

# The development gap

*... but what is NRDC doing? Professor S. D. Smith, who is both Professor of Physics at Heriot-Watt University and Chairman of Edinburgh Instruments Ltd, writes on the problem of support for development.*

The Science Research Council (SRC) dispenses about £100 millions for research purposes each year. The community using it almost certainly contains the greatest concentration of academic brain power, but only a minor proportion of innovative, entrepreneurial and even practical ability, in the UK. But is there a mechanism to turn the practical results of this national investment efficiently into industrial products that could contribute to the economy?

Most people would, I submit, say no. One body representing academics, the Standing Committee of Professors of Physics, recently submitted a document to a Parliamentary Committee on Science and Technology stating that "most university investigators would prefer to invent nothing than something which might fall into the hands of the National Research Development Corporation". The organisation which automatically acquires rights for the exploitation of any activity currently funded by the SRC.

The appropriate development funding to take a device from a research laboratory to production line can be several times the cost of the original research. Certainly obtaining original research results is easier than making the equipment viable on a routine basis; for example, the laboratory research yielding the vertical temperature sounder known as the Selective Chopper Radiometer for the satellite Nimbus 4 cost about £40,000 while the development programme to engineer it for space cost nearer to £200,000.

One major problem is that NRDC funds for development extend only to about £5 millions per annum—in-sufficient, on the above arguments, to develop even a small proportion of "device-successful" research originating from the SRC. Even more important, NRDC officials themselves differ on whether or not the NRDC is there to encourage innovation and help British industry. But if its specific objective is not to help British industry, what is its purpose at all? Not only does modest development not seem to meet with favour in the NRDC; under the harsh financial terms the NRDC attempts to extract from companies

and investors, it seeks far ranging rights and then attempts to get its money back on *each* specific project by way of royalties at the rate of up to 12% per year on the unit selling price.

There are two immediate difficulties with this. Firstly, only about one out of ten projects may be *financially* successful, although a larger proportion may be technically successful. Secondly, the burden of a 12% royalty, being very large in proportion to the possible profit margin (probably about the same) in any competition with (in particular) American companies, can drive the selling price above a realistic level. I also suspect that the principle of trying to recover money *rapidly* on each specific project is wrong.

A related problem is that the NRDC only gives 50% of development funds. For both small and large industry today, this poses an almost insuperable problem of where to find the other half. A further condition invariably includes giving *all* rights and patents to NRDC: this is quite inconsistent with partial funding! The harshness of such terms make NRDC a worse prospect than a merchant bank—the more so because of the wearisome negotiations that drag on for months into years with innumerable wrangles with officials, accountants and so on. Thus in many ways it does *not* fulfil the role of financing truly developmental projects. There is only one saving grace; the NRDC shoulders the burden of loss in event of a failure. As I see it, the only way for a company to make a commercial success of an affair with the NRDC is to extract as much money from them as possible and then declare the project a failure.

So, how does a successful development occur at all? I believe that the British scientific instrument industry is almost in a position of not being able to progress without that element of luck or good fortune characterising all science and industrial development. The state of the laser industry and of the optical components industry and subtechnologies shows this clearly. The fact that things do happen is, I believe, quite often due to spin-off from some large project which carries with it a necessity for engineering and

technical development. The development of some component or system then takes place, initially through what I would call "tame orders". Such an order a company can cope with; it can carry out the work for a given amount of money. This must be responsible for much more development than the NRDC route.

Such procedure brings into question the role of agencies beyond the SRC/NRDC area and in particular the Ministry of Defence and so on, where the method is commonly applied. There are two disadvantages: this source of support is not generally accessible, as of right, as a route for development to companies working outside the "defence" area or by the university research community; and, second, it is dictated very much by the whim of current "defence" thinking. I believe that there is case for optimising the rules of the games for research and development expenditure in the direction of helping the development of devices when they lead towards industrial products. Opponents would argue that many of these things will not be economical anyway; but we are spending the money in any event with equally little economic reason.

Why don't we, as a matter of urgency and seriousness, optimise development routes? Some moves would require political initiation, but the terms of reference are not so difficult to envisage. With large projects (like the SRC's Laser Laboratory), some integration into British industrial effort should be attempted as a matter of policy. It must be wrong for the good of the nation to proceed into new technical areas independently of encouraging improved technology in the country. Then, instead of the NRDC, perhaps we require a new branch of the SRC, that can commission development work or pre-production orders and coordinate this activity with the pure science expenditure. Awards could be made and judged against a serious review of technical performance with the sanction of no more funds against inefficiency. Where industry is involved a shared support of the order 80% from SRC to 20% from industry might be right, combined with a liberal and flexible attitude to rights and patents.

To cries of "featherbedding", the answer is not to have no bedding at all. An energy gap may be a source of devices in semiconductors; a development gap is no source at all. This nettle must be grasped at the level of politics.