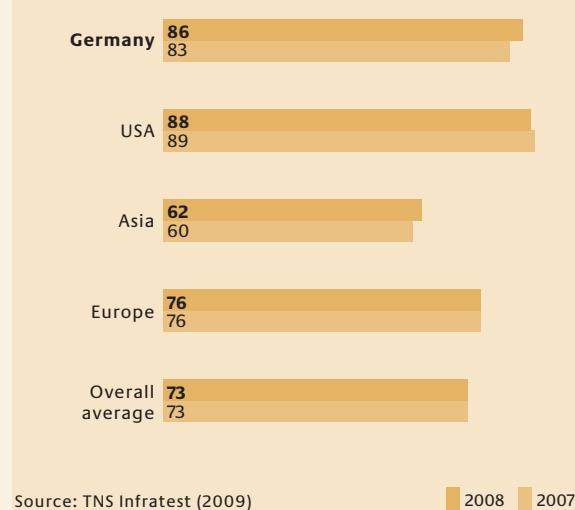
2008 2007

### Germany is just above the European region index and only slightly behind the USA

In 2008, Germany's best performance was once again in "Applications" (ahead of "Infrastructure" and "Market Development"). It achieved 86 points, placing it hot on the heels of the USA with 88 index points. The USA dropped one index point, which placed it third in the world ranking. The European countries included in this benchmark study achieved a region index of 76 points, while the Asian countries achieved 62 points, an improvement of two index points over the previous year.

**Fig. 2.4b: Region index in the category "Applications" – 2007/2008**

Germany well above the European average



Source: TNS Infratest (2009)

2008 2007

### Great Britain becomes market leader – Germany climbs three places in the national index

While **Germany** showed the greatest improvement in terms of ranking, France improved most in terms of index points.

The **biggest drop** in ranking in the national index was suffered by **Sweden** and **Denmark** (both fell two places).

**Spain** gained two index points, but remained in twelfth place. **Finland, India, South Korea** and **Italy** all improved their performance by one index point each. As a result, Italy fell to last place with 44 aggregate index points. **China** improved its performance by four index points, rising to 45 points which, relative to the world leader, placed it second to last, ahead of Italy.

The performance of the **Netherlands** remained the same, with 84 index points in sixth place.

**Japan** lost one index point, and with 75 index points in the national index stayed in ninth place.

In spite of losing one index point, the **USA** moved up a place, and is ranked third.

**Great Britain** also dropped an index point, but still remained market leader.

**Fig. 5.1c: Rankings in the category "Applications" – 2007/2008**

Germany climbs from seventh to fourth place

Country	Rank in 2008	Rank in 2007	Change in index
Great Britain	1	2	-1
Norway	2	1	-3
USA	3	4	-1
<b>Germany</b>	<b>4</b>	7	+3
Sweden	4	2	-5
Netherlands	6	6	±0
Denmark	6	4	-5
South Korea	8	8	+1
Japan	9	9	-1
Finland	10	10	+1
France	11	11	+5
Spain	12	12	+2
India	13	13	+1
China	14	15	+4
Italy	15	14	+1

Source: TNS Infratest (2009)

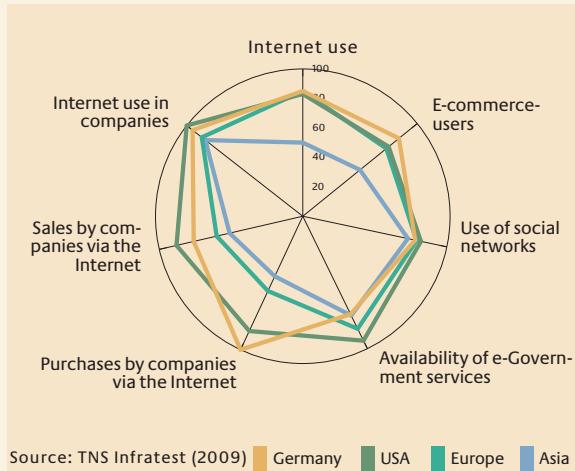
**Germany and the USA almost level in many key performance indicators – but Germany has considerable weakness in “Availability of e-Government services”**

In the category “Applications”, Germany and the USA are neck-and-neck: while Germany is market leader in “Purchases by companies via the Internet”, its performance of 76 points in “Sales by companies via the Internet” left Germany lagging far behind the USA's 88 index points. However, in “Internet use in companies” Germany's 95 index points placed it just behind market leader the USA.

Compared to the other ICT regions, Germany is market leader in “Number of e-Commerce users as a proportion of the population” with 84 index points. In “Availability of e-Government services”, Germany achieved the lowest value of all the top ICT regions, with 78 index points.

**Fig. 2.4d: Average performance of key indicators in the category “Applications” – 2007/2008**

Germany has significant weakness in e-Government services



**Germany market leader in “Purchases by companies via the Internet” for the first time**

The German ICT industry improved in five out of seven key performance indicators, but lost ground in two indicators.

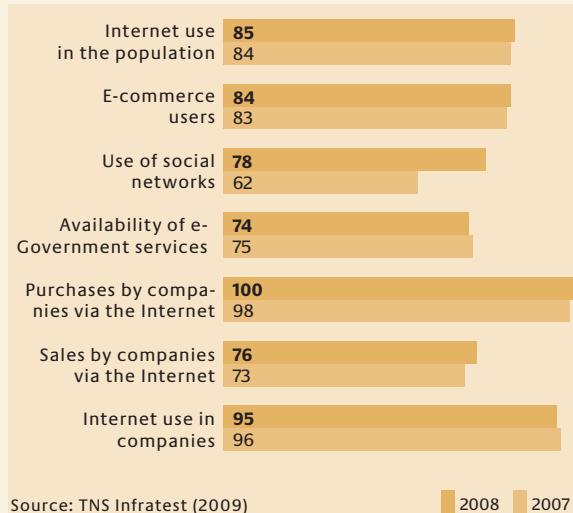
In the “Applications” category Germany succeeded in becoming market leader in one of a total of 21 key performance indicators,

“Purchases by companies via the Internet”. This was Germany's best performance across all key performance indicators.

Germany had the largest growth in “Use of social networks” gaining a further 16 index points.

However, in both “Internet use in companies” and “Availability of e-Government services” Germany lost one index point.

**Fig. 2.4e: Germany: Changes in performance in key indicators in the category “Applications” – 2007/2008**  
Market leader in “Purchases by companies via the Internet”



## Expert opinions on “Applications”



*“It's not too late for digital Germany. If we are to introduce a hitherto untapped social stratum to the Internet, we need to demonstrate the individual advantages of the World Wide Web. And that is the aim of initiatives, such as the ‘Experience the Internet’ project recently launched by the Federal Ministry of Economics and Technology.”*

Anselm Speich, Project Manager of Monitoring Report – Digital Germany, TNS Infratest Forschung GmbH



*“Companies outside Germany are investing more in IT-based solutions. As far as private customers in Germany are concerned, we can see that they are open to new IT solutions, as reflected in the leading figures for purchases via the Internet. So why can't we achieve a comparable lead with business customers when it comes to IT usage?”*

Dr Sebastian Brandis, COO, General Manager, BT Germany GmbH & Co. oHG



*“In addition to bricks and mortar business, online business is already establishing itself as the most important and attractive sales channel, opening up a world of new options. User participation, creativity and interaction can be primary drivers for turnover generated on the Web. E-Commerce was yesterday; today belongs to social commerce, and tomorrow it will be audience engagement.”*

Franz Kilzer, Director Consumer & Retail, TNS Infratest GmbH



*“With their initiative for a National e-Government Strategy (NEGS), the German government, the federal states, local authorities, economy and science have made it clear that a federal e-Government is necessary. This means that we are independently orientated towards mutually agreed goals and cross-sector projects in the IT planning committee can be successfully implemented.”*

Markus Städler, Head of Department IT 1, IT and E-Government Policy Matters, Deutschland Online Office, Federal Ministry of the Interior



*“While the reasoning used to appeal to users is good and effective, it needs to address the digital natives. The young generation grows up with expectations of the ICT industry that are completely different to those of the baby boomer generation, which was raised in what was still an analogue world.”*

Britta Oertel, Head of Information Management and Technologies Division, Institute for Future Studies and Technology Assessment



*“Small and medium-sized companies have considerable cost-cutting potential in the category ‘e-Procurement’. The same applies to public bodies. Procurement guidelines now need to be brought in line with economic requirements.”*

Dr Willi Bredemeier, Institute for Information Economics



*“Small and medium-sized companies are also making increasing use of the Internet to optimise business processes. However, the results of our studies show that this target group is still not being given sufficient information. These companies are not just smaller versions of big companies, they operate under completely different conditions. This must be taken into account if information and service offerings are to be successful.”*

Dr Kai Hudetz, E-Commerce Center for Trade at the Institute for Trade Research, Cologne



*“In order to boost the competitiveness of the German economy, we should be promoting the best practice application of IT solutions for use by German companies, who are global market leaders, to support their processes. Information technology in strong processes will secure our future.”*

Dr.-Ing. Egmont Foth, CIO, Fischerwerke GmbH & Co. KG

### We must not allow ourselves to fall behind in “Internet penetration”

In the ranking of ICT industries, Germany can take the lead in “Purchases by companies via the Internet”.

The international comparison has confirmed Germany's poor performance on e-Government, where it fell to its lowest position across all the key indicators, taking eleventh place.

In “Internet use in the population”, Germany must continue its efforts to reach a higher ranking.

**Fig. 2.4f: Germany's performance compared with market leader as of 2008**

Improve performance in e-Government – increase Internet use

Internet use in the population	Market leader Norway Germany ranked eighth
E-commerce users	Market leader Norway Germany ranked sixth
Use of social networks	Market leader South Korea Germany ranked seventh
Availability of e-Government services	Market leader Denmark Germany ranked eleventh
Purchases by companies via the Internet	Market leader Germany
Sales by companies via the Internet	Market leader Great Britain Germany ranked fifth
Internet use in companies	Market leader USA Germany ranked fifth

Source: TNS Infratest (2009)

### Summary of “Applications”

In summary, we can conclude the following:

- ▶ Compared to other categories, the world's leading ICT industries managed their best performance in the category “Applications”, achieving an average index of 73 points.
- ▶ With an average of 90 index points, Great Britain was the market leader, pushing Norway into second place.
- ▶ The European countries achieved an average of 76 index points (compared to the USA with 88 index points). The Asian countries achieved a region index averaging 62 points.
- ▶ Germany climbed three places from seventh to fourth place, achieving 86 percent of the best possible performance of one hundred points.
- ▶ France made the greatest improvement in the national index in terms of index points (up five index points).
- ▶ The German ICT industry achieved its first market leadership in “Purchases by companies via the Internet”.
- ▶ However, compared to the top 15 ICT industries, in eleventh place Germany performed worst across all key performance indicators and categories for “e-Government”.
- ▶ Germany showed improvement, particularly in “Use of social networks” (up 16 index points).
- ▶ Even though Germany can boast its best performance in “Applications” (ahead of “Infrastructure” and “Market Trend”), further improvements are needed.



### 3.

## Potentials for innovation in the German ICT industry



### 3. Potentials for innovation in the German ICT industry

These days, information and communication technologies (ICT) are already indispensable cross-sectoral technologies for many key areas of the economy. This is not just a matter of the diverse application of “embedded systems” in industries, but also the use of cutting-edge ICT to address the important social challenges of the future, such as healthcare provision, climate protection or energy conservation.

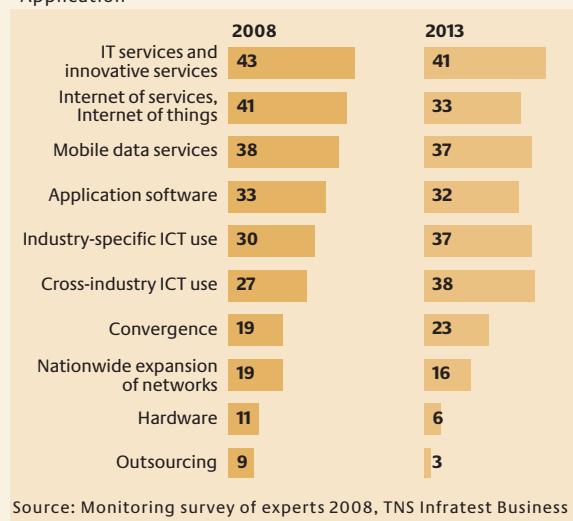
This chapter describes the potentials for innovation in the German ICT industry based on the most important growth areas.

#### Expedite the rapid, targeted expansion of promising growth areas

In 2008, experts working on the “Monitoring the Information and Communication Industry” project identified the key growth areas in the ICT industry. The front-runner was “IT Services and innovative services” ahead of “Internet of services, Internet of things”, “Mobile data services” and “Application software”. Following in fifth and sixth place were “Industry-specific ICT use”, “Cross-industry ICT use”, and in particular “Embedded Systems”. The following section will deal with individual key areas in greater detail.

**Fig. 3a: Chronological comparison of the top growth and innovation areas of the ICT industry as a percentage of mentions**

The top growth areas are in innovative ICT fields of “Application”



Germany is the world's third largest producer of “embedded systems” after the USA and Japan. Above average growth is still forecasted for this sector. The market for “embedded systems” is an excellent growth and innovation driver for the German ICT industry.

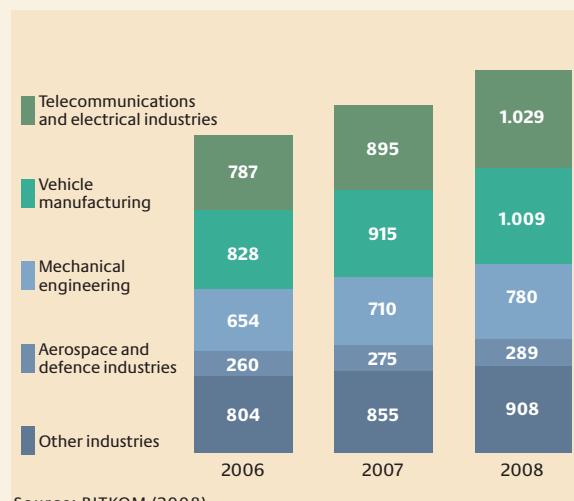
According to BITKOM, the global market for “embedded systems” is growing by eight percent per year. Sales are set to increase from 166 billion euros in 2008 to 194 billion euros in 2010 due to the strong growth of the application potential.

German sales rose by eleven percent in 2008 to 4.01 billion euros. On the supplier side, sales of embedded hardware reached 1.6 billion euros in 2008. Further sales of 670 million euros were generated by software and 1.8 billion euros by services and project-specific software development. In 2008, the German market for “embedded systems” represented 2.8 percent of the German ICT industry's total sales of 144.6 billion euros (including consumer electronics).

2008 also saw more than one billion euros of sales generated with “embedded systems” in the automotive industry and 1.03 billion euros in the telecom/electronics industry, thus making it proportionately the biggest industry. The aerospace and defence industry generated 289 million euros, mechanical engineering 780 million euros, and other industries 908 billion euros.

**Fig. 3b: Germany: Sales of embedded systems by industry in millions of euros 2006 – 2008**

The telecom/electronics industry is the driver for embedded system sales



**Well above average growth rates forecast for cloud computing. Huge opportunity for growth in the predominantly SME-based ICT industry**

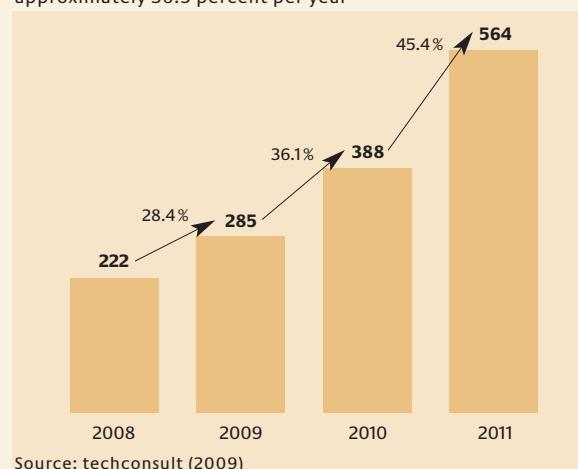
Cloud computing is a paradigm shift: the traditional concept of the ICT application is undergoing a transformation towards the “Internet of services”.

Cloud computing is a new real-time delivery model for IT services, which is bill according to usage. Depending on its use within the value-added chain, there are a number of service options available: Infrastructure-as-a-Service (IaaS – e.g. provision of storage space via the Internet), Platform-as-a-Service (PaaS – e.g. provision of development tools via the Internet), and Software-as-a-Service (SaaS – e.g. provision of applications via the Internet). Cloud computing helps avoid high fixed costs for locally stored software and archived data.

Analysts estimate the global market for cloud computing for 2008 to be worth 31 billion euros. By 2013, this is expected to rise to more than 101 billion euros. IDC estimates that in 2009, seven percent of German companies with 100 or more employees were using cloud services. The volume of the cloud computing market in the B2B sector for 2009 is estimated at 285 million euros. Germany expects a market volume of 388 million euros in 2010, and 564 million euros in 2011. This represents an average annual growth of 36.5 percent for the period 2008 – 2011.

The main concerns of users with regard to cloud computing relate to problems with contract and data protection law, the possibility of limited availability of the Internet, and a lack of confidence in the longevity of providers.

**Fig. 3c: Germany: Development of the market for cloud computing in millions of euro – 2008 – 2011**  
The German market for cloud computing is growing by approximately 36.5 percent per year



**German SMEs as innovation driver**

German SMEs can be a significant innovation driver, particularly in the case of cloud computing. According to the Federal Statistic Office, 99.6 percent of all ICT companies can currently be classified as SMEs. Records show there were 77,861 ICT companies in the Federal Republic of Germany in 2008, of which 742 were large companies with 250 or more employees. While small and medium-sized companies throughout Germany account for 46 percent of Gross Value Added (GVA) and 35 percent of sales, of those figures 49 percent can be attributed to ICT GVA and 44 percent to ICT sales.

As a result – and particularly in view of the present economic and financial crisis - innovative SMEs trying to penetrate international markets should have the support of large companies and public funding to ensure that adequate financing options are available.

**Making greater use of the advantages of modern ICT to address major social challenges, such as healthcare provision, electric mobility, climate protection and e-Energy**

**Growth area – e-Health: annual savings justify initial investment costs**

According to BITKOM, Germany is the only EU member state without a modern e-Health network. The creation of an intelligent network in the healthcare system, such as the introduction of the long-planned electronic health insurance card, would require a one-off investment of 1.7 billion euros, plus annual expenditure of 150 million euros. However, this initial investment would be quickly recouped from the resulting annual savings: one billion euros from the prevention of insurance card abuse, 200 million euros from the use of electronic prescriptions, and 500 million euros from reduced treatment costs.

The Federal Ministry of Health has confirmed the introduction of health insurance cards, albeit with limited functionality initially. In the long-term, the ICT industry is hoping that these functions will be expanded to include the online transmission of patient data, for example.

### **Development of Germany to become market leader in electric mobility**

One application currently being promoted is “electric mobility”. In its current concept phase, electric mobility is more than just the replacement of the combustion engine with an electric motor. In fact, it is about the large-scale use of electric cars, together with infrastructure involved, such as intelligent power supplies (smart grids) or ICT-based charging and billing infrastructures.

Initiated by the Federal Government, the goal of the **“National Development Plan for Electric Mobility”** is to promote research and development and the commercialisation and launching of battery-powered vehicles on the market in Germany. The intention of the Federal Government is that Germany should become a lead market for electric mobility so that it can stand its ground in international competition and maintain its cutting edge in the automotive sector and related supplier industries. As part of its Economic Stimulus Package II, the Federal Government will provide 500 million euros between 2009 and 2011, most of which will be used to promote electric mobility.

### **Growth area – climate protection: energy savings made possible by ICT far exceed ICT energy requirements**

According to the SMART 2020 study conducted by McKinsey, in 2020, 1.4 billion tonnes of carbon dioxide will be generated worldwide through the use of ICT. However, at the same time, ICT use could also reduce global emissions of CO<sub>2</sub> by 7.8 billion tonnes.

The Federal Environmental Agency has calculated that by 2015 some 110 billion kilowatt-hours per year could be saved in Germany, which represents 20 percent of current power consumption. It is essential to exploit the huge potential for saving energy in the information and communication industry if Germany is to reach its climate protection goals.

At the third National IT Summit, the Federal Government adopted its “Action Plan Green IT”. Its aim is to promote the production and development of resource-saving devices and, through the intelligent use of IT, achieve a 40 percent reduction in Germany's energy consumption by 2013.

In the meantime, the “Green IT Alliance” has also taken up the cause under the leadership of BITKOM. Their key goals are as follows: to further develop the political and economic agenda for “Green IT”, expand the pioneering role of the ICT industry in green technologies, improve the export opportunities of German technology suppliers and promote closer collaboration between suppliers, users, policy makers and the scientific world.

Further initiatives in the area of green IT include focussing on the promotion of the new “e-Energy – ICT-based energy system of the future” project initiated by the Federal Ministry of Economics and Technology. It is aimed to create an “Internet of Energy”, which would simplify and accelerate information, communication and transaction processes on the electricity markets. The concept includes applications, such as “Smart Metering” and “Home Network”.

### **Expedite expansion of the innovation drivers “Mobile data services”, IT security and RFID**

### **Growth area – mobile data services as opportunity for the mobile phone market**

Mobile access to the Internet is becoming increasingly widespread worldwide, and is now regarded as one of the largest growth drivers, including in the mobile phone market. Germany needs to take action if it is to develop internationally competitive mobile applications. One of the reasons why business opportunities in the mobile use of the Internet are not being exploited to the full is the lack of customer-friendly tariff models.

Market leader in the international comparison is the USA with a mobile Internet penetration of 15.6 percent. In second place is Great Britain, with a penetration of 12.9 percent. They are followed in the rankings by Italy (11.9 percent), Spain (10.8 percent) and France (9.6 percent). Germany is in the middle of the range in sixth place, with a penetration of 7.4 percent. 63 percent of Germans own a broadband-capable mobile phone, but only a tiny proportion uses them to surf the Internet. The main reason customers are holding back is the perceived high cost of mobile surfing.

The mobile internet will gain acceptance as soon as there is nationwide availability of broadband access to the mobile phone network (Long Term Evolution or 3G). The market for mobile services may well develop into a driving force for innovation. Two key development areas are already emerging for mobile applications. These are mobile mail and navigation systems for business customers and mobile use of social networks for private customers.

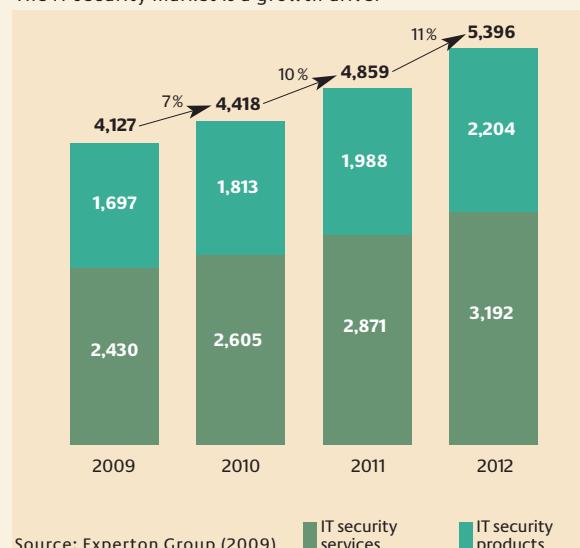
#### **Expedite expansion of security for IT due to higher than average expected growth rates**

Despite the current economic downturn, the market for IT security continues to be regarded in Germany as a growth driver. The category IT Security covers the security of technical systems used in information and communication technology (Security for IT). This takes into account IT security products and IT security services.

The Experton Group predicts a growth of five percent on a volume of 4,124 million euros for 2009. From 2011 onwards, that forecast rises to a growth of more than ten percent.

The participants in the expert workshops held in October 2009 as part of this study also confirmed this growth potential. IT security is regarded as a growth market and one of the clear strengths of the German ICT industry. However, the participants in the workshops also said that Germany still had a lot of catching up to do if it wanted to exploit and above all develop this potential.

**Fig. 3d: Market development for IT security products and services in Germany in millions of euro, 2009 – 2012**  
The IT security market is a growth driver



#### **Eight percent of GVA in 2010 already generated through use of RFID**

41 percent of the monitoring experts spontaneously declared the “Internet of things” to be a promising growth area. This placed the “Internet of things” second in the ranking of the most important growth areas for the German ICT industry.

According to a study by Deutsche Bank Research, global RFID sales will grow annually by 25 percent and reach a volume of 16 billion euros in 2016. Deutsche Bank Research predicts that RFID sales in Germany in 2016 will reach 2.2 billion euros.

According to a study by the Federal Ministry of Economics and Technology (BMWi), by 2010 RFID will already be contributing towards eight percent of GVA in the manufacturing, retail and transport sectors, as well as in the private and public service provider sectors. In 2004, this figure was 0.5 percent. In Germany, sales have increased 19 percent and are expected to reach 2.2 billion euros by 2016. However, the commercial success of RFID depends primarily on the enforcement of uniform standards.

RFID has enormous potential for the economy. Consumers also increasingly benefit from the application of this technology in everyday life. In this context, however, it is important to ensure acceptance of RFID by the general population.



## 4.

### **Identification of fields of action for business and Government in Germany**

## 4. Identification of fields of action for business and Government in Germany

*“Germany lacks the equivalent of the ‘Man on the Moon’ project that was able to inspire and motivate an entire nation. Such co-operation and commitment cannot be generated by projects or ministries. Individual ideas will never change the way we think, but the right visions can make us work wholeheartedly towards their successful realisation.”*



Prof Dr Gunter Dueck,  
IBM Chief Technologist

The German ICT industry needs a vision for its long-term development, and a strategy of action for the years ahead. A vision and strategy aimed at promoting the German ICT industry should be set out in a manifesto designed to appeal to policy makers, the business world and the public, and boiled down to one or more slogans. “ICT made in Germany and applied in a global webciety” could be the mission statement for the German ICT industry.

### Basic principles of the ICT industry strategy

The experts who participated in two workshops in preparation for the IT summit all agreed on the need

to focus on goals and actions within the framework of a strategy to promote the national ICT industry. This should result in a package of co-ordinated measures designed to provide long-term support for the German ICT industry through to 2013. Where necessary, this concept would have to be adapted to reflect current technical and economic developments.

The expert teams drew up a concept for the German ICT industry designed initially to identify its strengths and opportunities, as well as its weaknesses and risks, so that appropriate fields of action could be identified.

**Fig. 2.2a: Strategy for the German ICT industry**  
The next economic upturn will see Germany as world market leader

- |  |   |
|--|---|
| <p><b>1. Reduction of weaknesses and industry disadvantages</b></p> <ul style="list-style-type: none"> <li>▶ <b>Field of action – innovation policy:</b> increased R&amp;D expenditure, tax deductibility of R&amp;D expenses, transparency in the granting of funding</li> <li>▶ <b>Field of action – invention / innovation gap:</b> eliminate shortfalls in the conversion of innovations into marketable products</li> <li>▶ <b>Field of action – industry marketing:</b> targeted national/international marketing campaigns</li> </ul> | <p><b>2. Reduction of key industry risks</b></p> <ul style="list-style-type: none"> <li>▶ <b>Field of action – skills shortage:</b> elimination of skills shortage, e. g. by improving the Immigration Act</li> <li>▶ <b>Field of action – education policy:</b> education and further training tailored to requirements</li> <li>▶ <b>Field of action – financing:</b> provide technology-based companies (SMEs) with risk capital</li> <li>▶ <b>Field of action – data security:</b> safe communication infrastructures for individuals, companies and public bodies</li> </ul> |
| <p><b>3. Prompt exploitation of opportunities</b></p> <ul style="list-style-type: none"> <li>▶ <b>Field of action – telecommunications policy:</b> invest promptly in networks, manage pricing policy at European level</li> <li>▶ <b>Field of action – regulation:</b> regulators as partners and providers of services in the economy</li> <li>▶ <b>Field of action - standardisation:</b> play a leading role in setting standards</li> <li>▶ <b>Field of action – Public Sector / e-Government:</b> cut red tape</li> </ul>              | <p><b>4. Further expansion of key strengths</b></p> <ul style="list-style-type: none"> <li>▶ <b>Field of action – exploitation of growth opportunities:</b> use of ICT as a cross-sectoral technology in promising application areas</li> <li>▶ <b>No action required:</b> maintain excellent research and development (patent protection)</li> </ul>   |

## Reduction of weaknesses and industry disadvantages

### Need to focus ICT industry strategy through to 2013

To make the German ICT industry world leader, we need to focus on goals and courses of action within the framework of an ICT industry strategy 2013.

The aim of this strategy would be to

- ▶ eliminate existing weaknesses of the German ICT industry;
- ▶ minimise risks;
- ▶ exploit the opportunities offered by promising new applications as a growth driver, and
- ▶ where we are in a strong position, leverage the existing advantages of the German ICT industry.

### Field of action – industry marketing

The German ICT industry has image problems abroad. It is not widely known that Germany produces high-quality software and solutions, and this needs to be better communicated in future.

The interviews with experts showed that Germany is perceived abroad as the nation of “BMWs and Porsches”. Future marketing of the German ICT industry should therefore promote an association with the globally recognised strengths of the German economy. We should strive to position Germany as one of the world's leading innovative locations, at the same time ensuring that it is also recognised as a market leader.

## Reduction of weaknesses and industry disadvantages

### Field of action – innovation policy

*“In many industrial nations, it is seen as the mark of a modern innovation policy to invest ten percent of its economic performance in research and education. The Federal Republic still has a long way to go to reach this target: the latest figures show that private and public expenditure on education and research amounts to only 7.3 percent of GDP.”* (BDI / Deutsche Telekom Foundation: Innovation Indicator 2009)

The experts agree that the innovation policy needs to create a better statutory framework for innovation in the German ICT industry.

- ▶ Increased R & D expenditure: experts are demanding an increase in R & D expenditure for information and communication technology, as this would considerably increase the attractiveness of Germany as a research location. ICT research has a particularly dramatic effect on implementation and growth. This should be given greater consideration in future when allocating research resources in projects. BITKOM is demanding a 15 percent increase in public funding for the ICT industry from 2009 onwards.
- ▶ Tax deductibility of R & D expenses: tax incentives should encourage research and development – as is already standard practice in almost all OECD countries.
- ▶ These tax incentives should not be available solely to SMEs, but to all companies in the German ICT industry. However, tax incentives should supplement direct public research funding, not replace it.
- ▶ Transparency in the granting of R&D funding: experts are demanding a simplification of the application procedure for funding and faster approval procedures. Even under the Federal Government’s high-tech strategy, the granting of funding still lacks transparency.

### Field of action – invention / innovation gap

*“We are too slow to convert value-enhancing innovations into marketable products. One reason for this is that we lack the human resources to exploit technical advantages for the benefit of our businesses.”*

(Dr Michael Gorri, Daimler AG)

**“Produce more marketable products from inventions.”** A particular weakness of the German ICT industry is the “gap” between research, development and application, and failure to adopt innovations quickly enough. Eliminating the “innovation gap” would be of considerable benefit to the German ICT industry, as its innovative strength is otherwise world-leading. The reasons for this “innovation gap” are probably a lack of co-operation between the economy and publicly-funded research, and insufficient financing options for R & D projects in near-market phases.

Recommendations of the experts:

- ▶ Research and development projects should be more realisation-oriented. They should be expanded to include aspects, such as technical feasibility, assessment of commercial prospects and promotion of market entry and should leverage any advantages for sustained market success. Development projects should include systematic checks to ensure sufficient attention is being paid to all implementation aspects.
- ▶ Integration of application know-how: training and research should be expanded to systematically include application know-how and knowledge management techniques.
- ▶ Supporting the internationalisation of SMEs: The attempts of SMEs to gain a foothold on international markets do not receive enough support from large companies or public funding.

## Reduction of key industry disadvantages

### Field of action – skills shortage

*“Education spending in Germany is below the OECD average. This jeopardises the future of our ‘federal state of education’ in the face of global competition. We need concrete measures, such as the promotion of higher education and research, if we are to move up into the top group in the next four years.”*

(Prof Dr Lutz Kolbe, Georg August University, Göttingen)

As a result of demographic developments, we are currently facing an increasingly acute, structurally conditioned skills shortage. This is due not only to deficiencies in education, further training and international recruitment, but also to an inflexible employment market. Experts are of the opinion that Government policy makers have so far failed to recognise the true scale of the problem.

### Elimination of skills shortage through improved education

The experts recommend the following measures:

- ▶ reforms in the so-called MINT subjects at schools, i. e. Maths, Information Technology, Natural Sciences and Technology – BITKOM has demanded that the teaching of MINT subjects be increased from 25 percent to 33 percent of the total number of lessons. Experts are also demanding uniform education standards and curricula for MINT subjects;
- ▶ promotion of ICT subjects among pupils and students – measures to increase the appeal of study courses and career paths – efforts should be made at a young age to interest girls in technical subject matter, careers and courses;
- ▶ reforms in the MINT subjects in higher education, in particular with the aim of encouraging greater internationality: “More foreign professors at German universities! More German professors at foreign universities!”. Furthermore, educational qualifications should be internationally comparable;

- ▶ expansion and improvement of in-company vocational training and further training, and better dovetailing of qualifications and general HR policy measures – support of private further training initiatives in the form of tax incentives.

### Field of action – education policy

*“The popularity, or rather unpopularity, of the so-called MINT subjects is a major problem. There is also a gender-specific issue, reflected in a lack of female interest in these subjects. If we were able to inspire the interest of this target group, Germany’s talent pool would grow by almost one hundred percent.”* (Dr Herbert Heitmann, SAP AG)

### Education policy should focus more on MINT subjects to close the skills gap

Experts recommend the following measures:

- ▶ Increase education spending – for example, BITKOM is calling for an increase in education spending from 5.1 percent of GDP to 6.1 percent over the next five years. Some experts ventured the opinion that investment in education was even more important than investment in networks.
- ▶ According to BITKOM, “we need time to reform the completely inflexible structure of educational federalism in Germany. It is time for the Federal Government and the Länder to ‘pull together again’ and get educational reform under way in the near future.” According to experts, this should focus in particular on the introduction of uniform nationwide educational standards for MINT subjects. These should be drawn up “in close consultation with the education authorities and the business world” (BITKOM).

## Reduction of key industry disadvantages

- ▶ More students from each school year need to opt for further education if we are to meet the demand for skilled workers. A larger proportion of these students need to opt for a MINT subject. There is a lack of enthusiasm for new technologies in Germany: "We need to start early and motivate school pupils to take an interest in natural sciences and technology, particularly female pupils. Managers must not consider themselves above teaching MINT subjects in schools".
- ▶ We need to ensure greater compatibility between career and family. However, the conditions must be such that women stay in their chosen careers.

### **Tax incentives for the education and further training of skilled ICT workers – continued further training in companies during the economic crisis – universities offering continuing vocational training**

*"We want to carry out a marketing campaign for the German ICT industry to generate greater enthusiasm for technology. We need more willingness to innovate and take risks, more entrepreneurship, and we need society as a whole to have more faith in the concept of free-enterprise."*

(Thomas Schröder, Sun Microsystems GmbH)

- ▶ The need for entrepreneurship should be taught within the education system. One of the main reasons why foreigners refuse to invest in Germany is said to be a lack of entrepreneurial spirit.
- ▶ The need for continuous training of skilled workers in the ICT industry is greater than in any other industry.
- ▶ Experts recommend anticyclic investment in further training. In-company vocational training and further training should be more integrated with the rest of HR policy.

- ▶ Education and further training should be encouraged by means of tax incentives.
- ▶ Universities should offer more opportunities for further education.

### **Eliminate the skills shortage by facilitating immigration for highly qualified personnel**

*"It is crucial for the German ICT industry to develop national and international talent pools and to offer continued support to encourage them to stay in Germany as a business location!"*

(Marie-Therese Huppertz, SAP AG)

Germany needs to evolve into an attractive immigration country for highly qualified staff, without neglecting to further develop the know-how of skilled employees on the domestic market.

The following measures are recommended:

- ▶ easing of the Immigration Act, especially where settlement permits for highly qualified skilled workers;
- ▶ proactive international recruiting, especially for high potentials with international experience;
- ▶ greater flexibility on the job market, such as a relaxation of dismissal protection laws.

We need globally active companies based in Germany, not least because high potentials do not want to work in organisations that are purely sales and distribution-based. At the same time, the German ICT industry should be made more attractive to foreign companies. Germany must strive to remain an attractive business location for foreign companies to set up, and must take care not to lose its liberal image regarding inward investment matters, for example via campaigns which compare foreign investors to a plague of locusts.

## Reduction of key industry risks

### Field of action – financing

*"It is now much harder to obtain credit than before the economic crisis, and this could be regarded as an obstacle to the expansion of the German ICT industry."*  
(Prof Dr Paul J.J. Welfens, Bergische University, Wuppertal)

**Venture capital.** Access to venture capital and other forms of credit must be ensured, especially in the current economic and financial crisis. In particular, there should be tax incentives for venture capital, and the regulations for payments from profits should be revised.

**Provision of credit.** Business creators still do not have access to sufficient financing options. In the current financial crisis it has become even harder to obtain credit. At the same time, the other conditions for start-ups have also deteriorated.

**Government funding should support internationalisation of SMEs.** While we have plenty of start-up centres, we do not support them long enough. Start-ups and SMEs should also receive public funding to help prepare them for the global market.

### Field of action – data security

*"If we want more digital data communication in networks, we cannot rely on laws based on concepts from the previous century. We need to create an information law that guarantee users certain minimum standards."*  
(Stephan Holländer, HTW Chur)

In 2008 the sharp increase in data theft sparked a debate on data protection issues. Data security is becoming a critical factor in the success of ICT applications. Policymakers must provide an appropriate legal framework.

Experts recommend a revision of data protection law. The Federal Government should work together with the EU to create a modern data protection law, for example, one that offers different levels of protection for data transmission and is tailored to the requirements of the digital age. The team of experts involved in this study also discussed the creation and expansion of a citizen portal as a platform for addressing the issue of data protection.

## Prompt exploitation of strengths

### Field of action – telecommunications policy

*"Enabling! – putting other industries in a position where they can achieve greater growth. The ICT industry is better placed to do this than any other. In the next ten years, broadband expansion alone will allow up to a million jobs to be created across all industries. The German ICT industry needs further initiatives similar to those introduced by the Federal Government for broadband."* (Dr Wolfgang Kubink, Deutsche Telekom AG)

Broadband networks form an essential basis for innovative products for the ICT industry. With a broadband penetration of more than 28 percent, Germany is in the middle of the range, in seventh place among the top 15 ICT industries.

Experts believe that:

- ▶ Investments in networks are essential to allow a broader spectrum of innovations.
- ▶ The distribution of frequencies released as a result of the "Digital Dividend" should be used to ensure nationwide provision of broadband connections, particularly in rural areas.
- ▶ Income from the auction of wireless broadband services should flow into a "digitisation fund" sponsored by the Federal Government and the Länder and used for the further expansion of digital media.
- ▶ Businesses should support the "infrastructure atlas" to be drawn up by the Federal Network Agency. Greater transparency would significantly reduce the cost of underground construction work, which accounts for 80 percent of cabling costs.
- ▶ In view of the falling income from telecom services, regulatory measures for consumer prices, such as regulation of end prices for data services, reduction of roaming charges or further reduction of termination fees should be implemented with a sense of proportion. According to BITKOM and experts, such regulatory interventions should be completely avoided if possible.

### Field of action – regulation

*"Building up a high-capacity broadband infrastructure is a key task for the general economy, and requires enormous investment. Without an effort by all the players, and without a competition of ideas, technologies and business models, we will fail in this endeavour. This particularly applies to the penetration of areas as yet unserved by broadband. Regulation will continue to play a role."*

(Dr Iris Henseler-Unger, Federal Network Agency)

Experts advocate the continuous monitoring and adjustment of the regulatory framework, because markets and their conditions are changing so fast.

- ▶ The current regulatory policy serves the purpose of safeguarding competition and preventing any abuse by market-dominating companies. In view of the investment in infrastructure required, the German ICT industry needs to focus more on regulatory goals that are both investment and innovation-friendly.
- ▶ The effects of regulatory measures on growth, capacity for innovation and jobs should be given greater consideration. Regulators must be seen not only as controllers, but also as partners and providers of services in the economy.

## Prompt exploitation of strengths

### Field of action – standardisation

*“The country that sets the standards has every chance of determining and dominating the markets. As a nation we can and should take it upon ourselves to lead the way in standardisation.”*

(Prof Dr Hermann Eul, Infineon Technologies AG)

German suppliers and manufacturers set standards. As the process of globalisation continues, standardisation is becoming an increasingly important competitive factor.

Experts advocate that:

- ▶ Germany should be doing everything in its power to set its own standards (for e-Mobility, for example) or at least play a part in setting global standards. It would be inexcusable if opportunities to take part in this process were missed because we were not represented in the relevant bodies.
- ▶ The German ICT industry must draw more on its experiences with standardisation processes and learn from them. Nanotechnology was a negative experience (where Great Britain prevailed over Germany) while laser technology proved to be a positive experience.
- ▶ In China, the development and enforcement of standards is promoted through public funding and by other initiatives. We should investigate what can be learned from this example.
- ▶ In Germany, information and communication technology products often need to complement one another and be standardised through to the finished plug & play device. This offers global advantages over stand-alone and local solutions.

### Field of action – Public Sector / e-Government

*“In the IT sector, the Government is often a very big customer, and may act as a trailblazer. However, Government procurement guidelines and practices are not necessarily innovation-friendly. Furthermore, public procurement officers always have to concern themselves more with costs than with a strategic vision that would also include the aspect of innovation.”*

(Prof Dr Knut Blind, Technical University of Berlin)

- ▶ Small and medium-sized companies in particular are struggling to cope with bureaucracy. Online technologies are often not deployed enough, or indeed at all, to establish working connections between the commercial sector and the authorities. We need to press ahead with the development of eGovernment 2.0.
- ▶ Government procurement guidelines impede innovation and lead to suboptimal availability of e-Government. There is also a qualification problem where procurement officers are concerned.
- ▶ As both buyer and supplier, the Government should set an example with innovative services (such as the electronic identity card).

## Further expansion of key strengths

### Field of action – focussing on growth areas in the ICT industry

*"ICT must remain an integral part of Germany's success story. We are striving to consistently implement ICT innovations in our user companies. As a strong ICT industry with marketable products, we will be able to further expand as an export nation – both with 'IT made in Germany' and 'IT applied in Germany'."*

(Dr Thomas Endres, Deutsche Lufthansa AG)

Suppliers increase demand by developing innovative products with strong commercial viability. In future, business enterprises should orientate themselves more strongly towards potential demand and customer requirements. According to the experts, one new approach that should be investigated for Germany as a business and ICT location is that companies should adopt a more demand-orientated innovation policy. It is possible to drive high demand for new, highly innovative products with strong commercial viability among both individuals and public authorities. Examples include company-specific applications in high-price segments and process innovations in a range of application sectors.

In detail this means that:

- ▶ Manufacturers need to expedite the diffusion of innovations to application industries and increase the level of use of ICT products in private households.
- ▶ The focus should be on the use of ICT products – right through to checklists for users in the corporate sector. The choice of words and descriptions of con-

nnections should avoid unnecessary Anglicisms and be well-written and easy to understand. Failure to communicate with the customer means missing out on potential sales.

- ▶ One way of stimulating demand is via the promising fields of application of the future. In particular, these include the application sectors below, which are being driven forward by both economic policy and companies in the ICT industry.

These include:

- ▶ Traffic telematics
- ▶ e-mobility
- ▶ Climate protection or Green IT
- ▶ e-Energy and Energy efficiency, in particular Smart Metering
- ▶ Healthcare, e. g. electronic health insurance card and e-Health
- ▶ IT security, particularly in product areas that demand very high levels of IT security
- ▶ e-Government and further stimulation of demand by the Government.

Experts recommend the following action to expand these fields of application:

- ▶ Identification of key projects by businesses: Businesses should identify key projects in promising application sectors that are likely to be suitable for export. For example, equipping the entire Ruhr area with electric vehicles would be a key project that could bring about the adoption of e-mobility in Germany.

## Further expansion of key strengths

- ▶ Bundling large companies and SMEs in innovation clusters. There is global evidence that operating in networks gives companies a competitive advantage. Experts at the workshops recommended:
  - ▶ establishment and maintenance of innovation clusters, paying special attention to start-ups and technology-based SMEs;
  - ▶ encouragement of collaboration between SMEs and large companies in the areas of research, development and innovation;
  - ▶ promotion of cross-border and international innovation clusters.
- ▶ Government support for the implementation of flagship projects: it is crucial to continue direct co-operation between the private sector and economic policy, for example in flagship projects. The position of a Chief Information Officer (CIO) at Federal Government level should be supplemented by that of a "Chief Operating Officer" (COO) who would be responsible for the implementation and co-ordination of flagship projects.
- ▶ Strengthening of co-operation between suppliers and users: the dismantling of barriers between suppliers and user companies and the introduction of more effective collaboration between them would reduce costs by billions of euros. Co-operations could be initiated by both the business sector and the Government. The IT Summit has become an ongoing platform for direct dialogue between Government, businesses and the world of research.
- ▶ Adequate funding: adequate funding must be made available for project management. Lessons and conclusions should be drawn systematically from previous successes and failures with pilot projects, project management, public private partnerships, funding programmes and other initiatives (such as Transrapid and the health insurance card).

## Patent protection

- ▶ The existing patent protection system promotes innovation. Experts regarded this as an area of existing strength, and did not define any course of action.



## 5.

# Competitiveness of the top ICT nations



The background is a blurred collage of multiple computer screens, each showing different data visualizations such as bar charts, line graphs, and tables. This creates a sense of a complex, data-rich environment, possibly a control room or a data center, where multiple metrics are being monitored and analyzed simultaneously.

## 5.1 The USA – the global ICT market leader

The current economic crisis has seen the USA's GDP fall 2.8 percent in 2009, down to 9.4 trillion euros. However, it is expected to remain steady in 2010. In 2009, the turnover of the ICT sector shrank by 1.9 percent to 621.4 billion euros, while in 2010 it is expected to grow by 0.3 percent to 623 billion euros.

The following strength / weakness profile of the US is based on the results of the TNS benchmark study and an evaluation by leading experts in the USA.

### Economic situation

The USA has the largest, most technologically advanced economy in the world. With a GDP of 9.7 trillion euros in 2008, the US economy generated one fifth of the world's annual income. In the global economic crisis, the International Monetary Fund (IMF) is assuming a 2.8 percent decline in gross domestic product (GDP) for 2009, with economic stagnation in 2010, and that the USA will resume its economic growth in 2011.

With exports of 878 billion euros in 2008, the USA is one of the largest export countries in the world, behind Germany (1,018 billion euros) and China (967 billion euros), but ahead of Japan (508 billion euros).

The USA is a service society, and generated 68 percent of its GDP in the service sector in 2008. Broken down into individual sectors, the financial sector leads with 20.7 percent, followed by the public sector (12.6 percent) and industry (11.7 percent).

### The USA is the global market leader in ICT

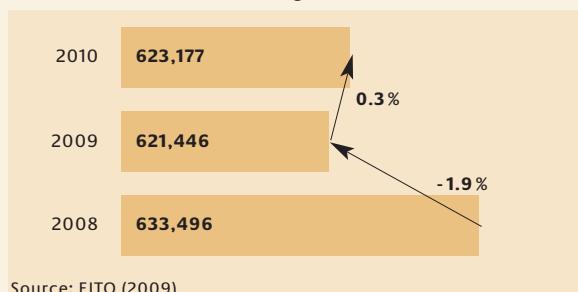
The USA has by far the largest ICT market in the world.

According to EITO, in 2008 the US ICT market generated sales of 633.5 billion euros. In 2009, sales are expected to fall 1.9 percent to 621.4 billion euros. An interviewee commented: "Companies cut back the budgets due to the economic crisis and the end users have slowed down purchases as well."

EITO predicts a 0.3 percent growth in the ICT market in 2010, to a sales volume of 623.2 billion euros.

In 2008, information technology generated 50.4 percent of ICT turnover, slightly more than telecommunications. Because the IT sector is suffering more from the global economic crisis than telecommunica-

**Fig. 5.1a: ICT sales in millions of euros and average annual growth rate, 2008 - 2010**  
The USA will resume economic growth in 2010.



Source: EITO (2009)

tions, the proportion of turnover contributed by the latter is expected to rise to 50.3 percent in 2009 and 50.8 percent in 2010.

The success of the USA on the global markets was explained by one expert as being due to the fact that there was no invention / innovation gap in the USA and it was able to launch products quickly through a wide range of sales channels.

"California is a big market. The United States of America is a huge market. Products can be developed and drafted very quickly. We have these dynamic channels of distribution where you can get products into the market quickly. One of the things about America is the willingness to try innovative things. And more or less every company tries to innovate. This is a kind of underlying willingness. Because the country is so large, product features succeed or fail very quickly. If they are successful, then there is a huge and promising market."

In the USA, 265,000 ICT companies generate a total annual turnover of 633 billion euros. The largest and best-known companies are AT & T, IBM, Intel, Google and Microsoft. The concentration of companies is particularly high in individual ICT submarkets in the USA (e.g. telecommunications, operating systems), so that the 50 largest companies generated more than 60 percent of total turnover.



Nick Collins,  
Senior Vice President,  
Technology Research and  
Consulting, TNS US

### TNS benchmark: the USA's performance in the category "Market development"

The American ICT industry has a global market share of 28.4 percent, placing it ahead of Japan (9.4 percent). In terms of sales it is global market leader, and is ranked first in the TNS benchmark study with one hundred points. China and Germany are in third and fourth place, each with a market share of 5.9 percent.

With "ICT expenditure per inhabitant" at 2,078 euros in 2008, the USA was ranked third in the group of most important ICT industries, behind Denmark with 2,227 euros in ICT expenditure per inhabitant and Norway with 2,172 euros.

The IT sector in the USA has been hit hard by the current economic crisis (slowdown in investment) and falling hardware prices. In 2009, sales in the IT sector fell by 3.4 percent. In the international comparison, the USA was ranked seventh in the TNS benchmark study in the category "Growth in IT turnover".

Its "R&D expenditure for ICT as a proportion of GDP" was low at 0.32 percent. Experts put this down to the fact that far less money is being invested in innovations during the economic crisis.

*"The ICT industry has been one of the most important growth drivers in the US economy in the last twenty years. The biggest players in hardware and software are all headquartered in the US. We have the global players, thus we are setting global standards."*

"In the last couple of years the companies were underfunded. You may see a slowdown in innovation in the US until 2012/2013 because of the underinvestment of the last two or three years."

According to the European Patent Office, in 2008 the American ICT industry registered 30 patent applications per million inhabitants. This placed them only eighth in the TNS benchmark ranking.

### The reasons for drops in turnover in the IT sector are a slowdown in investment and a decline in consumer confidence

The IT sector generated 309 billion euros in 2009, 3.4 percent less than in 2008. The IT sector showed a 3.0 percent growth in 2008 and 5.6 percent growth in 2006. Experts expect a further 0.7 percent drop in IT sales in 2010, down to 306.5 billion euros. The developments forecast by EITO have been confirmed by American experts. "It is to be expected that people and companies will spend less for IT services and products. I assume that revenues will slow down by one percent in 2009."

Sales in the hardware sector fell 3.4 percent in 2009, down to 72 billion euros. One year previously, sales rose by 0.3 percent.

Fig. 5.1b: Market development in the USA, 2007 - 2008  
The USA has the largest ICT market in the world



Fig. 5.1c: IT market sales in the USA in millions of euros and average annual growth in percent, 2008 - 2010  
Decline in IT sales due to economic crisis



*"I would say that we might have a shortage of real hardcore scientists in the next 3 to 5 years. That is due to the problem of immigration. The US restricts immigration of scientists from outside the country."*



The experts consulted felt that commercial customers were to blame for this drop in sales. The highly IT-dependent bank and insurance industries in particular have not upgraded their hardware at all. "The financial services industry was very reluctant regarding their investments in ICT. However, this will change from 2010 onwards."

The computer industry primarily has investments by Government agencies and demand from public healthcare and education services, both of whom have benefited from economic recovery programmes, to thank for the fact that the market did not collapse completely in 2009.

According to EITO, sales will decline by 0.7 percent to 69 billion euros in 2010. 61 billion euros were generated in the software sector in 2009, representing a 3.1 percent drop in sales. In 2010, sales are expected to fall 0.8 percent to 60 billion euros. In 2009, the IT services sector had a turnover of 176 billion euros, which was 1.8 percent lower than the previous year. Sales in 2010 are expected to rise 0.7 percent, to 177 billion euros.

### The Telecommunications market

According to EITO, turnover in the telecommunications market declined by 0.4 percent to 313 billion euros in 2009. In 2010, the market is predicted to rise 1.3 percent to 317 billion euros. The American experts consulted predict that telecom sales will remain steady or rise slightly.

In 2009, the market for telecom services increased to 261 billion euros, a growth of 0.9 percent. Revenue drivers are mobile data services, with a growth of 18.6 percent to 27 billion euros, and Internet services, with an increase of around 4.1 percent, to 25.5 billion euros. Sales of telecommunication services rose 1.8 percent to 265 billion euros.

**Fig. 5.1d: Telecom market sales in the USA in billions of euros and average annual growth in percent, 2008 - 2010**  
The Telecom sector has been far less severely hit by the economic crisis.



Source: EITO (2009)

Sales of telecom devices fell 0.4 percent to 313 billion euros in 2009. This decline in sales was largely due to the mobile communications device sector, where sales fell 9.3 percent to 21 billion euros in 2009. In 2010, sales are expected to drop a further 1.4 percent, to 51 billion euros. "The US has been one of the first countries with a very high landline coverage. That's why the mobile penetration is only catching up. China on the other hand is only building up a mobile coverage."

### Decline in recruitment after economic crisis – currently no shortage of skilled workers

At the end of 2008, the financial crisis caused the US real economy to enter a recessive phase. Nonetheless, according to the "Bureau of Labour and Statistics" the number of IT workers rose 3.8 percent to 4.97 million. In 2007, the number of skilled IT workers had risen 4.4 percent to 4.79 million. However, according to Jancor Associates the demand for IT specialists fell by six percent between November 2008 and November 2009. In 2009 the IT sector reacted to the economic crisis with large-scale redundancies. According to the consultancy firm Challenger Gray & Christmas, the computer industry plans to lay off 24,000 employees, while the telecommunications sector plans to reduce its labour force by 13,000, and the electronics sector by 11,000.



Charles A. White,  
Senior Vice President,  
Client Services, TNS US

The experts consulted felt that there was currently no skills shortage in the USA. However, the experts anticipated a shortage of highly specialised skilled workers in three to five years, once the current economic crisis has been completely overcome.

This skills shortage will arise because the American Government is now imposing greater restrictions on the immigration of experts from abroad. "Technology innovations could be much easier if the immigration rules weren't so hard."

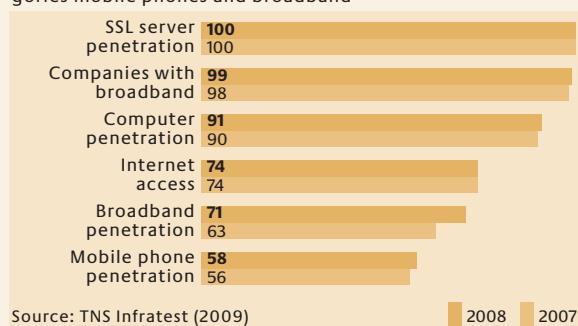
The IT industry has a good, close relationship with renowned educational institutions: "I think we have an especially good relationship between the IT industry and the major leading universities. All the big IT companies definitely go to the major universities and offer them equipment so that the students get to use their equipment from early on. Universities and business are very close to each other."

#### **TNS benchmark: the USA's performance in the category "Infrastructure"**

**Broadband.** In 2008, the USA was second only to China in absolute figures for the most broadband connections worldwide. However, in the international comparison, the USA still has some significant catching up to do as its penetration rate is only 26

**Fig. 5.1e: Development of infrastructure conditions in the USA, 2007 - 2008**

The US still has some serious catching up to do in the categories mobile phones and broadband



*"The broadband Internet offerings from the telecom providers as well as the cable providers entered the US-market at the same time, thus the cable and the telecom providers had overlap in customer relationships. So it was a natural extension to choose either the telecom or the cable provider for broadband. That is why cable penetration for broadband in the US is much higher than in Germany."*

percent (compared to world leader Denmark with 37 percent), and the USA is trailing a full 29 index points behind global market leader Denmark in the TNS benchmark study.

The experts consulted explained that this poor performance was primarily due to the size of the country. One expert commented: "Rural areas are technological black holes and broadband is concentrated on large urban areas."

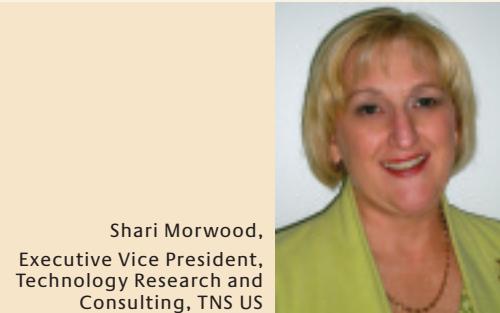
The US Government has announced "stimulus packages", similar to initiatives in Germany, designed to boost broadband coverage in the USA. However, in the category "Companies with broadband connection", the USA has 99 index points, taking second place after world leader South Korea in the TNS benchmark.

Broadband as an Internet connection already has wide acceptance among Internet users and in 2008, narrow band was used in only eight percent of Internet households. Use of broadband in Internet households rose to 94 percent in 2009. It is expected that by 2014 at the latest only one percent of Internet households will still be using narrowband. However, that is still the equivalent of one million households.

In the USA, TV cable connection has become the main mode of delivery for media content. Cable connection is highly suitable for the transmission of multimedia content because of its high bandwidths. eMarketer has calculated that in 2008 DSL had more than 41 percent of the US market, while the market share for cable was 53 percent.

The DSL market share is expected to fall to 40 percent by 2012, that of cable to 50 percent, while "other technologies" (e.g. Powerline and satellite) are expected to achieve a market share of more than nine percent.

*"The US ICT industry is a very important industry in terms of innovation and in terms of helping the economy to grow. A big future trend is mobile communication. This is something very fundamental happening now in the industry. It is extremely promising, because it is shaped by the young people who are really technology adopters."*



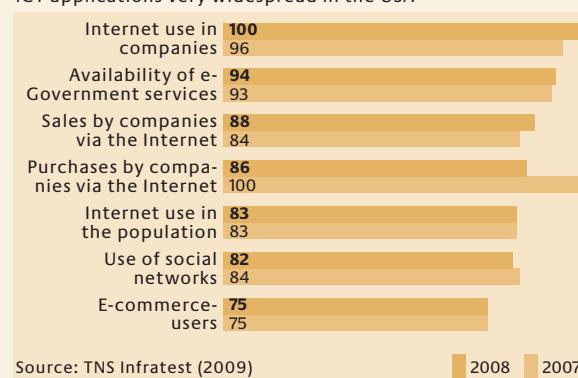
Shari Morwood,  
Executive Vice President,  
Technology Research and  
Consulting, TNS US

**Mobile communication.** In 2008 there were 270 million mobile phone customers in the USA. While this represents a mobile telephony penetration of 87 percent, world leader Finland already has a penetration rate of 129 percent. One expert gave the following explanation for this gap: "The service is very expensive and you need to have a good credit to have the service. In addition there are a lot of poor people in the US."

In "SSL server penetration" the USA is global market leader.

#### TNS benchmark: the USA's performance in the category "Applications"

Fig. 5.1f: Use of ICT applications in the USA, 2007 - 2008  
ICT applications very widespread in the USA



Source: TNS Infratest (2009)

After China, the USA is the country with the largest number of Internet and broadband users. In 2009 the number of Internet users in the USA reached 228 million. However, this represents a penetration rate of only 74.1 percent, leaving the USA in ninth place in the ranking, well behind world leader South Korea.

However, "internet use in companies" is higher in the USA than in any other country, and in 2008 it was global market leader in this category.

In "Availability of e-Government services" the USA achieved 94 index points. This corresponds to third place in the TNS benchmark, behind Denmark and Sweden. "A lot of what people do with e-government in the US is paying money and accessing information. A lot of that runs through internet access and usage. If you look at the applications that people use to work with and speak to the government this is very in line with how people use the internet and technology in general. That is an alignment. It is just a little faster than walking to people directly."

According to Nielsen, 94 percent of Internet users have bought products online. "The advantage of online shopping is that the people save money because there is no risk of impulse buying like in normal shops."

54 percent of all companies buy products via the Internet, and 28.4 percent of all companies sell via the Internet. This put the USA in second place (after Germany) and third place respectively in the TNS benchmark study.

According to Pew Internet, 35 percent of adult Internet users (18 years old and over) have a profile on at least one social network. This places the USA in fourth place in the TNS benchmark ranking with 82 points, which is 18 index points behind the world leader, South Korea.

In 2005, however, the rate was only nine percent. "The baby boomers generation jumped onto the social network band wagon." 65 percent of all youths (12 – 17 years old) who have an Internet connection have a profile on at least one social network.



Don Ryan,  
Vice President, Technology  
Research and Consulting, TNS US

### **Summary: strength/weakness profile for the USA**

In the interviews, experts were asked to identify three key strengths and weaknesses from their perspective. They were asked to supplement and verify the results of the TNS benchmark accordingly.

In addition to the significance of its high-turnover ICT industry on the global market mentioned earlier, a particular strength of the US ICT industry is its considerable capacity for innovation. This applies to large, medium-sized and small companies in equal measure. “All companies are trying to innovate. Big companies and also small companies always look at innovative ways to consume ICT services.” “I think it is because of the low (legal) entry barriers for these innovations, in that way they can get to market pretty quickly.”

*“Having established channels is very important. In the US we can move products into the market very quickly and test their feasibility so that they succeed or fail quickly.”*

In the USA, new products are launched on the market very quickly.

The US ICT industry has global players setting global standards in each category. “The real leaders – if you look at the technology as a stack – are US companies. They focus a lot of attention on the US market and a lot of innovation, that they develop, is first offered in the US. Look at HP, Microsoft and Intel. These are international companies but a lot of what they do, is first introduced in the US before it is introduced corporally, meaning that the US is in a competitive advantage.”

“In the future, there will be even a greater concentration on these big leading companies that are located in the US.”

**Fig. 5.1g: Strength/weakness profile for the USA**  
USA still global market leader

<b>Key strengths</b>	<b>Key threats</b>
<ul style="list-style-type: none"> <li>▶ Capacity for innovation</li> <li>▶ Marketability (“time to market”)</li> <li>▶ Market leadership, global players in all ICT categories</li> </ul>	<ul style="list-style-type: none"> <li>▶ Possible weakening of the global market power of Microsoft</li> <li>▶ Saturation of the IT sector, particularly in growth markets</li> <li>▶ Digital divide where broadband connections are concerned</li> </ul>
<b>Key weaknesses</b>	<b>Key opportunities</b>
<ul style="list-style-type: none"> <li>▶ Economic crisis has brought the “venture capital market” to the verge of collapse</li> <li>▶ Lack of credit provision</li> <li>▶ Effects of the economic crisis on demand (private, companies and public authorities)</li> </ul>	<ul style="list-style-type: none"> <li>▶ Mobility</li> <li>▶ Entertainment – “the Americans have a continued desire for better &amp; more realistic entertainment”</li> <li>▶ Innovative services on the Internet (e. g. cloud computing, “peak computing”, green ICT)</li> </ul>

*"An argument for setting up a local country office of an ICT company in Germany is that from a characteristic standpoint Germans are no-nonsense people, they are very efficient, have a clear plan, execute the plan and finish innovations."*

One major **threat** is the possible weakening of the global market power of Microsoft. If this were to happen, it would weaken the USA's supremacy in the ICT industry.

"One risk is that Microsoft is going to lose its prior position. Microsoft is getting older. The personal computing software as we know it today starts to get eclipsed by other forms of computing and software delivery. If you think of a type of company that minimises its technology leadership in the US, I think it is Microsoft. But if Microsoft loses its position it could weaken the whole industry and, thus, weaken the US's position as a leader. If there was a company that could take Microsoft's place it would be Google."

This weakening of the US's lead position should be seen within the context of globally saturated IT markets. The saturation of growth markets in particular has caused a demand backlog and thus a fall in prices, which has in turn led to a slump in sales for globally active US companies.

The USA has a clear "digital divide" where broadband Internet connections are concerned. Rural areas in particular lack the necessary technological conditions for the introduction of broadband. "Statistics show that broadband does enhance people's lives also from an intellectual point of view. It is critical for America that broadband is not only brought into rural areas but also into urban regions where people are deemed to be impoverished. All need to be given access."

A key current **weakness** of the American ICT industry is that the venture capital market has collapsed in the economic crisis. "A lot of innovation is driven to venture backed start ups and the venture market has basically dried out. So you will see less innovation in the next two or three years to come."



Bernard Brenner,  
Senior Vice President,  
Innovation and Product  
Development, North America  
Technology Sector, TNS US

Another weakness is the lack of confidence in the financial sector. "Lack of credibility in financing: Companies want to make capital investments and are constrained to do so."

During the economic and financial crisis, expenditure for ICT products has declined in the private, commercial and public sectors (cf. above, Drops in turnover in the ICT industry).

One of the most promising **opportunities** for the future is mobile communication. Because there is room for improvement in this sector, it has considerable potential. "I think the way people work and communicate and use mobile technology, is so far not very well developed. One of the opportunities is that we could drive a whole new working and personal communication pattern using mobile communication."

These new applications are driven in particular by the young generation: "What I think is really important is unified communication. There is a big trend. It is about how the voice communication we are having now is changing into some kind of data communication. That's something very fundamental for the industry and shaped by the young people who already are technology adaptors."

There are also opportunities in the entertainment industry with high potential sales expected for better, faster and more practical services.

Other promising applications include innovative online services such as cloud computing or peak computing. "I think cloud computing and other types of infrastructure services is a kind of peak computing and offers much more ease to anyone who wants to use it. This will help to drive innovation as well."

## 5.2 The Chinese ICT industry

While the economic crisis of 2009 led to a slump in GDPs worldwide, China's grew by 7.7 percent. The following section provides a detailed analysis of the Chinese ICT industry and its performance in 21 indicators. In interviews with leading ICT experts in China, the researched data were analysed and compiled to form a verified strength / weakness profile of China.

### Economic situation

China is set to depose Germany as largest export nation for the first time. In 2008 Germany exported goods to a value of 1,018 billion euros and China to a value of 976 billion euros. However, it would appear that nothing can hold China back – not even the economic crisis.

The Chinese economy grew by just under nine percent in 2009. This represented a drop of just less than one percent over the previous year, and its lowest level of growth for seven years. Growth is expected to be nine percent again in 2010. In 2009, China implemented an economic stimulus package worth more than four hundred billion euros, accompanied by a more relaxed fiscal and monetary policy.

The Fortune 500 list of the top 500 companies in the world includes 44 Chinese companies. In 2009, the money-earning capability of China's top 500 enterprises exceeded that of their United States counterparts for the first time. According to reports released by the China Enterprise Confederation (CEC), the total sales revenue of China's top 500 enterprises stood at 2.5 trillion euros. This represents a growth of 19.7 percent over the previous year. The net profits of the Chinese companies stood at 116 billion euros in 2008, well above the 67.2 billion euros of the top US companies in the same period. Although the financial crisis decreased net profits for the Chinese companies by 12.4 percent from a year ago, it is far less than the 84.6-percent fall experienced by US companies, which saw the worst decline in 55 years.

### China's success

So what are the reasons for the success of the Chinese economy, apart from low labour costs? China is far less centralist than the West assumes. Beijing may set the goals, but the companies themselves decide how to achieve them.

China expert Sebastian Heilmann: "At a time when the market economy system based on ownership, privatisation and minimum Government intervention is losing credibility, Beijing's policy of state intervention is looking distinctly superior. The banks have been instructed to extend credit to companies. It would appear that instead of China becoming more westernised, the world is becoming more Chinese."

### Research and Development

In 2009, R & D expenditure as a proportion of GDP reached 1.52 percent in China.

The possibility of tax concessions for IT and electronic goods is currently under discussion.

Suntech Powers has just replaced Q-Cells as the second largest manufacturer of solar cells. The Chinese company generates 98 percent of its revenue abroad, and benefits from both American and European public funding programmes for solar power. However, foreign companies have little chance of participating in solar power projects in China, because Government authorities stipulate that 80 percent of the added value must come from within China.

### China's ICT market

Of the BRIC countries, China has the most advanced ICT market.

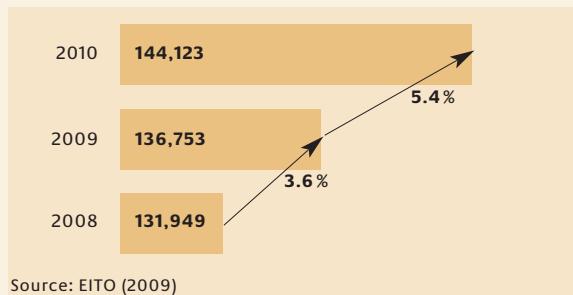
According to EITO, the Chinese ICT market generated total revenue of 132 billion euros in 2008, increasing to 136.8 billion euros in 2009. 22 percent of this was generated by IT hardware, IT services and IT software, while 78 percent was generated by telecommunications. Experts are of the opinion that the ICT industry has only been peripherally hit by the economic crisis.

*“Chinese competition is an alarming mixture of the will to succeed, patriotic drive, entrepreneurship, strong political backing and rapidly growing technological capabilities. Combined with low labour costs and its undervalued currency, China is able to produce products for the whole world. China’s top priority is to conquer the global market.”*

(Winand von Petersdorff, FAZ)

According to EITO, ICT sales in China rose by 11.3 percent from 2006 to 2007, and by 10.2 percent from 2007 to 2008. Chinese experts confirmed that prior to the economic crisis, ICT growth was always greater than the average growth of GDP, which has grown annually by about eight percent.

**Fig. 5.2a: ICT sales in millions of euro and average annual growth rate, 2008 - 2010**  
Growth flattens out due to the economic crisis, but will continue in the future



The drop in hardware prices and telecommunication charges will slow growth in the years ahead. This was confirmed by the Chinese experts interviewed.

According to EITO, from 2008 to 2009 ICT sales rose by 3.6 percent to just under 137 billion euros. By 2010, revenue from ICT is expected to rise by 5.4 percent to 144 billion euros.

At the end of 2007, the ICT industry had a workforce of 50 million. This has increased annually by two million employees, putting the 2009 workforce figure at just under 55 million. Assuming that China has a workforce of 770 million, this means that seven percent of all employed people in China work in the ICT industry.

There is no shortage of junior employees in China. Training is high-quality and starting salaries for novices are highly attractive. At most there is a shortage of basic researchers with extensive professional experience.

There were 22,000 ICT companies in China in 2008. The top five of these Chinese ICT companies generated more than 60 percent of China's ICT turnover, and employed ten to twelve percent of the total ICT workforce.

In 2007 and 2008, China was the “world champion exporter” in information and communication technology. China exported ICT products and services worth approximately 242 billion euros in 2008, placing it well ahead of the USA (122 billion euros in exports).

In 2008, China was the third largest ICT nation, with a 5.9 percent market share of ICT sales on the global market, behind the USA and Japan, but ahead of Germany (5.6 percent).

**Fig. 5.2b: Market development in China, 2007 - 2008**  
China is world champion ICT exporter and the world's third largest ICT market



“ICT expenditure as a proportion of GDP” in China is 4.5 percent. The Chinese experts interviewed confirmed these data inasmuch as their estimates put it at approximately four percent. Compared to the previous year, this proportion had fallen 0.7 percentage points due to the economic crisis. Despite falling hardware prices and telecommunications expenditure, “ICT expenditure per inhabitant” rose by eight euros as a result of increased Internet usage.

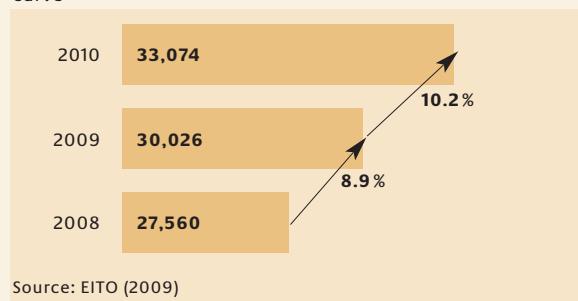
According to the European Patent Office, in 2008 the Chinese ICT industry registered approximately 600 patents. One expert commented on this low figure as follows: "Some people don't even know where the patent office is!" Yet another expert was of the opinion that the number of patents should be considerably higher, because in 2008 the companies "Zhongxin" and "Huawei" alone registered a total of approximately 2,000 patent applications.

The experts commented that technological innovations tend to come from other global regions and countries, Europe and Germany in particular. The Chinese license the patents, further develop the technologies and successfully launch these technology-based developments on the Chinese market.

"R & D expenditure for ICT as a proportion of GDP" is still low in China at 0.15 percent. R & D expenditure for information and communications technology accounts for between seven and ten percent of all R & D expenditure in China.

The IT sector generated 30 billion euros in 2009, 50 percent more than in 2006. According to EITO, growth in 2008/2009 was just under nine percent. Information technology sales in 2010 are expected to amount to 33 billion euros. Experts confirmed that between 2007 and 2008, sales in the IT sector rose by approximately ten percent, to 33 billion euros.

**Fig. 5.2c: IT market sales in China in millions of euros and average annual growth in percent, 2008 - 2010**  
After the economic crisis, China continues on strong growth curve



The poor distribution of hardware in rural areas saw China ranked 79th out of 134 countries in the WEF study with regard to its technological "readiness". The hardware sector grew 6.5 percent in 2008 / 2009 (compared to 14.5 percent the previous year) and is expected to generate approximately 21 billion euros in sales in 2010.

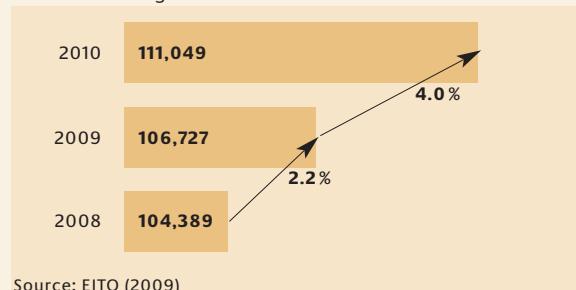
4.5 billion euros were generated in the software sector in 2009. Growth rates for 2008/2009 and 2009/2010 were 15 and 14 percent respectively. "There is a growing awareness of China as an offshore outsourcing location and as an emerging IT powerhouse", said an expert.

The Chinese Government has founded eleven software centres and six Government bases for export software. A certification process has been introduced for Chinese companies. China is producing an increasing number of software products with "Copyright in China". Initially, customers for software development were primarily from Japan. However, orders are now being taken from Europe and the USA.

In 2009, the IT services sector had a turnover of 6 billion euros, and in 2009 / 2010 sales rose 12.5 percent to 6.8 billion euros.

In 2008 / 2009, Chinese telecommunications market sales rose 2.2 percent to 107 billion euros. In 2009 / 2010 a rise of four percent to 111 billion euros is expected.

**Fig. 5.2d: Telecom market sales in China in millions of euros and average annual growth in percent, 2008 - 2010**  
Increase of the growth of the telecommunications sector



In 2009 / 2010, sales in the telecom services market grew 3.5 percent to 78 billion euros. Since 2006, Internet access services and Pay TV have accounted for an average growth rate of at least 20 percent. Revenue from mobile data services increased eleven percent to 15.3 billion euros. By contrast, turnover from mobile phone calls and telecom services fell almost one percent to 32 billion euros.

Assuming a growth of 5.4 percent, sales of Telecom devices in 2010 are set to generate almost 33 billion euros. The growth rate in 2009 was 1.1 percent with sales of 31 billion euros.

### China's infrastructure

**Broadband.** According to the Ministry of Industry and Information Technology, 95 percent of all municipalities and villages had access to broadband Internet connections in 2008. It is even claimed that there are broadband connections for every single village in the Eastern and central regions of China. In 2009 it was hoped to provide full Internet coverage to rural areas. According to Point Topic, in 2008 almost 80 percent of these connections were via DSL. China began to lay fibre optic cable in 2007, and almost two percent of Chinese households now have access to

this type of connection. The glass fibre market is of interest to foreign suppliers, as China is unable to meet the current high demand. The main Chinese companies are FiberHome, Yantze Fiber Optics Corporation, Jiangsu Hengtong and Jiangsu Fasten. The main foreign companies with significant interests in China are Alcatel-Lucent, Corning, Nortel Networks and NKT.

**Mobile communication.** China has awarded licenses for 3<sup>rd</sup> generation mobile communications technology to China Mobile, China Unicom and China Telecom, so after a long delay the mobile communication standard of the next generation is now available to the world's largest market for mobile communications. China Mobile has more than 400 million customers, three times as many as China Unicom. China Telcom has 43 million mobile phone customers. Overall, China has more than 570 mobile phone customers. By the end of 2009 this is expected to have risen to 650 million users. This means that one in five of the world's mobile phone connections is in China. The widespread coverage of mobile communication is due to low state-subsidised tariffs. The mobile phone penetration rate in July 2008 was 45.6 percent. By the end of 2009, the penetration rate was expected to reach between 48 and 49 percent.

"China Mobile, China Unicom and China Telecom are the core of China's ICT industry. That means every price point depends on their purchasing price, like the price of cell phones, PCs, internet or broadband usage." This means that the decisions of these three providers influence the entire ICT industry in China. "Actually the Chinese government is the most tightly controlling ICT industry in the world" – commented the experts interviewed.

The key national suppliers and manufacturers are Huawei, ZTE, Potevio, Datang, Fiber-home, Haier and TCL. The most important foreign suppliers are Nokia, Motorola, Nortel, Samsung, Sony Ericsson and Alcatel-Lucent.

In return for granting licenses, the Ministry of Industry and Information Technology is hoping for investments in network expansion, end device developments and new services. The aim is that in 2010 investments in the ICT infrastructure and related products and services will represent between six and seven percent of GDP. Over the next two years, Chinese mobile communication providers will invest 27.4 billion euros in 3G networks and services. In a few years' time, annual investments in 3G and other telecommunication services are expected to reach 31.3 billion euros.

China Mobile has just launched an operating system for mobile phones on the market. It is the world's first operating system for mobile phones developed by a mobile phone company. The Ophone devices could halt China Mobile's decline in profits. A week earlier, China Unicom had concluded an agreement with Apple for the sale of iPhones in China. China Telecom is currently in negotiations with RIM. China's market for smart phones is fiercely competitive, particularly in view of the fact that China is one of the world's largest telecommunication markets.

The Ministry of Industry and Information Technology and the State-owned Assets Supervision and Administration Commission of the State Council have instructed China Mobile, China Telecom und China Unicom to set up and operate their infrastructure jointly. Existing transmitter masts and telephone cable networks must be made available to the competition. If an operator plans to set up new transmitter masts or expand cable networks, the other operators are obliged to inform the company within ten working days whether they already own suitable facilities that could be shared, or whether they wish to participate in the building project. Furthermore, any companies not wishing to participate are not permitted to carry out any construction work at the respective sites for a period of three years.

Fig. 5.2e: Development of infrastructure conditions in China, 2007 - 2008

The use and preparation of the ICT infrastructure is progressing rapidly



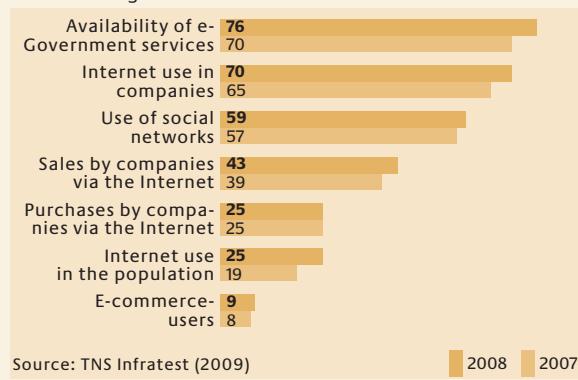
The high figures for broadband connections are due to the fact that, like South Korea and Japan, China has ensured that content is available in Chinese language and writing. By the end of 2008 there were 1.5 million local websites on the network.

In 2008, 20 percent of Chinese households had access to the Internet. Twelve percent of households own a PC, but SSL server penetration in China is extremely low.

### Use of ICT applications in China

No other country in the world has as many Internet and broadband users as China. On 30 June 2009, China had 338 million Internet users. By the end of 2009 this figure was expected to rise to 370 million. In the first six months of 2009, the number of Internet users rose by 13.4 percent, the equivalent of 40 million users. In 2008, Internet penetration rose from 16 percent to 22.3 percent. 5.6 percent of Internet users are e-Commerce users.

**Fig. 5.2f: Use of ICT applications in China, 2007 - 2008**  
China is a huge demand-driven market



The number of broadband users rose to 320 million, which represents a growth of 3.8 percent since December 2008. This means that 94.3 percent of all Internet users go online via broadband. Broadband penetration in China is 25.5 percent.

In the last months of 2009, the number of mobile Internet users increased by 32.1 percent, to 155 million. The number of online shoppers rose 14 million, to 88 million. The number of Internet users who also pay online rose 4.8 percent.

According to comScore Metrix, 50 percent of Internet users aged 15 years or older are members of social networks. The Chinese experts estimated a lower figure of approximately 25 percent.

16 percent of Chinese companies make purchases via the Internet. 14 percent of all Chinese companies sell via the Internet. In an international comparison of the 134 countries included in the WEF study, China was ranked 54<sup>th</sup> in the category "Internet use in companies".

### Promotion of ICT in China

The National People's Congress, which acts as parliament in China, recently reformed the State Council and resolved to set up five "super ministries". These will include the new "Ministry of Industry and Information Technology" (MIIT), which will primarily be responsible for the ICT industry. Where appropriate, other ministries may also assume responsibility, such as the "Ministry of Science & Technology" (MOST), the "Ministry of Public Security" (MPS), the "General Administration of Press and Publication" (GAPP) or the "State Administration of Radio, Film and Television (SARFT)".

China's capacity for innovation was ranked 26th in the Global Competitiveness Index of the WEF study, a rise of two places.

With the "State Council's Medium and Long-term Plan on Science & Technology Development 2006 – 2010", the 11<sup>th</sup> five year plan in a row, China is striving to promote its own product innovations on the home front, thus reducing dependency on technologies produced abroad. Foreign investment is inhibited by the fact that, in the event of a conflict, Chinese products will always be given priority. The objectives of the five year plan for ICT are: to strengthen the global significance of China's ICT industry; to establish Chinese ICT brand products globally; to increase R & D expenditure for ICT; to provide financial support for new technologies and their development; to support the establishment of Chinese standards; to speed up the installation and expansion of ICT infrastructures, especially broadband, broadcasting and telephone – also for rural areas.

According to the experts consulted, 9.8 billion euros are to be invested in the Chinese ICT industry over the next five years.

When interviewed, experts emphasised that the Government often leads by example with the introduction of new technologies. It also promotes the introduction of new applications in other state-owned enterprises.

The Government has also decreed that high-quality ICT products will be exempt from duty, and recently introduced a reduced VAT rate of 17 percent.

### Strength / weakness profile for China

The following is a summary of the strength / weakness profile:

#### China's key strengths include the following:

In 2008, China was the world's third largest ICT market. China not only has a production industry of global significance, it is also ahead of the USA with the world's largest ICT sales market.

Low labour costs and a highly qualified workforce make China one of the world's best locations for the production of ICT products and services. This applies both to Chinese companies such as Lenovo, Huawei or Zhongxing and to foreign companies with sites in China, such as Ericsson, Siemens and Motorola. Research centres are also frequently relocated to China.

The Chinese Government is exemplary in its capacity as a forerunner and a user of new technologies, and is a particularly strong promoter of cross-industry use of ICT.

**Key risks** include a lack of efficiency and profit orientation in the manufacture of "high value-added" products in the ICT industry.

Some of China's production of ICT products is dependent on imports from foreign supplier industries.

China also suffers from a lack of creativity. There is hardly any basic research. The ICT industry in China is mainly production-orientated. The margins earned are so low that there is insufficient funding for research, development and innovation. There is also a lack of project experience for the co-ordination and management of large international projects.

A key **weakness** of the Chinese ICT industry is the fact that it still has too few global players with which to create global brand names.

Further weaknesses include the economic and financial crisis, which has resulted in the stagnation of exports and a 25 percent decline in sales – triggered by a fall in demand from other regions of the world.

Fig. 5.2g: Strength/weakness profile for China  
China on course to become an ICT world power

Key strengths	Key threats
<ul style="list-style-type: none"> <li>▶ Attractive production location due to low labour costs</li> <li>▶ The world's largest sales market</li> <li>▶ Government is exemplary in its use of the latest ICT technologies</li> </ul>	<ul style="list-style-type: none"> <li>▶ Lack of efficiency and profit orientation in the manufacture of "high value-added" ICT products and services</li> <li>▶ Dependence on foreign supplier industries during production</li> <li>▶ Lack of basic research and international project experience</li> </ul>
Key weaknesses	Key opportunities
<ul style="list-style-type: none"> <li>▶ Not enough global players with the respective brands and ability to assert themselves</li> <li>▶ Effects of the economic crisis on demand and exports</li> <li>▶ Censorship of Internet content</li> </ul>	<ul style="list-style-type: none"> <li>▶ Low-cost mass production of telecommunication end devices /products</li> <li>▶ Use and application of ICT as cross-sectoral technology on the world's largest demand-driven market. Attractive outsourcing market</li> <li>▶ Exploitation of new fields of application: Green IT, e-Energy, mobile Internet, mobile data services, manufacture of customised software</li> </ul>

Source: TNS Infratest (2009)

The censorship of Internet content in China is regarded by experts as a political but not an economic risk.

One of the key **opportunities** offered by the Chinese ICT industry is the low-cost mass production of ICT products and services. Compared globally, the manufacture of telecommunication end devices is particularly attractive.

The Chinese Government promotes the use of ICT as a cross-sectoral technology in a wide range of applications. This promotion and support is also stipulated in the 11<sup>th</sup> five-year plan.

Thanks to its comparatively low labour costs, China can also establish itself as an attractive outsourcing partner for software development.

New, promising applications are the mobile Internet and its applications, together with Green IT and e-Energy.

In the coming years, China will take a leading role in the manufacture of customised software solutions, especially as these will also be required on the domestic sales market.

### 5.3. Country profiles

#### 5.3.1 Country profile – China



With 33 index points, China only reached 14<sup>th</sup> place in the global benchmark study of ICT industries. It was unable to improve its average performance compared with the previous year. China was global market leader in two key performance indicators: “ICT exports” and “Growth in IT turnover”. The country has an impressive rate of growth, and shows extremely high potential.

#### Market development – 11<sup>th</sup> place ↓

Despite the global economic crisis, the category “Growth in IT turnover” for 2007/2008 showed a dramatic increase of 16.6 percent. This placed China in the lead in this category. China is also market leader in the category “ICT exports”. In 2009 China is set to depose Germany, the current “World Champion Exporter”, for the first time. However, its “ICT expenditure as a proportion of GDP” fell from 5.2 to 4.4 percent in 2008 as a consequence of the continuing drop in prices for hardware and state-subsidised telecommunication services.

**Fig. 5.3.1a: Significance of the Chinese ICT market as of 2008**

Global market leader in “ICT exports” and “Growth in IT turnover”



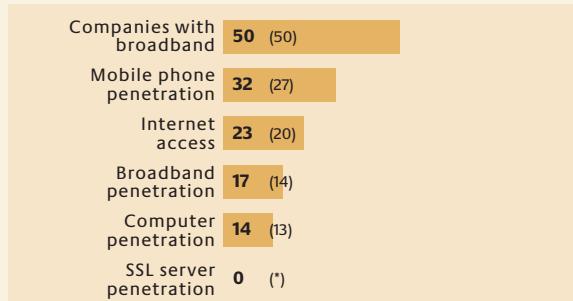
Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Infrastructure – 14<sup>th</sup> place ➔

China improved its average performance in the category “Infrastructure” by two points to a total of 22 index points. However, this did not affect its ranking: as in the previous year, China was in second to last place. “Mobile phone penetration in the population” in China improved six percentage points to 47.5 percent, i. e. to 32 index points. The category “Internet access in households” also rose three percentage points to 20 percent, which corresponded to an index value of 23 points.

**Fig. 5.3.1b: State of development of China's infrastructure as of 2008**

China's performance in the category “Infrastructure” was moderate to poor throughout



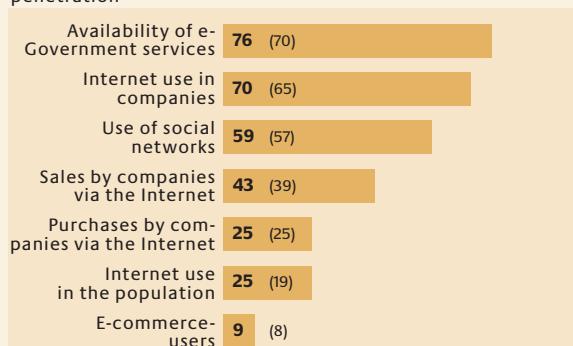
Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Applications – 14<sup>th</sup> place ↑

China improved its average performance in the category “Applications” in 2008, gaining four index points to reach 45 index points and thus rising from last to second to last place. The Chinese ICT industry has made headway largely as a result of its improved figures in “Internet use in the population”, which rose more than six percentage points to 22.3 percent. It also gained ground in “Use of social networks”, which rose from 44.7 to 50.3 percent.

**Fig. 5.3.1c: Maturity of the Chinese applications sector as of 2008**

Still some catching up to do in the category “Internet user penetration”



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.2 Country profile – Denmark



Denmark achieved a good performance in 16 indicators, enough to place it among the top nations in the international ICT comparison. Denmark tied with Sweden in third place on average overall performance, with 71 index points. Denmark is world leader in three key performance indicators (“ICT expenditure per inhabitant”, “Broadband connections in the population” and “Availability of e-Government services”).

#### Market development – 7<sup>th</sup> place ➔

In the category “Market development”, Denmark reached 7<sup>th</sup> place, with 44 index points in the national average index. Denmark set the global benchmark for the indicator “ICT expenditure per inhabitant”. In “ICT expenditure as a proportion of GDP”, Denmark's performance fell by 13 index points to 5.28 percent. In “Growth in IT turnover”, it fell from 3.2 to 1.3 percent, largely due to the continued decline in the prices of hardware. In terms of size and volume of exports, the Danish ICT industry is of little significance.

#### Infrastructure – 1<sup>st</sup> place ↑

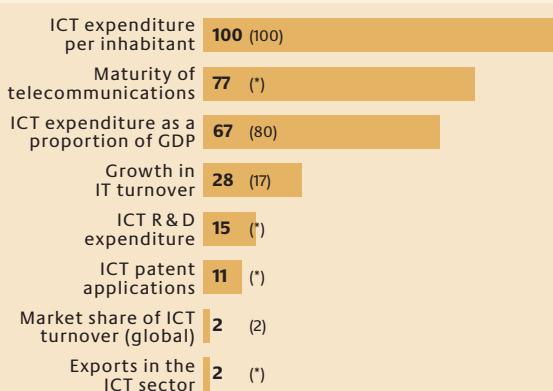
In the category “Infrastructure”, Denmark achieved 91 index points in the national average index, the best performance of all 15 ICT nations. In “Broadband connections in the population” Denmark set the benchmark, achieving the best performance with approximately 37 percent. The penetration rate of mobile phone provision in Denmark rose by ten percent to 126 percent. There were also improvements in “Computer penetration in households”, which rose from 83 to 85 percent, and in “Internet access”, which rose from 78 to 82 percent.

#### Applications – 6<sup>th</sup> place ↓

Denmark achieved 84 index points in “Applications” (6<sup>th</sup> place in the national index), an average performance compared with the market leader. In the category “Sales by companies via the Internet”, Denmark ceded global market leadership to Great Britain in the 15-nation comparison, thus falling two places in the overall ranking for the category “Applications”. Denmark remains global market leader in “Availability of e-Government services”.

**Fig. 5.3.2a: Significance of the Danish ICT market as of 2008**

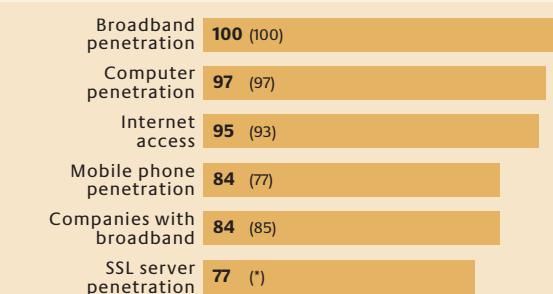
Denmark leads in “ICT expenditure per inhabitant”



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

**Fig. 5.3.2b: State of development of Denmark's infrastructure as of 2008**

Denmark is global market leader in the category “Infrastructure”



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

**Fig. 5.3.2c: Maturity of the Danish applications sector as of 2008**

No longer global market leader in “Sales by companies via the Internet”



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.3 Country profile – Germany



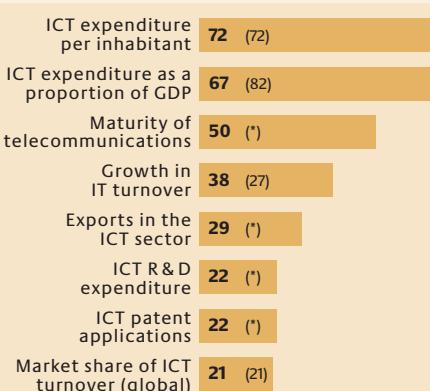
With a rise in performance of two index points over the previous year, Germany achieved 67 index points in the overall benchmark. This performance placed it in the middle of the range, sharing seventh place with Norway. Germany improved its position in 2008, rising from ninth to seventh place. This was largely due to achieving world leadership for the first time in the key performance indicator “e-Procurement – purchases by companies via the Internet”.

#### Market development – 5<sup>th</sup> place ➔

With an average performance of 46 index points in the national average index, Germany shared fifth place with the Netherlands. Germany's development remained static in six of the eight key indicators examined in this report. It was well above average in only one key indicator, “ICT expenditure per inhabitant”, with 72 points.

**Fig. 5.3.3a: Significance of the German ICT market as of 2008**

Positive development in “Growth in IT turnover” only



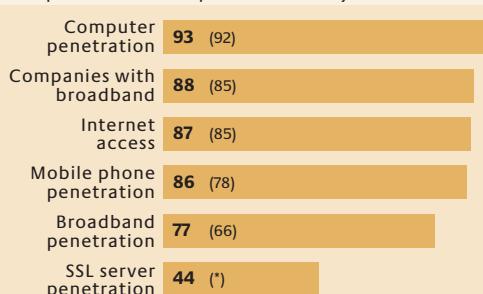
Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Infrastructure – 8<sup>th</sup> place ↑

Germany improved its performance, gaining five index points to reach an index value of 79 and 8<sup>th</sup> place in the overall ranking, just behind the USA. Germany is making headway in all infrastructure categories except “SSL server penetration”. The greatest improvement was in the provision of broadband connections, where Germany's performance rose by eleven index points to 77. Germany's performance also improved in the provision of mobile phone connections, where it gained eight points.

**Fig. 5.3.3b: State of development of Germany's infrastructure as of 2008**

SSL server penetration still poor in Germany



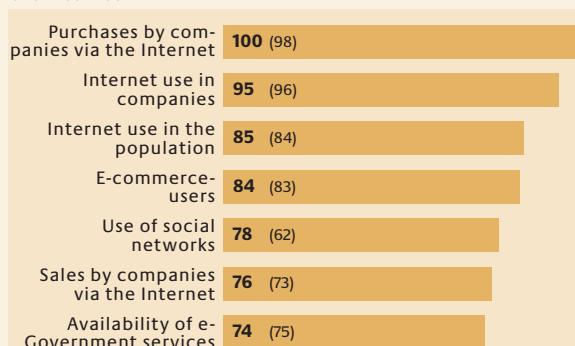
Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Applications – 4<sup>th</sup> place ↑

Germany's average national index improved by three index points, rising to an index value of 86. This represented an improvement in Germany's ranking from seventh to fourth place. In particular, its performance in “Use of social networks” rose by almost twenty percent to 67.3 percent, a gain of 16 index points. In the category “Internet use in the population” its rise to 76 percent represented an improvement of more than 3.5 percent. Germany achieved world leadership for the first time in “Purchases by companies via the Internet”.

**Fig. 5.3.3c: Maturity of the German applications sector as of 2008**

Germany set the benchmark in “Purchases by companies via the Internet”



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.4 Country profile – Finland



With an average of 68 index points in the global ranking of the top 15 ICT nations in 2008, Finland gained sixth place relative to the global market leader, the USA. Its ranking was unchanged over the previous year. Finland is the global leader in two key performance indicators (“ICT R & D expenditure as a proportion of GDP” and “ICT patent applications”).

#### Market development – 4<sup>th</sup> place ↓

Finland's performance in “Market development” deteriorated due to a downturn in “ICT expenditure as a proportion of GDP” (down from 6.2 percent in 2007 to 5.8 percent in 2008) and “Growth in IT turnover” (down from three to 2.7 percent). This resulted in Finland falling one place to fourth place in the average index for “Market development”, with 51 index points. Finland maintained its position as world leader in the key indicators “ICT R & D expenditure as a proportion of GDP” and “ICT patent applications”. In terms of sales and exports, Finland is of little significance on the global market.

#### Infrastructure – 5<sup>th</sup> place ➔

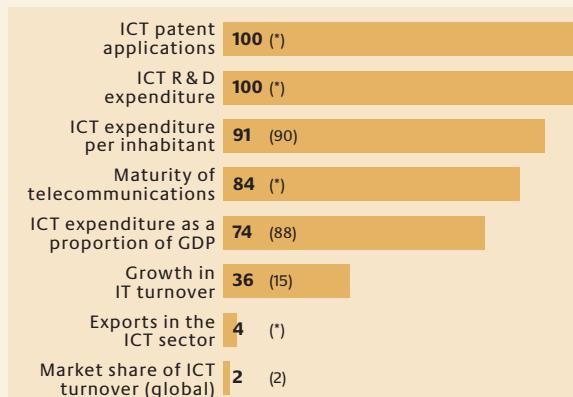
In the category “Infrastructure”, Finland's relative performance rose two index points to 22. However, this did not affect its ranking, and Finland remained in fifth place. The strongest percentage growth in real terms was achieved in “Mobile phone penetration in the population”, which gained 14 percentage points, rising to 129 percent. However, in “SSL server penetration” Finland clearly still has some catching up to do.

#### Applications – 10<sup>th</sup> place ➔

Despite improving its relative performance by one index point to 74 index points in the national index, Finland stayed in tenth place in the category “Applications”. Even though its “Internet penetration rate in the population” was already high, Finland still managed to improve its performance to 82.6 percent in 2008 (78.9 percent in 2007). This positive development may be one of the reasons why “e-Commerce user penetration” also rose three percentage points, to 51 percent.

Fig. 5.3.4a: Significance of the Finnish ICT market as of 2008

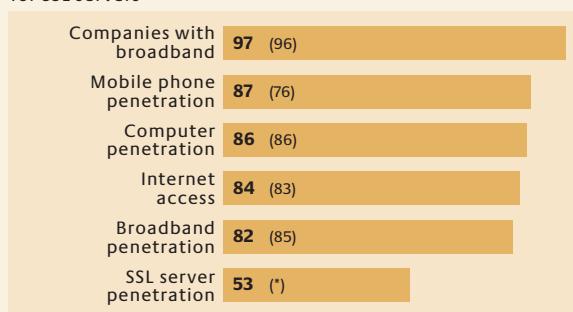
Finland leads in R & D and Patents



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

Fig. 5.3.4b: State of development of Finland's infrastructure as of 2008

Finland's infrastructure well to very well developed, except for SSL servers



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

Fig. 5.3.4c: Maturity of the Finnish applications sector as of 2008

Only moderate performance in the categories “Sales/Purchases by companies via the Internet”



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.5 Country profile – France



With an average of only 57 index points, and in eleventh place in the global benchmark study, France clearly has some catching up to do. Compared to the world's leading ICT nations, this Western European economy is trailing far behind, and is therefore ill-prepared to take up the challenge of an increasingly competitive market. France failed to make global leader in any performance indicators.

#### Market development – 7<sup>th</sup> place ↑

While France's performance in the category "Market development" was the same as the previous year (44 index points), it still improved its ranking relative to the other countries, rising one place to seventh place. However, it clearly still has some catching up to do. "ICT expenditure as a proportion of GDP" fell from 5.6 percent to 5.3 percent in the current year. This led to a deterioration in performance of twelve index points. "Growth in IT turnover" fell from 3.5 percent in 2007 to three percent in 2008 which, relative to the other countries included in the study, resulted in a gain of 16 index points to reach 36 index points.

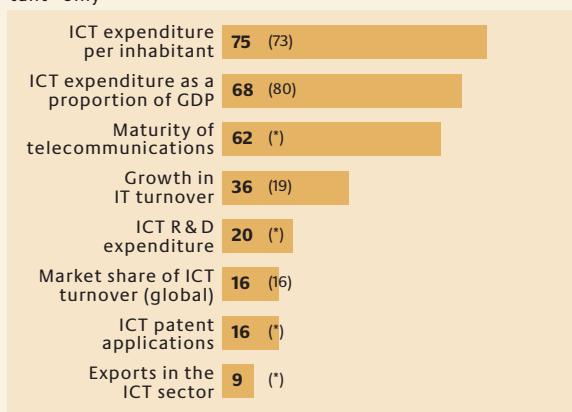
#### Infrastructure – 11<sup>th</sup> place ➔

With a rise from 62 to 67 index points in the national index for infrastructure conditions, France had the largest growth this year, along with Germany. However, its ranking was unchanged and it stayed in eleventh place. France's positive development was primarily due to its improved performance in "Internet access in households", where the penetration rate increased from 49 to 53 percent. In the category "Computer penetration", the penetration rate rose from 62 to 68 percent. In "Broadband connections in the population", France's performance is one-third below that of the world leader, Denmark.

#### Applications – 11<sup>th</sup> place ➔

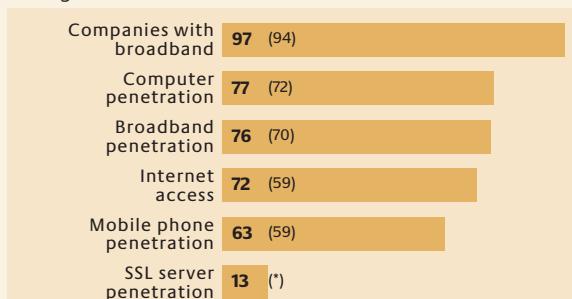
With 65 index points in the national average for the category "Applications", France stayed in eleventh place, but with an improvement of five index points it had the highest point gain in the national average across all key performance indicators. Within one year, "Internet use in the population" grew considerably by approximately 17 percentage points to 68 percent, "e-Commerce user penetration" rose five percentage points to 40 percent, and "Use of social networks" rose nearly twelve percentage points to just under 64 percent.

**Fig. 5.3.5a: Significance of the French ICT market as of 2008**  
Relatively strong performance in "ICT expenditure per inhabitant" only



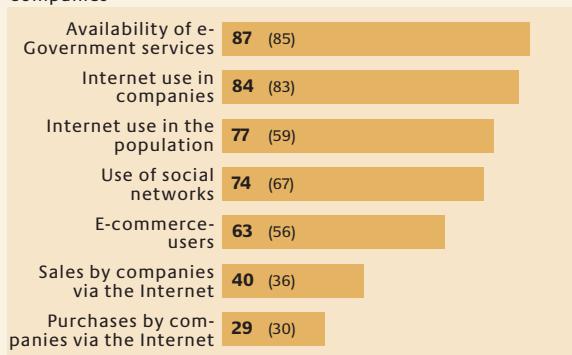
Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

**Fig. 5.3.5b: State of development of France's infrastructure as of 2008**  
France's performance in the category "Infrastructure" only average



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

**Fig. 5.3.5c: Maturity of the French applications sector as of 2008**  
Good performance in "e-Government" and "Internet use in companies"



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.6 Country profile – Great Britain



Great Britain rose two places in 2008, breaking into the top three for the first time, its average of 72 index points putting it in second place, behind the USA and ahead of Denmark. This was primarily due to improvements in the category "Infrastructure". Great Britain was world leader in "Sales by companies via the Internet".

#### Market development – 3<sup>rd</sup> place ➔

Great Britain's national average index for the category "Market development" remained unchanged at an average of 52 index points. This was enough to allow Great Britain to hold on to third place. While it suffered some drops in performance, notably in "Growth in IT turnover" (down from 4.2 percent in 2007 to 2.5 percent in 2008) and "Market share of ICT turnover in the global market" (down from 5.8 percent to 5.6 percent), it also made clear improvements in other areas, such as "Increase in ICT expenditure", up from 2,030 euros to 2,055 euros per inhabitant.

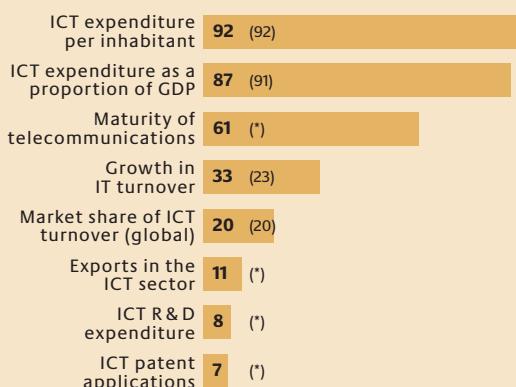
#### Infrastructure – 5<sup>th</sup> place ↑

Its relative performance increased by four index points compared with the previous year, rising to 82. Great Britain is in 5th place and was able to improve its performance in five out of six key performance indicators. A particularly significant increase was achieved in the penetration rate for "Availability of broadband connections in companies" (up nine index points to 87 percent). A three percent rise in penetration rate was achieved in the categories "Availability of broadband connections" (28 percent), "Mobile phone penetration" (123 percent), "Computer penetration in households" (78 percent) and "Internet access" (71 percent).

#### Applications – 1<sup>st</sup> place ↑

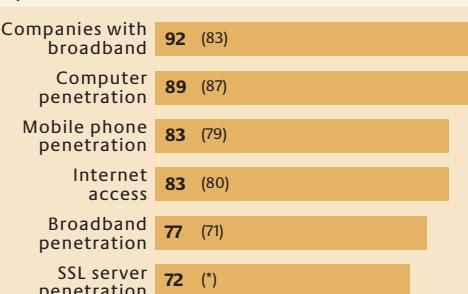
Even though Great Britain's average performance fell by one index point to 90 index points in the aggregate national average index for "Applications", in 2008 this was sufficient to achieve market leadership, pushing Norway into second place. While Great Britain ceded its market leadership in the category "Use of social networks" to South Korea in 2008, it became market leader in "Sales by companies via the Internet" for the first time. Great Britain also achieved improvements in all other key performance indicators.

Fig. 5.3.6a: Significance of the British ICT market as of 2008  
Strengths in ICT expenditure



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

Fig. 5.3.6b: State of development of Britain's infrastructure as of 2008  
Great Britain's performance well above average in the category "Infrastructure"



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

Fig. 5.3.6c: Maturity of the British applications sector as of 2008  
Outstanding in sales, weak in "Purchases by companies via the Internet"



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.7 Country profile – India



With only 25 index points, and trailing a long way behind the global market leader, India brings up the rear in the global benchmark study. In real terms, however, India's performance is impressive. While it still has a long way to go to catch up with the world leaders, it has significant growth rates and high potential in markets with strong demand.

#### Market development – 14<sup>th</sup> place ↑

Even though its national average index in the category "Market development" remained unchanged at 30 index points, India nevertheless rose one position to take 14th place, thus bringing it level with Italy. India had to be content with second place in "Growth in IT turnover" in 2008. While its growth of 15.61 percent was impressive, it was not as good as the Chinese growth rate of 16.58 percent. India's expenditure in the category "R & D expenditure as a proportion of GDP" was the second highest in the global benchmark study.

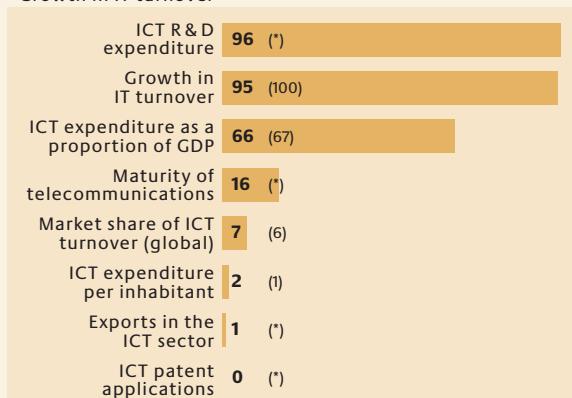
#### Infrastructure – 15<sup>th</sup> place ➔

India improved its national average index by three points, but still brings up the rear in the international comparison, with only nine index points. There was considerable growth in "Mobile phone penetration in the population", which was up nine percent to just under 29 percent. "Computer penetration in households" rose by six percentage points to 26 percent, and "Internet access in households" rose three percentage points to 4.3 percent.

#### Applications – 13<sup>th</sup> place ➔

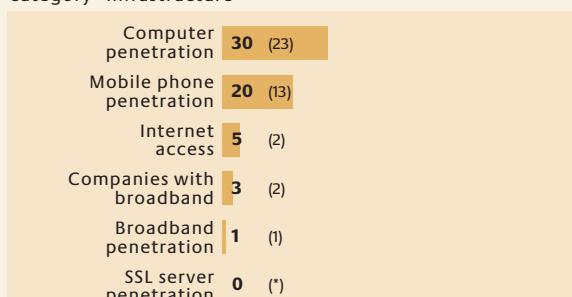
In "Applications", India succeeded in improving its relative performance by one index point to 49 points. India is ranked 13<sup>th</sup> in the international comparison. Its greatest improvement was in "Use of social networks", where it improved its performance by more than ten percentage points to 60.3 percent, representing an increase of five index points to an index value of 70. Taking its large population into account, the "Internet penetration rate" of 8 percent is, as expected, still low.

**Fig. 5.3.7a: Significance of the Indian ICT market as of 2008**  
Particular strengths in the categories "R & D expenditure" and "Growth in IT turnover"



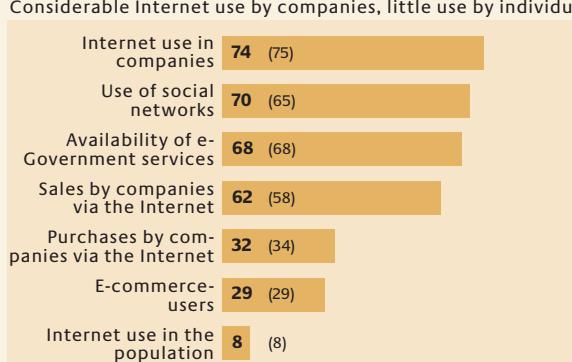
Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

**Fig. 5.3.7b: State of development of India's infrastructure as of 2008**  
India's performance poor to moderate throughout in the category "Infrastructure"



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

**Fig. 5.3.7c: Maturity of the Indian applications sector as of 2008**  
Considerable Internet use by companies, little use by individuals



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.8 Country profile – Italy

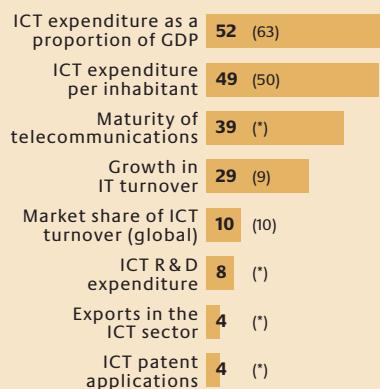


Despite an improvement of one index point to a total of 45 points, Italy was only able to gain 13<sup>th</sup> place in the global benchmark study. Compared to the global market leader, Italy clearly still has some catching up to do. Italy is world leader in the key performance indicator “Mobile phone penetration”.

#### Market development – 14<sup>th</sup> place ➔

Italy fell from 31 to 30 index points in the national average index in the category “Market development”, and was therefore only able to reach 14<sup>th</sup> place in the ranking. Despite a drop of 0.08 percent in the category “Growth in IT turnover”, Italy's performance relative to the other countries improved by a full 20 index points to a total of 29 points. However, this had to be seen alongside a deterioration of performance in “ICT expenditure as a proportion of GDP” of eleven index points. Italy achieved less than 50 percent of the best possible performance in seven key performance indicators.

**Fig. 5.3.8a: Significance of the Italian ICT market as of 2008**  
Below average performance throughout

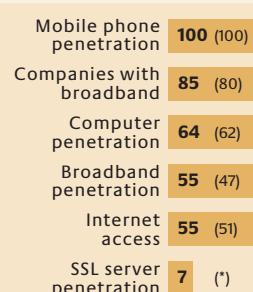


Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Infrastructure – 13<sup>th</sup> place ➔

Despite improving its performance by three points in the national average index, Italy was still only able to achieve 13<sup>th</sup> place. World leadership in the category “Mobile phone penetration” and a growth in “Broadband connection penetration in the population” of eight index points were not enough to improve Italy's performance relative to the other countries included in this benchmark study.

**Fig. 5.3.8b: State of development of Italy's infrastructure as of 2008**  
Italy is global leader in “Mobile phone penetration”



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Applications – 15<sup>th</sup> place ↓

Despite improving its average performance in the category “Applications” by one index point, Italy was placed last in the ranking because other countries included in the benchmark study were able to improve much faster. However, the detailed analysis did show evidence of some improvement, particularly in “Use of social networks”, which rose to 69.3 percent, an increase of approximately 13 percent. If Italy is to join the top ICT nations, it needs to improve its performance, particularly in “Internet use in the population” which, at 48.9 percent, was almost the same as the previous year (48.5).

**Fig. 5.3.8c: Maturity of the Italian applications sector as of 2008**  
Good performance in “Use of social networks” only



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.9 Country profile – Japan



With 65 index points, Japan fell from eighth to ninth place in average overall performance. Having ceded its global market leadership in “ICT expenditure as a proportion of GDP” to South Korea, Japan is no longer world leader in any key performance indicator.

#### Market development – 2<sup>nd</sup> place ➔

Even though Japan's performance deteriorated by five index points to 53 points in the national average index, it was able to hold onto second place in the category “Market development”. However, it was still trailing a full 24 index points behind the global market leader, the USA. In 2008, Japan ceded the world market leadership in “ICT expenditure as a proportion of GDP” to South Korea for the first time. “Growth in IT turnover” fell from 4.6 percent to 2.6 percent.

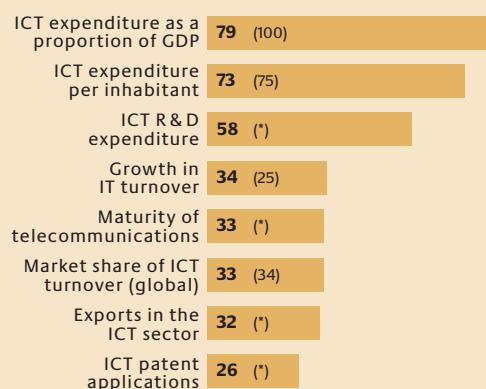
#### Infrastructure – 10<sup>th</sup> place ➔

Japan improved its average performance by two index points in the category “Infrastructure”, rising to 22 index points and staying in tenth place in the ranking. In particular, Japan improved its performance in “Internet access in households” by eleven percentage points to 71 percent, and in “Mobile phone penetration” by four percentage points to just under 87 percent. In “SSL server penetration” Japan clearly still has some catching up to do.

#### Applications – 9<sup>th</sup> place ➔

While Japan's relative performance deteriorated by one index point to 75 points in the national average index in the category “Applications”, this did not affect its ninth place in the ranking. Japan showed only a slight improvement over the previous year, the most significant growth of 2.8 percent being in “Purchases by companies via the Internet”. This was not enough to make any progress in the average performance development.

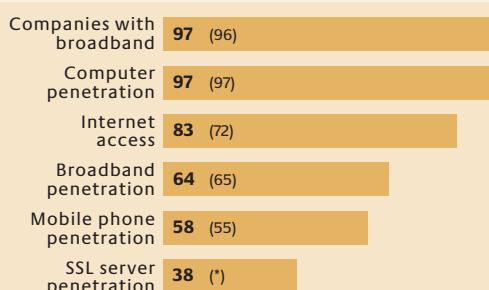
**Fig. 5.3.9a: Significance of the Japanese ICT market as of 2008**  
Japan strong in “ICT expenditure as a proportion of GDP”, weak in “ICT patents” and “ICT exports”



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

**Fig. 5.3.9b: State of development of Japan's infrastructure as of 2008**

Very good performance in the categories “Broadband penetration in companies” and “Computer penetration”



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

**Fig. 5.3.9c: Maturity of the Japanese applications sector as of 2008**

Japan performed well in Internet applications



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.10 Country profile – Netherlands

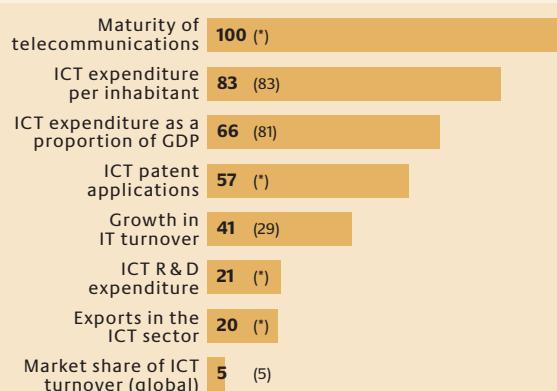
 In overall performance the Netherlands fell one index point to 71 points, dropping from second place to third place (level with Denmark). This means that the Netherlands is still in the top three. In the overall benchmark, the Netherlands trails ten index points behind the world leader, the USA. However, the Netherlands is world leader in three key performance indicators: "Maturity of telecommunications market", "Internet access" and "Computer penetration in households".

#### Market development – 5<sup>th</sup> place ➔

With 46 index points in the national average index (48 points in 2007), the Netherlands was above the average overall performance of all countries, which was 44.6 points. This placed it fifth in the ranking. The performance of the Netherlands fell by 15 index points in "ICT expenditure as a proportion of GDP", and from 5.4 percent to 4.2 percent in "Growth in IT turnover".

Fig. 5.3.10a: Significance of the Netherlands ICT market as of 2008

World's best performance in "Maturity of telecommunications"



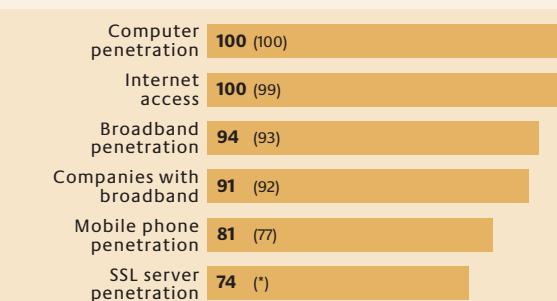
Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Infrastructure – 2<sup>nd</sup> place ↓

The relative national average index of the Netherlands remained unchanged, with the country keeping its 90 index points. However, this was not enough to prevent it from having to hand over its leading position in the category "Infrastructure" to Denmark, thus forcing the Netherlands into second place in 2008. The Netherlands improved its performance in all indicators with the exception of "Companies with broadband connections", where it fell from 87 to 86 percent. SSL server penetration remained unchanged at 79 percent in real terms.

Fig. 5.3.10b: State of development of the Netherlands' infrastructure as of 2008

Top performances in "Internet access" and "Computer penetration in households"



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Applications – 6<sup>th</sup> place ➔

The Netherlands is the only country whose relative average performance remained unchanged compared to the previous year. It stayed in sixth place, with 84 index points. However, it still improved its performance by just under three percentage points, to 86.4 percent, in "Internet use in the population", and by just under six percent, to 63 percent, in "Use of social networks". It also rose three percentage points, to 39.6 percent, in "Purchases by companies via the Internet". The Netherlands has therefore made definite progress as an ICT nation.

Fig. 5.3.10c: Maturity of the Netherlands' applications sector as of 2008

Above average performance throughout in the category "Applications"



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.11 Country profile – Norway



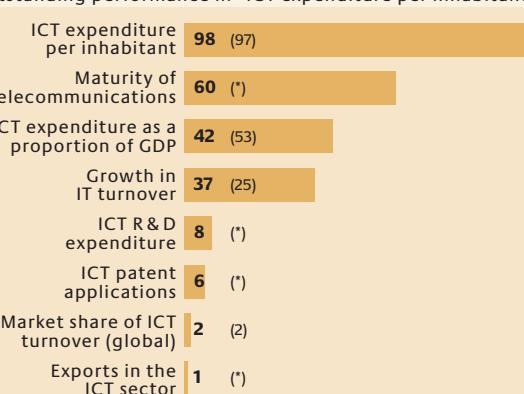
Even though its index value of 67 points remained unchanged, Norway fell in overall performance from sixth to seventh place, level with Germany. Norway successfully defended its global market leadership in the category “e-Commerce users”, and also became global market leader in the category “Internet use in the population”.

#### Market development – 11<sup>th</sup> place ↓

Norway's performance fell by one index point in the national average relative to the world leaders. This meant that Norway dropped back to eleventh place. “ICT expenditure as a proportion of GDP” fell from 3.8 percent to 3.3 percent, and “Growth in IT turnover” fell from 4.6 percent to 3.3 percent. However, in “ICT expenditure per inhabitant”, Norway is hot on the heels of world leader Denmark.

Fig. 5.3.11a: Significance of the Norwegian ICT market as of 2008

Outstanding performance in “ICT expenditure per inhabitant”



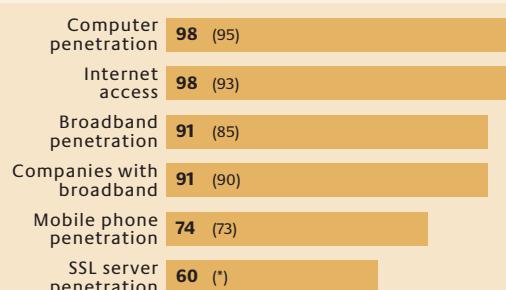
Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Infrastructure – 3<sup>rd</sup> place ↑

After improving its average index by three points in 2008, Norway is level with Sweden in third place. With 86 index points, Norway is well above the European average. In 2008, “Broadband penetration in the population” rose by three percentage points to 34 percent, “Computer penetration in households” rose by four percentage points to 86 percent, and “Internet access in households” rose by six percentage points to 84 percent.

Fig. 5.3.11b: State of development of Norway's infrastructure as of 2008

Top performances in “Computer penetration” and “Internet access in households”



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Applications – 2<sup>nd</sup> place ↓

In 2008, Great Britain became world leader in the 15-nation ranking in the category “Applications”, pushing Norway (89 index points) into second place. For the first time, albeit in a very close contest, Sweden ceded world market leadership in “Internet use in the population” to Norway. However, in “Purchases by companies via the Internet” Norway's performance fell by a full 21 index points.

Fig. 5.3.11c: Maturity of the Norwegian applications sector as of 2008

World's best performance in the key indicators “e-Commerce users” and “Internet use in the population”



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.12 Country profile – Sweden



Sweden dropped from fourth to fifth place (69 index points) in overall performance, taking it down to the upper middle of the range. In the category "Internet use in the population" it ceded world market leadership to Norway. This means that Sweden is no longer world leader in any category. However, it reached 99 index points in "Computer penetration in households", "Availability of e-Government services", "Internet use in the population" and "Internet use in companies", thus only just missing out on global market leadership four times.

#### Market development – 7<sup>th</sup> place ↑

Even though Sweden's national average index remained unchanged at 44 index points, relative to the other countries it still rose one place to seventh place, as the other countries did not achieve the same degree of improvement in the category "Market development". The greatest percentage change compared to the previous year was in "ICT expenditure as a proportion of GDP", which fell from 5.6 percent to 5.4 percent.

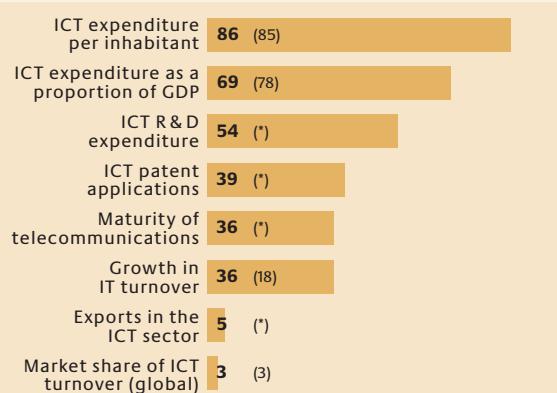
#### Infrastructure – 3<sup>rd</sup> place ↑

Sweden gained three points, rising to 86 index points in the national average index, which put it in third place in the category "Infrastructure". Sweden's good position is due in particular to an eight percent improvement in "Mobile phone penetration" to 119 percent. It also made progress in "Broadband penetration in the population", with improved penetration of approximately 1.5 percentage points to just under 32 percent and improved penetration in "Computer penetration in households", up four percentage points to 87 percent.

#### Applications – 4<sup>th</sup> place ↓

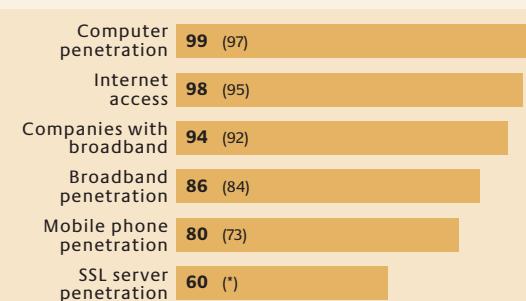
Denmark and Sweden suffered the largest drops in ranking and index point development in the national average in "Applications". Sweden fell from second to fourth place after its national index fell four points to 86 points. It ceded its world leadership in "Internet use in the population" to Norway for the first time, which was reflected in a fall in its average performance. With 99 index points each, "Internet use in companies" and "Availability of e-Government services" are both only slightly behind the world leader.

**Fig. 5.3.12a: Significance of the Swedish ICT market as of 2008**  
Poor performance in the key indicators "ICT exports" and "Global market share"



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

**Fig. 5.3.12b: State of development of Sweden's infrastructure as of 2008**  
Good to very good performance throughout in the category "Infrastructure"



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

**Fig. 5.3.12c: Maturity of the Swedish applications sector as of 2008**  
Outstanding performance in "Internet use" and "Availability of e-Government"



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.13 Country profile – Spain



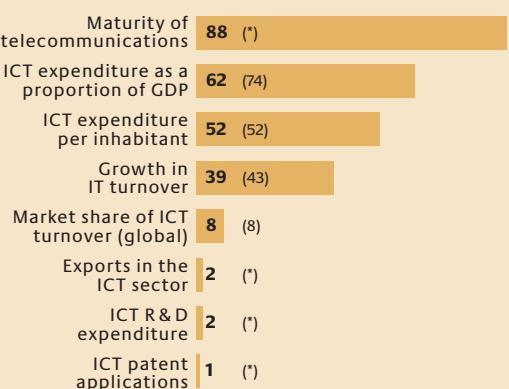
With 49 points and at twelfth place, Spain is trailing far behind with its overall performance in the international comparison of ICT nations. In nine out of 21 key performance indicators, Spain's performance was well below 50 percent of the best possible performance.

#### Market development – 13<sup>th</sup> place ➔

Spain's relative performance in the category "Market development" fell from 38 to 34 index points. In spite of this, Spain was able to retain its ranking in 13<sup>th</sup> place. In Spain, "Growth in IT turnover" fell from eight percent in 2007 to 3.8 percent in 2008 – a drop that was particularly conspicuous compared to the other nations in the ranking.

Fig. 5.3.13a: Significance of the Spanish ICT market as of 2008

Good performance in "Maturity of telecommunications" only



Source: TNS Infratest (2009); Previous year's figures in brackets,

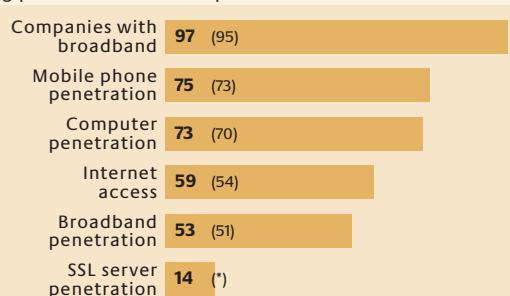
\* Figures unavailable

#### Infrastructure – 12<sup>th</sup> place ➔

Despite a gain of three points in the national average index, Spain was unable to improve its ranking, and remained in twelfth place with 61 index points. There was significant growth in the following categories: a rise of six percentage points to 51 percent in "Internet access in households", and of four percent to 64 percent in "Computer penetration in households". The equipping of companies with broadband is good. However, in "SSL server penetration" Spain clearly still has some catching up to do.

Fig. 5.3.13b: State of development of Spain's infrastructure as of 2008

Strong performance in "Companies with broadband connections"



Source: TNS Infratest (2009); Previous year's figures in brackets,

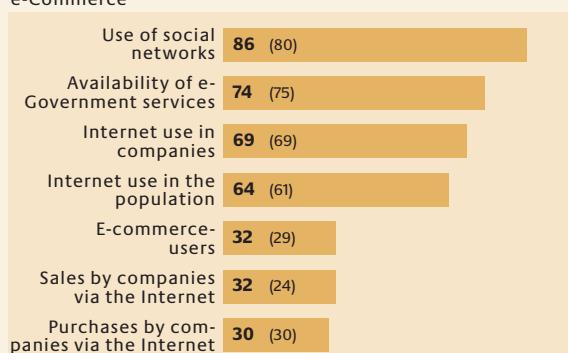
\* Figures unavailable

#### Applications – 12<sup>th</sup> place ➔

Despite gaining two points in the average index value in the category "Applications", Spain stayed in twelfth place with 55 index points. In particular, "Use of social networks" rose by just under eleven percentage points to almost 74 percent. "Internet use in the population" also improved by 4.5 percentage points, to 56.7 points. "Sales by companies via the Internet" rose 2.5 percent to 10.2 percent. The Spanish ICT industry has improved in the category "Applications".

Fig. 5.3.13c: Maturity of the Spanish applications sector as of 2008

Purchases and sales via the Internet well below average, as is e-Commerce



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.14 Country profile – South Korea



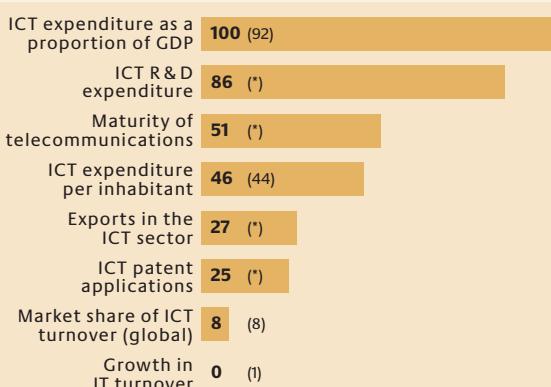
Despite a gain of one index point to 63 points in its overall performance, South Korea was unable to improve its ranking, and remained in tenth place. However, strong growth is still expected in this tiger economy in the years ahead. South Korea is already world leader in three key performance indicators: "ICT expenditure as a proportion of GDP", "Companies with broadband connections" and "Use of social networks".

#### Market development – 10<sup>th</sup> place ➔

South Korea was the only country able to improve its national average index in the category "Market development". It rose from 41 index points in 2007 to 43 points in 2008, and the country was able to hold on to tenth place in the ranking. In 2008, Japan was forced to relinquish its global market leadership in "ICT expenditure as a proportion of GDP" to South Korea.

Fig. 5.3.14a: Significance of the South Korean ICT market as of 2008

World leader in "ICT expenditure as a proportion of GDP", last in "Growth in IT turnover"

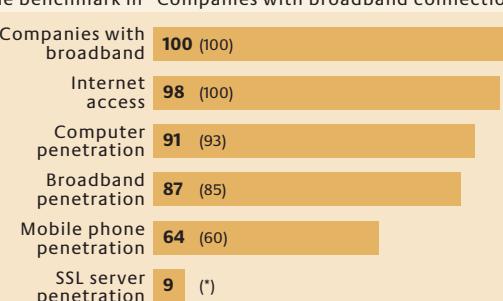


Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Infrastructure – 9<sup>th</sup> place ↓

The relative performance of South Korea remained unchanged at 76 index points. However, South Korea still fell from eighth to ninth place in the overall ranking in this category because the other countries included in this benchmark study improved faster. South Korea ceded global market leadership in "Internet access in households" to the Netherlands, but retained its global market leadership in "Companies with broadband connections". South Korea clearly still has some catching up to do in "SSL server penetration".

Fig. 5.3.14b: State of development of South Korea's infrastructure as of 2008  
Sets the benchmark in "Companies with broadband connections"

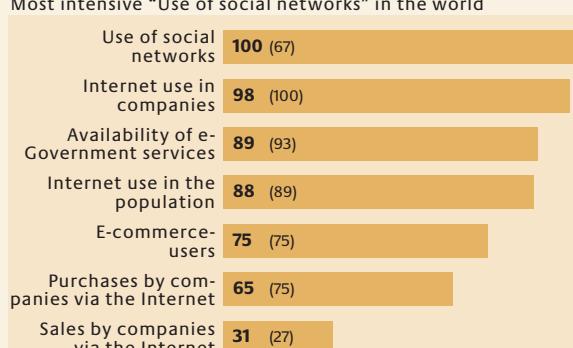


Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Applications – 8<sup>th</sup> place ➔

South Korea was able to improve its performance in the national index by one index point to an average of 78 points. However, this did not improve its position in the international comparison, and it stayed in eighth place in the ranking. There was a dramatic increase in "Use of social networks", which rose by more than 33 percentage points to 85.9 percent. This meant that South Korea became global market leader for the first time in this key performance indicator, and this was also the reason for its good performance.

Fig. 5.3.14c: Maturity of the South Korean applications sector as of 2008  
Most intensive "Use of social networks" in the world



Source: TNS Infratest (2009); Previous year's figures in brackets

### 5.3.15 Country profile – USA

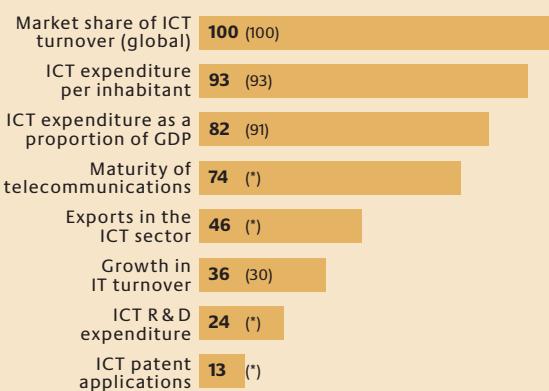


As expected, the USA remained global leader on the ICT markets in 2008. The world's largest ICT nation achieved an average performance of 81 index points (or 81 percent) in 21 key performance indicators out of a best possible performance of 100 points (100 percent). This places the USA well ahead of the other ICT nations. However, the USA was unable to improve its performance in terms of index points compared with the previous year. The USA is global market leader in one key indicator per category: "Market share of ICT turnover in global market", "SSL server penetration" and "Internet use by companies".

#### Market development – 1<sup>st</sup> place →

Compared to the 15 top ICT nations, the USA is world leader across all key indicators, with an aggregate national average index of 77 points. In second place, Japan trailed 24 points behind. However, the USA's performance was down by two index points compared to the previous year. The biggest changes in the USA's performance compared with the previous year were in "ICT expenditure as a proportion of GDP" (down nine index points relative to the other 14 ICT nations) and "Growth in IT turnover" (up six index points). The USA is world leader in the ICT markets.

**Fig. 5.3.15a: Significance of the US ICT market as of 2008**  
USA world leader in "Market share of ICT turnover in the global market"



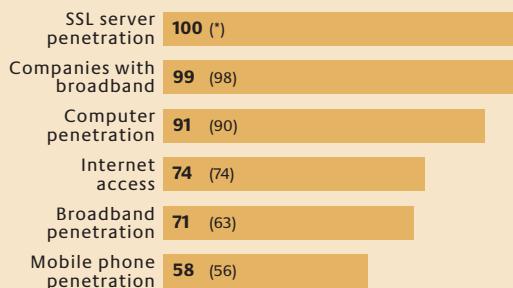
Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Infrastructure – 7<sup>th</sup> place ↓

With an average of 81 index points in the category "Infrastructures", the USA has only a slight lead over Europe (78 points). The Asian ICT industries achieved 45 points. The USA is in seventh place, which represents a drop of one place or two index points compared with the previous year. In "Broadband connections in the population" it achieved 26 percent, and 87 percent in "Mobile phone". It also had 80 percent in "Computer penetration in households" and 64 percent in "Internet access in households". It is world leader in "SSL server penetration".

**Fig. 5.3.15b: State of development of the USA's infrastructure as of 2008**

USA sets benchmark for "SSL server penetration"



Source: TNS Infratest (2009); Previous year's figures in brackets,  
\* Figures unavailable

#### Applications – 3<sup>rd</sup> place ↑

In 2008, despite a drop of one index point to 88 index points compared to the previous year, the USA was able to move up one position to third place relative to the other ICT nations. The USA ceded its world leadership in "Purchases by companies via the Internet" to Germany. The USA's performance in this category was 14 index points behind Germany (86 index points). The USA set the global benchmark and is world leader in "Internet use in companies".

**Fig. 5.3.15c: Maturity of the American applications sector as of 2008**

Good performance in the category "Applications"



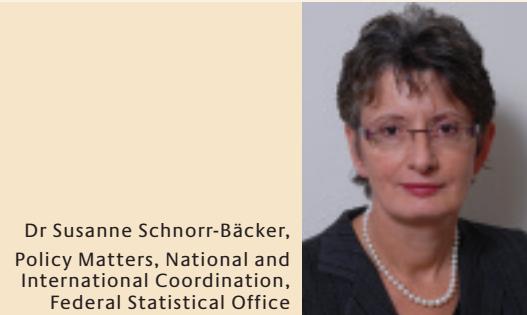
Source: TNS Infratest (2009); Previous year's figures in brackets

## Appendix



## Methodology

*"In order to carry out an assessment of the German ICT industry, including an international comparison, up-to-date, objective information is vital."*



Dr Susanne Schnorr-Bäcker,  
Policy Matters, National and  
International Coordination,  
Federal Statistical Office

### 1. Benchmarking

The “Monitoring Report – Digital Germany” analyses the performance of the German ICT industry, comparing it with Germany’s main competitor countries in Europe and Asia, and with the global market leader, the USA.

In order to calculate the performance of all 15 countries in a comparable manner, “key indicators” were used to position Germany in relation to the 14 main ICT countries in a benchmark report.

#### Selection of countries

Countries were selected on the basis of a survey of experts conducted by TNS Infratest in October (cf. 4<sup>th</sup> ePerformance Report 2008, pages 41 - 46). In response to the question “From which countries / regions will German ICT face the greatest competition in the next few years to the end of 2013?”, the following countries were regarded as having by far the most important ICT industries, and were therefore selected for the benchmark study.

- ▶ The German ICT industry must be compared with the performance of the USA, the global market leader.
- ▶ In addition to the five European countries with the largest populations (Germany, Great Britain, France, Spain and Italy), Norway, Denmark, Sweden, Finland and the Netherlands were included in the benchmark study as the leading European ICT countries.
- ▶ The ICT developments in Japan, South Korea, China and India were chosen to represent the Asia-Pacific Region.

#### Selection and type of indicators

Agreement on the key indicators to be used was reached at an expert workshop. The criteria used in selecting them were relevance, validity, and coverage of the areas selected, together with the regional and temporal comparability of data. The requirements for high validity and availability of data, which were to some extent contradictory, had to be balanced against one another when making the decisions. A total of 21 key indicators and seven “topics in focus” were identified.

“Key indicators” are indicators for which directly comparable data are available for all 15 of the selected benchmark industries for the whole of the period examined. 21 key indicators were used for the benchmark study.

For the “topics in focus”, high-quality data are available for a number of countries, in some cases covering periods of many years. However, these values are not available for all 15 top ICT industries.

#### Categories “Market Development”, “Infrastructure” and “Applications”

Industry positioning and industry assessment of the ICT markets were performed using the three categories “Market Development”, “Infrastructure” and “Applications”.

The performance of the 15 leading ICT industries in the category “Market Development” (cf. chapter 2.2) was measured on the basis of eight key indicators (see fig. a). Further indicators were also used to assess the market development of selected industries. These were measured quantitatively for each of the countries available, or represented on the basis of qualitative analyses. The indicators used were “Market and company structure data”, “Growth in e-commerce turnover”, “Skilled ICT manpower” and “Education and further training”.



The performance of the 15 leading ICT industries in the category “**Infrastructure**” was measured in a global comparison using six key indicators (see fig. a). Further indicators were also used to assess infrastructure conditions: DSL broadband connections, coaxial cable connections and indicators relating to data and IT security.

The performance of the 15 leading ICT industries in the category “**Applications**” (see fig. a) was measured in a global comparison using seven key indicators. In the case of mobile Internet penetration the

current growth and innovation areas for the German ICT industry were also shown.

The correlation of key indicators with the other indicators and the qualitative thematic analyses is crucial to the overall benefit of the benchmarking model, allowing conclusions and recommended actions for economic policy to be derived from the qualitative benchmark.

The table below provides a summary of the key indicators and sources used.

**Fig. a: Overview of key indicators**

<b>Category I „Market development“</b>		<b>Category II „Infrastructure“</b>		<b>Category III „Applications“</b>	
<b>Key indicator</b>	<b>Base</b>	<b>Key indicator</b>	<b>Base</b>	<b>Key indicator</b>	<b>Base</b>
Market share of ICT turnover in the global market	EITO	Broadband penetration	Point Topic, ITU	Internet use in the population	ITU
Exports in the ICT sector	OECD	Companies with broadband connections	Eurostat, OECD, UNCTAD, Nielsen, Pyramid Research	Use of social networks	ComScore
ICT expenditure as a proportion of GDP	EITO, IMF	Computer penetration	Eurostat, OECD, C.I.A., eMarketer, IAMAI	E-commerce users	Eurostat, eMarketer
ICT expenditure per inhabitant	EITO, IMF	Internet access	Eurostat, eMarketer	Purchases by companies via the Internet	Eurostat, OECD
Growth in IT turnover	EITO	Mobile phone penetration	ITU	Sales by companies via the Internet	Eurostat, OECD
ICT R & D expenditure	OECD, Chinese Academy of Engineering	SSL server penetration	OECD	Internet use in companies	WEF
ICT patent applications	EPA			Availability of e-Government services	WEF
Maturity of telecommunications	OECD, ITU, eMarketer				



## Quantitative Performance Measurement

### Indexing of key performance indicators – the rating scheme

A quantitative global comparison of the performance of the German information and communication industry was carried out for all 21 key indicators.

To enable comparison of data from a wide variety of sources measured in different units, index values were calculated for each of the key indicators. In each case the current performance of the “best-in-class country” formed the yardstick for comparison, and was given the maximum index value of 100. The other countries included in the comparison obtained index values of less than 100 according to the gap between them and the global leader.

A scoring system was introduced, and performance was assessed by comparison with the market leader (100 index points):

Index 80 to 100 = „top“

index 60 to 79 = „good“

index 30 to 59 = „moderate“, and

index 0 to 29 = „poor“.

The benchmark of key indicators always includes a comparison with the previous year, so that developments in performance can be assessed in an historical comparison.

### Calculating the

- ▶ “ICT performance of industries” and
- ▶ “ICT performance split by categories”

A procedure was developed allowing a country benchmark study to be carried out for the ICT industries on the basis of clearly understandable mean index values.

Mean values were calculated for the 21 key indicators. This was made possible by the agreed availability of annual data throughout the three-year research project for all the ICT industries included in the benchmark study. As the values for the key indicators are standardised by the indexing performed (index of best-in-class country in the benchmark study = 100), and as they are also cardinal in nature (index 50 is half as good as index 100), they can be aggregated as mean values. In this way an index can be calculated for the overall performance of an industry in the ICT sector. In addition, mean values can be calculated for the three categories, “Market development”, “Infrastructure” and “Applications”.

When aggregating the 21 key indicators to produce a national average or index for a category, weightings were applied to reflect the relative importance of the individual key indicators.

One major advantage of the system developed is the ability to incorporate further key indicators in the future without compromising temporal comparability.



## 2. Interviewing of experts in selected countries

The quantitative performance measurement as described in (1.) is supplemented by a “**qualitative industry assessment**”. This was carried out by Managing Directors and board members from leading German ICT companies. Foreign experts were also interviewed and asked to assess their country profiles in comparison with the German ICT industry.

This report is based on qualitative interviews with experts from the USA and China. In China, two interviews were conducted in Mandarin with experts from the information technology and telecommunications sector. In the USA, five interviews were conducted with experts in English.

The experts were asked to express an opinion on the comparisons between Germany and their own country with regard to individual indicators. The main questions asked were:

- ▶ What are the strengths and opportunities of the German ICT industry compared with your own industry? What image does the German industry have?
- ▶ Why can a number of “outliers”, both upwards and downwards, be seen in your own industry in the global comparison?
- ▶ What current developments, examples of best practice, and trends in your ICT industry can Germany learn from?
- ▶ From the point of view of foreign experts, what should the German ICT industry primarily do to maintain its international competitiveness? To what extent can national economic policy contribute to this?

The results of these interviews are set out in the form of country profiles with comments (cf. Sections 5.1 and 5.2).

## 3. Conducting of workshops

In this reporting period, the industry assessment was carried out in the run-up to the fourth National IT Summit. The aims of the workshops conducted in preparation for the IT Summit were to identify the most important areas of innovation for the German ICT industry and develop an innovation and industry strategy for Germany.

### **Workshop 1: “Developing and implementing ICT innovations in Germany, and marketing them successfully worldwide”, Berlin, 16 September 2009**

This workshop was attended by representatives from 16 supplier and user companies, and 19 representatives from associations, management consultancies and public bodies, including state secretaries, company chairpersons, managing directors and presidents of trade federations. The workshop was chaired by State Secretary at the Federal Ministry of Economics and Technology (BMWi) Dr Pfaffenbach and Professor Dr Harhoff of the Commission of Experts on Research and Development.

The key question at the workshop was how can the networking of sciences, economics and politics be improved to close the implementation gap between invention and innovation?

### **Participants in Workshop 1: “Developing and implementing ICT innovations in Germany, and marketing them successfully worldwide”, Berlin (Nokia Siemens Networks), 16 September 2009**

Ansgar Baums, BITKOM e. V.  
 Dr Thomas Endres, Deutsche Lufthansa AG  
 Prof Dr Hermann Eul, Infineon Technologies AG  
 Dr Andreas Gördeler, BMWi  
 Dr Michael Gorri, Daimler AG  
 Christoph Hecker, FINAKI Germany  
 Dr Herbert Heitmann, SAP AG



Thomas **Hemmerling-Böhmer**, Karl Storz GmbH & Co. KG  
 Dr Iris **Henseler-Unger**, Federal Network Agency  
 Stephanie **Kage**, BMWi  
 Prof Dr Jürgen **Kluge**, McKinsey & Company  
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 Wolfgang **Kopf**, Deutsche Telekom AG  
 Gabriele **Kossack**, Nokia Siemens Networks GmbH & Co. KG  
 Gerhard **Müller**, Ernst & Young GmbH  
 Dr Udo **Nothelfer**, GLOBALFOUNDRIES  
 Uwe **Peter**, Cisco Systems  
 Harald **Preiml**, HEITEC AG  
 Ernst **Raue**, Deutsche Messe AG  
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 Dr Stephan **Scholtissek**, Accenture  
 Karl-Georg **Schon**, Federal Foreign Office  
 Thomas **Schröder**, Sun Microsystems GmbH  
 Dr Andreas **Schuseil**, BMWi  
 Lydia **Sommer**, Nokia Siemens Networks GmbH & Co. KG  
 Dr Jürgen **Sturm**, BSH Bosch Siemens Hausgeräte GmbH  
 Bernd-Wolfgang **Weismann**, BMWi  
 Prof Dr Paul J.J. **Welfens**, Bergische University, Wuppertal

### **Concept and Organisation**

Stephanie Kage, BMWi

### **Moderators and Lecturers**

State Secretary Dr Bernd **Pfaffenbach**, BMWi (Chair)  
 Prof Dr Knut **Blind**, Fraunhofer Institute for System and Innovation Research (ISI)  
 Prof Dr Dietmar **Harhoff**, Commission of Experts on Research and Development (Moderator)  
 Dr Jörg **Hermsmeier**, EWE AG  
 Dr Ferdinand **Pavel**, DIW econ GmbH

### **Minute-takers**

Dr Sabine **Graumann**, TNS Infratest Forschung GmbH  
 Anselm **Speich**, TNS Infratest Forschung GmbH

### **Workshop 2: “An international comparison of the German ICT industry: main competitors – areas of innovation – need for action on economic policy”, Berlin, 14 October 2009**

This workshop was attended by representatives from 21 supplier and user companies and 25 representatives from associations, management consultancies and public bodies, including state secretaries, company chairpersons, managing directors and presidents of trade federations.

The key questions for the workshop, which was conceived and organised by TNS Infratest, were:

- ▶ To what extent do the findings of the “Monitoring Report – Digital Germany” and the TNS benchmark study for the German ICT industry need to be confirmed, supplemented and modified?
- ▶ What are the special strengths and weaknesses of the German ICT industry compared to the main competing industries?
- ▶ What are the promising growth and innovation areas in the German ICT industry?

The workshop prepared recommendations for action for 13 fields of action aimed at taking the German ICT industry to world leadership.

### **Participants in Workshop 2: “An international comparison of the German ICT industry: main competitors – areas of innovation – need for action on economic policy”, Berlin (BMWi), 14 October 2009**

Dr Stephan **Albers**, BREKO – Federal Association of Broadband Communication e. V.  
 Spiros **Alexakis**, CAS Software AG  
 Fabian **Bahr**, Giesecke & Devrient GmbH  
 Hans-Peter **Bauer**, McAfee GmbH  
 Peter J. **Bisa**, Tactum GmbH  
 Dr Peter **Bleeck**, BMWi  
 Dr Andreas **Boes**, Institute for Social Science Research e. V.



Dr Sebastian **Brandis**, BT Germany GmbH & Co. oHG  
 Dr Malte **Cherdron**, VZnet Netzwerke Ltd.  
 Ulrich **Dietz**, GFT Technologies AG  
 Wolfgang **Dorst**, Sun Microsystems GmbH  
 Dr Michael **Eggers**, BVMW – German Association of small and medium-sized businesses e. V.  
 Dr.-Ing. Egmund **Foth**, Fischerwerke GmbH & Co. KG  
 Prof Dr.-Ing. Hans-Joachim **Grallert**, Fraunhofer Heinrich-Hertz-Institut  
 Dr Dipl.-Ing. Oliver **Grün**, VDEB – Association of IT small and medium-sized IT companies e. V.  
 Stephan **Holländer**, HTW Chur  
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 Dr Michael **Littger**, LL.M., BDI – Federation of German Industry e. V.  
 Dr Dirk **Michaelsen**, Dr Helbig & Partner International Consulting  
 Dr Michael **Müller-Wünsch**, Ceva Logistics GmbH  
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 Dr Sabine **Graumann**, TNS Infratest Forschung GmbH  
 Prof Dr Lutz **Kolbe**, Georg-August-University Göttingen (Moderator)  
 Anselm **Speich**, TNS Infratest Forschung GmbH

#### **Minute-takers**

Tobias **Weber**, TNS Infratest Forschung GmbH  
 Jenny **Wukasch**, TNS Infratest Forschung GmbH

#### **Currency conversion rates**

All currency conversions were based on the official mean exchange rate of the European Central Bank as of 2008.

For the US dollar this conversion rate was 1 EUR = 1.4708 USD, for the Chinese Yuan it was 1 EUR = 10.2170 CNY.

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