

Shaping Ideas to Shape the Future

Competence, security and new business areas



Executive Summary of the third phase of the study "Prospects and Opportunities of Information and Communication Technologies (ICT) and Media"

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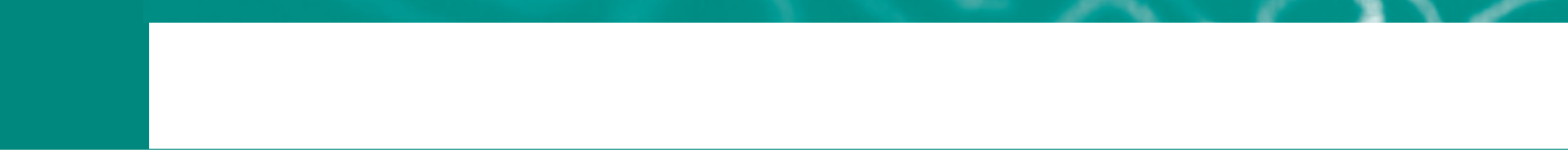
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Executive Summary of the third phase of the study “Prospects and Opportunities of Information and Communication Technologies (ICT) and Media”



Foreword by the Federal Ministry of Economics and Technology



After the development of language, the written word and the printed word, digitization is the next step in decisively changing how people interact with each other. Information and communication technologies (ICT) are an integral component of our everyday lives. They constitute one of the most important

economic sectors in Germany, as well as accelerate growth and drive innovation in core industries, such as automotive and mechanical engineering, energy, media and health-care.

The German IT Summit, which pursues the goal of further strengthening Germany as a location for ICT, has adopted the long-term study "Prospects and Opportunities of Information and Communication Technologies (ICT) and Media" as a project for the third time now. This year's study "Shaping Ideas to Shape the Future" provides concrete recommendations for a successful, sustainable path to the future of ICT and media and delivers valuable information for the fifth IT summit in Dresden on December 7, 2010.

I am delighted that the third project phase of the study is focusing on future developments in ICT and media and their areas of application, thus probing more deeply into the findings made so far and providing impetus for the future. The preceding Delphi Study already explored the extreme importance of future developments in information and communication technologies for society, the economy, academia and politics. This year's publication illustrates this importance using the issues of competence, security and new business areas.

The trend of the last few years makes it clear that it is no longer possible to conceive of life without ICT and the Internet. Hence it is all the more crucial not only that all citizens have fast access to the Internet in the future, but also that they are able to use it competently and safely.

Children must be introduced to new media early on and in a responsible way, and adults must also continuously further their training.

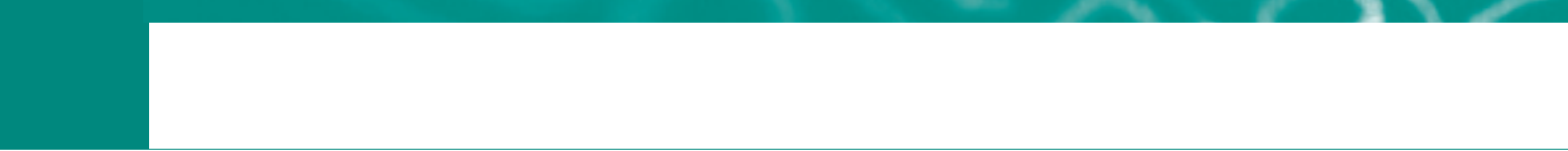
But it is not just for users that the appropriate conditions for using information and communication technologies and new media have to be created. Providers also have obligations. Security and availability of ICT are not just core components of a modern information society, they are also of immense economic importance for Germany as a center of business. Secure communication and secure transactions are the foundation for fully realizing the opportunities of the new technologies.

ICT is already the most important driver of innovation. And, as the study shows, this development will continue to gain momentum. ICT does not just reshape innovation processes, it also accelerates them. Furthermore, new trends in technology transform entire industries and open up whole new areas of business. At the IT summit in Dresden, we will discuss these developments and work out the opportunities for the German economy.

The joint project "Prospects and Opportunities of Information and Communication Technologies (ICT) and Media" of Münchner Kreis, EICT, Deutsche Telekom, TNS Infratest, Siemens, Vodafone, SAP, Telefónica O₂, ZDF as well as Focus, VDE, Sony, Deutsche Bank, Opera, Daimler and the German Federal Ministry of Economics and Technology is a good example of how a number of organizations and companies from all kinds of different fields can come together for a project and work on an important issue from a range of angles. The study managed once again this year to bring together academics, economists and politicians in a common discourse.

I hope the study enjoys a wide readership and I thank the project partners for their dedication.

Hans-Joachim Otto, MdB
Parliamentary State Secretary in the
Federal Ministry of Economics and Technology



Foreword by MÜNCHNER KREIS



The response to the studies carried out in the last two years on the “Prospects and Opportunities of Information and Communication Technologies (ICT) and Media” has exceeded all expectations. The assessments of the more than 500 international experts on potential trends in the next 20 years and the challenges and opportunities identified have triggered countless discussions and provoked a great deal of thought. The very extensive study on the future of ICT has been downloaded from the Internet more than 60,000 times. The findings were included in the federal government’s 2009 IT summit process.

It is clear that “looking into the crystal ball” has only been a first step. Issues like technology, applications, social implications, innovation policy and infrastructure development, to name but a few, are not only diverse and highly complex but above all are very closely interrelated. This is where the third phase of the study, presented here, comes in. Three selected overarching groups of issues, namely “ICT and competence,” “ICT and security” and “ICT for new business areas,” were discussed in depth in a multi-layered process, again with a large number of experts, with the aim of developing specific action areas and, if necessary, measures.

In the course of the project, an interactive online discourse was held in spring and summer 2010 for the three issues selected in the preparatory phase. In this discourse, 97 experts made more than 690 contributions overall to the discussion. A standardized questionnaire derived from this discourse was then answered by 880 international experts from the ICT and media industry. The central findings and assessments of the people surveyed are summarized and explained in this report.

The contributions presented discuss key issues of future ICT and media, and present proposals and concepts for measures or specify the problems in detail as a basis for further inquiry and possible solutions. This is where the interdisci-

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Ludwig-Maximilian-Universität München,
Chairman of the Board
MÜNCHNER KREIS e. V.

plinary approach of the study comes into its own: it is possible to improve the ICT competence of people with the support of advanced technologies, but it also requires business know-how and a suitable political framework. The same applies for the explosive issue of information security and the field of ICT-based business opportunities.



As in the preceding phases of the study, the findings were extremely diverse as well as highly controversial. No wonder – complex tasks rarely have simple solutions. The study therefore shows all the more that it is incumbent on us to work intensively on developing comprehensive solutions and measures. In Germany, we face the challenge of resolutely seizing the abundant opportunities offered by the wide-ranging potential uses of ICT in almost all areas of the economy and society, and ensuring the necessary institutional framework. Only then will we be able to shape the transformation of the economy and society that is being rapidly brought about by digitization in a sustainable way, and at the same time acquire and secure the technical and social skills that will be indispensable in the world of tomorrow and without which Germany cannot maintain its position as a leading economy. To this extent it can be hoped that the contributions and food for thought provided by the study give rise to debate and action plans.

The study was conducted by TNS Infratest on behalf of a consortium led by MÜNCHNER KREIS and is supported by the German Federal Ministry of Economics and Technology (BMWi) as part of the 2010 IT summit process. Partner companies and organizations as well as representatives from academia engaged intensively in the discussion process and in preparing the findings in textual form over a number of months. Our thanks goes to them all, as well as to the excellent operational project coordination team! We hope that this third phase of the future study will be as widely received as the preceding phases and thus help to improve the future sustainability of our country. We are pleased that Münchner Kreis was able to act as a neutral, functional platform for this important study.

Prof. Dr.-Ing. Jörg Eberspächer
Technische Universität München,
Chairman of the Research Committee
MÜNCHNER KREIS e. V.

Methodology



The findings of the Delphi Study from 2009 already afforded all kinds of insights into the future of information and communication technologies – quite a few were expected, many were surprising, some were even controversial. This variety provided by the study shows the potential of the “Prospects and Opportunities of Information and Communication Technologies (ICT) and Media” project: It gives us the opportunity to reflect. Is the result desirable? Do we want such a scenario to occur? And the answers to these questions lead to further questions: What do we have to do to facilitate a desirable state of affairs in the future? What can we do to better exploit future opportunities? In terms of methodology, this third phase of the project links directly with the preceding study: its core and key methods comprise a moderated online expert discussion and an Internet-based expert survey.

Composition of expert team

The team of experts involved in the project who developed the questionnaire, identified the experts for the expert discussion and expert survey, as well as interpreted and evaluated the results, comprises representatives from the project partners Münchner Kreis, EICT, Deutsche Telekom, TNS Infratest, Siemens, Vodafone, SAP, Telefónica O₂, ZDF as well as Focus, VDE, Sony, Deutsche Bank, Opera and Daimler.

The findings of the discussion and survey are based on the assessments of various expert groups. The experts from both the moderated expert discussion and the Internet-based expert survey comprise representatives from business, academia and politics who were personally invited from the networks of the project partners and the German Federal Ministry of Economics and Technology (BMWi) to take part in the study on the basis of their knowledge and experience in certain subject areas.

Preparation of the questionnaire

Building on the findings of the second phase of the “Prospects and Opportunities of ICT and Media” study, the team of experts involved in the project identified three core issues that will decisively influence the development of the

ICT and media sector over the next few years. Central questions were formulated in workshops with the expert team for the three core issues of “ICT and competence,” “ICT and security” and “ICT for new business areas.” They were then compiled in a comprehensive questionnaire for both the moderated online expert discussion and the Internet-based expert survey.



In the online questionnaire, four standardized questions were asked on each issue, in addition to individual questions: on the economic and social significance of the issue, on Germany's position with regard to this issue compared with other countries, and on the players called upon for the issue (specifically: politics, business, academia and/or every single citizen).

Moderated online expert discussion (Delphi discourse)

For this study, a moderated expert discussion was held. It was conducted over the Internet in two waves in May/June (wave 1) and July 2010 (wave 2). The experts approached by the project partners for this discussion were asked in pre-registration to answer questions on their personal geographical focus and professional experience, and to state which three areas they would like to comment on in accordance with their expertise. Using this information, profiles were created on the online platform for the registered experts.

A moderated online expert discussion was chosen as a basis for the study because of the focus on three core issues. It enabled deep insights into these three issues and provided additional broad background knowledge on the current debates in these areas. In addition, it allowed a differentiated interpretation of the quantitative, empirical part of the project phase. The online expert discussion made it possible to bring numerous and above all international experts together. Each participant was able to give their opinion at any time of day and, if they wanted, to take time to formulate complex answers. Several discussion threads could run simultaneously and independently. They could, for example, also return directly to contributions days later and add comments or expand on their own thoughts.

Three moderators supervised the discussion. In all, 97 experts actively took part in the two panel discussions, answering a total of 79 questions and making 691 contributions.

The findings of the discussions and the answers to and opinions on the 79 questions will be addressed in the following articles. In addition, in many places in the articles, the findings of a discussion or also individual expert opinions are illustrated by highlighted quotes.

Internet-based expert survey

In addition to the expert discussion, in July/August 2010, a quantitative Internet-based expert survey was conducted, which reflected quantitatively the findings of the moderated expert discussion, i.e., using closed questions. The experts from the moderated online discussion were also given the opportunity to participate in the expert survey. The questionnaire comprised three sections – a section on each of the subject areas “ICT and competence,” “ICT and security,” and “ICT for new business areas.” The questionnaire comprised 120 questions in all; 880 experts took part, 385 answered the section on “ICT and competence,” 197 the questions on “ICT and security” and 581 the block on “ICT for new business areas.” At the beginning of the survey, the experts were asked to give their personal geographical focus. Based on this, for questions for which the country-specific background was significant for the study, the experts were asked about the country they had specified. For the evaluation, the experts were divided into two groups: the experts for Germany are shown as “GER experts,” experts for other European countries (excl. Germany) as “EU experts.”

Robert A. Wieland
Managing Director,
TNS Infratest GmbH

Presentation of findings

The findings of this year’s study are thematically summarized below in 18 articles. Each article presents the results of the expert survey in detail. For each question, only those groups in which at least ten experts gave an answer are shown. Unless stated otherwise, the percentages are based on all possible answers, including “don’t know/N/A.”

In addition to a large number of specific questions, the individual text contributions include in particular questions on economic and social significance (represented in two semicircles), on Germany’s position ranked against other countries (depicted using a stacked bar) and on the experts’ assessments with regard to the players called upon (illustrated using stacked columns).

Summary

The executive summary outlines the essence of the three sections. The two methods used – the online expert discussion and expert survey – complemented each other extremely well. Together they provide meaningful figures and insights into deeper correlations. The experts highlight the issues that are significant for Germany’s economic and social development and how Germany as a center of business is positioned at present compared with other countries. Implementation of the recommendations is now in the hands of the players from politics, business and academia, but also of every single citizen. In many cases, a joint effort will be required.

We are delighted to be able to present you with the findings of the third project phase, which examines the future of ICT and media from the perspective of three very different but interrelated core issues.

Dr. Udo Bub
General Manager,
European Center for Information and
Communication Technologies (EICT) GmbH

Methodology profile

Online expert discussion

Method

Moderated online expert discussion

Survey period

Wave 1: May 31 to June 8, 2010

Wave 2: July 19 to July 27, 2010

Number of contributions from participants

691 overall

Selection of experts

Representatives from business, academia and politics who were personally invited to take part in the study on the basis of their knowledge and experience in certain subject areas, from the networks of the project partners.

Composition of expert team

GER Experten n = 87

Other European and international experts n = 10

Content of the questionnaires

79 questions in total on the three subject areas:

- "ICT and competence"
- "ICT and security"
- "ICT for new business areas"

Pre-registration

Questions on:

- Geographical focus
- Professional experience, etc.

Internet-based expert survey

Method

Internet-based survey of experts

Survey period

July 20 to August 16, 2010

Interviews conducted

880

Selection of experts

Representatives from business, academia and politics who were invited to take part in the study on the basis of their knowledge and experience in certain subject areas, from the networks of the project partners.

Composition of expert team

Where the country-specific background was significant for the study the questions put to the experts were based on the country specified as their geographical focus.

GER experts n = 777

EU experts n = 77

Other int. experts n = 26

Content of the questionnaires

Total of 120 questions:

- 40 questions on "ICT and competence"
- 34 questions on "ICT and security"
- 38 questions on "ICT for new business areas"
- 4 questions on the economic crisis
- 4 statistical questions

Content of the study

I ICT and competence

- I.1 Participation on and in the Net – status quo of the digital divide
- I.2 Competence profiles of the future
- I.3 Education and education infrastructure in the digital society
- I.4 Responsibility for “digital” education
- I.5 Competent use of media in the knowledge and entertainment society of the future
- I.6 Evolution of competence requirements of and within companies

II ICT and security

- II.1 Security in the digital world
- II.2 New openness, new framework?
- II.3 The role of the state: how much regulation does the Internet need?
- II.4 ID cards for the future: possibilities and limitations
- II.5 IT security: the responsibility of the user
- II.6 IT security – an economic and location factor

III ICT for new business areas

- III.1 Technology trends and their significance for the sustainability of the German economy
- III.2 Growth markets and opportunities from ICT
- III.3 ICT market in flux
- III.4 ICT in and for companies
- III.5 Organization for innovation
- III.6 Europe as a center of business

Executive Summary

Only through a coordinated effort, in which all players from society, politics, industry and academia are aware of the opportunities and impacts of digitization, will it be possible to shape the future and to do so successfully.

The study at a glance

In the future, trust in digital media, services and applications and their use in society and the economy will be determined by competence, knowledge and security.

For the third time already, the long-term project "Prospects and Opportunities of Information and Communication Technologies (ICT) and Media," which is being carried out by MÜNCHNER KREIS together with partners and sponsors, provides a platform for notable experts from industry, academia and politics to discuss their understanding of the future significance of digitization for the economy and society. This study is based on the results of the two preceding project phases from 2008 and 2009. The findings on future developments, challenges and opportunities of ICT and media suggest a future that is increasingly infused with digital technologies, both in private and professional spheres. More than 1,000 international experts actively took part in this extensive study. The ICT and media experts commented on 79 questions in two moderated online panel discussions. The resulting findings were incorporated into a further international expert survey comprising 120 questions, after which they were evaluated and analyzed.

In continuation of the findings from the previous years, under the central themes "Shaping Ideas to Shape the Future," three issues came under close scrutiny:

1. "ICT and competence"
2. "ICT and security"
3. "ICT for new business areas"

Based on the results of the online discussion and the international expert survey, the third project phase identifies the potential of central developments, determines Germany's current position compared internationally and calls on the main players to provide impetus. The stated aim of this phase is to support and shape our digital future. The findings of the study were presented at a special conference on November 5, 2010 in Berlin. The 150 participants then discussed Germany's future economic and social development on the basis of these findings. The aim of the three workshop groups on the issues of "ICT and competence," "ICT and security" and "ICT for new business areas" was to develop specific stimuli to make Germany fit for the future. Action areas were identified in each of the three subject areas and, where possible, recommendations were derived to provide valuable impetus for the IT summit in Dresden at the beginning of December 2010.

The new findings also confirm that, while the pace at which information and communication technologies are changing the world of today remains undiminished, the majority of developments that lie ahead of us depend on courses set today and are not predetermined per se.

In the following three sections, the authors of the "Shaping Ideas to Shape the Future" study set out specific potential ways in which our digital future can be shaped.

“ICT and competence”

(Media) competence, (media) use and education are the keys to unlock the digital door of the 21st century. 19 years after the World Wide Web opened up, broad cross-sections of society still do not possess these keys. Only around a quarter of the German population has the necessary (media) competence to use the Internet expediently and securely. That is the latest finding on the status quo of the digital divide in this study. The section “ICT and competence” includes solutions for building up digital competence and securing these skills for even more people in the long term.

The findings of the study clearly show that traditional basic skills like reading, writing and arithmetic remain a core component of a modern education system, as does an awareness of cultural and ethical values. However, they are no longer sufficient in themselves. Many Germans, for example, do not have the necessary applied knowledge on the issue of network and data security on the Internet. Corresponding action must be taken to remedy these deficits. This is also the call of the experts involved in this study. They emphasize that specific skills and key qualifications, such as competent handling of personal data on the Internet, data privacy and information processing, are a top priority. It is equally important that people have the ability to assess the relevance, credibility and up-to-dateness of information and sources on the Internet.

The Federal Ministry of Economics and Technology (BMWi) has already made successful inroads into building up these skills with initiatives like “Experience the Internet.” The experts believe the most important thing is to ensure that

users have sufficient experience. Only by actually doing can users overcome their reservations, or even fears, and achieve the necessary confidence and trust. To this end, there should be certificates about whose reliability and independence users can be absolutely certain. This also includes an (evaluation) system which can be used as a guide. Politics and the economy, as providers of impetus, must set up and introduce an independent, reliable system of this kind.

Now is the time for reform: The Internet requires a modern, multilayered education system and a corresponding education infrastructure. Only then can children and young people be introduced to new media from school-age as part of their education and be taught how to use it. The experts recommend a Germany-wide campaign to introduce media studies on a broad basis as a school subject.

They are also calling for continuous training of teachers and educators in order to ensure that teaching remains innovative and appropriate to media. The state, as the most important provider of impetus, must first prescribe a national, binding framework for this.

But parents should also be more closely involved in their children’s learning process. The idea of Germany-wide guidelines “Living in digital worlds” as a “standard” could be particularly powerful. As basic reading, with clear and simple rules for using the Internet, they could help to dispel uncertainties, counteract reservations, build trust, and work against naïve use of the Internet. A Germany-wide initiative like this could lay the foundations for the urgently required blanket (media) competence. Responsibility for developing the guidelines lies with politics and academia,

as well as with the economy. But individuals will also increasingly be required to take the initiative in constantly developing their own skills in this area. The principle of “life-long learning” will be crucial for everyone in the future.

The results also make clear that the ability of companies to adapt to digital globalization will be crucial to the economic development of a country. The phenomena arising under Web 2.0, such as user-generated content, mass collaboration, and social communities, result in new kinds of cooperation within and between companies and increase the transparency of corporate communication. In research and development, approaches such as open innovation or open source are playing an ever more important role. Specifically, digitization requires new competencies in the professional context. As such, companies must develop appropriate digital competence and adapt their own organizational structures.

The competence of employees should be expanded through institutionalized training measures. The experts deem the first steps in this direction to be guidelines that provide a framework for behavior in using Internet/Web 2.0. Teleworkstations and virtual teams as well as open approaches to collaboration require a strong corporate culture and employees to be treated with respect. Flexible worktime models are an initial, concrete step here.

The increasingly web-based nature of networking with employees allows scope for criminal or unethical conduct. In this regard, the onus is on politics above all to provide impetus and legislate accordingly to promote networking while at the same time preventing loss or damage.

Raising awareness about changes in a digitized world and sharing knowledge about the possibilities of active, open participation in Germany are the two most important steps forward into the future at present. They allow future changes to be shaped today.

It should be noted that all stakeholders are actively called upon to support and promote this process. After all, it is only with competent users, students, employees and companies that Germany will be able to meet the challenges of the future.

“ICT and security”

Secure, trustworthy and reliable conduct in an increasingly digitized world is the future key factor for successful societies and economies. Use of the Internet is based on the unprotected exchange of data in a globally distributed network of computers. Open, unrestricted access to information and markets is intrinsically insecure. How can it be better protected?

In the “ICT and security” section, experts identified and evaluated current issues and developments on this subject. They answered questions about comprehensive and appropriate security in the digital world, discussed the roles and obligations of state, industry, academia, and users, and assessed the opportunities for national societies and economies.

Their common denominator is: “Privacy is probably the most endangered objective in a digitized world.” This section therefore focuses on secure digital identities and the new electronic ID card in Germany. The new ID card is a means of enabling a digital identity to be documented at any time.

The experts recognize what has been achieved so far: research and development are at a high level; advances are being made in standardization, including for new scenarios like cloud computing or e-energy; data privacy and data security have been enshrined in the German constitution (Article 91c); electronic ID cards and De-Mail make important, exemplary contributions to secure ICT infrastructures; the German and European security industries are internationally competitive, their technology is seen as reliable and neutral.

Nevertheless, the experts believe there are still conflicting interests that require a balance to be struck between legal regulation and voluntary commitment by the private sector – as is currently the case with geodata services. Network operators and providers are liable in case of insecure systems and users have duties of care. They should keep user IDs and PINs in a safe place and report their loss immediately; they should use firewall and antivirus software and keep it up-to-date at all times. However, many users are

still unaware of, and need to be taught, the value of protecting personal and sensitive data on the Internet, e. g., in social networks.

The first impetus for creating such awareness should be provided by the government. The experts believe it should do more to inform people about the risks, rights and obligations in regard to the handling of their personal data. This should include, they say, additional measures in education – both in schools and in further education and training. They recommend the introduction of a Germany-wide, standard “Internet license,” that would have to be regularly renewed.

The simple usability of security functions is also crucial. In this regard, the experts say that it must be possible to use high-quality security functions without expert knowledge. Data privacy and security measures designed to be user-friendly are to reduce the risk of unintended release of personal data. Furthermore, this impetus must come from academia and, together with the economy, must result in new products.

Provision of a legal framework and the monitoring of legitimate use of personal data is the responsibility of a democratically elected and accountable legislature. It determines the rights and ownership of certain data, who is responsible for protecting data in which cases, and how violations of this legal framework are to be punished. Impetus should come from politics, which is particularly responsible for the security of the Internet and the data entailed.

According to the experts, impetus could come from binding, international data privacy regulations (see Data Protection Center 2010), agreed jointly by politics and the economy.

Politics and the economy should also protect the ICT infrastructure with secure communication and identification functions. The electronic ID card can be seen as a particularly positive impetus here, with an immense scattering effect. The electronic ID card provides users with a tool for documenting their identity at any time – offline or online – in a self-determined way, transparently and securely.

“ICT for new business areas”

Information and communication technologies have effected serious changes in competition and the global markets and will do this to a much greater extent in the future. Almost all industries and market players are affected by the changes. Who sets ICT trends is a crucial factor for the future competitiveness of a country or region. According to the experts, Germany only has a middle ranking in this respect at present – too far down the field to be successful in the core areas of ICT on a sustained basis.

They see huge opportunities for Germany in linking ICT with traditional application industries, in the area of e-energy, e-health and e-mobility, but also in e-commerce. It is in these promising growth markets that Germany has the potential to achieve a pioneering and top position. The German economy meets the requirements of system integration and standardization in the area of embedded systems in particular. The same applies to the “Internet of Things.” Here too, Germany can meet the main requirements for excellent technical development of complex systems.

However, the strong competence in technology is currently not supported by agile business models and attractive, emotional marketing activities. There is a lack of “hybrid innovations” that combine and advance new ideas for products and services with market and business strategies. In Europe as a center for business, it is difficult to see any comprehensive branding as achieved by Apple, for example, under whose umbrella new products are developed, core business is systematically expanded, and new business models (App Store) are successful.

On the dynamic ICT markets, the experts believe it has become very difficult to survive over the longer-term. Leading players are more easily challenged today: flexible value-creation networks are open to new players. ICT creates a basis for achieving broad reach with relatively low investment. This provides a new opportunity for small and medium-sized enterprises (SMEs). It also creates new scope for customers to compare existing agreements and offers with the available market information and to act accordingly.

In view of these developments, the European deficit in marketing competence and entrepreneurial initiative urgently needs to be remedied. Despite a large number of players with high levels of competence, two-way transfer and commercialization are very limited at present. Inadequate interaction between developers and marketing experts hinders in particular the rapid market maturity of disruptive innovations. In order to engender the necessary cultural shift in companies, the experts recommend greater efforts by business.

In the area of business processes, impetus can be found in the "open innovation model," in which companies can open themselves up to ideas from outside, from customers, suppliers or universities through ICT. The model can inject dynamism into established patterns of thought and action, but it can also specifically save on costs and time in the development process.

Tapping into the expected benefits of ICT in companies requires flexible, scalable IT systems and tools that adequately take into account the size of the company, the ability of a system to adapt, and the distribution within the company.

For established, individual companies, ICT offers huge potential for improvement. The experts see resource savings through planning, flexible availability and virtual cooperation in real time with digital media. They call for corporate guidelines for competent use of ICT as well as communications etiquette that must be supported and practiced by a company's main decision-makers.

For the required cultural shift which promotes more entrepreneurial initiative, company incentive systems are recommended. In particular, target agreement should be used as a tool to promote innovation and business ideas. Specific measures proposed include the initiation of spin-offs or the development of marketing plans.

The most persistent barrier to the successful implementation of development projects and new business ideas is financing, especially in small companies. It falls to both the economy and politics to act faster with sufficient risk capital.

For the ICT industry and the traditional industries transformed by ICT, national and European support programs are hugely important. They should contain elements that support cross-industry collaborations by systematically promoting ideas for commercialization in the form of joint ventures, projects or the establishment of new companies.

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