Who get Kicks out of Science Policy?

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In the debate over science policy in Australia, the main protagonists have been scientific elites on the one hand and government and business elites on the other. Left out of the debate have been those community interests which are not tied to elite groups. To redirect science and technology towards wider community interests, there needs to be greater community participation in decision making about science, a change in research priorities and also in the way scientific research is done.

Scientists like to have control over what research they do. But the funding for scientific research in Australia mainly comes from the government. Politicians and government bureaucrats have their own ideas about research priorities, and high on their list is serving the 'national interest' — which has come to mean mainly large corporate interests and the public bureaucracy itself. This has led to a major re-evaluation of the funding and organisation of scientific research, otherwise known as science policy.

Who is left out? The 'silent majority' and wider community interests, such as small businesses, environmentalists, women, the poor and unemployed, waged and salaried workers, members of 'single issue' groups and even researchers and bureaucrats in the lower echelons. The conflict over science policy provides an opportunity for people belonging to or supporting these outsider groups to make demands for changes in research priorities. In this document we outline the case for such demands and suggest what changes in current arrangements and policies are needed.

The Problem

'Science takes a dive in Australian budget'
'Industry inarticulate about its needs; science head'
'ARGS head appeals to PM over cutbacks'
'Academy of Science Lobby formed'
'PM wants science to be business'
'Uni R&D direction must change: Button'
'CTEC gets tough with the unis over cash for research'
'CSIRO whipping boy for ills of industry: scientist'
'Minister to fight energy research cuts in budget'

As these recent newspaper headlines show, the funding and organisation of scientific and technological research in Australia are at some sort of 'turning point'. Along with the slowdown in growth of funding (with a plain cut in some areas), the government is pressing researchers to seek closer ties with business as a way of making their research results more 'relevant'. The commonwealth departments administering the bulk of Australia's non-military research budget — Science, Education, Health, and Industry, Technology and Commerce — are earnestly seeking ways of restructuring the funds they have.

In response, scientists have, if falteringly, begun to organise themselves and defend the funding of their projects. Says the President of the Institute of Physics; "We would prefer to continue with a low profile, doing research that we consider of genuine benefit to the community; but other groups have become more vocal and scientists must now come out of the woodwork."

The basic situation is this. Scientists — and this usually means scientific elites — want to continue to control most decisions about research. They argue that only they, the (scientific) experts, know best what research should be done. And indeed, it is in the interest of elite scientists to pursue their own fundamental research as an 'intellectual good' without reference to any outsiders. On the other hand, politicians and bureaucrats are demanding more control over the funds which they dispense to scientists. They argue that since the great bulk of research is financed by public funds, the government has the responsibility to ensure that the research should satisfy 'economic' criteria and serve the 'national interest'. But in practice they are pushing for research to be oriented much more to the interests of private capital and of the state apparatus itself.

In these circumstances, we believe *other* voices need to be heard, arguing that both pure and applied scientific research should be directed towards goals that other scientists or government policymakers might not champion if left to themselves. In particular, community groups should present *their* views on the directions scientific research should take and make those views heard in the scientists' lobby groups and among government administrators and directors of scientific and educational organisations. In addition to putting alternative views on research directions and how research priorities should be set, there is an opportunity to argue for changes in the way scientific institutions — from school science departments to the CSIRO — are run, particularly to challenge their elite and male-dominated career structures.

The Australian government spends over $1000 million per year on research and development (Department of Science, 1985). The current distribution of this huge amount of money is neither equitable nor effective. Both the community and science as a whole can benefit if the level of funding, its distribution and the evaluation of the results of research are a matter of public debate. Neither the institutions that exist, nor the distribution of funds to the various scientific disciplines, nor the way scientific research is actually conducted should be immune from close public scrutiny.

It is worth putting the performance of research in Australia into historical context. Australian industry has traditionally done little research and development and, until the 1960s when the Australian Industrial Research and Development Incentive Scheme was established, governments did not encourage them to do any. Until the 1960s the bulk of scientific research in Australia was done by the CSIRO which, although it focused much of its efforts on the primary sector, covered the whole range of scientific disciplines in basic and applied research. The

movement towards large-scale scientific research within the universities did not begin until after World War II. That move in Australia followed overseas trends, where university-based researchers, led by a vanguard of proselytising fundamental scientists flushed with their successes in military work, pushed for greater government support for basic research, arguing for its economic and broader cultural role (Rose and Rose, 1969). By the 1960s elite Australian scientists had been successful in massively increasing funding for basic research by a huge expansion of the tertiary education system and the introduction of the Australian Research Grants Scheme, as well as getting the ear of government on policy advisory bodies (Moyal, 1980). The result of this has been that certain 'big science' research disciplines related to European and North American research, whose usefulness to Australians may be questioned (nuclear physics and some medical research, for example), continue to claim a disproportionate share of resources. In addition, the dominance of male elites in scientific research has remained unchallenged.

So, nowadays, in Australia, a very high percentage of research and development is funded by the government rather than by industry. The Australian government funds 79% of research and development, a percentage exceeded among the 20 richest capitalist countries only by Iceland and New Zealand. In contrast, the Swedish government funds only 44% of research and development and the Canadian government 58% (Department of Science, 1985). The second factor in Australian science is the dramatic reduction in private company research and development both as a percentage and in real terms during the 1970s. Current government emphases on the restructuring of Australian research should be viewed in this context. The government is pressing the research scientists to assist in making Australian industry more internationally competitive, which means locking it into trends set by transnational corporations.

The economic squeeze is serving to entrench current power structures inside the Australian scientific community. Those in powerful positions are protecting their fiefdoms against threat. The first research programs to go are those which have no powerful patrons; many of these programs are relevant to non-elite groups. The squeeze on research jobs means that those who conform to the system get ahead. The career structure means that women in particular lose out as do both men and women who do not play the ruthless publication-cum-bootlicking game. Some of Australia's most talented young researchers cannot find jobs and leave Australia or quit science.

Geological research illustrates the contending forces. Within the government research organisations, much geological research is geared to service mining interests. By contrast, academic researchers usually are more concerned with building their scientific reputations, so they focus on more esoteric problems and methods. The situation is more complex in that some academics as well are oriented towards mining interests while the esoteric academic orientation has entered the government research bodies (like the Bureau of Mineral Resources) to some extent. Left out of all this is any research oriented to groups such as mining workers or towards goals such as the long-term use of Australian resources in an environmentally sound manner. Also left out are prospects for researchers who do not take up either academic or mining industry orientations.

The issue is not whether publicly funded research should be relevant to the needs of Australians: it should be. Nor is it whether researchers and the users of research should be brought together: they should be. The issue is: who determines 'relevance' and who are the 'users'.

How can broader social interests be brought to bear on directing research priorities? Certainly scientists themselves cannot be left with the responsibility. Nor is it possible or desirable for government to declare unilaterally the national interest in individual research projects. So some *new forms* of involving community interests in the setting of research objectives and in the strategic planning of research are necessary.

Many scientists in the CSIRO and in universities have expressed concern about the way government speakers have interpreted 'relevance' to mean relevance primarily to the interests of industrial and commercial management. They object to research becoming the 'handmaiden of profit' as opposed to socially-useful, employment-generating, environmentally-sensitive economic activity. But it would be foolish to oppose this merely by defending what has 'just growed' under the cover of 'scientific autonomy'. It is surely politically indefensible — in the sense that neither governments nor excluded social groups will stop their criticisms of the scientific enterprise — to carry on with the current elite-dominated, male-dominated, internally governed but publicly funded system. Scientists and non-scientists alike need to find new ways to broaden and democratise the carrying out of research and development.

There are many ways in which this could be done and we outline some of the more important ones below.

Community Participation in Decision Making

A key to redirecting science and technology towards wider community interests is to re-examine who makes decisions concerning what research is done. Currently most of these decisions are made by elites within the scientific hierarchy, the government and big business, and the bulk of research which is conducted serves the interests of these groups (on the US situation see Dickson, 1984). An increase in community participation in decision making about research priorities thus would be a start in redirecting research so that it serves community interests (Barns, 1984).

It is important that community groups demand that research appropriate to their needs is conducted. For example, 'new settler' farmers and family farmers generally could negotiate with the Department of Primary Industry or CSIRO researchers to look at their needs rather than those big business farmers. This could include research into environmentally sound alternatives to pesticides and herbicides, recycling animal and plant wastes as fertiliser and alternatives to large-scale farm machinery. Environmental groups similarly could ask organisations such as CSIRO to investigate small-scale renewable energy technologies. Medical researchers in hospitals and universities could be approached by community health groups to study preventive rather than curative approaches to disease. And so on. In other words, community groups, just like private business, can become 'clients' of researchers and can demand that research which will benefit community interests is carried out.

To ensure that the demands of these groups are heard, there will need to be increased community participation on bodies which make decisions regarding research priorities and research funding. Such bodies include the CSIRO Advisory Council, university councils, and funding bodies such as the Australian Research Grants Scheme and the National Health and Medical Research Council. It is vital that such community representatives have the numbers and power to influence decision making and that they are not merely tokens, as is the

working environment, preventive medicine, long-term social effects and the like.

Women's studies. Much scientific research could be directed towards particular problems faced by women, such as the gender division of labour and the new reproductive technologies.

Environmental studies. Some of the areas that deserve more attention are the health hazards of conventional technologies (such as coal burning, the automobile and television), land degradation and intensive forestry.

Renewable energy. Much more research and development could be put into energy efficiency, solar and wind energy, and in particular towards overcoming the political and economic obstacles to these alternatives.

Peace studies. Aside from political and social investigations into the causes and consequences of military races, much practical research could be done into the technical and organisational aspects of economic conversion from military to civilian production, and into methods for nonviolent resistance as an alternative to military defence.

These are just some of the areas in which more research would be likely — often at the expense of previously favoured research areas — if community groups had more say in decisions about science. This may well lead to the breaking down of traditional disciplinary boundaries and also to a broadening of the concept of science.

Our emphasis on these currently under-researched areas does not mean that industrially-relevant research is unimportant. Quite the contrary. The government is right to cajole Australian industry into changing its manufacturing techniques and products for sale internationally, to increase Australian industry's share of new technology-based world trade. Australian industry has to be persuaded to increase the paltry sums it currently spends on research and development. But the fact that private industry has to be so cajoled, with tax incentives and major government-financed programs (such as $30 million per year for motor vehicle research and development programs), shows that whatever the national interest may be in having a sounder manufacturing base, private Australian industry cannot be relied on to serve it. The Australian people want research into new products and services which will create jobs and which fit with the country's environmental and political goals. There is no reason to assume that the research and development which Australian firms — even those not linked to transnational corporations — will want to do, and which they will try to get publicly-funded bodies like CSIRO and the universities to do for them, will meet these wants. The Australian people's broader social goals are not necessarily served by profit-seeking private firms, particularly transnationals.

So, even in industrially-oriented research and development there is scope for a variety of approaches (Wainwright and Elliott, 1982). New technologies, both in processes and in products, can be exploited in many ways. Machine tools can be designed and installed to increase and extend workers' skills and break down divisions of labour without productivity losses, rather than to deskill; new consumer products can be designed to be long lasting and easily repairable rather than as throwaways; new products and services can be based on existing Australian renewable resources and skills rather than merely mimicking the products which emanate from northern hemisphere countries with different resource endowments. In short, the type of industrial research to be done, since it is to be subsidised with public money (including company taxes foregone) is a suitable subject for *public* debate and accountability, rather than just *private* contract between industrialists and professional researchers.

Who Does It, and How?

Community input into decisions about scientific priorities will have little impact unless scientists are responsive. Most scientists are full-time professionals working for large organisations, and their careers depend on organisational advancement and professional kudos. Hence there is little incentive to tackle problems of concern to less powerful groups in the community. To change this situation by putting tight controls on scientists would be heavy-handed and counterproductive, and in any case tight controls would be exercised by governments of scientific administrators who would be more concerned about their own interests than those of communities in whose name they might justify their actions. A more promising approach is to encourage or create ways of doing scientific research which can be linked to the communities being served rather than to large-scale organisations. Here are some possibilities for moving in this direction.

Extension services. Most scientific consulting is done for governments or large corporations, as they are the main groups which can afford it. Therefore it is not surprising that scientists become attuned to the needs of these powerful groups. An alternative is the creation of community extension services. The control and orientation of sections of research organisations, such as CSIRO and the universities, could be shifted from these organisations to particular community groups, such as women or renewable energy groups. In other words, these sections would be given a brief to provide research and consulting oriented to the needs of presently excluded groups. Extension services of this type could be administered using the community auditor scheme described above. A key part of this alternative would be to make advancement in research careers dependent on success in satisfying the community group. For example, a section of a university botany department or the CSIRO Division of Plant Industry could be put under the control of a representative group of new settler farmers, who might ask it to examine a problem such as the suitability of a range of 'waste' plant products, singly and in combination, for fertiliser.

An example of a 'community extension service' which is worthy of investigation for its applicability to Australia is the Dutch 'knowledge shop' or 'science shop' (Meertens and Nieman, 1979). Most Dutch universities have these shops (they are often real city-centre shops) to which community, trade union and other non-profit groups can go if they have a researchable problem. The shopworkers act either as 'brokers', putting the groups in touch with university researchers who might be able to advise them, or carry out a full-scale research project on the group's behalf with university financial support.

Such extension services would be attractive to community groups, who need help in formulating their problem in a researchable way — often the most difficult task — as well as in getting the research done. They are also attractive to the researchers themselves since they enlarge the 'constituency' of university research supporters by opening publicly-funded research facilities to community groups. Researchers' unions such as the Federation of Australian University Staff Associations and the CSIRO Officers Association could propose community extension services to their employers on straightforward democratic grounds so that money provided by well-endowed industrial and government contractors is matched with money for research for the less well endowed.

case of students on university councils. Community representatives must be present at *all* levels of the organisation and not just on 'advisory committees'. It is particularly important that they are represented on committees which 'review' or 'audit' the research of university departments, research institutes, CSIRO Divisions and so forth, so that they have the opportunity to influence research programs at all stages.

How would community representatives be chosen? One way would be by election. The electorate might consist of all members of specified groups, such as women's group, environmental groups, trade unions and the unemployed. Alternatively, the representatives might be elected by local communities.

It is important that community representatives continue to serve community interests and that they are not coopted by elite interest groups. A big problem with the election of representatives is that those elected may become an elite group themselves, especially if allowed to be re-elected many times. An alternative selection method which seeks to overcome this problem is choosing community representatives by lot from a specified constituency (Emery, 1981). Jurors make vital decisions about people's lives, and there is no reason why members of the community chosen by lot, *given proper backup,* could not make informed judgments about research.

Community representatives will need to have appropriate knowledge about the issues that they are discussing. One of the arguments which will be used against community representatives, however they are chosen, is that they cannot be expected to have specialised knowledge about research. On the other hand, it has been argued convincingly that specialised knowledge is *not* essential for informed decision making and that such knowledge is often overvalued (Levy-Leblond, 1976; Sklair, 1973). Naturally, community representatives will do a better job if they are properly served by the various committees' secretariats and paid for the time they must devote to being properly prepared in the advice they give. The participation in decision making on research directions will have an added advantage in 'demystifying' scientific knowledge, since funding for research will depend on being able to explain it in everyday language, not jargon. Selection by lot would provide an additional stimulus for scientists to explain and justify their work to the public since, potentially, anyone could be in a position to judge it.

Committee procedures should be open and accountable. This would benefit not only community representatives but also researchers themselves, for it can only be beneficial if, for example, those seeking funding know why their bids were not successful.

There would also be merit in associations between community groups and small groups of researchers, perhaps departmental or project-sized. These community auditor groups should be part of the day-to-day decision making processes of the research group, especially on priorities, strategies and methodologies.

In principle a university department of sociology could invite community groups representing women, ethnic minorities or the unemployed — groups which are often studied by sociologists — to join a committee which would assess and suggest research directions for the sociologists. Conversely, groups whose cooperation is needed by sociologists for research purposes should request the creation of such a committee as a prerequisite for their cooperation.

There may be objections that whereas community representatives might be quite capable of advising on research directions for the social sciences which deal with obvious community interests, this will not be the case for the natural sciences. However, the same procedure can be adopted in the devising of programs for applied (and even some basic) research in the natural sciences. The work of chemistry departments is of interest to trade unions and environmentalists interested in pollution and work hazards; of biology departments to groups concerned with environmental and community health matters; of mathematics departments by people interested in modelling, and so on. Certainly, there will be many difficulties in establishing continuing community input into the research project setting. It is our view that researchers would be unwise not to arrange such inputs. Otherwise they can be criticised for being solely concerned with arranging *private industrial* links.

Given the balance of forces at the moment in Australian politics, the potential of the Accord should be considered as a context in which strategic questions about the organisation of the research system can be debated. In its present form the Accord stresses the importance of planned policies for industry development, and states that "consultation is a key factor in bringing about change in industry". Although it is not explicitly mentioned in the Accord document, scientific research and development are obviously essential for planned industry development. The key issue, as we have emphasised, is not whether research should continue to receive public support — it should — but by whom and to what ends it should be directed.

Until now, relations between the scientific community and the community at large have in the main been characterised by a mutual disregard and lack of interest, if not outright disdain. The Accord provides an opportunity for scientists and technologists to propose research programs, for example for the development of socially beneficial, employment-generating products and productive processes, which can be supported by trade unions. Such proposals could then be advanced within the established consultative planning framework, notably the industry councils. An excellent treatment of the possibilities is given by Mathews (1985), who presents a program of technology-related issues for inclusion in a trade union industry policy.

What Sort of Research?

At the moment, most scientific research is done on topics that are of interest mainly to scientists themselves or to influential sections of the state and capital. If a wider section of the population had an input in shaping research priorities, then different areas of research would be emphasised (BSSRS, 1983).

Areas likely to be given encouragement include the following.

Social and political studies. Investigations could be carried out on the social and political aspects of existing industries, of proposed technological innovation, and of economic policies. This approach would supplement the usual studies of the technical or hardware sides of issues, which are usually the only studies done. For example, as well as examining the economic and technical aspects of energy systems, comprehensive analyses of the social and political implications of different energy options could be carried out alongside.

It should be a condition of major publicly funded or subsidised applied or industrial research that there is some serious parallel research into related social and economic effects. Along with research in microelectronics, new chemical and drugs, energy sources and so forth, there should be research on the

Alternative career structures. Advancement to the highest reaches in scientific careers depends on success within a scientific discipline (which may be tied to powerful external groups) or success in climbing administrative hierarchies. Those who orient their research to the interests of the poor or to alternatives critical of powerful elites risk jeopardising their promotion prospects and even their jobs. How can research jobs be restructured to avoid this problem? There are several possibilities.

One approach is to flatten the hierarchy in scientific research, so that junior scientists are less subject to administrative fiat from above. If salaries were mostly the same, and job contracts gave greatest security to those in *lower* positions, there would be less sycophancy and backstabbing and more opportunity to focus on work that is satisfying and socially relevant.

Another approach is to greatly expand *permanent part-time* work. (This proposal is quite different from what is happening currently, namely the expansion of part-time work which is very *insecure*.) Those employed part-time — especially if they had another part-time job in an unrelated field — would not be so dependent on science for their occupational survival, and therefore would be more open to doing work relevant to less powerful groups. Furthermore, this approach would permit the employment of more professional researchers, in particular more women. The more flexible working arrangements we are suggesting here — job-sharing in all its possible forms — can readily be supported by researchers' unions and by those in government advocating greater opportunities for women.

Tax incentives and other resources for research. Tax incentives for research at the moment mainly encourage research in large corporations, which make large profits and employ tax consultants to minimise their payouts. Therefore what will happen with the increased tax incentives which the government has introduced is that much of what used to be operational expenses will be reclassified as 'research' and claimed as a deduction. Private research spending will increase in Australia, but much of it only by the strokes of accountants' pens and only in large corporations.

What is needed to redirect scientific priorities are tax incentives which encourage individuals and small groups to undertake research linked to community concerns. The existing laws already allow small enterprises to claim deductions, and initiatives can be taken simply by utilising the existing incentives. The encouragement for small-scale research could be greatly expanded by simplifying the administrative obstacles which face small operations.

This proposal may only have limited usefulness, however, because many groups interested in research need venture capital to begin a project, rather than tax incentives. In addition to new sources of venture capital, a variety of other schemes could be established to encourage sponsoring of research to serve non-profit bodies such as feminist collectives or trade unions. One possibility is that researchers sponsored by such groups could be subsidised by the government by an amount equal to unemployment benefits.

In effect, this would allow non-profit groups to use their funds to supplement dole-level income by researchers who would be, almost by necessity, dedicated to the cause involved. (This might also provide a vocal new constituency to push for raising the woefully low level of dole payments!)

Conclusion

The possibilities we have outlined here are intended to illustrate what new directions are desirable in broadening the sources of research funding, opening up the existing system to wider participation and giving space to allow new ideas of how research could be organised to develop.

Of course, we cannot neglect reforms to the *existing* research system: indeed such reforms would be necessary for any of the possibilities we outline to become widespread. In the debates about the costs and efficacy of the Australian research system, various reforms have been proposed. For example, the recent Examiner's Report of the Organisation for European Cooperation and Development floats the idea that there should be a body (preferably a Department of Science and Technology) to co-ordinate *all* Australian government research funding bodies, including those for medical and even military research. And there has also been floated a trivial and divisive proposal to split the Australian Research Grants Scheme into two separate agencies, one to fund the natural sciences and one to fund the social sciences and humanities.

We have no blueprint to offer for the reorganisation of the plethora of committees, institutions and boards that distribute Australia's public research cash, although we do think that there is a need for more co-ordination and more clear procedures for establishing strategic research priorities. It may well be desirable to abolish some bodies and to democratise the scope of others.

Our message is that the time is ripe for reforms in the way research in Australia is both decided on and conducted. The success of such reforms will depend not only on the formal procedures that are established to involve a wider range of community representatives in research priority setting review, but also on the willingness of community organisations to press their case. At the moment, even when these organisations understand full well what scientists are up to and wish to support some of them and point the work of others in different directions, the channels for conveying their views are difficult to find or, at best, work erratically. Therefore the establishment of formal procedures which encourage interaction between the community and researchers is of primary importance. Community willingness to use these procedures is then likely to be a natural follow-on.

Nevertheless, even now, if a community group has a problem which it thinks needs to be researched, it can seek out sympathetic researchers at the local university or CSIRO research lab. Persistent requests for assistance can at least make researchers uncomfortable; at best, they will provide sympathetic researchers with the ammunition they need ('community pressure') to push for different research directions to be pursued.

Of course, this is the 'other side' of the current exhortations of the Minister for Science and of various scientific lobby groups for greater 'public understanding' of scientific issues. When they *do* understand, what is the 'public' expected to do with their comprehension, apart from applauding from the sidelines and expressing approval at election time for higher spending on research and development? It would be better if the lobbyists 'opened up' decision-making in research program formulation, so as to invite the 'public' to involve themselves in this decision-making. The public's role should not be to "hear and cheer" but to "participate and decide". It is encumbent on researchers to find new ways of inviting community participation in research priority setting and program review (such as 'knowledge

shops'). Indeed it might well be in their interest, as we have argued, to seek out new friends and avoid a dependence on one, possibly unreliable, client group, namely private industry.

Those responsible for broader issues of research policy, on funding committees, in government departments, in research establishments and in university governing bodies, also have a role to play in opening up Australia's research system. They can encourage community groups to present their agendas for research that needs to be done through the appropriate channels and they can put forward some of the reforms which we have outlined to develop better mechanisms for community group involvement.

Scientific and technological research in Australia are at a turning point. With imagination and effort, programs for research which will benefit the community at large can be developed and implemented.

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