THE FOUNDATION FOR SCIENCE AND TECHNOLOGY

DINNER/DISCUSSION SUMMARY

Sir Gareth Roberts' Review
SET for Success

Held at The Royal Society, 6 Carlton House Terrace, London SW1Y 5AG
on Tuesday 22nd October 2002

Sponsored by
Particle Physics and Astronomy Research Council

In the Chair: The Rt Hon the Lord Jenkin of Roding

Speakers: **Sir Gareth Roberts FRS**
President, Wolfson College, Oxford
Mr Harry Bush CB
Finance Regulation & Industry Directorate, HM Treasury
Mr Bill Parsons
Executive Vice President Human Resources, ARM

SIR GARETH ROBERTS outlined the findings of his report. Emerging shortages in mathematics, engineering and science were caused by increasing demand and fewer students. Ineffective science teaching in schools was identified as a key problem – 67% of physics teachers at key stage 4 did not have a physics degree; 30% of them no physics A level. The problem was not unique to the UK; a Californian study had reached very similar findings; and all EU states were in similar difficulties. A notable exception was Canada. He was heartened by the acceptance by the Government of his findings. Support for the 37 recommendations in the report had now come through in the Spending Review provision for additional resources for both schools, universities and research bodies; and in such policies as differential salaries for teachers, the provision of teaching assistants, the promotion of school/business links and continuing professional development. But it would take considerable time for results to show from these policies; sustained additional expenditure would be necessary. The gap between academic and business salaries could never probably be closed, but it could be narrowed to allow academic researchers a reasonable standard of life. But Universities must accept that industry was unhappy with the quality of many Ph.D. students, who lacked breadth and flexibility. The hurdle for Ph.Ds should be raised, and supervisors trained, to ensure that students did not develop a too narrow focus, but were able to see their specialities in context. Employers needed to improve conditions of employment for Ph.D.s. Medium sized companies showed the most serious decline in R&D and would be helped by partnerships for collaborative research built round clusters of businesses. The core aim must be to encourage the interchange between business and academia.

MR. HARRY BUSH put the Roberts report in the context of the cross cutting review and the spending review; the key features were the economic contribution of science and technology; the development of sustainable structures; and the acceleration of knowledge transfer. Innovation was crucial to lifting productivity and must rest on a healthy science base. There was no doubt that science was underfunded, to the limit that the Treasury could afford; that there was a major infrastructure backlog; a misalignment of funding streams; and insufficient clarity about pricing. The government's response to these issues was the commitment to 10% p.a. real growth; £500m additional capital; and requiring full cost recovery as an essential basis for Universities to build sustainable research businesses. But the Government was not the only player; there were serious challenges for others. Government Departments and industry would have to pay the full economic cost of research. Industry would have to engage in collaborative research and develop a greater drive within the RDAs to ensure its needs and resources were known and used. The RDAs themselves needed to develop regional economic strategies and strengthen university and industry links. Universities had to adopt a more business like approach to research customers, giving cost information and justification for time and cost overruns. They needed to move, as the civil service had done, to a market based pay system. In short, the solution did not lie just in better funding, but in structural reforms, realistic pricing and costing, balanced funding streams and partnership.

MR. PARSONS described how he, though trained as an engineer, left engineering jobs to become an HR director. So many firms neglected the need to give engineers interesting and responsible jobs at an early stage, and to

indicate how rewards might be earned. This became reflected in the view of parents that engineers and their jobs were " boring"; So they encouraged their children to follow other paths. He found no fault with the Roberts Report in dealing with how the supply of engineers might be improved, but it did not deal with the demand side – demand in two senses – was there employment for the sort of engineers that universities produced; and how do you encourage the demand from parents that their children become engineers? The problem went back to the schools and the poor quality of teachers; but were differential salaries for science and maths teachers the answer? There were many subjects where there was a shortage of good teachers, e.g. modern languages; How could you defend singling out science teachers? Concern about "dumbing down" in the syllabus was fair, but the real problem was the weak link between the syllabus and what universities expected. But improving schools without addressing parental concern and motivation might be a waste of time. At universities there were a number of issues; first he doubted whether some of the "innovative courses" now provided were more than a facade for intellectual weakness; second, there was a conflict between the ever increasing standards demanded by professional bodies and courses available; and the image of engineers in universities was as bad as elsewhere. There might be a case for increased student funding for those on unpopular courses. Finally, in industry, there was a prejudice against Ph.D.s as Sir Gareth had mentioned. The only value of a Ph.D. was behavioural – it showed the employee had stamina. We needed fewer Ph.D.s, but of a higher quality. There must be much better interchange between industry and academia; industry could help with motivating students by investing engineering jobs with more glamour and pay and, above all, involvement at an early stage with management.

The issue of "demand" as articulated by Mr. Parsons was a major theme in the following discussion. Improving teaching, amending university curricula, improving liaison between industry and academia – all-important objectives to be pursued – would be wasted unless a desire on the part of students to become scientists and engineers was simultaneously stimulated. It was a question of perception, but, in many cases, a justified perception. Much more effort must be put into persuading parents that engineering was a desirable career for their children; that it would be both financially rewarding and would not confine them into a narrow rut. This was a task for the professional organizations, but, above all for the schools. Who had met a school careers adviser who knew about engineering careers, and was enthusiastic about them? If students had not been persuaded from the age of 14 that science or engineering was a good choice, that science would give them a better chance than other subjects of getting to the university of their choice and be "fun", the battle was lost. The natural enthusiasm for finding about the world at age 11 so often disappeared. Much of the problem was the curriculum at Key Stage 3 and 4, uninspired teaching, and the ridiculous practice of making pupils choose subjects at an age when they cannot possibly know their long term interests; but the dreary reputation of the narrow, macho (beer and curry) culture in engineering industry (particularly off-putting to girls) was a significant factor. "Fun" meant grappling with issues which students felt important and on which they could make a contribution. One speaker cited an example of girls, all of who had 3 As in A levels, none of whom wanted to do science or engineering as a career. The Canadian exception was due to the high status of teachers, "destination syllabuses", good professional development courses and minimal monitoring or assessment. The UK could learn much from this particularly on the need for a light hand on assessment (beginning, at last, to be recognised at University level). Different speakers took different views on the question of whether we needed many more Ph.D.s in science and engineering. On the one hand, the link between universities and industry was often dependent on the knowledge of Ph.D.s in industry of the qualities of research in their universities, and we needed more of them to develop the essential interchange between them. But others held the view that industry certainly needed a lot of trained scientists and engineers, but not Ph.D.s, who so often failed to adjust to industrial needs. It was important not to confuse the need to have a public, part of whose education was an understanding of science; a large, technically competent cadre of scientists and engineers working in industry; and a much smaller cadre of high quality Ph.Ds working in academia and industry. Schools must produce the first, and FE Colleges could produce many of the second group. Incentives to produce the second and third groups might well be different. Also, we live in a global employment economy; why should industry use poorly performing Ph.D.s from UK universities when they could get highly motivated ones more cheaply from, say, India? We had to be careful not to price ourselves out of the market

A number of speakers commented on the narrow nature of University degree courses, which seemed designed to sideline or ignore matters and problems which young people would be interested in, and which form the basis for a satisfactory life. UK practice was contrasted with MIT, where 25% of a student's time is given to Humanities. Combining science with social study subjects, such as psychology, could have great value – after all, even scientists have to deal with other people.

Speakers also noted with appreciation that the Treasury had now started to work with academia to redress some of the problems that had developed. The Cross-Cutting Review and the acceptance of the Roberts Review were major steps forward. But doubts still remained about whether the real needs of industry had been understood and whether the objectives of encouraging high quality scientists to stay in academia and developing greater university/ industry collaboration was as achievable as Ministers desired. Two problems would still be with us – academic salaries could never match industry rewards, and when a scientist goes into industry, academia often thinks that the reason is that he/she is not good enough to make it with them.

Sir Geoffrey Chipperfield KCB