The focus of current scientific research is increasingly affected by governmental bodies and key decision makers, with scientists from all disciplines now experiencing increasing pressure to pursue demand- and industry-driven research. Such studies often require large collaborative efforts, beyond what an individual could achieve on their own. In light of this, *International Innovation* asks some of its contributors the key question:

**Will there still be a place for individual investigator-driven studies in the future?**
Dr Tony Kenyon (University College London):

I am uneasy about the view of research as purely or largely a mechanism to generate economic benefit, or to generate immediate impact outside the academic sphere. Of course, research should make a contribution to society, as it is largely publicly funded. However, history tells us very clearly that there have been many important scientific discoveries that have had very little, or no, immediate impact but in the long run have proved vital to the development of some key aspect of modern life. The laser is a prime example of this, and I could also mention Maxwell’s work on electromagnetism and the work at the European Organization for Nuclear Research (CERN) that ultimately led to the development of the World Wide Web.

The benefit that comes from a particular piece of research is very often unclear in the short term, and usually next to impossible to predict unless the research is directly addressing a very specific and tightly defined problem. Even then, it is sometimes the interesting side issues the research uncovers that end up being more important. If we concentrate only on studies that are demand-driven we risk stagnation. New ideas have to come from somewhere, and it is usually from blue skies research and the individual researcher or research group thinking about a problem purely because of its interest.

Professor Patrik Schmutz (Swiss Federal Laboratories for Materials Science and Technology):

Modern technological advancement can be aimed at the needs of society and we welcome the guidelines that governments and decision makers produce for scientists to work within this framework. However, it is also true that ‘innovation’ is a state of mind. The seeds of innovation lie within individual investigators but they are not necessarily always submitted to ‘research calls’.

We believe in the validity of the evolutionary view of economics, which asserts that it is advances in scientific and technological knowledge that generate new technological paradigms. Demand only picks up the paradigms that best suit the needs of the moment. Therefore, in the coming decades advancements in scientific disciplines will still require individual-driven research as much as evolution requires spontaneous mutations. Nevertheless, no scientist would disagree that science also has to fulfil the requirements of society and that we all need to work in close collaboration with industry due to societal needs.

Individual investigator-driven studies will still be essential in the future because larger scientific project structures (networks, expected experimental and theoretical synergies) often suffer from heavy and inefficient management and the slow exchange of scientific information due to the definition of intellectual property.

Dr Dride De Focatiis (University of Nottingham):

Industry and government have a role to play in setting the scene for the key priorities, but it is often the individual investigators or groups of investigators who, in discussion with industrial collaborators, have detailed awareness of where the maximum benefit can be obtained with the minimum of effort and resources.

Professor Jamie Hobbs (University of Sheffield):

I think there will always be a place for individual investigator-driven studies. Curiosity has been a major driving force in scientific discovery over the last century. As well as providing valuable discoveries and innovations in its own right, this type of research provides the base for more directed investigations trying to solve particular problems. It also allows us to react quickly to new challenges.

Unfortunately, the world is a complex place and there is little evidence to suggest that human beings are good at predicting what challenges will face us in the future. If we limit the science that is conducted too heavily to just what seems important now, we may well be harming our capability to address future problems.

Professor Jan von Delft (Ludwig-Maximilians-Universität):

To quote my Nobel Prize winning colleague, Professor Theodor W Hänsch: "If you want to discover something, you have to look where no one has looked before". There are countless examples where the seeds for innovation come from individual, investigator-driven studies – where someone, guided by curiosity and instinct, looked where no one had looked before, and discovered something that no demand- or industry-driven master plan could ever have anticipated.

Most funding is dependent on the formation of a consortium. Individual investigator-driven research can still be possible by partly using some of the grants allocated for other projects to try more risky approaches, but it is true that science is going forward like a bulldozer and needs more and more expensive resources.

Professor Luc Stoppani (University of Applied Sciences Western Switzerland):

Most funding is dependent on the formation of a consortium. Individual investigator-driven research can still be possible by partly using some of the grants allocated for other projects to try more risky approaches, but it is true that science is going forward like a bulldozer and needs more and more expensive resources.
A Nobel cause

As scientific research undergoes a transition from traditional individual-led research on specific problems, often with no apparent immediate impact, to large collaborative efforts focused on the major issues affecting society today, could this also have an effect on one of the most prestigious scientific accolades – the Nobel Prize?

In 1895, Alfred Nobel decreed in his will and testament that the whole of his remaining estate should be used to award “prizes to those who, during the preceding year, shall have conferred the greatest benefit to mankind”. The first Nobel Prize was awarded in 1901 and since then another 560 awards have been presented in the areas of Physics, Chemistry, Physiology or Medicine, Literature, Peace and Economic Sciences. However, it is stated in the statutes of the Nobel Foundation: “In no case may a prize amount be divided between more than three persons”. Therefore, the groundbreaking discoveries made by collaborative initiatives involving researchers from across the globe and multiple different disciplines cannot receive the recognition deserved.

For example, the 2013 Nobel Prize for Physics was jointly awarded to Professors François Englert of the Université Libre de Bruxelles, Belgium, and Peter W Higgs of the University of Edinburgh, UK, for their work on the theoretical discovery of the Higgs boson; Englert and his late colleague Professor Robert Brout (Université Libre de Bruxelles, Belgium) published their findings almost simultaneously with Higgs in 1964. However, many collaborators and indeed rivals were not recognised for their contributions to the theory. And the proof of the theory – finally announced by the ATLAS collaboration at the Large Hadron Collider in Switzerland in July 2012, involving an extensive array of scientists from around the world over a period of several decades – was not recognised at all.

With the trend for high-impact, multidisciplinary research involving large multinational teams continually growing and developing, there is a clear call from the scientific community that this work should be encouraged and rewarded, posing a significant question to those behind the Nobel Prize.