skills.[80] The resulting improved data selection could further enhance the usefulness of R&D and innovation surveys. Presumably, such a measure could also improve interdisciplinarity in innovation research. In addition, the possibility of combining central surveys on R&D and innovation activities into a joint social-sciences infrastructure project should be considered; such combination could well yield synergies in data collection and prevent duplication of efforts. Furthermore, the Federal Government should continue and expand its efforts to promote data centres for research. And the business register should be made available for use in the framework of scientific research projects.

A 5 HIGH-TECH STRATEGY 2020 FOR GERMANY

New orientation of R&I policy

In July 2010, the Federal Government presented the High-Tech Strategy 2020 for Germany, which introduces new emphases for the targeted growth of the German research and innovation system. Under the High-Tech Strategy 2020, innovation policy receives a stronger orientation to "missions". This means that it is oriented more strongly to major priority areas, rather than to specific technologies and research programmes, the previous main orientation.

In comparison to the High-Tech Strategy 2006, the newly oriented High-Tech Strategy lends itself to greater public awareness and transparency within the political process. And it further enhances interdepartmental co-operation between different ministries. Overall, the Strategy process is systematically oriented to five major priority areas that represent key challenges for Germany. These include:

- Climate / energy,
- Health / nutrition,
- Mobility,
- Security,
- Communications.

The Expert Commission welcomes this focusing process and approves of the priorities that have been defined. In each of these priority areas, Germany's R&I system offers a favourable basis and existing strengths that can be efficiently reinforced. German industry has considerable comparative advantages in these areas and sees excellent growth potential in them.[81]

The High-Tech Strategy defines a generic process that needs to be effectively implemented. The five priority areas correspond to sectoral innovation systems in which actors from the areas of science, industry and public administration jointly define and implement key measures, programmes and projects. The relevant strategy process conforms to a system, with "priority areas" at the top level, and "framework programmes" as well as "funding programmes" at the next two levels. At the level of framework programme planning, the relevant emphases and funding programmes are specified in keeping with a defined schedule. The framework programmes "Research for Sustainable Development", "Medical and Health Research ", and "National Research Strategy BioEconomy 2030" were approved by the Federal Government in 2010.[82] They have been assigned to the area of responsibility of the Federal Ministry of Education and Research (BMBF). In addition, the framework programme "ICT 2020 – Research for Innovation" was approved in December 2010, under the direction of the Federal Ministry of Economics and Technology (BMWi). In 2011, the remaining framework programmes are to be developed, and the strategy for the "Mobility" and "Security" requirements areas is to be specified.[83]

Sharpen priorities

The Expert Commission supports this focus on mission-oriented innovation policies, and it approves of the greater concentration the programme has brought and of the relevant strategy process that has been initiated. By and large, specific priorities remain to be set for the High-Tech Strategy 2020. That process needs to be carried out quickly, both on an overarching level and in detail. On the other hand, it must be determined whether all requirements areas are to be of equal importance. In addition, clear priorities have to be set for both the framework programme and the relevant funding programmes, and specific pertinent aims and measures have to be defined. Budgetary allocations for the various requirements areas have to be defined. Furthermore, operational criteria and schedules for performance evaluation have

to be defined for all three levels ("priority areas", "framework programmes" and funding programmes"). The Expert Commission considers it important to show, more clearly than has been demonstrated in the past, that the High-Tech Strategy 2020 will help concentrate and reorient support policy effectively also at the implementation level. The emphasis on mission-oriented frameworkprogrammes should not be permitted to fade, particularly if pre-existing funding programmes have a high degree of inertia and are replicated with little focus. A considerable portion of the framework and funding programmes still consists of continuations. With regard to these replicated funding programmes, the Expert Commission recommends systematic evaluation and review to determine whether the continuing efforts are in line with the major priority areas and strategies.[84]

With its High-Tech Strategy, the Federal Government is seeking to implement consistent innovation policy throughout all relevant areas. In the view of the Expert Commission, such innovation policy must be coherently oriented, and logical, throughout several different hierarchical levels. Relevant planning processes must be rigourously organised throughout the levels described (priority area – framework programme – funding programme). This also means that processes must operate consistently and harmoniously even when different departments/ministries are involved in agenda setting and implementation.

In the architecture designed for the High-Tech Strategy, specific action lines are assigned to each priority area. For example, the National Electric Mobility Platform is an action line within the priority area "Mobility". The number of action lines being pursued within that priority area – 38 – seems too high, however.[85] Which action lines are of high strategic importance, and which ones have more of an operational character, has not been made adequately clear. It is questionable whether all 38 action lines can be successfully pursued with the limited budgets available.

Define structural terms precisely; promote transparency

The Expert Commission sees a need for further specification of terms being used in this concept, including "future-oriented projects", "action lines" and "key technologies". In addition, the manner in which such terms relate to the requirements areas needs to be clarified. The responsibilities of the various ministries involved need to be made transparent. Strategies for key technologies, cross-disciplinary projects / framework conditions and, in some cases, for future-oriented projects[86] are being formulated in an overarching manner for all priority areas. That approach dilutes the focus of the High-Tech Strategy 2020 and makes the strategy too complex, in spite of the strategy's orientation to the five priority areas. And that difficulty, in turn, hampers implementation of the concept – which is useful overall – and impedes the necessary performance evaluation.

The decisive factors in the success of the High-Tech Strategy 2020 also include the process of inviting tenders for funding programmes and the transparency of the relevant budgets and planning systems. The R&D planning system (*Leistungsplansystematik*)[87] is currently being revised. The conversions involved in this process hamper comparison of past and new funding practices. Relevant reconciliation accounts must be completed as quickly as possible, to permit monitoring of the success of funding programme reorientations resulting from implementation of the High-Tech Strategy 2020.[88]

Bring in new groups of actors

Additional promoters and innovation drivers need to be involved during the process of implementing of the High-Tech Strategy 2020. Already, the Federal Government's High-Tech Strategy has been reaching important actors within the German R&I system. Such actors especially include the established research organisations[89], major corporations, and small and medium-sized enterprises (SMEs) that regularly engage in R&D. At the same time, other important target groups are not being reached to an adequate extent. As a result, innovation policy runs risks of focusing too narrowly on established groups of actors and of responding too slowly to new trends.

In particular, groups able to provide additional ideas, and thus of importance with regard to further development of Germany's R&I system, need to be brought on board. That group includes innovative start-up companies, as well as foreign companies that are carrying out sophisticated R&D projects at

their locations in Germany.[90] In addition, innovative companies that do not carry out R&D of their own also need to be involved. Chapter B 4 highlights the contributions of such companies to innovation in Germany.

Furthermore, dialog with potential entrepreneurs, business angels and venture capital companies needs to be intensified. Insights obtained in co-operation with such actors, especially insights relative to barriers to innovation and entrepreneurship, should be taken into account in implementation and refinement of the High-Tech Strategy, since they are of decisive importance with regard to achievement of the relevant overall goals.

Be more open and global in innovation

Entrepreneurs, venture-capitalists and innovators who have located at globally significant innovation locations (such as Silicon Valley), need to be attracted as promoters for innovation projects in Germany. Such persons provide expertise and network relations that can be of great value for actors within the German R&I system. At the same time, existing international networks of German companies and science organisations[91] need to be used more effectively with a view to obtaining further impetus for German R&I policy.

Within the High-Tech Strategy 2020, efforts to forge effective links between foreign policy, innovation policy and business development should be intensified. Internationally, Germany still has too little presence with new forms of international innovation and knowledge transfer.[92] The international component of Germany's innovation policy seems rather weak even in comparison to the corresponding policy components of smaller European countries such as Switzerland, Sweden, Finland, Austria and Denmark.[93] The Expert Commission proposes that this discrepancy be promptly eliminated and that bridge-building organisations be established, at leading innovation centres, to carry out and combine tasks in the areas of a) international science policy and b) promotion of innovative German companies with a view to greater international market presence.

The organisation SwissNex[94], for example, supports the growth of Swiss start-ups at the world's most important high-technology centres, and it has locations in San Francisco (Silicon Valley), Boston, Singapore, Shanghai and Bangalore. At present, German R&I policy is providing no comparable support for young German companies at those locations, or at other, similar locations. Bridge-building organisations can support the internationalisation process, and the growth of young German companies, in a lasting way. As a rule, concerns that such activities lead to losses of know-how and potential job reductions in Germany have not been confirmed. In sum, the growth impetus and know-how that such activities bring in from abroad, and the activities' positive impacts on Germany's own innovation system, outweigh any negative effects.

DEVELOPMENT OF THE PATENT SYSTEM A6

New efforts to establish an EU patent

The European patent system is still fragmented and economically inefficient. For this reason, in its 2010 report, the Expert Commission expressed its support for the European Commission's plans to introduce an EU patent that would be valid in all Member States. Developments over the past year have made it relevant to return to this topic.

With the 1973 European Patent Convention (EPC), agreement was reached on the introduction of a unified procedure for reviewing and granting patents in Europe. The organisation commissioned to implement the Convention, the European Patent Office (EPO), began functioning in 1978. That organisation examines patent applications and, for applications that fulfill the relevant requirements, grants patents for a total, now, of 38 countries (all EU countries and 11 additional European countries).

As soon as the EPO has completed its examination, the "European patent" breaks down into a bundle of national patent rights. A patent applicant whose application has been approved by the EPO thus has to apply for validations for those countries in which the patent protection is to be valid. In spite of the elimination of pertinent translation requirements in most of the EPC countries, such validations still normally entail considerable costs.[95] What is more,