Opening Germany's borders to the world's innovation elite

Germany must continually open its borders and facilitate the immigration of qualified workers.

- The immigration of skilled workers such as scientists, entrepreneurs and highly qualified experts must be facilitated. Germany is in urgent need of a political and social consensus on the necessity of attracting and integrating highly skilled workers from abroad. Countries such as Canada have established targeted systems to systematically attract and integrate highly qualified personnel. Germany can learn from these countries.[20]
- The Expert Commission suggests providing simplified immigration regulations – e.g. in terms of residence and work permits – for non-German entrepreneurs who aim to substantially invest and create jobs in Germany.[21]
- Efforts to improve the integration of foreign workers in the German labour market must be strengthened at all skill levels. The Expert Commission welcomes the improvements in the immigration regulations for graduates, qualified workers and those participating in training, as well as the improvements in information policies.[22]
- The recognition of foreign professional qualifications – e.g. in the context of the "Integration through Qualification" programme – has not led to the desired results yet.[23] Efforts to improve the recognition of foreign professional qualifications have to be further strengthened.

Improving the utilisation of the potential of women in business and science

In all areas of business, research and innovation, gender equality has to be enhanced.

- Germany is still characterised by an insufficient utilisation of the potential of women in all areas of research and innovation. Here, political stakeholders, businesses, associations and research institutions are called upon to participate in solving this issue.[24]
- In the field of engineering, an increased participation of women in academic degree courses, doctoral programmes and subsequent occupational paths must be ensured – particularly with regard to professorships.[25]
- Raising girls' interest in research and technology will have to be a priority issue in pre-school and school education.[26]
- Ultimately, the Expert Commission also considers the introduction of quotas for leading positions in the research system and the private business sector as an appropriate means to accelerating a transition towards greater gender equality.[27]

OPEN ACCESS A 2

Outstanding role of publications in the R&I process

Research and development processes in business and science are often cumulative, i.e. they build on the findings of previous research. In many disciplines, the most important means of distributing information are publications in scientific journals. The most frequently used method of ensuring the quality of publications are assessment procedures in which external, anonymous experts provide a written review on the quality of an essay, thereby supplying the journal's editor with valuable information. Based on this, the editor will decide whether, and under which conditions, an article is to be published in the journal. Commercial publishing houses will then publish the approved text, either in print or electronic form. In some cases, the distribution of publications is carried out by the scientific organisations themselves. In recent decades, the concentration of suppliers in the commercial scientific journal market has increased significantly.[28]

Calls for open access are getting louder

The ongoing market concentration is accompanied by significant price increases for products offered by publishing houses (such as journals or full-text downloads). In the fields of medicine, science and technology, prices of publications have quadrupled in certain areas over the last 20 years, while budgets of academic libraries are stagnating.[29] The expected passing on of cost advantages resulting from digital publishing of research findings[30] is not yet to be

observed. Against this background, calls are getting louder for introducing new procedures in the organisation of the scientific communication system. Central to these demands is the concept of "open access", which is the process of making research findings available on the internet free of charge (cf. Box 2).[31]

The open access movement has emerged since the mid-1990s against the backdrop of steep price increases by major publishers of scientific journals. Advocates of the open access approach have pointed out that the public sector participates in three ways in financing the production of scientific journals:[32]

- Publishers mostly receive essays from authors gratuitously as these are usually funded by the public sector[33]
- Publicly funded experts are often integrated into the process as part of the publishing houses' quality assurance procedures. In most cases, these experts also provide their services free of charge.[34]
- Finally, scientific journals are frequently purchased by libraries that are often financed by the public sector. Especially frequently cited journals are difficult to replace,[35] which makes it relatively easy for publishers to enforce high prices. Commercial publishing houses also use the instrument of product bundling as a means of marketing less known journals alongside the particularly renowned ones.

For large publishing houses, this is a profitable business. Elsevier for instance achieved a return of sales of 37 percent in 2011; in the same year, Wolters Kluwer achieved 13 percent, and Wiley 15 percent.[36]

The large specialist publishers are increasingly subjected to criticism, and calls for open access are getting louder and louder. The following prominent examples may illustrate these trends:

- In a memorandum by the Faculty Advisory Council of Harvard University in April 2012, 2,100 scientists were called upon to publish their articles in the university's own open access repository (DASH), in external open access journals, or journals with relatively low subscription fees.[37] The initiators considered this as a necessary measure; they argued that it was impossible to support the pricing policy of the large publishing houses any further. They stated that some of the journals cost USD 40,000 per year and that two publishing houses had raised their prices for digital publications by 145 percent within the matter of six years. According to the Faculty Advisory Council the subscription contracts with at least two major publishers should be terminated.
- About 13,000 scientists from around the world have declared on the website thecostofknowledge.com that they would no longer work with Elsevier, unless the publishing company changes its general policy.[38]
- In May 2012, the mathematics department of the Technical University of Munich announced that "due to unreasonable costs and subscription conditions" it would cancel all Elsevier journal subscriptions as of 2013.[39]

Advocates of the open access approach argue that, besides financial considerations, free availability has a positive effect on a scientific paper's visibility and impact. In accordance with international standards, open access publications usually contain an abstract, metadata, and keywords and are thus easily found via search engines and library catalogues.[40] Target audiences can obtain open access publications instantly and gratuitously through any internet connection. Hence they do not have to consider whether they should allocate their scarce time and financial resources to gain access to a particular publication. This results in immediate high visibility of open access publications, as readers have the option of immediately examining whether a text is relevant for their academic purposes. Supporters of open access argue that open access can thus raise attention for interdisciplinary papers in particular. Moreover, open access promotes the participation of researchers from developing countries and emerging economies in academic discourse.[41]

The relatively high visibility of quality-assured open access publications suggests that open access publications have a stronger influence on the work of scientists and are cited more frequently than paid subscription publications. This assumption is supported by a number of empirical studies, although the methods used are not without controversy.[42] Furthermore, the assumption of an increased citation rate may not apply to all subject areas.

BOX 02

Open Access – the "golden path" and the "green path"

The "golden path" to open access refers to a procedure in which a scientific paper is first published as an open access publication. As a rule, this also includes a quality assurance process such as peer reviewing or editorial reviewing. In this scenario, the author usually concludes a contract with the publisher, which specifies conditions and rights of use. In August 2012, the internet platform Directory of Open Access Journals listed more than 10,000 open access journals for which a peer review or an editorial review is a prerequisite for publication.[43]

The financing model behind open access publishing differs from that of conventional journals. Some of the open access publishers charge publication fees to the author or the author's institution. Many open access journals are edited by organisations such as scientific organisations and are financed through membership fees.[44] In many of these cases, publication fees are not charged. Yet the financing of the journals is shifted from the reader to the author of scientific papers or the members of the scientific organisation, respectively. Thus the "golden path" to open access is not necessarily cheaper than the conventional system. In general, efficiency can be gained if the costs of the overall system are reduced due to an increase in competition and the decision not to produce printed versions.

The "green path" refers to the making available of scientific papers – primarily of preprints and postprints[45] – in freely accessible databases, called repositories,[46] and/or on the researchers' websites as a means of self-archiving. Preprints, i.e. manuscript versions of papers that have been submitted to journals or anthologies, usually do not undergo quality assurance procedures. This means that, as a rule, authors still have the rights of use, which means that there are generally no legal objections that would hinder self-archiving.[47] The situation is different in the case of postprints that have undergone quality assurance procedures and have been approved for publication. Depending on the publishing houses' willingness to permit second publication, legal issues may ensue here. Today, some of the academic publishers permit the second publication of postprints with a certain time delay.

Freely accessible databases can be divided into institutional and subject-specific repositories. Institutional repositories bundle the scientific activities of institutions, while subject-specific repositories collect scientific papers according to discipline. Establishing a repository also incurs costs, which must be taken into account when assessing the overall system.

In practice, there are open access strategies that cannot be clearly assigned to either the "golden" or the "green" path.[48] For example, some of the publishing houses provide free access to fee-based publications once a certain period of time has elapsed. Some of the publishers provide free access to digital publications while at the same time distributing a fee-based print version of the same publication. Another option employed by publishing houses is the fee-charged distribution of print versions alongside free digital versions.

Some publishing houses provide their readers with free access to individual articles in an otherwise fee-based journal, provided that the authors pay a fee.

Measures to promote open access

Already in October 2003, the German Science Organisations[49] and twelve other national and international signatories published the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities.[50] Since then, almost 400 institutions have signed the declaration.[51] The declared objective is to distribute knowledge through the internet by promoting the principles of open access. The Berlin Declaration does not only refer to scientific research findings as such, but also to source data, source material, digital images and graphics, as well as scientific material in multimedia formats.[52] The signatories of the Berlin Declaration have committed themselves to support the transition towards an open access system through diverse activities.[53] Germany's four large non-university research organisations (Fraunhofer-Gesellschaft, Helmholtz Association, Leibniz Association and Max Planck Society)

BOX 03

Open access activities of Germany's four main research institutions

Adopted in July 2008, the objective of the Fraunhofer-Gesellschaft's Open Access Policy is to "ensure that full-text versions of all papers and articles written by its employees are made freely available in the international digital media."[54] Fraunhofer-Gesellschaft has its own institutional repository, *e-Prints*, which is part of the *Fraunhofer-Publica* publication database.[55] Researchers at the Fraunhofer-Gesellschaft are encouraged to make their works also available as e-Prints following first publication in conventional journals.[56] To enable scientists to publish their works via the golden path, the Fraunhofer-Gesellschaft launched its Open Access promotion fund.[57] In addition to this, the Fraunhofer-Gesellschaft provides a support centre that offers comprehensive advice on scientific publishing and aims to facilitate networking activities.[58]

In September 2004, the Assembly of Members of the Helmholtz Association expressly committed itself to open access, stating that "publications from the Helmholtz Association shall in future, without exception, be available free of charge, in so far no conflicting Agreement with the publishers or others exists."[59] 2005 saw the launch of the Helmholtz Open Access project, which aims to facilitate the Helmholtz research centres and their scientists in implementing the open access approach.[60] The majority of the 18 existing Helmholtz centres have their own institutional repository[61], and a number of Helmholtz scientists are involved as members of editorial boards of open access journals.[62] The absorption of publishing fees is being discussed at the individual Helmholtz centres; the libraries of the Helmholtz centres have concluded cooperation agreements and general agreements with several publishing houses concerning the publishing of their open access journals.[63]

The Leibniz Association adopted their Guidelines on Open Access in November 2007.[64] According to these guidelines, "research findings from the Leibniz Association [...] shall be digitally published and publicly accessible whenever possible."[65] Leibniz-*Open* serves as the main open access portal of the Leibniz institutes. It is based on a network of open access repositories from various disciplines that are operated by the infrastructure facilities of the Leibniz Association.[66] In addition to this, several Leibniz institutes have their own open access journals and publication platforms respectively.[67]

The Max Planck Society (MPG) has committed itself to the MPG Open Access Policy. The key objective of this policy is to "make its scientists' research findings available for the benefit of the whole of humanity, free of charge whenever possible (Open Access)".[68] The Max Planck Society operates its two key repositories, *eDoc* and *PubMan*, under the umbrella of the Max Planck Digital Library (MPDL).[69] Publication fees that may occur for articles published by Max Planck scientists in certain journals via the golden path are financed through the MPDL's overall budget.

have embarked on a number of measures to promote open access (cf. Box 3).

The German Research Foundation (DFG) and the European Union (EU) have been funding the launch and development of open access journals for several years now. Both the DFG and the EU have launched relevant support programmes in this area (cf. Box 4).

Thus project participants are encouraged by their respective donors to make the findings of their projects freely available to the public. Since 2006, participants of DFG projects are required to offer their research findings also on the internet, i.e. digitalised and free of charge.[70] In the context of the Horizon 2020 programme, the European Commission (EC) established the principle that all articles that are attributable to funding by the Horizon 2020 programme must be made available to the public as of 2014. This may be achieved via the golden path or the green path.[71]

Concerns about open access

For the benefit of any researcher's career path it is essential to publish articles in prestigious scientific journals. This means that a golden path publication

BOX 04

DFG and EU programmes to promote open access

The German Research Foundation (DFG) offers three support programmes to provide financing support to research facilities and individual researchers upon application.[72] The DFG's Open Access Publishing Programme supports tertiary education institutions in shouldering publication costs of open access journals.[73] The Scientific Journals Programme allows individual scientists who serve as editors or co-editors of a DFG open access journal to apply for grants in order to cover technical and editorial work.[74] Finally, the DFG programme "Electronic Publications in the Provision of Scientific Literature and Information" aims to support model and pilot projects that contribute to advancing the open access system through technical and/or organisational innovations and innovative business models.[75]

In the context of the 6th and 7th Research Framework Programme, the European Union has launched several initiatives in recent years, aimed at developing a suitable infrastructure for open access. Programmes include the Digital Repository Infrastructure Vision for European Research (DRIVER),[76] DRIVER II,[77] Open Access Infrastructure for Research in Europe (OpenAIRE),[78] as well as OpenAIREplus.[79]

is only attractive to scientists if the respective open access journal ranks among the leading publications of a specialist area. Although this is in fact the case[80] with a number of open access journals, it is still true that in many areas researchers continue to depend on publications in conventional scientific journals.

Yet the green path may also entail legal issues, as many publishers are not willing to permit second publications. Against this background, the German Association of University Professors and Lecturers (DHV) rejects any obligation for scientists to publish their works in a particular form or order.[81] According to the DHV, scientists alone shall decide whether they wish to publish their works in the context of open access publications or in conventional journals.

The German Publishers and Booksellers Association *(Börsenverein des Deutschen Buchhandels)* questions the financial viability of the overall move to open access and expresses concerns regarding a permanent transformation of the existing publishing structure.[82] The association points out that the editorial activities of the public sector are inherently expensive and less efficient than those of the private sector. Furthermore, a shifting of costs from the reader to the author and publishing institution – as is the case with the golden path – could also lead to an undesirable shifting of costs from the demand side to the supply side. This means that smaller institutions with a high proportion of frequently published scientists would be exposed to cost increases. Yet the private sector, which makes strong use of scientific publications while at the same time publishing very little, would be largely exempt from costs. The German Publishers and Booksellers Association further points out that the green path would lead to costly parallel structures: the development of parallel repositories would in fact oppose a cost-effective provision of scientific findings.

Summary and recommendations

The Expert Commission is convinced that an efficient organisation of the creation and distribution of research findings promotes the transfer of knowledge. Yet, from the perspective of R&I policies, the costs of the entire system of creating and transferring findings have to be taken into account. Open access increases competition and further taps the potential of the internet as a means of distributing knowledge. Thus the open access approach should be promoted. Yet this should also include protecting the interests of researchers involved. The development and expansion of open access journals and repositories should be further supported via public funding, with the aim of making open access publishing appealing to researchers. In the design of new structures it should be ensured that these are viable in the long term and as efficient as possible. Yet, in recent years it has emerged that an ever increasing number of repositories exist in parallel. This trend calls into question whether the system costs for the publication and distribution of research findings can decrease significantly over time.

The Expert Commission recommends integrating a contractually bound, indispensable second publication right into the Copyright Act for academic writers whose publications originate in research activities

that were largely financed by public resources. This right shall take effect within a reasonable period of time after initial publication.[83] If scientists hold the right to second publication, they should be obliged in the case of publicly funded projects to publish their research findings online and free of charge upon expiry of the term.[84]

A 3 THE EU PATENT SYSTEM

Current situation

On 11 December 2012, the European Parliament agreed on the introduction of unitary EU patent protection.[85] The EU member states have thus taken a considerable step towards reaching their objective of overcoming the fragmentation of the EU patent system. The Expert Commission takes this opportunity to once again comment[86] on the status quo and to point to important legal and economic issues relating to the EU patent system.

The EU already provides for a European bundle patent, which dates from the European Patent Convention (EPC) of 1972. This bundle patent exists alongside national patents, which are granted by the individual EU member states' patent offices in accordance with national legislation. Since 1978, the European Patent Office (EPO), established in 1978 with headquarters in Munich, has been in charge of the examination and granting of European patents. However, upon granting, the European patent then disintegrates into several individual national protective rights, which are subject to evaluation in the respective target countries. Patent infringement claims and revocation actions relating to patents granted by the EPO are then brought before the national courts and negotiated under applicable national patent law.

Despite the existence of the EPO, there is still no patent that is valid in all EU member states and that can be enforced or contested in court according to uniform legal criteria. The fragmentation of the European patent system is impeding the harmonisation of the internal market. Despite the absence of translation requirements in most EPC states, the European patent system still results in high costs for patent application and enforcement on a country-by-country basis.[87] These costs represent a considerable hurdle for small and medium-sized enterprises in particular. What is more, the assigning of patent legislation to national courts may result in several court proceedings and, in some cases, may also result in conflicting court orders relating to one and the same patent in different member states.

The majority of patent disputes within the EU are negotiated in Germany.[88] Hence Germany's patent jurisdiction has been able to build up relevant competences over the last decades. From the perspective of conflicting parties, Germany's patent jurisdiction is also characterised by significant comparative advantages. These include (i) the swift resolution of cases, (ii) relatively low costs of litigation, which allow even SMEs to participate in litigation, (iii) a high level of technical competence among judges, which is reflected in the "technical quality" of decisions, (iv) the concentration on a few highly specialised courts, (v) the parsimonious use of external expert opinions, which are usually cost-intensive.[89]

The status quo

The package for the creation of a unitary EU patent protection comprises two proposed regulations.[90] The first regulation is concerned with the enhanced cooperation of 25 EU member states to create a European patent with unitary effect, which shall provide the sovereign territories of the participating countries with unitary protection. The examination and granting shall be effected by the European Patent Office, as is the case with bundle patents, which will continue to exist. The second regulation specifies requirements for the translation of patent documents. According to this regulation, future patent applications may be filed in English, French or German.[91] Italy and Spain did not approve of the proposed language regime and are thus not participating in the enhanced cooperation.

The EU patent package further includes an interstate agreement between all EU member states participating in the enhanced cooperation for the creation of a European Patent Court, also referred to as the Unified Patent Court.[92] In future, this court shall be the exclusive jurisdiction for any dispute regarding the validity or infringement of a European patent with unitary effect. It will also be responsible