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The Commission of Experts wishes to emphasise that the positions expressed in the report do not necessarily represent the opinions of the aforementioned persons.

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Summary

A Current developments and challenges

A 1 Recent trends in science and research policies

In 2014, important strategic steps have been taken in the area of science and research policies.

In the tertiary education sector, the cooperation ban has been lifted. While the Commission of Experts expressly welcomes this step, it stresses that the rule of unanimity, which is anchored in the German Constitution, in fact gives a right of veto to each of the federal states.

The Federal Government has now taken full financial responsibility for BAföG, Germany's student loan and grant scheme. The Länder governments need to make use of their newly won financial leeway to ensure adequate basic funding for their tertiary education institutions.

The Higher Education Pact, the DFG programme allowance, as well as the Pact for Research and Innovation are being continued further. The Commission of Experts recommends that the Federal and Länder governments agree on a clear and transparent division of tasks with regard to the future financing of teaching. In the medium term, the DFG programme allowance should be aligned more closely with the actual overhead costs incurred. The Commission of Experts further recommends redesigning the current financing model for non-university research organisations by standardising the relevant funding formulas.

The Federal and Länder governments have taken the decision in principle for a new initiative to follow the Excellence Initiative. The Commission of Experts points out that, in continuing the Excellence Initiative, the level of funding for top-level research must remain at least constant. At the same time, institutional funding of Germany's best-performing universities will also have to be maintained.

A 2 Germany's R&D intensity and innovation activities of SMEs

Germany's R&D intensity, i.e., expenditures for internal research and development (R&D) in relation to gross domestic product (GDP), decreased from 2.98 percent in 2012 to 2.85 percent in 2013. While this trend is partially owing to slow growth in the business sector, the decrease is largely attributable to purely statistical effects and should therefore not be overrated. Yet, the Commission of Experts also notes that in order to close the gap on leading innovative nations in the long term Germany will have to commit to a more ambitious target for the year 2020: 3.5 percent of GDP for R&D.

The long-term development of innovation activities of German SMEs is a cause for concern. Although German SMEs recorded growth in terms of employment of engineers and natural scientists, growth rates did not keep pace with those recorded by large companies in the past decade. What is more, between 1995 and 2012, innovation expenditures in relation to turnover decreased considerably among SMEs. The reasons for this have yet to be resolved, and thus it is still unclear how policies should respond. Given the important role of SMEs for employment and economic growth, the Commission of Experts expresses general concern regarding these trends in innovation activities of SMEs. Against this background, the Commission of Experts will address this subject in more detail in upcoming Annual Reports.

A 3 The new High-Tech Strategy – innovations for Germany

On 3 September 2014, Germany's new High-Tech Strategy was adopted by the Federal Cabinet and presented to the public. To put the new High-Tech Strategy into practice, permanent milestones will have to be set swiftly and communicated to the public in a transparent way. A counter-productive overlap with measures from other policy fields has to be avoided. The Commission of Experts urges the Federal Government to continue its path of bundling topic-related support measures – an approach that was introduced at the start of the Strategy's second phase. The Commission of Experts further recommends defining a clear hierarchy of targets also within the priority challenges.

The new High-Tech Strategy places special emphasis on transparency and participatory processes. For this to be achieved, the relevant ministries should experiment, e.g., with internet-based instruments, such as online platforms as tools for gathering ideas and forming opinions.

To identify and rectify any undesirable developments, mechanisms for a systematic monitoring of the High-Tech Strategy should be developed.

A 4 The Federal Government's Digital Agenda

With its "Digital Agenda 2014–2017", the Federal Government has been attaching great importance to the opportunities and challenges emerging from digital change. The Commission of Experts welcomes this commitment.

The Federal Government should swiftly implement the policy goal of providing 50 Mbits/s broadband coverage area-wide. To ensure that Germany's network infrastructure can compete internationally, the supply of a digital infrastructure has to be regularly monitored and adapted according to the changing needs of the business sector. Furthermore, the Commission of Experts believes that it is essential to swiftly develop a consistent package of measures, which should specify how and over which period of time other initiatives from the Digital Agenda are to be implemented and financed. In addition, the Commission of Experts urges the Federal Government to provide legal certainty with regard to data protection; make non-sensitive personal data collected by the public sector accessible for academic research; make stronger use of open standards in public administration; take a leading role in terms of safe transfer of sensitive data, and, finally, advance the development of the Industry 4.0 concept. The implementation of the Digital Agenda requires transparent modes of documentation.

A 5 Framework conditions for venture capital in Germany

Venture capital is an important source of financing for young innovative enterprises. Yet, Germany's venture capital market is far less developed than markets in the United States and many European countries. Germany is an innovation-based economy and thus squanders potential for growth and productivity. Against this background, the Commission of Experts welcomes the fact that the Federal Government is planning several measures to improve the international competitiveness of the framework conditions for venture capital in Germany.

The Commission of Experts particularly welcomes the Federal Government's announcement to revise the restrictive tax regulations for the treatment of carried-over losses. The Federal Government should refrain from introducing a general taxation on capital gains realised upon the sales of free floating shares – a measure that has been called for by various stakeholders. Neither should the Federal Government give in to demands to increase the tax rate on carried interest. Each of these measures would reduce incentives to invest in young innovative firms. In addition, conditions for anchor investors have to be designed in an investment-friendly way. New restrictions regarding the investment opportunities for insurance companies and pension funds must be avoided. The Federal Government's plan to create a fund for growth financing of German start-up businesses via the European Investment Fund (EIF) should be implemented without delay.

B Core topics 2015

B 1 Promoting innovation through cluster policy

Over the past 20 years, a number of cluster initiatives have been launched in both Germany and Europe. The goal of cluster policies is generally twofold: spatial concentration and networking effects. Cluster policies aim to correct market and coordination failures that might hinder the genesis of a cluster and its early development. The great diversity of policy measures in terms of goals, design and implementation makes it difficult to compare and assess the effectiveness of these measures. The choice of appropriate policy measures requires detailed knowledge of externalities and of complementarities in the innovation system.

Against this background, the Commission of Experts recommends the following:

- As the organisational form of a multi-staged technology-open competition has proven successful, future policy initiatives should adopt this organisational form.
- The carefully executed initial evaluation of the Federal Government's Leading-Edge Cluster Competition should be used as a benchmark for also systematically evaluating the great number of regional cluster initiatives.
- The evaluation of the Leading-Edge Cluster Competition has demonstrated the great innovation potential emerging from financing R&D cooperation projects between large companies and SMEs. Such collaborations should therefore also be supported as part of other measures, i.e. beyond cluster policies.
- The Commission of Experts welcomes the introduction of different exchange formats, which will give policy-makers at federal and regional levels and cluster managers the opportunity to share their experience and to learn from each other. These new opportunities should be fully exploited.
- With regard to the clusters supported, the Federal and Länder governments should aim to avoid an excessive focus on regional partners and potential isolation from external stimuli. Cluster initiatives at state level should aim to create transregional net-

works. Against this background, the support programme for the internationalisation of clusters, which was announced by the Federal Ministry of Education and Research (BMBF), advances and complements the Leading-Edge Cluster Competition in a consistent manner.
– If the Leading-Edge Cluster Competition were to be continued further, one can expect that its positive effects will weaken considerably. The Commission of Experts therefore advises against continuing the Leading-Edge Cluster Competition beyond the third funding round.
– The Commission of Experts further calls for an evaluation of the medium- and long-term effects of the Leading-Edge Cluster Competition. To assess the effects of funding in an objective manner, systematic monitoring should be implemented. This will also require the collection of data beyond the funding period.

B 2 MOOCs: an innovator in the educational sector

Since 2013, the risks of Massive Open Online Courses (MOOCs) have been the subject of lively debate in Germany, while the potential has been largely disregarded. Looking forward, the potentials of MOOCs should be taken into account to a greater extent. MOOCs are an important, valuable supplement to the teaching and research instruments currently used in Germany's colleges and universities.

MOOCs could lower the burden of colleges and universities in supplying standard knowledge and create leeway for more research-related teaching. The use of externally created MOOCs provides small colleges and universities in particular with opportunities for improving their study programmes. MOOCs can create positive reputation effects for the colleges and universities producing them and for Germany as a location for education and research.

MOOCs can facilitate students in organising their studies. What is more, MOOCs provide easier access for working professionals involved in life-long learning and for secondary school students seeking orientation. The broad range of goals MOOC participants pursue sheds new light on the debate on low graduation rates for MOOCs; a debate that has been highly critical at times. In fact, many MOOC participants do not aim at obtaining a course certificate at the very start but rather focus on other objectives such as guidance in their choice of studies or acquiring the relevant German terminology in their given field.

The Commission of Experts wishes to make the following recommendations:
– All tertiary education institutions should examine new models of combining different forms of learning and teaching in depth.
– It might not make sense for every college and university to create its own MOOCs. Those engaging in their own MOOC production should do this as part of an overall strategy with clearly defined objectives.
– Public funding for the creation and use of MOOCs can be useful in cases where an increase in expenditure can be justified by quality improvements.
– The ministries in charge of financing tertiary education institutions should not use the integration of MOOCs as a justification for depriving tertiary education institutions of their financial resources for teaching.
– The public sector should create a legal framework that allows individual colleges and universities to experiment with MOOCs. This may include areas such as admission to studies, development of study programmes, financing keys, copyright, teaching loads, remuneration, credit points and financing of universities.

B 3 Digital innovation and the need for reform of copyright law

Literary, scientific and artistic works are protected by copyright law. Activities relating to copyright have economic and societal relevance. Copyright protection granted for a relatively short term generates incentives for innovation as evidenced in the economic literature. While the use of digital technologies facilitates illegal copying of existing works, it also reduces the costs of creating and disseminating new creative works: productivity and product diversity in the copyright industries increases, and new innovation actors, among them user innovators, enter the market. The current legal framework does not adequately account for these developments, and regulations for the enforcement of copyright have not proven successful.

The Commission of Experts therefore recommends the following:

- The creative redesign of works should be permitted in order to set incentives for user innovations. Redesigns should be permissible based on an exemption from law, provided that an inherent difference from the original work is maintained, and provided that the redesign is non-commercial.
- Access to scientific findings should be simplified. To achieve this, a general exemption to copyright for scientific and education purposes should be introduced, thereby providing practicable regulations for the broadest possible access to the stock of knowledge. This exemption from law should be complemented by compulsory compensation. The current complex rules of German copyright for the domain of science have to be simplified.
- The current copyright regulations are very complex and therefore oppose a greater public acceptance of the law. The Commission of Experts therefore urges the Federal Government to simplify the copyright provisions as part of their ongoing reform efforts. These steps should also be flanked by policy measures that improve awareness among users and increase the transparency of copyright law.
- Sending violation alerts is a useful alternative to the common practice of issuing formal warnings. Violation alerts can help inform about rights violations and create transparency. A legal claim for reimbursement of the costs of a formal warning should be tied to the condition that a prior violation alert has been sent via the internet service provider to the infringer.

B 4 Additive manufacturing ("3D printing")

Due to its versatile applications, additive manufacturing (AM) is a much-debated technology that is thought to have a disruptive potential. Even at this stage, AM provides an essential technological basis for innovation and production processes in industry. AM can strengthen Germany as an industrial location, limit the shift of added value and employment to other countries and even relocate added value processes to Germany.

To fully harness the potential of AM in Germany, the Commission of Experts recommends the following:

- Interdisciplinary research collaboration (e.g. with material sciences and nanotechnology) at higher education institutions and non-university research institutions should be strengthened via appropriate measures, and technology transfer to businesses should be supported further.
- In the context of promoting Industry 4.0, the potential of AM should also be pursued further.
- To reduce information costs and to overcome lock-in effects, the diffusion of AM technologies may require support on the demand side. This may include a stronger focus on AM in best practice examples for Industry 4.0 and Smart Services to be showcased

in the competence centres, which have been announced by the Federal Government as part of the Digital Agenda.

- Support measures for AM should be embedded in a consistent overall framework. Current support measures for AM are being provided detached from each other and not in a systematic way.
- Unresolved legal issues relating to AM, such as liability, have to be clarified without delay in order to increase legal certainty for innovators.
- The Federal Government should set stronger incentives for developing quality standards and for testing and certification activities in the area of AM designs, materials and products.
- European and non-European cooperation in the fields of AM research and standardisation should be promoted to a greater extent.
- Skills in the use of AM should be taught across the vocational education and training system. AM technologies should be broadly employed not only in the higher education sector, but also in vocational training and in schools. Teaching staff and vocational trainers should receive relevant training in parallel.

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