Translation

Innovations from the lab to commercial application

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The structure of the big chemical and pharmaceutical companies has changed. Traditional centralised research departments conducting fundamental research have fallen victim to economic considerations. In exchange, young, dynamic start-up enterprises are increasingly brightening up the scene. This boosts the development of new international co-operation models for the conversion of scientific ideas and findings into new products.

The biotech industry has developed into an established sector in Germany, among other countries; its business ideas originate primarily from universities or research institutes, which are put into practice by young scientists. Assisted by management and business plan seminars, the foundation of companies has become a serious alternative for bioscience graduates to conventional professional careers which have become increasingly rare due to the structural change in the industry. Public promotion programmes such as GO-Bio, EXIST and FLÜGGE support such initiatives at different stages.

This trend is progressively spilling over into other areas in chemistry, physics and engineering for which – considering the innovation and human potential – similarly fertile conditions are found at the universities. Admittedly, long time lines and high development effort as well as significant production costs are to be balanced against a highly variable intrinsic product value. In the case of biotech companies, the guarantee for return on investment is generally the prospect of later clinical approval for a lucrative blockbuster drug. This is in stark contrast to bulk production in the chemical industry: large-scale manufacturing of chemicals and polymers seen against low profit margins and high capital expenditure for technical equipment.

Nevertheless, this sector also offers opportunities for added value through highly innovative processes and/or refined goods and a business to business (B2B) model. Generating new know-how and patents is the actual value driver for such start-up companies and gives them a right to exist beside large enterprises which increasingly focus on regulatory aspects (technical safety, regulatory approval), mass production for end consumers as well as sales and marketing. The high dynamics of innovation in a flat-hierarchy, highly flexible and pragmatic environment have led to a profitable job sharing between the biotech start-up scene and the pharmaceutical industry, for example. However, two aspects deserve attention in order not to hamper this ongoing development.

On the one hand, there is an early stage financing problem for advancing innovations by newly-formed companies. The gap between the seed phase, mostly financed by public funding bodies, and the start-up phase, which is focused on product development and expansion, has grown in the past few years. New mechanisms of co-operation between venture capital (VC) companies and private investors need to be found. While for the former an investment only attracts interest as from a certain financing volume and an already calculable stage of development of the technical innovation, the latter

frequently take a higher risk and are more guided by the founders' personality; yet it is less of an incentive if private investors – including the founders of the company – get marginalised by venture capital in the course of subsequent financing rounds.

On the other hand, university intellectual property (IP) management requires overhauling. Although today most universities have their own technology transfer agencies and inventor offices, processes are frequently unduly bureaucratic and subject to unrealistic expectations of early profits. The revision of the German Employee Invention Act of 2002, which deprived university employees of their independence as inventors, was rather counter-productive. The majority of university IP – in contrast to technologically more focused large research organisations such as the Max Planck Society or Helmholtz Association – comprises a wide range of single highly innovative discoveries/developments, with most of them still premature for application. Turning this strongly polarised opportunity/risk ratio into a sustainable innovation requires a high level of personal commitment in combination with entrepreneurial skills, where complex decision-making processes turn out to be obstructive.

Need for action has been recognized in these areas, and one can hope that the translation of results from fundamental university research into economic practice will further grow in efficiency, especially in a country that highly depends on technological development.

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Arne Skerra, born in 1961, studied chemistry at the Technical University of Darmstadt and obtained his doctoral degree as Dr. rer. nat. at the Gene Center of the Ludwig-Maximilians University Munich in 1989. After staying at the MRC Laboratory of Molecular Biology in Cambridge, UK, and the Max-Planck-Institute for Biophysics in Frankfurt/Main, he became professor for protein chemistry in Darmstadt in 2004. Since 1998, he has been full professor and head of the biological chemistry institute at the TU Munich in Weihenstephan.

Apart from his commitment in scientific societies, e.g. as chairman of the biochemistry division of GDCh, Skerra is also an entrepreneur. His process for the production of functional antibody fragments in E. coli by genetic engineering as well as the Strep-tag protein affinity tag are applied world-wide today. In 2001, he founded Pieris AG, which commercializes and develops Anticalins as a new class of biopharmaceuticals. Furthermore, in 2009 he founded XL-protein GmbH based on the PASylation technology to extend the plasma half-life of biologics.