Scientific Creativity: Scope for Development

Small working groups, interaction with other researchers, long-term funding, low administrative workload – these are the most significant pre-conditions for creativity in science, says a new international study.

Science lives on original and pioneering discoveries. Researchers from the Technology Policy and Assessment Center at Georgia Institute of Technology (USA), together with colleagues from the Fraunhofer Institute for Systems and Innovation Research in Karlsruhe (Germany) and Science and Technology Policy Research (SPRU) at Sussex University (United Kingdom) investigated how creativity best thrives, taking twenty particularly creative research groups in the fields of nanotechnology and human genetics as examples. The study "Creative Capabilities and the Promotion of Highly Innovative Research" (CREA) especially scrutinised the working environment of these groups to understand how organisational structures, financing patterns and leadership styles influenced their scientific results. The study's most important findings are:

- Creative scientific research mostly occurs in small groups (e.g. of two to eight scientists) who research in competition and in cooperation with numerous other groups. The relationship between experienced and young scientists is closer in small teams and also new thematic developments can be more rapidly and effectively integrated in the research work. Large working groups, on the other hand, can become creativity traps if the group leaders are too involved in management tasks and representational functions and lack time to work in the lab.

- Research teams are creative, if their working environment provides rich opportunities for contact with groups with complementary research interests and work focuses. The broad diversity of subjects and themes at universities is of advantage here, although active researcher personalities are needed to take advantage of this institutional diversity for their group. The finding is striking that basic research labs in industry are successful in organising scientific diversity effectively.

- Creative research teams need space and time. They are supported by financing models which sustain risk-taking research, for instance, prize awards spread over several years, institutional basic financing or other wide-ranging long-term research sponsorship. It is also important that the teams are not run hierarchically and that young scientists are able to conduct independent research early on.

- Research institutions are unattractive for creative scientists if the administrative and management burdens limit the time available for research substantially. Further obstacles to creative research are inflexible faculty structures and external research sponsorship tied to existing disciplines or themes. Both can prevent a switch to new research topics.

The Project on Creativity Capabilities and the Promotion of Highly Innovative Research in Europe and the United States (CREA) was sponsored by the European Union Newly Emerging Science and Technologies programme (NEST).

The CREA research report can be downloaded at: http://www.cherry.gatech.edu/crea.