

House of Lords Science and Technology Committee

Inquiry into the Setting of Science and Technology Research Funding Priorities

Private submission by Donald W Braben

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1. This submission is primarily about academic research.
2. Science is the source of prosperity. Such unexpected scientific discoveries as DNA structure, the genetic code, holography, the laser, magnetic resonance imaging, and nuclear power have transformed our lives and created huge economic stimuli. Initially, society had no need of them. Now they are indispensable. Several hundred of these transformative discoveries were made during the 20th century by researchers working mainly at academic institutions (including Research Council institutes, for example) at home or abroad. They are evidence of science's originality and unpredictability, and hence, of the fact that the advance of scientific knowledge cannot be centrally directed. Indeed, had academic research always been directed to meeting society's needs, it is likely that few of these discoveries would ever have been made.
3. Up to about 1970, it was widely acknowledged that the best academic research policy was to create environments that foster diversity and creativity. Nowadays, academics cannot escape the constraints imposed by priorities and orchestration. As a result, science is losing its vitality and industry is being deprived of valuable intellectual feedstock. These are global problems but they are particularly acute in the UK where research funding has become more fragmented and processes of researcher assessment such as peer review have been taken further than elsewhere.
4. The world has changed since the 1970s, of course, but the constituents of good science have not. Public investment in academic research today is higher than ever, but it is being increasingly directed towards the achievement of national objectives. The Haldane Principle as originally formulated has thus been abandoned. Indeed, governments, supported by many senior scientists, now maintain that rising investments can *only* be justified if academics take national benefit into account when formulating their proposals. These new academic research policies undermine science's potential. The benefits that followed the discovery of the laser, for example, took decades to be realised.

5. The policy changes were introduced gradually and progressively over the last few decades, and consequently perhaps, have escaped the rigorous scrutiny that characterise scientific enterprise itself. Social and political pressures increased the numbers of universities, but full account was not taken of the effects the changes would have on research. As there are now far more applicants than can be supported from public purses, funding agencies have developed fairness-based policies for selecting the best of them – typically about 25% of those submitted, on average. But science is not democratic. One doubtful researcher can be right, and a thousand convinced colleagues can be wrong. While the new policies might be effective for mainstream research, they discourage the new thinking that leads to new and unpredictable advances.

6. Funding agencies recognise these problems, but concentrate their efforts on amelioration rather than reappraisal (peer review with a light touch, etc). But originality cannot be moulded no matter how we may bend the mould. For example, many scientists greeted Peter Mitchell's 1961 discovery of chemiosmosis, one of the most important biological advances of the 20th century, with hostility sustained over many years before it was eventually accepted; indeed Mitchell won the 1978 Nobel Prize for Chemistry.

7. These factors point to an urgent need for a fundamental reappraisal of the roles and functions of the academic sector. Some steps that could be taken include:

- (i) Set up initiatives that specifically foster transformative scientific discoveries. Such discoveries are inspirational, and provide the foundations of a healthy scientific enterprise. The 20th century was characterized by a steady stream of them but its flow has diminished in recent years, probably because transformative research proposals are likely to be rejected by today's virtually inescapable peer review. Other methods must be used, such as those pioneered by the Venture Research initiative sponsored by BP during the 1980s. A national scheme along similar lines would cost less than 1% of the academic research budget. Such an initiative was set up last December by the Provost of University College London for researchers within UCL and is making excellent progress.
- (ii) Create a Cabinet post dedicated to overseeing the academic sector, thus acknowledging that sector's vital roles in economic stimulation, education, and as valuable sources of independent advice on national affairs.
- (iii) Re-examine the role of universities. The UK's polytechnic colleges once offered wide ranges of excellent vocational training. In 1992, however, government abolished the binary system, and reclassified the former polytechnics as universities thus blurring the distinction between training and teaching. Anyone who can benefit from a university education should of course be entitled to one. But in expanding the universities account

was apparently not taken of the effects that massive rises in student numbers would have on the concept of the university. Now that some 50% of the student cohort attends university, how can its once automatic association with excellence continue unquestioned when 50% is the proportion usually associated with average? One possible way of satisfying society's understandable wish to extend higher education would be to regard *secondary education* as being complete only after say three or four year's study at a university or similar institute. Higher or tertiary education for suitably qualified students might then begin at a newly created class of Research University* after this extended secondary phase had been completed.

- (iv) Re-examine the question of university autonomy. Not so long ago, it was widely *assumed* that universities should be autonomous, and some nations took deliberate steps to ensure that their autonomy was protected. Unfortunately, these steps have become deeply eroded. Government seems to believe that there is nothing special about the university, and subjects its performance to the same processes of optimisation and assessment other institutions must endure. However, protecting this last bastion of intellectual freedom from the tides of homogenisation would be nationally beneficial.
- (v) Clearly separate the roles of the academic sector from those of industry. The Research Councils are now required to support the research that meets the needs of users and beneficiaries, but this mission clearly overlaps with that of industry. However, academics often lack the commercial acumen required to identify the advances that might be beneficial to others. Its new mission is also a major departure for the academic sector, which hitherto was charged with the disinterested advance of knowledge. It was conspicuously successful in this. An effective relationship between the two sectors would clearly be nationally beneficial. However, this relationship will be most effective if it is a partnership of equals.

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* In 1988, the heads of over 500 universities worldwide signed the European Magna Charta marking the 900th anniversary of the founding of the University of Bologna, the oldest in the world. Its Fundamental Principles were:

- The university is an autonomous institution at the heart of societies differently organised because of geography and historical heritage; it produces, examines appraises and hands down culture by research and teaching.

- To meet the needs of the world around it, its research and teaching must be morally and intellectually independent of all political authority and economic power.
- Teaching and research in universities must be inseparable if their tuition is not to lag behind changing needs, the demands of society, and advances in scientific knowledge.
- Freedom in research and teaching is the fundamental principle of university life, and governments and universities, each as far as in them lies, must ensure respect for this fundamental requirement.

These uncompromising statements would be the founding principles of a new class of Research University. New institutions are not necessary. A Research University could be a current university that can make a credible case for incorporation under the new status. The UK might have some 20-30 such research universities. They could be funded along similar lines to those used successfully by the erstwhile University Grants Committee for many decades.