

ALIPRO NATIONAL REPORT

GERMANY

Overview of national research programmes on mobile telecommunications in Germany

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Abstract

Germany has a very strong mobile market and an advanced set of R&D programmes for mobile communications. There are three ICT programmes covering mobile communications on national level: one for basic research by the German Research Foundation and two for applied research by the federal government. In addition, most of the federal states have their own ICT programmes, which are rather oriented towards business development. All programmes analysed are run efficiently and offer a considerable level of funding. In addition to this there are also private R&D organisations like T-Labs doing research on mobile communications.

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1 National Report for Germany

1.1 Mobile communications market Germany

The market for mobile communications in Germany is very strong. There are more mobile phone than fixed line customers. At the end of June 2005 there were more than 74 million mobile phone customers in Germany (total population: 82 million). This corresponds to a market penetration of nearly 90%. The total turnover created was 5.4 billion euro.

There are four mobile operators in Germany serving the majority of customers directly: T-Mobile, Vodafone, E-Plus, and o2 Germany. Besides, about 20 million mobile phone customers are served by seven service providers and various re-sellers.

The four German mobile operators invested in 2004 a total of 2.3 million euro, most of it into infrastructure for UMTS. UMTS was introduced to the market in May 2004. The coverage of UMTS cells of T-Mobile, Vodafone, and E-Plus exceeds by far the 50% of population required by the UMTS licence conditions. However, the market uptake of UMTS services is still below expectations. A breakthrough is expected from the upcoming Christmas sales, for which many new terminals have been announced.

Two major trends in telecommunications are currently driving the mobile markets: broadband and convergence, along with an ongoing decline of prices. The need for more bandwidth has sharply increased during the last few years. Fixed net offers vary between 6 and 24 Mbit/s maximum bandwidth (ADSL and ADSL2+) currently. Available bandwidth in mobile networks is far below this. To complement existing GPRS and UMTS solutions a number of public WLAN hotspots have been deployed, currently about 8,000. They are serving customers at places like hotels, restaurants, gas stations, and airports. [1]

1.2 Regulatory background

The telecommunications market in Germany is regulated by the Telecommunications Act (TKG) of 22 June 2004. The purpose of this Act is to promote competition and efficient infrastructures in telecommunications and to guarantee appropriate and adequate services throughout the Federal Republic of Germany through technology-neutral regulation [2]. Telecommunications regulation is under federal authority.

The aims of this regulation are, among others, to safeguard user interests in telecommunications and privacy, to secure fair competition, to encourage efficient investment in infrastructure and to promote innovation, to ensure provision of basic telecommunications services at affordable prices throughout Germany, to secure efficient and interference-free use of frequencies, to secure efficient use of numbering resources, and to protect public safety interests.

The current version of the Act is a major revision of the former Telecommunications Act of 25 July 1996. It implements five European directives and further changes based on experience in order to make regulation more efficient. [3]

The compliance with the regulations of the Act is supervised by the *Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway* (formerly named: Regulatory Authority for Telecommunications and Posts). It is an authority within the scope of business of the Federal Ministry of Economics and Labour. By liberalisation and deregulation, the Agency provides for the further development of the electricity, gas, telecommunications and postal markets and, as from 1 January 2006, also of the railway infrastructure market. Besides regulation the Agency has further tasks in the telecoms sector, e.g. administration of frequencies and phone numbers, taking actions against misuse of numbers, market observation, and information of the public.

For the purpose of implementing the aims of regulation, the Agency has procedures and instruments at its disposal including rights of information and investigation as well as the right to impose graded sanctions. [4]

The Agency became widely visible to the public on the occasion of the auctioning of UMTS licences in 2000, which was conducted by the Agency. The Agency is also in charge of approving Deutsche Telekom tariffs before they can be offered to customers, which is required due to the market dominating position Deutsche Telekom still has in some areas.

1.3 Research strategy

The strategy for state-financed research activities in the ICT sector is laid out in the *IT Research 2006* programme [5]. With the “IT Research 2006” programme, the Federal Ministry of Education and Research (BMBF) has set the course for research funding in the field of information and communications technologies for the period 2002 to 2006. The programme aims to offer motivated researchers at universities and in institutes and companies the opportunity and the means to jointly put their creativity and expertise to work to strengthen Germany's position as a technology location, thus using top-level research to develop innovations which will benefit people and create new jobs.

The programme document states that the ICT sector is the most dynamic branch of the economy in Germany with an average growth rate of around 10 % over the last few years. The high rate of growth of the ICT market in Germany and its comparatively good position with regard to the scientific basics have enabled Germany to become an attractive location for ICT production and research over the last years. This is also reflected in patent activities in Germany. Looking at the applications for patents during the 90s, the field of mobile communications was by far the most dynamic sector; the same can be said for the Internet and data security. Germany occupies a good position in all three areas, but must expect increasing competition. The potential to take the lead in individual fields is there and the said programme is intended to support utilisation of this potential.

“IT Research 2006” identifies those research topics and areas of innovation in the field of ICT from which Germany could expect to gain advantages. Mobile communications is included in programme area 3 “Basic technologies for communications engineering”.

The programme is described as “a flexible and open programme which learns as it goes along. The research areas listed are neither complete nor finalized”. The programme was prepared in close dialogue between the science and business communities, in which also the individual areas of funding were discussed.

The programme focuses on research activities to be executed in Germany. An integration into the European Research Area (ERA) is not addressed in the programme. Information received from the programme administration officers in charge of programme area 3 (see above) confirms that activities of this kind are currently neither being done nor stimulated.

1.4 Research programmes on mobile communications

The survey on R&D programmes in Germany done at the project start of ALIPRO revealed that there is no research programme focusing exclusively on mobile communications in Germany. However, there are a number of programmes which fund activities in this area. Some of them mention mobile communications explicitly as a target area, while others do not exclude this area by including all research areas. Depending on the programme, activities ranging from basic research to pre-product developments can be funded.

Regarding the programme host, programmes can be categorised into three groups:

1. One programme is run by the central, self-governing research organisation that promotes research at universities and other publicly financed research institutions in Germany: The *German Research Foundation* (DFG). Only basic research is funded.
2. Programmes are also run by two *ministries of the federal government*. More precisely, the ministries provide the funds, but the programme administration is done by subcontracted public organisations. Types of activities that are eligible for funding range from

application-oriented basic research to research and development in the pre-competitive domain.

3. Promotion of innovation by the Federal States: Most of the German federal states fund innovation projects in the area of ICT. Projects in this third group are the ones closest to the market. Project activities are in general required to be executed within the funding Federal State.

Below the main programmes are described in more detail.

1.4.1 German Research Foundation (DFG)

The German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) [6] is the central, self-governing research organisation that promotes research at universities and other publicly financed research institutions in Germany. The DFG is an association under private law. Its members are the universities, the academies of sciences and humanities, and a number of research institutes and research organisations.

The DFG **serves all branches** of science and the humanities. Promoting research includes supporting individual projects and research cooperation, awarding prizes for outstanding research achievements as well as funding scientific infrastructure and encouraging contacts in science and research. However, **only basic research** is funded. **All researchers**, irrespective of their nationality but by default holding a doctorate, working at German institutions, may apply. DFG assumes that personnel paid from the research grant shall work in Germany. Researchers at purely commercial institutes are excluded. There is a certain focus on promoting young researchers.

The **communications quality** is good. Information about the programme is distributed via press releases and on the website of DFG, the latter is available in German and English. The quality of the **application process** is fair. Applications may be submitted at any time. At the example of "Individual / Research Grants" the complete proposal should be self-explanatory not exceeding 20 pages. An application template with explanatory text is available online in electronic format in German and English. The duration of proposal evaluation is, however, quite long (6 – 8 months). Each proposal submitted to the DFG is evaluated by two independent reviewers, based on which an award recommendation is prepared by the head office and finally decided upon by a review board. About 50% of all submitted proposals in the area "Electrical and communications engineering" are accepted. The application processing mechanism is **transparent**. The criteria for the review process are clearly defined and publicly available.

Only few details were found out about the project **reporting process**. Recipients of research grants report to DFG on a regular basis, at least at the end of the project. Reports can be provided in electronic or paper format. The reports shall contain the process and results of work. The schedule for the reports is laid down in the letter of approval to the grant recipient. Reports are reviewed by reviewers.

The **flexibility** is good. Modifications of the contract ranging from objectives to budget changes are in principal possible. Subcontracting may be permitted. The **financial capacity** is also good. The 2004 annual budget for all disciplines was 1309 Mio EUR, of which 11 million euro funds were allocated in "electrical and communications engineering". The **average funding** in this area is about 100,000 euro per proposal, but there is no general fixed upper limit. A **financial guarantee** from the applicant is not required. The budgets in the proposals have been **cut** on average by 20-30%. Costs that can be funded include staff costs or funding for one's own position, scientific instrumentation, consumables, travel, miscellaneous (e.g. contracts awarded to third parties) and publication costs.

DFG uses its funds very **efficiently**. In 2004 only 3.6% of DFG's total budget was used for administrative programme management. 99% of all funds are provided to DFG by the German federal government and the federal states. The **programme management quality** is good. Processes are defined in guidance notes and procedure guidelines. Quality management is taken care of by DFG's department "Quality assurance and process development".

To ensure an **impact** of the project results, DFG expects its grant recipients to publish the project results or to make them available to the public in a suitable way. Due to the basic-scientific nature of the funded work, the creation of jobs is not an immediate outcome of the achieved results.

1.4.2 IT Research 2006 (BMBF)

“IT Research 2006 – Funding Programme for Information and Communications” [5] is the R&D programme of the Federal Ministry of Education and Research (BMBF) for the field of information and communications technologies in the period 2002 to 2006. The programme aims to offer researchers at universities and in institutes and companies the opportunity and the means to jointly put their creativity and expertise to work to strengthen Germany's position as a technology location. It is intended to facilitate innovations which will benefit people and create new jobs.

“IT Research 2006” lists those **research topics** and areas of innovation for which proposals can be submitted. “Mobile Broadband Communication Systems” is included in programme area 3 “Basic technologies for communications engineering”. The programme is described as “a flexible and open programme which learns as it goes along”. It is, however, doubtful that any updates at least for the topic Mobile communications have been made since its start. Only topics of this priority list (Förderkatalog) can be funded. Moreover, **only application-oriented basic research** is funded, but no projects close to market. **Any type of academic institution or commercial enterprise** is eligible to apply or participate, limited to organisations residing within Germany.

The **communications quality** is fair. General information about the programme is available on the web in German and English. There is also a helpdesk for basic questions which can be contacted by e-mail or by telephone via a free phone number. Calls are published in the Federal Bulletin (Bundesanzeiger) which appears in paper format. On its webpage [7], however, call information could not be found quickly, and information is available in German only. Call details, application forms etc. can also be obtained directly from the programme management organisation in charge or via a newsletter. Requests in regard to this survey have been answered slowly and mostly incomplete.

There are two to three **calls for proposals** per year. Applicants are advised to first talk to the programme management organisation in charge (Projekträger). A two-stage application process is used: first a project sketch is required only. The best proposals are invited for submitting a full application of which the large majority is usually approved. The **quality of the application process** cannot be fully assessed, as the evaluation procedure is **not transparent**, and no such details were provided on request. Furthermore, no information on number of applications or acceptance rate were provided.

Project progress reporting is required every six months by default. No further details were made available. In addition, no information regarding the **flexibility** for project contract modifications was provided.

The **financial capacity** is good. The 2004 budget for the research area “Basic technologies for communications engineering” (in which “Mobile broadband communications systems” is one out of four topics) was 57 million euro. Average figures for requested or approved funding amounts were not provided. There is no fixed upper limit for a project budget. The **grant to the project budget** is up to 50% for enterprises and 100% for academic institutions.

Funds for the programme administration **are used efficiently**. The costs amount to approximately 5% of the total budget. The **quality of programme management** cannot be assessed as nearly no information was provided. Several project management organisations support the BMBF in administrative project tracking, interim and final review, and financial control. There are no internal mechanisms or procedures in place for reviewing the research programme in order to improve its management quality.

An integration into the **European Research Area (ERA)** is not addressed in the programme. Information received from the programme administration officers in charge of programme area 3 (see above) confirm that activities of this kind are currently neither being done nor stimulated, although they are not illegitimate. Information regarding the **impact** of the programme, e.g. results, patents, or jobs, have not been provided.

1.4.3 Information society Germany 2006 (BMWA)

With the action plan "Information Society Germany 2006" the Ministry of Economics and Labour (BMWA) funds research and development projects in the pre-competitive domain which are aimed at developing and demonstrating novel multimedia applications and services. The sub-area in the scope of ALIPRO is "Mobile media", whose **focus is on mobile multimedia services**. The goal is to develop and test wireless networked mobile multimedia applications. The focus is clearly on applications. Only research and development projects in the **pre-competitive** domain are funded. Industry and academia are entitled to apply and receive funding, but a dominant participation of SMEs is targeted. Applicants must reside within Germany.

This is a comparably small programme. Only little information has been obtained on this programme:

The quality of the **application process** is fair. Only one call has been issued. Proposers were asked to provide a project sketch (i.e. an abstract of about 10 to 20 pages). A panel of technical experts reviewed the proposals. The projects selected are requested to submit an application form including full details on project planning. Typically, all of these projects receive a contract. In addition, applicant-initiated proposal abstracts can be submitted at any time. 150 project proposal abstracts have been received after the call, of which about 10 proposals were accepted. Apart from this, about 20 project proposal abstracts not related to a call are received annually. The duration of application processing is rather long. From submission to contract it can take 1 or even 1.5 years, depending on how quickly agreement on the project content and partners can be achieved.

The **financial capacity** is not strong. The annual budget is 36 million euro for the whole division Multimedia, of which about 3-5 million euro are allocated to activity "Mobile Media". There is no fixed upper limit for a project budget. Average figures for requested or approved funding amounts were not provided. Funding is done by a **financial grant to the project budget**. Universities / academia are funded 100% of their costs. Industry can be funded up to 50% if the proposal is fully applications-oriented (which is the focus of this programme). This is usually not the case, and the typical funding for industry is 35%. SMEs receive a bonus of 5-10 %. Industry from East Germany gets a 10% bonus. These boni can be summed up.

5% of the total budget is available for administrative tasks at the programme coordinator, which ensures the funds are used **efficiently**. No assessment of the **programme management quality** can be made due to lack of information.

1.4.4 Regional research programmes

Most of the 16 German federal states fund innovation projects in the area of ICT. These funding opportunities are no comprehensive research programmes. They are rather ways of financial contributions of the respective federal state to innovative activities of local academia and industry, mainly to strengthen local industry, and to create jobs. The types and means are not harmonised between the federal states. Projects in this third group are the ones closest to the market. Project activities are in general required to being executed within the funding Federal State.

Below, one example is given for the federal state of Bavaria.

Support Programme ICT in Bavaria

The support programme Information and Communication Technology in Bavaria [8] is one of the federal state programmes and is limited to the free state of Bavaria. It shall enable companies to conduct research and development work in the area of information and communications technology, and it shall improve and accelerate the implementation of R&D results into products, services and business processes. The Bavarian state government is the official granting authority, but the management of the programme is outsourced.

The programme includes an area dedicated to **mobile communications**. The scope of the programme is flexible. Responding to economic needs and political priorities, specific areas are focused upon for a limited time, like e.g. ICT in the automotive sector. The **objectives** are clearly

defined. The main goal of the programme is to strengthen the Bavarian ICT sector, and especially SMEs.

The **communications quality** is appropriate. Information about the programme and application details are available on the programme website and in printed brochures in German.

The **application process** is clearly described, but the evaluation process is not fully transparent. There are no calls; project proposals can be submitted continuously. Applications for grants are to be sent to the programme coordinator who provides application forms on request. The programme coordinator **evaluates** the applications on behalf of the Free State of Bavaria. After consulting expert evaluators, the project coordinator gives a recommendation on the support decision to the Bavarian Ministry of Economic Affairs, Infrastructure, Transport and Technology. The main criterion for **proposal evaluation** is that proposals should be innovative and likely to have a positive economic effect on the Bavarian economy. Another criterion for the evaluation is the participation of SMEs in the project.

Application statistics are not available. **R&D institutions and companies** are eligible to apply. Eligible for funding are projects dedicated to R&D efforts that go beyond one company. The projects are to be conducted in close collaboration between several companies respectively companies and research institutes.

The programme coordinator also performs the **programme management and supervision** of the support measures, which seem to be of good quality. This includes the administration of payment requests, the pre-audit of interim and usage receipts, the correspondence with the companies, the payments of the grants, and performs the ensuing audit. The coordinator uses a proprietary database for managing projects and proposals. Monitoring is done quarterly when projects ask for payments and have to **report** their activities to the coordinator. In addition, the coordinator visits projects in the middle and at the end of their lifetime.

The programme allows for some **flexibility**. Modifications of project contracts and redefinition of goals are generally possible. Sub-contracting of a limited amount of work is possible and may be funded.

The **financial capacity** is small. The total annual budget is about 5 million euro. There is no maximum amount defined for single grants. Universities/public academic institutions receive 100 % funding. Companies collaborating among themselves can receive funding of up to 50 %. If companies collaborate with universities in a project, the companies' funding will be lower than 50 % in order to enable 100 % funding for the university partner(s). For SMEs a bonus of up to 10 % is possible.

The programme has a **fully regional focus** without any recognizable relationship to ERA and its integration objectives.

Programme impact: The focus is on prototypes and other results with economic impact, but theoretical solutions and publications are also produced. Information on job creation was not provided, but it is supposed that these activities have a positive effect.

1.5 Other R&D initiatives on mobile communications

▪ Deutsche Telekom Laboratories:

In collaboration with Technical University Berlin (TU Berlin), Deutsche Telekom has established the Deutsche Telekom Laboratories [9] on the campus of TU Berlin. The goal is to conduct pioneering research on innovative information and telecommunications technologies with a pronounced market emphasis. Leading scientists collaborate with Deutsche Telekom experts to translate their visions for the future design of information technology and telecommunications into reality. In this way, Deutsche Telekom Laboratories pool the know-how of Deutsche Telekom AG with the expertise of some of the world's top research scientists.

- **Eureka cluster CELTIC:**

In Germany the state does not fund companies or academic organisations who participate in Eureka cluster CELTIC [10]. Nevertheless there is some participation of German partners in CELTIC. Besides Deutsche Telekom, who is strongly participating, a number of other companies and academia are currently participating in CELTIC projects.

1.6 Conclusions

Germany has an advanced landscape of R&D programmes in the ICT area, which provides a good choice of funding opportunities in the area of mobile communications. There is a complementary division of labour between basic research (DFG), applied research (BMBF) and regional R&D programmes in the federal states focused on business development. The programmes are run efficiently and the funding level is mostly appropriate.

However, there is still opportunity for improvement. Some of the analysed programmes are lacking a fully transparent evaluation process; at least we could not find out in some cases, what the criteria and mechanisms for evaluation are. Another unclear area is the flexibility of the programmes in regard to the application of funding rules.

The integration of the German research programmes into the European Research Area seems to be an open issue. Efforts to align national programmes with European programmes are only rudimentary. There is no indication that there are evaluation and selection mechanisms in place to avoid overlaps with European or other national programmes.

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