1989

Australian science in crisis, 1984: the founding of the Federation of Australian Scientific and Technological Societies (FASTS)

Richard Payling

University of Wollongong

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AUSTRALIAN SCIENCE IN CRISIS: 1984

The Founding of the Federation of Australian Scientific and Technological Societies (FASTS)

A thesis submitted in partial fulfilment of the requirements for the award of the degree of:

MASTER OF ARTS (HONOURS)

from

THE UNIVERSITY OF WOLLONGONG

by

RICHARD PAYLING, B.Sc.(Hons.), Ph.D.

Department of Science and Technology Studies
November 1989
The thesis covers two troubled years in Australian science: April 1983 to April 1985. The two years began with the arrival of Barry Jones as Minister for Science and Technology, with his vision of a high technology future, and the growth in expectations amongst Australian scientists - resulting from this vision - of increased government support for scientific research. They ended in dismay following the fall from grace of Barry Jones, the dashing of expectations from the 1984 federal budget, and the resolve of scientists to form a national political organisation FASTS (the Federation of Australian Scientific and Technological Societies), to act on their behalf to lobby government.

The magnitude of the crisis in 1984 which produced FASTS indicates the essentially internal nature of the crisis. The marginal and powerless position of the scientific community in 1984 demonstrates the inadequacy of any definition of science which does not accommodate the broader social and political nature of science.
DECLARATION

This work has not been submitted for a degree to any other University or Institution.

R. PAYLING
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<tr>
<td>AAEC</td>
<td>Australian Atomic Energy Commission (now ANSTO)</td>
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<tr>
<td>AAHPSSS</td>
<td>Australian Association for the History, Philosophy and Social Studies of Science</td>
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<tr>
<td>AAS</td>
<td>Australian Academy of Science</td>
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<td>AASW</td>
<td>Australian Association of Scientific Workers</td>
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<td>ABC</td>
<td>Australian Broadcasting Commission</td>
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<td>ABS</td>
<td>Australian Bureau of Statistics</td>
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<td>ACR</td>
<td>Australian Committee for Research</td>
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<td>ACS</td>
<td>Australian Computer Society</td>
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<td>ACTU</td>
<td>Australian Council of Trade Unions</td>
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<td>AGC</td>
<td>Australian Geoscience Council</td>
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<td>AGM</td>
<td>Annual General Meeting</td>
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<td>AIM</td>
<td>Australasian Institute of Metals</td>
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<tr>
<td>AIMF</td>
<td>Australasian Institute of Metals Finishing</td>
</tr>
<tr>
<td>AIP</td>
<td>Australian Institute of Physics</td>
</tr>
<tr>
<td>AIRDIB</td>
<td>Australian Industrial Research and Development Incentives Board</td>
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<tr>
<td>AIRDIS</td>
<td>Australian Industrial Research and Development Incentives Scheme</td>
</tr>
<tr>
<td>AIRG</td>
<td>Australian Industrial Research Group</td>
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<td>ALP</td>
<td>Australian Labor Party</td>
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<td>AAHL</td>
<td>Australian Animal Health Laboratory</td>
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<tr>
<td>ANRC</td>
<td>Australian National Research Council</td>
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<tr>
<td>ANSTO</td>
<td>Australian Nuclear Science and Technology Organisation</td>
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<tr>
<td>ANU</td>
<td>Australian National University</td>
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<tr>
<td>ANZAAS</td>
<td>Australian and New Zealand Association for the Advancement of Science</td>
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<td>ARC</td>
<td>Australian Research Council</td>
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<td>ARGC</td>
<td>Australian Research Grants Committee</td>
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<td>ARGs</td>
<td>Australian Research Grants Scheme</td>
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<td>Abbreviation</td>
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<tr>
<td>ASIA</td>
<td>Australian Scientific Instruments Association</td>
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<td>ASTEC</td>
<td>Australian Science and Technology Council</td>
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<tr>
<td>ATS</td>
<td>Australian Academy of Technological Sciences</td>
</tr>
<tr>
<td>AVCC</td>
<td>Australian Vice-Chancellors Committee</td>
</tr>
<tr>
<td>CAI</td>
<td>Confederation of Australian Industry</td>
</tr>
<tr>
<td>CAPA</td>
<td>Council of Australian Postgraduate Associations</td>
</tr>
<tr>
<td>CPI</td>
<td>Consumer Price Index</td>
</tr>
<tr>
<td>CSIR</td>
<td>Council for Scientific and Industrial Research</td>
</tr>
<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
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<tr>
<td>CSR</td>
<td>Colonial Sugar Refinery Ltd.</td>
</tr>
<tr>
<td>CTEC</td>
<td>Commonwealth Tertiary Education Commission</td>
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<tr>
<td>DITAC</td>
<td>Department of Industry, Technology and Commerce</td>
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<tr>
<td>DST</td>
<td>Department of Science and Technology</td>
</tr>
<tr>
<td>DSTO</td>
<td>Defence Science and Technology Organisation</td>
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<tr>
<td>FASTS</td>
<td>Federation of Australian Scientific and Technological Societies</td>
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<td>FAUSA</td>
<td>Federation of Australian University Staff Associations</td>
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<td>FSTW</td>
<td>Federation of Scientific Workers</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>HERD</td>
<td>Higher Education R&amp;D</td>
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<td>IAC</td>
<td>Industries Assistance Commission</td>
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<tr>
<td>IFC</td>
<td>Interim Federation Committee (FASTS)</td>
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<td>MICS</td>
<td>Licensed Management and Investment Companies</td>
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<tr>
<td>MITI</td>
<td>Japanese Ministry for International Trade and Industry</td>
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<tr>
<td>NCPST</td>
<td>National Committee for the Promotion of Science and Technology</td>
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<tr>
<td>NERDDC</td>
<td>National Energy Research, Development and Demonstration Council</td>
</tr>
<tr>
<td>NH&amp;MRC</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>NSTIS</td>
<td>National Science and Technology Information Service</td>
</tr>
<tr>
<td>NRC</td>
<td>National Research Council</td>
</tr>
<tr>
<td>NSTAG</td>
<td>National Science and Technology Analysis Group</td>
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<tr>
<td>NTC</td>
<td>National Technology Conference</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>NTS</td>
<td>National Technology Strategy</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
</tr>
<tr>
<td>QEFARGC</td>
<td>Queen Elizabeth II Fellowships and ARGC</td>
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<tr>
<td>RACI</td>
<td>Royal Australian Chemical Institute</td>
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<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
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<tr>
<td>S&amp;T</td>
<td>Science and Technology</td>
</tr>
<tr>
<td>SPC</td>
<td>AIP Science Policy Committee</td>
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<tr>
<td>TAFE</td>
<td>Technical and Further Education</td>
</tr>
<tr>
<td>Telecom</td>
<td>Australian Telecommunications Commission</td>
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<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organisation</td>
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<tr>
<td>WIMPS</td>
<td>Workers in Medical and Pharmaceutical Sciences</td>
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I am indebted to Mrs Cecily Munro for typing the original draft of the thesis, and to my wife and family and friends for their patience during this obsession.

For Michael, Rebecca, Malcolm, and Rachel
"FASTS" is the only major social initiative by Australian scientists since the Australian Association of Scientific Workers folded up back in 1949.

A. PRYOR and J. COLLINS, 1986

1.1. Australian Science

The Australian science in the title of this work refers to the political and social structure and function of science in Australia and not to what professional scientists would normally regard as science, that is, the theoretical and experimental detail of their scientific disciplines. Indeed, many scientists are uncomfortable with the term Australian science. Professor Bert Bolton, of Monash University, when asked to speak on a related subject, the history of Australian physics, at the Bicentenary Congress of Australian Physicists in 1988, refused to use the term - Australian physics - preferring instead the history of physics in Australia. The history of
"science in Australia", therefore, is a history of the research undertaken by scientists in Australia; whereas the history of "Australian science" is more a history of scientific organisations and the relationships of these organisations with government and the public. The two histories are, of course, interrelated in a complex and personal way. The history, in this thesis, covers the years 1983 to 1985 and attempts to show the complex interaction between individuals, organisations and underlying social and political ideas and structures which formed those years, from the enthusiasm of 1983, the apprehension and dismay of 1984, to the formation of FASTS in 1985.

The founding of FASTS, in 1985, was a political act and its task of lobbying government, industry and the public is a continuing political activity; and yet scientists generally are not comfortable with a political role for science, preferring instead to work away at their research with a minimum of government interference. Indeed, some of the more conservative scientists at the time - and despite the crisis - were critical of the political involvement of scientists which led to the founding of FASTS. This dilemma, between a political and an apolitical science, lies at the heart of the crisis in 1984; the magnitude of this crisis may be judged by its products: FASTS, an umbrella organisation for scientists and technologists established to lobby government; NSTAG (the National Science and Technology Analysis Group), comprising FASTS, the Institution of Engineers, Australia, and the two Academies of Science and Technology, to review science and technology in the Federal Budget; and the other prong of successful lobbying, the NSTIS (the National Science and Technology Information Service) established by the Academy of Science, when FASTS
failed to take on this added responsibility, to keep the media and the Australian public informed of the achievements of science and technology.

Many authors have attempted to define "science"; and most scientists, science analysts and others interested in science would have some personal, working definition of science which suits their particular purpose, and be disconcerted by the variety of definitions used by others. The obvious difficulty in reaching a consensus on a single definition of science does not, however, prevent people from defining science. Their definition is often then used to justify some particular role for science, and most definitions of science involve some political or apolitical role for science. For example, if defined merely in terms of the papers in scientific journals, as a set of abstract theories and experimental results which test those theories, then science appears divorced from society and from politics. Such a definition may then be used to justify scientific autonomy, on the grounds that political interference has nothing to contribute to science and therefore will only serve to hinder or distort science. "Nothing seems more hostile to science," writes Jean-Jacques Salomon, "than to have to render account to any authority except its own internal discussions." If, on the hand, science is defined as an instrument for the exploitation of people and the environment, then science is an evil requiring a maximum of public scrutiny.

Salomon has argued that the definition of science as theory and experiment is inadequate because theory and experiment "cannot be divorced from the activities which nourish them"; and the defini-
tion of science as exploitation is inadequate because it confuses "the evils of a social practice of science" with the nature of science.\(^4\) He, in turn, defines science as "the activity carried on by researchers - scientists, engineers, and technicians".\(^5\) David Dickson adopts a similar definition in *The New Politics of Science*: science is "the activity of those who define themselves as research scientists."\(^6\)

Though these two definitions, in effect, avoid defining science by shifting the onus onto "activity" and "research", they are satisfactory for the purposes of this thesis because they emphasise the role of scientists in science. Within Australia, research scientists form a readily identifiable group, being largely concentrated in university science departments and in government research laboratories, principally the CSIRO. The number of industrial research scientists, in 1984, was relatively small. FASTS was an attempt to bring these research scientists, and technologists, together into a single community of science and technology. But to build a cohesive community, FASTS would need to share more than common survival and self-interest. "The idea of the 'scientific community'," Salomon writes, "calls up the picture of a professional group united by the similarity of its intellectual interests and the norms by which it is guided."\(^7\)

All definitions exclude; indeed, one of the principal purposes of definition is to exclude. By identifying science with the work of scientists, the definition excludes all high school teachers of science from science, it excludes the majority of science graduates who go into computer programming, into production, sales, or other
areas of business; it excludes the Department of Science and the Minister for Science. It isolates scientists, justifies their defence of "real" science, increases their paranoia when under attack from outside, provides a barrier to dealing with wider social and political aspects of science, and substitutes no internal sense of the importance of these broader issues or the means to deal with them. Sociology, management, and politics are not a standard part of any science degree.

Early studies of the sociology of the scientific research community, especially in the USA, attempted to identify the "norms", or "moral consensus", which distinguishes the scientific community from other social groups. The norms identified - and attributable mostly to R.K. Merton - were: universality of scientific content, communality of knowledge, disinterestedness in experiment, organised skepticism, originality, humility, rationality, and individualism. Universality, for example, implies a "successful and amiable" consensus within the scientific community. Scientists are meant to appear "open-minded, impartial and self-critical". Or, as Daniel Kevles has written, on the convention of the supposed, impersonal nature of science: "Only the truth about nature is worth having. Knowledge of the human beings who seek it is relatively unimportant." In extreme, the scientist is, as Janna Thompson writes, merely "a scientific instrument, which observes, measures, calculates and deduces." Most scientists would accept many of these norms as an ideal for scientific endeavour, while recognising that they are often lacking in their own work and the work of their colleagues; besides, Thompson argues, most scientists would allow
some room in science "for aesthetic appreciation, passion and imagination."  

But, if scientists have, in fact, universally shared such norms, why is there no code of ethics for science? As sociologists have taken great pains to point out, these norms do not generally coincide with the actual behaviour of scientists, are imprecise, and are not homogeneous throughout the scientific community.  

Moreover, it is argued, universal scientific values come from shared paradigms, rather than "from an overall scientific 'ethos'." The uncritical acceptance of norms by scientists is an expression of this paradigm rather than of a critical study of reality. This acceptance of norms forms an ideology of science, which, in turn, affects "the choice of priorities and directions of scientific development"; and yet the appeals to objectivity, to expertise and to universality attempt to hide this ideology. "The ideological crisis in science," J.-M. Levy-Leblond writes, "arises from the contradiction between this reality and the image".  

During the Nineteenth Century, academic science split into the formal disciplines of physics, chemistry, biology, geology, etc. During the Twentieth Century, this differentiation continued with the formation of subdisciplines and inter-disciplines, each developing its own societies and networks of formal and informal links, holding its own conferences, and publishing its own journals. Science became not one community but a complex network of highly specialised communities. Hence physics became solid state physics, nuclear physics, upper atmosphere physics, surface physics, etc. So specialised have these areas become that Salomon was able to comment:
"It is in the restricted circles of specialists that the researcher finds his [sic] identity as a scientist."20 In these circles, the scientist learns a particular outlook on science - from more experienced colleagues - and searches for recognition. "Each field," M. Hales writes, "has a sub-cultural identity", a form of tribalism, which leads to "real obstacles to communication, cooperation and a wider relationship within a popular culture."21 FASTS is an attempt to bridge these tribal barriers between specialist societies.

Science has become a craft.22 "Membership in a scientific research community," M.J. Mulkay writes, "entails acceptance of the intellectual standards defining what kinds of problems and solutions are legitimate, ... only research which is generally regarded as meeting those standards is rewarded with professional recognition."23 Assessment of quality comes from people working closely in the same field and generally from those most eminent in the field. These eminent leaders then interact with other eminent leaders in other fields to spread the network of control of science. Professional recognition amongst peers is clearly important to scientists as may be judged by the number of prizes, awards, and medals, by the importance of establishing priority of discovery, and by the high prestige afforded some leading-edge research areas.24 The quest for recognition may, at times, assume such importance as to distort research priorities and overcome the "accepted norms" of science, such as disinterestedness.

The specialisation of science, with its key role for eminent scientists and areas of special prestige, leads to a science hierarchy and elitism. Science, therefore, is "inherently political"."25
The bulk of leading scientists are professors, or their equivalents in the non-academic sectors; they form "the ruling groups of scientific work." Professors are "the main defenders of scientific - or departmental - autonomy, accept or resist innovations in their fields, play a leading part in fighting scientific controversies or establishing consensus." A study in the USA in 1972 showed that science professors tended to be less conservative, politically, than their juniors, less conservative than scientists in business, less conservative than engineers, but more conservative than professors in the humanities. Professors, or their equivalents, are the heads of most scientific societies; and FASTS can be seen as the outcome of the activities of these professorial heads of societies. In establishing FASTS they claimed to be representing the "grass-roots" of science; it is difficult, therefore, to know whether FASTS is an establishment of the leaders of science or of the "grass-roots", expressed through its leaders.

Scientists and technologists have adopted three main political roles: as advocates, for research and higher education; as advisors, to government; and as adversaries, "in public questions on technical issues". The necessity of political involvement stems from the dependence of much of scientific research on government financial support, and from the recognition that science and technology are playing an increasingly important role in modern society; and yet, as we have seen, a political role for science does not sit easily with a supposedly apolitical science. The approach often adopted by scientists in response to this dilemma is to attempt to remove the "passion" from politics and to propose purely technical solutions to
political questions, "whether or not the parties to a particular conflict will accept them." To politicians, then, scientists often appear naive.

Paradoxically, scientists often enter politics to reduce the involvement of politics in their science. In effect, they enter politics to improve politics, by placing it on a more rational and informed basis, and to improve science, by keeping politics away from science. But the battle between science and politics is inherently an unequal fight. As Salomon comments: "science has no special claims to challenge the rationality of politics, but politics challenges the rationality of the scientific institution." The entry of science into politics was initially seen as the "scientification" of politics, but, as Peter Weingart concludes, it has ended with the "politicalisation" of science, with science becoming subject to political conflicts.

Weingart argues that the concept of a scientific power elite operating behind the scenes in government policy making is a "chimera", because there is no coherent scientific community to wield that power, there is no common set of values and beliefs amongst scientists to motivate that power, and scientific knowledge is not the sole preserve of scientists to delineate that power. In dealing with politics scientists do not have a coherent political stance, "alliances and fractions emerge [amongst scientists] which run along the lines of political convictions rather than of systems of knowledge." For FASTS to survive, in the long term, it must develop mechanisms to handle such divergent political views within its community of science and technology societies.
Haberer's historical study of science from the days of Bacon and Descartes to the Twentieth Century shows that, in major confrontations between science and politics, the latter has always prevailed. "What is remarkable," he writes,

is that when the interests and values of science confront those of politics, the community of science has ultimately tended to acquiesce with astonishing ease permitting, with only token opposition, the destruction of colleagues and scientific institutions, and the perpetuation of obvious assaults upon the integrity of science itself.37

The reason for this acquiescence, he explains, rests with the apolitical and instrumental ideology of science which removes the desire amongst scientists to sacrifice themselves for science.

A good way, Haberer contends, to study a community is when it is facing a crisis; a crisis he defines as a situation "of great stress and conflict".38 At such times, the leaders of science often hope to manipulate politicians but usually end up being used in turn and discarded, hence the acquiescence. M.D. King claims external threats to scientific status and autonomy produce an "identity crisis" in science, in which "alternative conceptions of the distinctive skills, rights and responsibilities which constitute the profession's idea of itself are thrown up and debated."39 It is essentially an internal crisis, the depth of which may not be fully appreciated by non-scientists. A personal observation by Daniel Greenberg shows another aspect of science in crisis:
having made a rapid ascent from deep poverty to great affluence [in the USA], ... , [the science community] still tends to be a bit excitable - not unlike a nouveau riche in a fluctuating market. The denial of a grant is equated with the persecution of Galileo; a harsh word from a know-nothing congressman, and the Cosmos Club simmers with talk of a new Dark Age.40

The crisis in Australian science in 1984 is interesting to observe from these three differing perspectives.

Science came under increasing attack in the 1960s for its contribution to war and to "the deterioration of the natural and social environment".41 From a radical perspective, the war in Vietnam was a struggle "against the science and technology of profit and oppression".42 In the 1970s, governments took increasing interest in controlled economic growth and the role that science might play in this. During these years scientists, also, began re-examining their social responsibility; many saw a completely autonomous science as socially irresponsible.43 But as the government calls for more planning of science coincided with many of the earlier suggestions from the radical movements of the 1960s, for more public participation in science, many of the more conservative scientists saw governments of the 1970s and 1980s becoming progressively more "anti-science".44

In his book, The Physicists, a historical analysis of physics in the USA, Daniel Kevles ends with a summary of the dilemmas facing modern physics, and by extension, modern science: the need to separate technical opinions from "political and ideological convictions"; the position of the "disinterested expert" versus loyalty to an
employer or granting body; pure science versus "practical goals"; a
dangerous alliance with "big business and the military"; and a
"best-science elitism" in a pluralist democracy. For over two hundred
years, Kevles concludes, physicists have remained "a special estab-
lishment ... destined to function in an uneasy tension with the
democracy from which they derived vitality, sustenance, and pur-
pose." The crisis in 1984 carried with it all of these modern
dilemmas.

The development of science policy as a separate discipline
coincided with the growth of government involvement in science.
Science policy has two general aims: a "policy for science", to allow
science to function optimally; and "science for policy", to allow the
optimal exploitation of the fruits of science. Salomon describes
two extremes of the planning of science: M. Polanyi's "republic of
science", with science left to the scientists and no outside interven-
tion; and C.F. Carter's "integrationist" concept of no autonomy for
science, with science fully planned according to economic needs.
Polanyi was a Nobel prize winning scientist and Carter an economist.
Science policy tends to steer a course somewhere between these two
extremes, attempting to relate government support for science to
social, economic and political priorities.

External priorities pose at least two major difficulties for
science. Non-science derived priorities disrupt the peer review
system - so central to peer recognition - for assessing the quality
of scientific work; and a community of science, split into small
enclaves of specialities, where individual recognition is largely
from within the speciality, finds it difficult to assess the relative
importance of differing specialities. How does a scientist from one discipline assess the status of another discipline when the content, the paradigms and indeed the very language of that other discipline may be foreign? Reduced autonomy, therefore, is a threat to the very "character of the scientific endeavour." To a less sympathetic eye, the reluctance by supporters of scientific research to set interdisciplinary priorities may be seen as a desire to keep control over the ultimate distribution of the funds, and therefore be seen as merely self-serving.

1.2. Earlier Crises in Australian Science

Barry Chiswell, in 1983, warned Australian chemists of the dangers of ignoring history:

For so long chemistry has been taught without any sense of history, that now we have come to believe that the pattern of our corpus of knowledge and our methods of teaching it, are both unalterable.

Suggestions for change - for example, to the balance between pure and applied research or in priorities between different fields of research - may then be seen as attempts to change the very basis of this immutable pattern and corpus of knowledge and, in so doing, precipitate a crisis.
When I graduated in 1978 with a PhD in surface physics, I knew very little of the history of science in Australia or of the way science in Australia was organised. In retrospect, this is surprising because physics is generally taught with a strong sense of history: in a reverence for great physicists of the past, for fundamental experiments and theoretical breakthroughs, and in the attributing of variables and equations to their inventors (for example, the newton for the unit of force, or the Schrodinger wave equation); but these historical events are viewed in isolation, as individual events, so that the underlying historical and social processes are not seen. A mere collection of events in this sense is not a history.

The roots of many of the problems which emerged in the 1980s can be traced back to the Great War and beyond, problems at the core of Australian science, like the long dependence on British science, the late development of science policy, the rifts amongst the three research sectors, the universities, government laboratories, and industrial R&D, and the paucity of industrial R&D.

The funding crisis in university research seems all the more terrible when one is unaware of just how recent adequate funding has been for universities and how little research universities in the past actually did in comparison with today. Without this historical perspective, a major research effort appears the natural thing for a university. It may also clarify the reluctance of today's academics to give up their relatively new found wealth.

Ignorance of the history of science is, of course, not limited to scientists. The heavy commitment of the CSIRO to primary industry rather than to manufacturing industry appears reprehensible, today,
when one is not aware of the historical origins of the CSIR (predecessor of the CSIRO) with its early reliance on agriculture, of the many great successes of the CSIR/CSIRO in agriculture, or of the distinctive structure of Australian industry with its heavy reliance on primary industries and the effect that hiding behind tariff barriers has had on its innovative capacity.

Crisis, or at least a time of prolonged difficulty or of major structural change, is not new to Australian science. The CSIR took ten years in the making from 1916 to 1926; ASTEC took even longer, from 1957 to 1978; the great depression of 1929 to 1933 brought tough years for science, as it did for most sectors of the economy; the universities did not get anywhere near enough research funding until they obtained Commonwealth support in the 1960s; and the 1970s brought a growing disenchantment with science and technology over Vietnam, and their contribution to "environmental and social deterioration". But the three episodes of most interest for comparison with the events of the 1980s are the turbulent years 1939 to 1949 which saw the rise of the Australian Association of Scientific Workers in 1939 and the fall of it and of the CSIR in 1949; the ARGS (the Australian Research Grants Scheme) funding crisis in the last year of the Whitlam Labor government in 1975; and the AIRDIS (the Australian Industrial Research and Development Incentives Scheme) funding crisis in 1982. There can be no coincidence that two of these crises occurred within ten years of the present one. The 1970s and 1980s were a period in which Australian science lost much of its post-War prestige and influence.
The Australian Association of Scientific Workers (AASW) was in some ways a forerunner of FASTS. It was formed in July 1939, largely by young scientists returning from post-graduate studies in the United Kingdom where they were exposed to similar politically minded organisations and movements, such as the British "social relations of science" movement, the British Association of Scientific Workers and the Cambridge Scientists' Anti-War Group. The AASW was formed with a constitutional aim of "securing the wider application of science for the welfare of society." The founders hoped "to attract the broadest possible membership" by avoiding "party politics and vested interests". This same attitude of the broadest possible membership and the welfare of society would be taken up in the 1980s by FASTS; but, while membership in the AASW was by individual scientists, membership in FASTS would be through their societies: the group representation in FASTS is likely to be the more conservative of the two structures.

By 1944, the AASW membership had peaked at about 1,000, or "more than 30 per cent of Australia's total scientific population", estimated then at some 3,000 to 4,000 people. But the year of its greatest success in terms of numbers was also the year when strong internal divisions emerged in the organisation, over the political role of science, which led rapidly to many of the more senior, "respectable" and conservative members resigning from the AASW. The remaining core of members, therefore, was younger, more radical, and more defenceless.
In 1946, with the beginnings of the Cold War, the Liberal Party accused the AASW and its industrial arm, the Federation of Scientific Workers (FSTW), of working for Russia, in particular of acting as a "fifth column" for the infiltration of communism into the CSIR. Eventually, the AASW collapsed and, as a direct consequence of the parliamentary attacks on the credibility of the CSIR, the CSIR was reconstituted in 1949 and renamed the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Thereafter, CSIRO officers were subjected to security screening,\textsuperscript{57} to keep out undesirable scientists. Given the events of the 1980s, one might now mourn the premature end to that scientific democracy promised by the appearance of the AASW in the 1940s.

In post-War Australia, science became progressively apolitical as the attention of scientists in Australia - as in the United Kingdom and the USA - was diverted to ensuring the autonomy of science from further government interference. Commenting on the period to 1965, Ron Johnston and Jean Buckley write:

> The government's decision-making about key directions in the development of science were made with the advice and influence of a small elite behind closed doors; there was almost no discussion with the wider community of scientists, let alone the general public.\textsuperscript{58}

While times were good, and science was growing in prestige and government support, scientists were generally prepared to allow this cosy state to continue.
The position changed dramatically in 1975. In the middle of that year, the Minister for Labour and Immigration, Clyde Cameron, was demoted to Science and Consumer Affairs. In stark contrast to Barry Jones in 1983, Cameron expressed no interest in his new portfolio of science. His attitude may explain in part the staggering administrative error in the Federal Budget which cut 66% from the allocation to the Australian Research Grants Scheme (ARGS) and 47% from the National Health and Medical Research Council (NH&MRC). The mistake was aggravated in the minds of scientists by an earlier election promise not to cut either scheme. Gough Whitlam, in his "full" account of the Whitlam years, 1972-1975, published in 1985, makes no mention of this incident, though, in erudite fashion, he does mention at length his correspondence with Cameron on the correct pronunciation of the "kilometre". Such is the relative importance to prime ministers and academics of the ARGS.

Professor Westfold, of Monash University, then became - in his words - "the spearhead" of academic attempts to have the Budget decision reversed. Press releases, and telexes, and letters, to the Prime Minister and relevant ministers, deploiring the reductions and predicting the dire consequences for Australian research, were signed and issued by the chairs of university research committees and the chairs of scientific societies. The Chairman of the ARGC, Professor Street, also of Monash University, began negotiating with the Government to restore the cuts, "but all to no avail." Protest meetings were held simultaneously at universities in Melbourne and Sydney on 10 September 1975. A message of support for the aims of the meetings was received, signed by all 37 CSIRO Chiefs
Dr Douglas N. Everingham, Minister for Health, attended the Melbourne meeting and read a long statement from the Prime Minister. The audience was amazed when they heard his statement challenge the meeting to provide figures setting out "the actual financial benefits flowing from ARGC grants." 63

Extra money was rapidly organised for the NH&MRC, by Everingham and the new Treasurer, Bill Hayden; but the case for the ARGC required more argument. The success of the NH&MRC throughout the 1970s and 1980s and the apparent ease with which it could justify large increases in support would become an increasing annoyance for non-medical scientists as they watched the NH&MRC funds rapidly overhaul and pass the ARGs. Professor Street continued negotiations with the Prime Minister's Department and with Treasury. Finally a package was worked out on 25 September 1975 which, though not reversing the Budget, did provide the ARGC with $7.2 million, down 20% on the $9 million from the previous year.

Representatives from the universities in Melbourne and Sydney met on 11 October 1975 at La Trobe University to plan a future strategy. Westfold comments:

Those of us who had been involved in the events of this sorry saga which had taken place within the short space of one month, resolved then that steps would have to be taken to remedy the almost total ignorance within the ministry and Government bureaucracy as to what basic research is all about. 64
On 14 April 1976 the university representative committee established the Australia Committee for Research (ACR), with Westfold as Convenor. This committee kept in contact with the two succeeding Liberal/National Party Ministers for Science, Senator Jim Webster and Brig. David Thomson, before complacency once again set in. The Australia Committee for Research was never formally dissolved. In 1985, Westfold welcomed the founding of FASTS as the natural successor to the ACR, with the hope that FASTS would be in a position to prevent a repeat of the shock of 1975, by informing parliamentarians of the value of scientific research.65

The early 1980s saw the formation of the Department of Science and Technology, with Thomson as Minister, and the department's first formal interest in high technology with a public forum on "Creating High Technology Enterprises", in February 1981. In those early years, Thomson worked closely with the new shadow minister for Science and Technology, Barry Jones, to develop a bipartisan policy in an area he considered too important to hamper with party politics. Under the influence of the differing philosophies of the two men, the Department of Science and Technology, developed an uneasy, dual approach of both key technologies and key industries. The early 1980s also saw the release of an ASTEC report recommending increased incentives for industrial R&D, in particular tax incentives, because of the declining levels of industrial R&D;66 the release of the controversial Myer report on technological change in Australia, which promoted the concept that technological change meant economic growth, that Australian industry needed to keep pace with overseas technology, and that Australia needed to increase the general level of technological
expertise within its community\textsuperscript{67}; and Prime Minister Malcolm Fraser's promotion of a minerals boom, as the Australian economy headed into recession.

The Department of Finance became concerned, in 1981, that the Australian Industrial Research and Development Incentive Scheme (AIRDIS) was forward committing too much of its funds and hence robbing the government of control of the scheme. The Department of Finance, therefore, towards the end of 1981, arbitrarily set a limit of $38 million on forward commitment for the AIRDIS. Since this sum had already been committed, their decision meant no more money was available for new projects, and this in turn left $14 million unspent and 160 projects unsupported. The backlog of over 300 1981-82 project applications was carried over to the next year causing a pile-up of 1982-83 applications. The Department of Finance had blundered in not understanding the nature of R&D, with most projects taking 2 to 5 years to complete and therefore necessitating a high level of forward commitment. The Department of Finance, and the Treasury, would become a continuing hindrance for Barry Jones and his Department of Science and Technology in succeeding years.

To heighten the difficulties of the scheme, the Industries Assistance Commission brought out a paper critical of the effectiveness of the AIRDI scheme\textsuperscript{68} and then decided to hold a hearing into its future. All submissions to the inquiry favoured some form of government assistance for industrial R&D, many preferring tax incentives, and a number supporting AIRDIS, including the Confederation of Australian Industry, Email, and the Department of Science and Technology. Some opposed the scheme, including the CRA mining company and
the Australian Industries Development Assistance. In July 1982, the Prime Minister, Malcolm Fraser, announced that no major changes would be made to AIRDIS and that the forward commitment money would be freed to allow the scheme's grants to flow again. The argument over tax incentives versus grants, however, did not end here.

The reaction of Australia's scientists to the two funding crises, of 1975 and 1982, were characteristically different as were the targets of the funding cuts. When the ARGS was cut in 1975, the universities, with CSIRO support, combined to form an action committee to protest at the cuts and to argue for more money. When AIRDIS was cut, admittedly less drastically, in 1981-82, scientists in the main left the protesting up to the industry organisations. The scientists affected in the former crisis were academics; while the scientists affected by the latter were mostly in industry. They were fewer in number and less easily motivated and organised than their academic colleagues. Few of them would have seen a cut to AIRDIS as a threat to their livelihood. This difference in reaction would carry over into FASTS, with the difficulty of attracting industry based societies into joining FASTS.

1.3. Other Science Organisations

FASTS was formed in 1985 because, at a time of perceived crisis, Australian scientists found they had no other, appropriate or powerful enough, voice to air their concerns or to lobby government on their behalf for a better deal for science. Individual scientists and
the heads of individual scientific societies had spoken out, but their protests had not produced the desired effect. The urgency of the crisis was accentuated by the conviction amongst scientists that science offered the only long term solution to Australia's economic problems. As Greenberg has remarked, the scientists sincerely believed "that what was good for science was good for society". None of the existing science organisations satisfied the necessary criteria: of representing all Australian scientists and of having the resources and the will to lobby government.

ANZAAS was formed in the 1880s to bring Australian scientists and the Australian public together to discuss scientific developments of mutual interest. It had no specific political purpose and effectively ceased to exist between meetings, with a new management committee being appointed after each meeting simply to organise the next meeting. This left no continuity in its management to act as an effective voice for science, even if ANZAAS were to see this as a legitimate activity.

The CSIRO, being the largest research organisation in Australia, contains a large proportion of Australia's scientists. The CSIRO was reformed from the CSIR in the 1940s with an emphasis on security, secrecy and public service control. CSIRO officers, in the main, quickly became reticent to speak in public, even about their own work, let alone about political issues which were critical of the government, to whom they were responsible and on whom they depended for virtually all their funding.
The Australian Academy of Science initially exerted influence on government through the prestige of its membership and through personal contacts with politicians and policy makers. This influence appeared to diminish in the 1970s and 1980s as the size of government increased and the prestige of science decreased. Nevertheless many scientists expected the Academy to play a stronger role in averting the crisis in 1984, while others saw the elitist nature of the Academy as preventing the Academy from truly representing the interests of all Australian scientists from the so-called "grass-roots".

The Australian Research Grants Committee (ARGC) was in a position to argue for better funding for the ARGS, which it did in every year of its existence, but the ARGC represented only academic research and included both the sciences and the humanities. The ARGC was also totally dependent on government grant support.

The Australian Science and Technology Council reported directly to the Prime Minister and therefore was in a relatively influential position. ASTEC sought advice on technical matters from leading scientists but its membership was not composed entirely of scientists and ASTEC steadfastly refused to lobby government on behalf of science or scientists, seeing in this the risk of losing its credibility as a source of independent advice to government.

The Commonwealth Department of Science and Technology (DST) was formed in 1980. It had responsibility for the public service administration of Australian science; for implementing government policy on science and technology; and for the development of new science and technology policies to present to government. The DST, however, was always viewed by professional scientists as part of the government
rather than as part of science and, being on the opposing side, so to speak, was the primary target for science lobbying.

The Australian Institute of Physics played a central role in the founding of FASTS, with the first President (Professor Fred Smith) and first Past President (Professor Geoff Wilson) both coming from the Institute. Indeed, the second and current President (Professor Frank Larkins), though representing chemistry, is also a Fellow of the Australian Institute of Physics. A key committee in the Institute is its Science Policy Committee and Wilson chaired this committee from 1983 to 1984 and Smith from 1985 to 1986. I was a member of the committee from 1983 to 1988 and so played a small part in the events of those years.

In the thesis I have included my role as an interested observer as this necessarily colours my analysis. It would be dishonest to pretend otherwise. To focus the work on Australian science and to heighten the historical feel of the study, where possible I have deliberately quoted only from Australian literature published or released in Australia during the years 1983-1985, except where required to relate the work to a more general science and technology studies context. Because of the relatively inaccessible nature of parts of the study, especially the goings-on in government circles in Canberra and the informal recording of many science conferences, I have been forced to rely more heavily on secondary sources than would be desirable in a purely historical work; chief amongst these sources is the journal Scitech, edited and published by Jane Ford. In using these, I have concentrated, where possible, on the actual words of the primary author as quoted in the secondary source.
So the stage is set for the events of 1983, leading up to the crisis in 1984 and the forming of FASTS in 1985. In this political drama there are many intertwining subjects: the key role of high technology in the political debate and the falling world position of Australia in the world economy, the battles between the Department of Science and Technology (DST) and the economic agencies, the battle between Barry Jones and the CSIRO, the position of the DST and a marginalised science of being politically on the outer when seen to be rightfully on the inner, the pressing of science to bail out the ailing industrial research sector, a halt to the growth in funding for the universities and for the large government research agencies, and finally the non-fulfilment of expectations over promised increases for the ARGS.

The thesis covers the two years from April 1983 to April 1985. It was always envisaged that it would eventually form part of a larger work covering, in addition, the activities of the Interim Federation Committee (from April to November 1985), the Foundation Meeting of FASTS on 12 November 1985, and the first years of operation of FASTS and NSTAG, from 1986 to 1989 - the year when Barry Jones was rehabilitated, as Minister assisting the Prime Minister, and the National Technology Strategy was revived, as the policy statement, *Science and Technology for Australia*. The thesis ends in April 1985, at the National Meeting of Concern for Science and Technology, to concentrate on the causes, the nature, and the outcomes of the crisis in 1984.
Notes

3. Ibid., p. x.
5. Salomon, op. cit., p. x.
9. Ibid., p. 98.
11. Ibid.
14. Ibid.
16. Ibid.
18 Ibid., p. 174.
19 Mulkay, op. cit., p. 109; also, B. Barnes and D. Edge, Science in Context, Readings in the Sociology of Science, (The Open University Press, Milton Keynes, 1982).
20 Salomon, op. cit., p. 152.
24 Ibid., p. 100.
27 Ibid.
32 Cameron and Edge, op. cit., p. 54.
33 Salomon, op. cit., p. 151.
34 P. Weingart, "The scientific power elite - a chimera; the de-institutionalization and politicalization of Science", Sociology of the Sciences, vi, 1982, p. 73.
35 Ibid.
36 Ibid., p. 73.
37 Haberer, op. cit., p. 310.
38 Ibid., p. 9.
39 Cameron and Edge, op. cit., p. 53.
43 Mulkay, op. cit., p. 125.
44 Ibid., p. 126.
45 Kevles, op. cit., p. 426.
48 Mulkay, op. cit., p. 126.
49 Ibid., p. 123.
50 Lakoff, op. cit., p. 375.
54 Ibid.
55 Ibid.
56 Ibid., p. 279.
57 Ibid., pp. 281-282.
58 Johnston and Buckley, op. cit., p. 378.
59 Ibid., p. 391.


as quoted, ibid., p. 181.

Ibid.

Ibid., p. 182.

ASTEC, Industrial Research and Development: Proposals for Additional Incentives: a report to the Prime Minister, (AGPS, Canberra, 1980).


Greenberg, op. cit., p. 347.

CHAPTER 2.

GROWING EXPECTATIONS 1983

Our timorous social history, the feeble grasp of complex matters that is exhibited by too many of our leaders, the low level of intellectual vitality, our lack of national self-confidence, our national tendency towards bureaucracy, conformity, obedience and fatalism, and the mediocrity of the business and academic establishment do not give us much ground for optimism.


Part 1: The 1983 Election and the Economic Summit

2.1. Barry Jones and the Post-Industrial Society

When Barry Jones - lawyer, historian, politician - rose to speak, on a matter of public importance, on 4 December 1980, he began a new phase in his outspoken public career, venturing into the new field of science and technology policy. "Australia", he began, "the poor little rich country, has fallen almost to the bottom of the list
of technologically advanced nations in expenditure on research and development ... This is a national disgrace."² Jones had identified what he saw as the causes of the problems facing Australia: the government's failure to stimulate Australian research and development, the domination of the Australian economy by foreign multinational companies, and the progressive introduction of labour displacing rather than labour complementing technologies. Now he must find the solution. A little over a year later, he was shadow minister for Science and Technology, had released the ALP's "Science and Technology Policy", which he modestly described as the best party policy in the English speaking world, and had published his most successful book, Sleepers, Wake!, Technology and the Future of Work.³

Amongst the generally favourable reviews of Sleepers, Wake!, Christopher Freeman, of the University of Sussex, described Jones' book as "one of the best", "an extremely interesting and provocative book";⁴ and Ken Tucker, of the David Syme Business School, in his review, described Jones as "a thinker of refreshing originality and a writer of persuasive conviction."⁵ The title, Sleepers, Wake!, comes from a J.S. Bach Cantata (No. 140, Wachet auf): "Sleepers, Wake! The watchman on the heights is calling ..."⁶ It was more than a simple appeal from Jones for Australians to waken to the danger - of failing to deal with post-industrial change - which Jones perceived was threatening them, it was an appeal to look up, to view the danger from a more lofty position: "In the 1970s," he writes, "politicians, bureaucrats and economists were too close to post-industrial changes to see them in perspective, recognise what was happening and work out appropriate responses."⁷ So fundamental
was this change, he warned, that it threatened to "destroy the fragile consensus on which the democratic system depends." 8

Such a threat was clearly beyond the ability of conventional economic wisdom to handle effectively. It called for a fundamental reappraisal of the relationship between technology and society. "Technology is a political instrument," he writes, 9 and in placing the solution outside conventional economics, Jones set himself and conventional economists in opposing political camps. Jones anticipated this opposition from the beginning; he described his conventional opponents as "economic optimists" who put their faith in market forces, insisting "that market forces regulate employment." 10 Economists, as a group, he writes, are "the most irrepressible Micawbers to be found anywhere". 11 In asserting the inadequacy of conventional economics, Jones would be challenged in turn to demonstrate whether radical thinking can provide better, or more effective, economic policies. 12

In his book, Sleepers, Wake!, Jones was principally concerned with the impact of technological change on employment and work. In pre-industrial society, he writes, the dominant form of employment was agriculture; in the ensuing industrial era, employment was dominated by industry; and in the current post-industrial era, beginning perhaps in the 1970s, employment is shifting towards services; this era, he predicts, will be followed rapidly by a post-service era of education, leisure, and tourism. 13 The society of the post-industrial era, he describes as an information society, indeed Jones describes Australia as an information society. 14
Despite the apparent inevitability of these changes, from agriculture to industry to services, and the danger of not adapting to them, Jones wisely rejects the concept of "technological determinism": that society has no choice in the adaptation and control of technology; and proposes instead that governments should "assert their right to shape, influence and - where necessary - control technological development".\textsuperscript{15} He recommends increases in the retention rates in our high schools, and greater access to information, so that our society may be better able to deal with the demands of an information society; an increase in expenditure on R&D; a series of social and work reforms; and finally he calls for the raising of the level of consciousness towards technology - implicit in the title of his book - and asserts the right of any society to choose its own future.\textsuperscript{16}

Technology in its broadest sense is an organised "way of doing things".\textsuperscript{17} It therefore includes social, political, economic and scientific factors; and when the term is applied to things, people, companies, or governments, it includes not just what they "do", but all those factors which motivate, support, allow, and shape what they do and how and why they do it. This multi-dimensional, political/cultural nature of technology offers society choices in the selection and management of technological change. A nation need not accept the inevitability or immutability of any form of technological change.

Writers on Post-industrial Society divide economic history, broadly, into three phases: a pre-industrial phase, dating from pre-history to about the middle of the Eighteenth Century and based
on agriculture and trade; an industrial phase, dating from about the mid-Eighteenth Century to at least the middle of the Twentieth Century, based on the Industrial Revolution (or several industrial revolutions); and a post-industrial phase, which we have just entered, or are about to enter. The major political issue in the model, then, is society adapting to technological change, rather than redirecting technology to overall social goals.

This broad description of economic history as three discrete phases ignores the facts that different countries have undergone such changes at different times, and at different rates, and that all countries carry mixed economies, with varying dependencies on agriculture, trade, manufacturing industry, and the so-called post-industrial industries. The developed countries, then, in the post-industrial society model, are those which have advanced most down this path. The concept also carries with it the assumption that the post-industrial phase is in some way inevitable, that countries must follow this path or fall behind - hence its links with technological determinism; that it is economically superior to the past, since less advanced countries will not be able to compete - hence its links with the idea of "progress". The model also glosses over differences between capitalist and socialist economies. A socialist perspective would see a post-industrial capitalist society as a continuation of capitalism without much revolutionary change.

The theory of Post-industrial Society is also closely linked with various theories of long-waves in economic activity. The existence of "long waves" or cycles of boom and bust in economic activity was first proposed by J. Van Gelderen, in 1913, and Nikolai Kondra-
Kondratiev associated "important discoveries and inventions" with the downswing in the wave and a large-scale application of these inventions with the next upswing. In 1939, Joseph Schumpeter suggested that the long waves were associated with clusters of key innovations and that, consequently, technological innovation was "an essential input into economic growth." Later, in 1975, Gerhard Mensch developed Schumpeter's ideas, proposing that depressions give rise to surges in innovation which then promote the new wave of economic growth. The ingredients, then, for a "new age" were key innovations, the right economic climate (such as a depression) and new markets.

The Mensch scheme began with key inventions. In the scheme, key inventions occur irregularly; but, during depressions, the promise of big profits from key innovations which flow from these inventions, attracts capital, and a rapid growth phase results. Later, stagnation sets in as saturation of demand is reached and other companies entering the market produce over-capacity. Capital is then used to displace labour, to cut costs. Mergers lead to further economies of scale; but a lack of "demand-inducing innovations" finally leads again to recession and depression. The lesson for a wise company - or country - therefore is to keep an eye out for key innovations, so as to jump onto the band-waggon for the new wave.

Christopher Freeman in studying structural relationships between technological change and unemployment, initially became a "fervent promoter" of Schumpeter and Kondratiev, and stressed the role of "new branches of fundamental science" in producing key inventions. More recently, concerned with the shaky statistical evidence for
clusters of key innovations, he has proposed a different mechanism for cyclical economic activity: basic innovations occur irregularly, often associated with breakthroughs in basic science and technology; but only when a swarm of imitators joins in is there a significant economic effect.25

The evidence linking innovation surges to economic recovery has always seemed rather tenuous, and a small number of cycles (typically four), of debatable duration, in 200 years gives little confidence in the theory's predictive ability for the future.26 D.E. Weiss in his study of the history of the chemical industry found statistical support for Mensch's ideas, but there was considerable latitude in his definition and selection of which key innovations to include in his analysis. In contrast, H.D. Haustein and E. Neuwirth, in a more global study of industrial production and innovations, have found their analysis does not support Mensch.27

Opponents of the post-industrial society concept, and of the technology-driven cyclical models, dislike the way the long waves exclude politics. To justify their opposition, they emphasise the disagreements amongst supporters of the models on the duration of the long wave cycles, and the disagreements over causes; they assert instead that political networks drive the economic trends. More radical opponents of the Post-industrial Society model question the indicators of progress, deplore the increasing alienation and the continued erosion of limited resources from continued industrialisation and economic growth, reject scientific control of nature and planning, promote decentralisation, seek to decrease the importance of experts, to demystify science, and to promote public participation in decision-making.28
There seems little new, therefore, conceptually, in Jones' appeal to the image of a post-industrial society, a society which is undergoing profound structural change as it moves from the dominance of manufacturing industries to that of service or "knowledge-based" industries. What is remarkable is the enthusiasm with which Jones brought the concept before the Australian people.

Dickson attributes the interest in Kondratiev "long-wave theory", which developed in the 1970s, to the depression in the 1970s and early 1980s and the theory's "implicit message of hope for the future". For traditional economists the 1970s were an "unusual bunching of unfortunate disturbances", such as the OPEC oil crisis, which were temporary, unlikely to be repeated, and if managed with normal monetary policies would eventually allow national economies to resume their post-war expansion. For the proponents of the post-industrial society (or the related cyclical, technology-driven models), the 1970s were an indication of fundamental, structural change which could not be handled effectively through monetary policies alone. Jones quite clearly stood with the latter, in opposition to the former, and the fundamental and entrenched differences in the two positions would mean a protracted and, at times, a bitter debate. This is perhaps not the place to argue, at length, the weaknesses in the concept of technological change in a post-industrial society - essentially the way it over simplifies the complex political nature of social and technological change - suffice it to say, that such weaknesses were eventually exploited by Jones' opponents to undermine his credibility.
By stressing the central role of technological change, the models had important consequences for science and for science and technology policy: a central role for technological change meant expertise in science and technology would become increasingly indispensable in a post-industrial society. But indispensable does not necessarily mean politically powerful since, as Lakoff explains, scientific expertise does not carry with it any special "moral or legal authority".\textsuperscript{32} This absence of political control has brought frustration to those scientists who expected control to come with expertise.

Kevles has noted, on the contrary, at least in the USA, that the last three economic downswings have resulted in calls for cuts in science funding, by "budget-cutting conservatives and socially purposeful reformers".\textsuperscript{33} To counter such a move in the 1980s, the promotion of a central role for innovation in a post-industrial society, it would seem, should allow scientists, as a source of invention, to argue for greater support. But, in adopting this argument, scientists must then deal with the criticism that in Australia there has often been a failure in bringing inventions to the innovation stage. Government policies must also be redesigned to foster the new technologies, leading to a debate on how to select these new technologies, and whether Australia could compete in these new areas. Scientists would then be dragged into the debate on priorities in R&D spending and into the links between R&D and economic success. In arguing for increased support science would become entwined in these political debates, with the threat of politicalising science. Freeman warns: "Those countries who wish to compete..."
successfully in international trade in the closing decades of this century will be obliged ... to look to the link between their technology policies and their economic policies."  

2.2. The Federal Election 1983

Facing a tough economic climate which promised only to worsen through 1983, Prime Minister Malcolm Fraser made the difficult decision to call an early election, for 5 March 1983. He had expected that divisions within the Australian Labor Party, over its leadership, would weaken the opposition's election campaign; but on the same day, and almost to the same hour, that Fraser approached the Governor General to issue a writ for the double dissolution of parliament, Bill Hayden stepped down as leader of the Labor Party in favour of the former trade union leader, Bob Hawke. To Fraser's dismay, instead of a divided Labor Party, on the following morning, the newspapers were able to announce the forthcoming election as: "Fraser versus Hawke".  

The central issue in the election was the economy. As Davis et al. have remarked, "A government [in Australia] considered incapable of managing the economy is invariably condemned as unsuitable to hold office, whatever the impact of its other policies." Unemployment stood at a long-term high of 10% of the workforce; industrial disputation appeared out of control; inflation was running at over 10% and interest rates were unaccustomedly high at 13%; wages were expected to blow out during 1983; drought was affecting the rural economy; and
the overall growth rate had dropped below 1%, threatening recession. It would be a difficult election for Fraser to win.

In the months before the official election campaign, the Australian Labor Party (ALP), in anticipating an early election, had attempted to seize the initiative on the economy. The ALP portrayed the Australian economy to be in "crisis", and accused the Fraser government of "missed opportunities" to prevent the crisis. Its leaders depicted the ALP, on the other hand, as having the only "realistic" solutions to the crisis: consensus, recovery, reconstruction, and technological development, in particular, "sunrise industries". Shadow treasurer Paul Keating blamed the Fraser government's contractionary policies for Australia's economic troubles and offered instead to expand the economy into recovery and then reconstruction. Jones, as shadow minister for Science and Technology told the press that the ALP's sunrise industries policy meant: "Labor has a policy for the future." Hawke, his personality a major election issue as he tackled Fraser, set the Labor Party, and the nation, the task of national reconciliation and consensus, to overcome the division he claimed the Fraser government had encouraged in setting Australian "against Australian and group against group".

As a first step in the new consensus, the ALP, before the election, struck a "prices and wages" accord with the union movement to contain inflation, industrial disputation, and the anticipated wages explosion. As the second step, Hawke offered to call, after the election, a national economic summit to achieve consensus on the difficulties facing the Australian economy, and to bring Australians
together to tackle their mutual economic problems. He promised to create 500,000 new jobs over the coming three years, as part of a $2.8 billion economic expansion package.42

The value of Jones' overall contribution to the ALP winning the Federal election in 1983 is difficult to assess. On the one hand, his rhetoric of technological change reinforced the sense of crisis in the Australian economy and the inadequacy of the government's attempts to handle the crisis; but, on the other hand, science and technology received little direct coverage by the major newspapers in the weeks leading up to the election. Jones worked hard to make science and technology an election issue. He presented the spectre of technological change sweeping the advanced nations of the world, threatening to reduce Australia to the rank of a less developed country, and to reduce the living standards of all Australians. By linking technology policy with economic reconstruction Jones offered a hope for the future; and undoubtedly his efforts created interest amongst scientists and others concerned with science and technology policy.

The ALP science and technology policy which Jones promoted promised, amongst its major initiatives: support for 16 "sunrise" industries; a 10% real increase for the Australian Research Grants Scheme (ARGS), which, with inflation running at 11% per annum, meant a 21% increase in the first year; increases for the Australian Industrial Research and Development Incentive Scheme (AIRDIS); greater availability of venture capital; expansion of the Department of Science and Technology (DST), and increased funding for Antarctic research.43 The science and technology community stood to gain a good deal from a Labor victory.
David Thomson, in his years as Minister for Science and Technology, had also worked hard to promote science and technology (S&T) issues, in a bipartisan fashion with Jones, and in particular he had supported the idea of key technologies; but in all his efforts as Minister he had been unable to generate the public interest and response that Jones was now doing for the ALP.  

Having lost the initiative in the early part of the election campaign, the Liberal/National coalition decided to take up the technology challenge. And "high technology" became an election issue. Malcolm Fraser, who rarely mentioned S&T matters in the past, and his senior Ministers began talking up "high technology". In a speech to the Young Liberals in Adelaide, Fraser announced: "We will ... need to examine whether Australia spends enough on research and development and the application of new technology ..."; and in his election speech, Fraser promised a 30% real increase in medical research funds and the creation of an Advanced Technology Corporation to assist innovators by providing venture capital.

Increasing the impact of the high technology issue in the weeks leading up to the election, both the Australian Academy of Technological Sciences (ATS) and the Australian Scientific Instruments Association (ASIA) released reports on venture capital and high technology. Under pressure, the government announced a National Biotechnology Scheme, $10 million more for AIRDIS, and consideration of a tax incentive scheme for high technology companies.
The Liberal/National Coalition lost the election. Malcolm Fraser stepped down as leader of the Liberal Party; David Thomson lost his seat of Leichhardt, in northern Queensland; and both men retired from federal politics. Hawke and the ALP had won, with a massive 25 seat majority in the House of Representatives; Jones and the election climate had generated a widespread interest in high technology. Gone, for the moment, were concerns over the adverse effects of high technology - on employment, on social stability, and on the environment; high technology was seen, by both sides, as beneficial and linked with future prosperity.\textsuperscript{50} The scientific community was optimistic; they identified science and technology, and in particular research and development, closely with high technology, and Jones had promised major increases in funding for R&D.

2.3. \textit{Jones, Minister for Science and Technology}

Barry Jones was made Minister for Science and Technology in the new Hawke Labor government; he was also appointed to three of the nine key ministerial committees, those on economic policy, industry policy and infrastructure. On the strength of his book, \textit{Sleepers, Wake!}, and the ALP science and technology policy, and on his prodigious memory too perhaps, and despite his lack of formal scientific training, Jones was viewed as having a "strong grasp" of science and technology issues. Dr C.K. Coogan, in \textit{Laboratory News}, described him as "the most constructive critic ever to give his considerable talents to the field of S&T";\textsuperscript{51} and Jane Ford, in \textit{Scitech}, wrote
that Jones "seems sure to bring a totally new look to the [S&T] portfolio, energetically promoting many new initiatives and catalys­ing the normally staid bureaucracy."\textsuperscript{52}

After the election, Jones continued the rhetoric of crisis and the need for immediate high growth in technology-based industries. In a radio interview shortly after the election, he commented: "What I'm concerned about is that time ..• is running out for us .... We really have to move very quickly indeed, or else [I] think you are going to find our standards of living deteriorating";\textsuperscript{53} and some days later in The Herald, he added: "Australia is losing ground steadily in economic and employment growth, standards of living, and national per capita income".\textsuperscript{54} A key indicator, for Jones, of the state of the Australian economy was the adverse ratio of 9.5 to 1 for imports to exports of high technology products. For Jones, with his post-industrial society vision of the future, this meant having "to change Australia's technological base".\textsuperscript{55} Top policy priorities would therefore be: increasing the availability of venture capital, and increasing the level of industrial R&D by 100% over the next five years.\textsuperscript{56} In implementing his industrial policies Jones looked to support from John Dawkins, Minister for Trade, and John Button, Minister for Industry and Commerce.\textsuperscript{57}

Thinking that, at last, Australia had a science and technology minister who was literate in - and committed to - science and technol­ogy, many in the scientific community looked forward keenly both to his implementing his science and technology policies and his stimulat­ing greater attention within the government as a whole to science and technology matters which scientists saw as crucial to economic
recovery. This enthusiasm was further fuelled by his talk of increased funding for research and development and of greater support for AIRDIS.

But the enthusiasm was not universal. The ALP science and technology policy had stated as one of its aim the need to encourage the "CSIRO to diversify its research activities in new fields such as information technology, safety, transport and the environment." Despite the conciliatory word "encourage", the policy was seen within CSIRO as a threat to CSIRO's autonomy. A further motivation for what followed may well have been concern within the bureaucracy of the CSIRO that, given Jones interest in science and technology, he was more likely to interfere in the running of the CSIRO. Immediately after the election, Dr Paul Wild, Chairman of the CSIRO, contacted Jones and then wrote to Hawke requesting that the CSIRO be moved from the Department of Science and Technology to the Prime Minister's Department, in a position similar to ASTEC, on the basis that Department of Science and Technology (DST) was mostly interested in technology while the CSIRO had broader interests spanning several departments. Jones, supported by Thomson, strongly opposed this move which would have greatly diminished the responsibilities and prestige of his portfolio and Hawke quashed the suggestion.

Jones had clearly looked to the CSIRO to support his initiatives in sunrise industries. In the light of future events and the troubled relationship between Jones and Wild which would develop, this was a most inauspicious beginning. It is a pity that Jones would be left without the support of the CSIRO in his promotion of a greater role for science and technology in government policy, and
that the CSIRO should not have realised that it would need the full support of Labor's only science and technology literate minister to deal with a Labor Government which must inevitably challenge what it saw as a bastion of elitism and privilege. In the previous Whitlam Labor government there had been "many areas of conflict" between the ALP and the CSIRO; the then Minister for Science, William L. Morrison, for example, had considered the "CSIRO to be too big and insufficiently attuned to the needs of industry and the wishes of the government". The Hawke Labor government would continue this uneasy relationship.

2.4. Jones on High Technology and Sunrise Industries

Jones' promotion to Minister of Science and Technology was keenly received by Australian industry. Pursued by technical journalists, Jones' face began appearing in professional, scientific and engineering journals. Bob Mills, in the Financial Review, described him as "the long-time evangelist of the necessity for Australian high technology"; Paul Coombes in Rydges described Jones as "an enthusiastic apostle for getting Australia up and running in new ventures"; for Justin Paine in Engineers Australia, he was "the disciple of high technology"; for Susan Woods in Australian Business, he was the "Brains Trust Minister"; and for Peter Vernon in Electronics Australia, he was a "passionate advocate of high technology". I can remember, in 1983, seeing research managers within BHP avidly reading his book, Sleepers Wake! Technolo-
and the future of work, to get some insight into the thinking of this man who promised to bring so much change to industrial R&D.

Given the nature and extent of the changes Jones wished to introduce, his words to industry could not be just promises and exhortations. "Business," he told them, "is really going to be divided between the quick and the dead"; many Australian businessmen, he added, "don't know what you are talking about"; and, more pointedly, "a lot of people in big business haven't had a new idea for years. You'd need a tin opener to prise an idea out of them." This was fine for businessmen - provided they thought he was talking about someone other than themselves; it also touched a sympathetic response from academics and government research workers who saw business as chiefly responsible for the low level of industrial R&D and for the recognised low level of interaction between government funded research and industry. Another remark by Jones at this time which reinforced the position of Australia's scientists was: "What we are concerned with very much is picking out talented people and letting them get on with it." This was indeed how university and CSIRO researchers saw themselves, talented people, working hard at what they were good at, at what interested them, and at what would eventually benefit mankind. "It was argued," echoing Greenberg in the 1960s, "and sincerely so, that what was good for science was good for society".

Since the 1983 election, the term "high technology" has been associated, in Australia, with the name Barry Jones. Indeed, Jones generated so much interest in high technology that the term, high technology, has become part of the political landscape. Part of
the success of the term "high technology" rests with the difficulty of actually defining it, which gives both its proponents and opponents a great degree of freedom in its use and abuse. This flexibility of definition has resulted in the term being continually redefined to suit different political ends; Richard Joseph associates this political dimension of the term with attempts "to alleviate anxieties and fears" about the social impacts of technological change and to "promote visions of the future", such as Jones' post-industrial society.

Joseph has identified four basic classes of definition in the term "high technology", in Australia, in the 1980s, depending on which of the following four criteria is selected: product complexity, the number of people employed with science and technology backgrounds, the level of R&D, and the degree of value-added in the product. Jones, for example, associated high technology with his 16 sunrise industries, selected, at least in part, because of Australia's leading R&D position in these areas; and it is only natural then that scientists, such as Dr Paul Wild, Chairman of the CSIRO, should take Jones' lead and define high technology as originating "from science and scientific research". Irrespective of which criterion is used, however, the total employment in high technology in Australia in 1983 was only 2 to 5% of the workforce, acknowledgement of which led Jones to shift from the employment-bias of his book, Sleepers, Wake!, to wealth generation, wealth which could then be used to fund other government programs, and later, to shift to high technology as a means of overcoming Australia's deteriorating balance of payments figures, a major preoccupation of the government in later years.
The key or linchpin to Jones' strategy for healing the Australian economy and for bringing about the needed structural change was not so much "high technology" as his 16 "sunrise industries". The future, he believed, lay with high growth, brain-based industries. The 16 were chosen because of Australia's leading research position in these areas, because of their domestic market potential, their niche potential in international markets, and because of their capacity to generate wealth. "We isolated 16 sunrise industries in our policy," he told Peter Vernon of Electronics Australia:

It wasn't really a matter of going out and picking them. It could be fairly said that the areas picked themselves. They were the areas where we were recognised as being world leaders or very close to it, with a few exceptions. The exceptions were areas where we had a very large recognised domestic need which could be filled.

Of the 16, Jones admitted biotechnology was "a personal passion". Many of the areas, biotechnology, computer software, custom-built computer chips, scientific instruments, medical technologies, lasers, ceramics, solar energy, and shape-memory alloys were areas where Australia had well established, world-class research efforts in government and academic laboratories. So initially they were enthusiastically supported by scientists.

Dr W.J. McGuigan (Greg) Tegart, Secretary of the Department of Technology and Science, described Jones' effort to develop new high technology industries as a "central aspect of the new Government's industry policy". Industry policy, however, is one of the most
difficult areas of government policy making, because of the great diversity of policies and the widespread impacts of these policies, and because of the large number of federal and State departments and agencies, committees and task forces, involved in industry policy making. Already anticipating opposition, Tegart said the policy was not about "picking winners" but about selecting broad technological priorities and then allowing industry to decide the particular applications. The selection of key technologies, he added, borrowing Hawke's phrase, would require "industry and community consensus".

Jones's promotion of high technology and sunrise industries was part of a worldwide trend. David Dickson begins his book, *The New Politics of Science*, with the words: "advanced technology has become the key to ... economic and military power. And ... science has become the key to advanced technology." Martin Ince in his book, *The Politics of British Science*, comments that many industrialised countries are casting around for "the key industries of the future"; increasing their funding of basic research; and "promoting stronger links between academic laboratories and industry". And Jean-Jacques Salomon warns: all of the industrialised nations are looking in the same fields - "electronics, computers, robotics, biotechnology, energy, materials, communication" - and not all will emerge "victors". The effect on science, in the 1980s, has been that the non-industrial concerns of science, such as environmental issues and the advancement of knowledge for its own sake, have been forced into the background. Science has become "a commodity", and research results "intellectual property".
2.5. The Espie Report on High Technology

The high technology financing committee of the Australian Academy of Technological Sciences published its report entitled "Developing High Technology Enterprises for Australia" in April 1983, though draft copies were available before the election. The committee was chaired by Sir Frank Espie, a mining industry representative and director of a number of Australia's largest companies. Subsequently this influential report became known as the Espie report. The report was aimed at detailing "the high-technology and venture-capital environments in Australia" and was based in part on a survey of about 60 high-technology companies. What the committee found was a worrying long-term decline in economic growth and employment relative to the rest of the world, especially in traditional manufacturing areas, such as textiles, clothing and footwear; and that Australia's performance in high technology was not keeping pace with this decline. The result was a growth in imports to compensate for dwindling home production, and, in importing more goods, Australia was effectively also importing unemployment.

New high technology industries were needed, as a source of "wealth creation and employment growth" and as a "cutting edge" for "a more internationally competitive, export oriented and dynamic industrial sector." The major obstacles were identified as: the lack of appropriate risk or venture capital, chiefly because of the conservative attitude of financiers; "the lack of a technology infrastructure"; of a favourable environment in government policies,
for example, in purchasing priorities and taxation; the poor relationship between entrepreneurs and the scientific community; lack of management skills amongst entrepreneurs; community attitudes averse to risk taking; and difficulties in entering large international markets. Chief amongst the committee's recommendations was the establishment of what the report called "venture capital companies" - but which would later be known as Licensed Management Investment Companies, or MICs - "to provide management guidance and equity capital", "to encourage private investment in the start up and early growth of defined 'eligible businesses' with high growth potential." Some, or perhaps most, of these "eligible businesses" would clearly be sunrise companies.

The venture capital measures in the Espie report were supported by Senator Button, Minister for Industry and Commerce, Jones, Minister for Science and Technology, and Chris Hurford, Minister for Housing and Construction, but were opposed by the Departments of the Treasury and Finance, and by the Industries Assistance Commission. Indeed the Department of Finance set up a committee "to discuss the Espie proposals", as "a delaying tactic". Jones fought back, describing obdurate members of these government departments as "unreconstructedly sceptical". But the criticism continued. Bob Mills, writing in The Financial Review, denied there was "a shortage of venture capital in Australia for sound, new, high technology ventures." He described the Espie report as "the cottage industry approach to building companies" and concluded that "high technologies are no panacea for Australia's economic woes. Even if they grow as fast as their greatest boosters project," he declared, "we can expect
them to generate only three to five per cent of gross domestic product in ten years. 95

The battle over the venture capital market was prolonged throughout the lengthy budget process into August 1983, with Treasurer Keating making no mention of it in his budget speech. By the Friday of budget week, however, Jones had won; it was announced that Hawke had decided to back the scheme.96

2.6. The ASIA Report on Technology and Industry

Shortly before the election in 1983, the Australian Scientific Instruments Association (ASIA), also published a report on Technology and Industry, through a committee chaired by Professor Peter Farrell, of the Department of Biomedical Engineering, University of New South Wales. The ASIA report stated: "The socio-economic environment must be set up to encourage a massive evolution of Australian industry away from low-value-added, low-technology industries into high-value-added, high-technology and high-growth industries".97 The report recommended support for venture capital, a 150% tax incentive scheme for R&D, an increase in the ARGS from $20 million to $50 million immediately, a doubling of AIRDIS, a shift in the CSIRO over the next 10 years to conduct 50% of its activities in new technology and new industries, government priorities to "buy Australian", reductions in tariffs, and the establishment of a national information service.98
All these recommendations, no matter how desirable in themselves, could be seen as self-seeking by an organisation whose members stood to benefit from them all. Despite this, a surprising number of the report's recommendations were implemented in succeeding years and the remainder continued to be hotly debated. The Chairman of the Committee, Peter Farrell, continued a high profile in subsequent policy debates.

2.7. The Anti-Sunrise Industries Debate

Both these high technology reports were clearly supportive of Barry Jones and his high technology policies, without actually referring to him specifically by name. But as soon as Jones entered the Ministry, the criticism of him and his "Sunrise Industries" policy, in particular, began. The government should not be picking winners. Let the market decide. The 16 sunrise industries were "merely a repetition of the 'shopping lists' of other countries, which have larger markets and more expertise and against which Australia cannot compete." It seemed Australia had lost confidence in its ability to produce and export quality products; other countries would necessarily do it better.

In their established, large companies, business leaders saw the sunrise industries policy as not supportive of their traditional industries, industries responsible for 90% of Australia's GDP. Small improvements in existing, large industries, they claimed, would have a bigger impact on GDP, at least in the short term, than all the
sunrise industries combined. They were concerned that their industries would be viewed as "sunset industries"; that sunrise industries would be seen as good and sunset industries as bad. High technology sunrise companies were "risky", they argued, and even if they succeeded it would be 10 to 20 years before they became fully established. The concerns of the business community were echoed by some Labor members and union leaders, who saw sunrise industries as a threat to government support for existing industries and traditional employment.

The Industries Assistance Commission (IAC) produced, in mid 1983, a discussion paper entitled "New Technology and Industry Assistance". The paper criticised the sunrise industries policy, arguing that government support for predetermined sunrise industries would jeopardise other emerging activities by preventing them from attracting finance and resources. The paper also criticised other government industry policies, including venture capital measures, purchasing preferences and offsets policies, and provoked in return sharp criticism from both Jones and Senator Button.

Following the release of the IAC report, Andrew Peacock, the new Leader of the Opposition, reversed Thomson’s selective technology approach and accused the government of trying to pick winners in the marketplace and of risking taxpayers funds rather than allowing entrepreneurs to risk their own or their companies money.

In response to the mounting criticism, both Jones and the Department of Science and Technology were seen to modify, or weaken, their position on sunrise industries. Jones admitted that high technology industries were not big employers, emphasising instead
that they were wealth generators, wealth which could then be used to support other programs.\textsuperscript{108} The Department of Science and Technology began by arguing for a dual policy: of support for sunrise industries and for the development of key technologies in existing industries. Later, by redefining sunrise industries, to avoid Treasury/Finance arguments against picking winners, the Department switched to a single policy of "key technologies".

These policy shifts, Joseph claims, "weakened Jones' credibility"; Senator Button, Jones' chief ally in cabinet, became more sceptical and his Department of Industry and Commerce slowed its initiatives in high technology.\textsuperscript{109} Joseph attributes much of the shift in emphasis, within the Department of Science and Technology, from high technology to key technologies to a lack of a clear understanding within the Department of how, in fact, to define high technology and sunrise industries.\textsuperscript{110}

2.8. \textit{Consensus, Interest Groups, and the Economic Summit}

The central political principle in the first Hawke government was consensus. The Labor party had won the election largely on the hope within the electorate that consensus would reunite the nation to meet its economic problems. An essential element of the Labor party's consensus was a wages accord forged with the union movement before the election. This accord promised to lower the high levels of industrial disputes and to moderate wage claims. But wage restraint by workers had to be matched by price restraint by Australian busi-
ness. Hence for consensus to function effectively, Hawke also needed the agreement of Australian business, to moderate price increases, thereby reducing inflation and hopefully, in conjunction with wage restraint, of increasing employment. Consensus therefore came to be identified strongly with a tripartite agreement amongst Government, business representatives, mostly big business, and the trade union movement through the ACTU. To be a part of this consensus it appeared you needed a large and powerful voice. The formation of a large and potentially powerful voice for scientists which FASTS represents is a typical response to this consensus.

Superficially at least the tripartite consensus of the Hawke government fits neatly into various theories of "State corporatism". Two models of the State which appear to conflict sharply in their descriptions of how the State operates, are pluralism and corporatism: many would identify pluralism with an ideal form of democracy (though it is also seen as unstable), and corporatism with elitism and fascism.

Briefly, pluralism asserts that power is dispersed amongst a variety of social and sectional groups, none of which dominates, with each pressing for its own interests. The State therefore functions through bargaining and compromise amongst these various interests.111

In this perspective, FASTS would simply be one of the many social groups struggling for attention. Suzanne Berger claims pluralism works best in times of affluence and minimal government intervention or in countries "where consensus depends on common and deeply rooted political beliefs and not primarily on assessment of the [political] system's performance and output".112 The conditions for pluralism
appear less favourable, then, during times of economic difficulties when there are calls for a properly managed State and economy. In such difficult times, pluralism may lead governments into a condition of policy "overload", when there are insufficient funds to maintain all the activities demanded by interest groups.\textsuperscript{113} Pluralism may also being criticised for not be fully representational, since not all interest groups have equal say and not all citizens form interest groups - for example, the poor.

Corporatism, on the other hand, maintains that a number of the major interest groups have gained a special, and privileged, position in the control of the State. In the corporatist State, certain interest groups, such as trade unions and employer associations, are given a "representational monopoly" in their interest area in exchange for recognising the monopoly of other interest groups. "The effect of corporatism," Ham and Hill conclude, "is to maintain harmony \textsuperscript{114} and avoid conflict by allowing these groups to share power."\textsuperscript{115} Claus Offe contends a corporatist trend has arisen since the 1970s because of the anarchic tendencies of interests groups in the 1960s and the need "to impose a certain measure of self-restraint, discipline, and responsibility on interest groups".\textsuperscript{116} In its most authoritarian form, as in Nazi Germany and Fascist Italy, it erodes the democratic input of other non-enfranchised social groups.\textsuperscript{117} In \textit{Sleepers, Wake!}, Jones expressed his concern for the advancing corporatism in Australia:

\textbf{Australia is moving towards a 'corporate state' in which major areas of society are run autonomously: e.g. industrial relations are left to the employers, unions and the Conciliation
and Arbitration Commission, ... The areas parliament can tackle are increasingly limited.\textsuperscript{118}

Within a corporatist state, there are clearly dangers in any attempt by scientists and technologists to form a major interest group, for in achieving sole recognition as the voice for science and technology in Australia this group then runs the risk of accelerating the corporatist trend and of being subsumed within government in exchange for compromises with other interests outside science and technology. This danger is implicit in Dickson's comment on the political power of science: "scientists and technologists wield power only through their adhesion and allegiance to an existing political base."\textsuperscript{119}

Davis et al. remark that only under Hawke, with his "penchant for summits as an approach to policy making", has the participation of pressure groups, in Australia, become "very public."\textsuperscript{120} Whether this amounts to corporatism or a less sinister group incorporation has been a matter of extensive debate.\textsuperscript{121} Peter Loveday, for example, besides pointing out theoretical difficulties in the corporatist concept, argues that Australia has never had a fully pluralist system of interest groups, let alone that Australia is moving from pluralism to corporatism.\textsuperscript{122}

Davis et al. have described some of the general characteristics of interest groups. Interest groups are readily divided into insider and outsider groups: insiders develop working relations with government, assist in formulating and implementing policy, and generally include business and professional associations; outsiders prefer to be more distant from government, are either of more marginal concern
or are seen to be extreme, and include many minority representative associations. FASTS would clearly qualify as an insider group.

Claus Offe argues that a full understanding of any interest group requires analysis on three levels, "ideological, economic, and political"; it is not sufficient to concentrate on the reasons why a particular interest group was formed, in isolation from the society in which it emerged. On an ideological level, one should consider the sense of identity and shared values that hold the group together; on the economic level, one need study the "opportunity structure" of the society in which the group operates; and on the political level, the opportunities and status afforded to the group by the political system in which the group operates.

"Most major Australian pressure groups," Davis et al. note, "are national organisations", and many of these are umbrella organisations, that is, "aggregates of sectional interests." Some of the more influential umbrella organisations include the ACTU, formed in 1927 and extended in recent years with the inclusion of several white collar Councils, the Confederation of Australian Industry, formed in 1977, the National Farmers Federation, formed in 1979, and the Business Council of Australia, formed in 1984. The formation of FASTS in 1985 appears part of this especially "modern" trend.

Because pressure groups are generally only concerned with a limited area of government policy, the leaders of pressure groups tend to meet with government representatives concerned with those same policy areas; the two sides often share similar professional backgrounds, sit on similar committees, and share many of the same resources and sources of information. As a result, they tend to form
what Weingart has called a "hybrid community" and Davis et al. call a "policy community", and still others might more loosely call the "old boys network", with each side reliant on the other. As each policy community works internally from its own viewpoint, the formation of policy communities has been blamed for the lack of overall, coherent, government policies.

In line with Hawke's consensus approach to government, the Labor Government called a National Economic Summit in April 1983 to deal with the macroeconomic problems facing the Australian economy. (Peter Beilharz and Rob Watts, in Australian Society, described the economic situation they faced as a "crisis"). The Summit brought together the government, union leaders, business interests, mostly representing big business, and the economic professions. Beilharz and Watts contend that Hawke, in emphasising consensus, "by claiming to represent all the people yet actually excluding the outsiders, the unorganised, the powerless and those on the left", was, in fact, "building a bogus consensus."

Amongst those interests not directly represented was the science and technology community. Traditional economic theorists in the government were not convinced that science and technology were key elements in the macroeconomic solution to Australia's woes, and consequently saw no need to include scientists and technologists in the debate. A number of scientists for their part criticised "the lack of emphasis on technology in the summit". The Institution of Engineers, Australia sought representation but was denied. Jones, who saw science and technology as the key to industrial restructuring, asked to address the Summit but was refused permission: his sunrise
industries policy was being criticised by the unions; he may also have been unpopular in the Labor Caucus; and refusal was seen by some as "a convenient way of slowing him down". Thus consensus linked the ACTU and big business against Sunrise.

Despite the absence of representatives from science and technology, science and technology issues were mentioned in several submissions to the summit, including one by the Confederation of Australian Industry (CAI) and in Senator Button's final day address to the Summit, in which he emphasised Australia's scientific achievement, the reluctance of managers to move into high technology, the need for venture capital, and the need for Australians to take risks.

Some months after the Summit, Dr Ian McLean and Richard Joseph, both working in the strategic policy section of the Department of Science and Technology which helped prepare Jones' aborted submission to the Economic Summit, approached Professor Geoff Wilson, President of the Australian Institute of Physics, with the suggestion that The Australian Physicist publish Jones' paper. It was duly published in the October issue and shortly afterwards was tabled in parliament. In reading the paper it is easy to see why Hawke may have considered it too dramatic, extreme, or diverting. It read, in part:

This conference is structured around [macroeconomics] .... The essence of this submission is that this is not enough. ... the entire capacity and direction of an economy depends on its technological base.

Five areas, all very different in scope and kind, warrant particular attention. They are: education and skills; research and development; community attitudes; information policy; and 'sunrise' industries and associated technologies.
2.9. The AIP President and Vice President Meet Jones

Professor G.V.H. (Geoff) Wilson, Rector of the University College of the University of New South Wales, at the Australian Defence Force Academy, Duntroon, became the new President of the Australian Institute of Physics (AIP) in March 1983. One of Wilson's first actions as President was to write to Jones congratulating him on his becoming Minister for Science and Technology and requesting a meeting with himself and the AIP's new Vice President, Professor Fred Smith, of the Physics Department, Monash University. The Institute had a history of keeping in touch with parliamentarians and ministers, and Professor Neville Fletcher, the former AIP President, and Wilson, as Vice President, had visited Thomson the previous year. Wilson was also a member of the Australian Research Grants Committee (ARGC) so in seeking to meet Jones, Wilson was representing both interests.

Wilson and Smith met Jones on 19 April 1983, for one hour. Smith recalls it was a warm, sunny Autumn day. They presented their "concern over the inadequateness of the ARGs in physical sciences"; the need for "excellence in research funding"; the Institute's activities in the Nuclear Armament and Warfare debate; and the results of the Institute's employment survey which indicated a shortage of scientific manpower would threaten any proposed growth in Australian science and technology. We "were most impressed,"
Wilson later wrote, "with the Minister's understanding of and concern over the issues raised". When asked about this meeting, so important to the future role of the AIP, Wilson commented: "We really were just making contact with him, discussing views on the ARGS and the funding of physics, and generally wanted to introduce ourselves and our society and show we were interested in science policy". "Looking back," Wilson remarked, "it was a bit weak, the lobbying, because we only did lobby the Department of Science". After the meeting, in the car park, Wilson and Smith met by chance with Dr Hugh Preston, then Director of the Science Policy Section of the Department of Science and Technology. It was the first time Smith had met Preston. They discussed the proposed National Research Fellowship Scheme, and, in particular, how many positions might be filled.

2.10. The AIP Science Policy Committee 1983

The Australian Institute of Physics developed from the Australian Branch of the British Institute of Physics, formed in the 1920s. It became an independent Institute only in 1963. Approximately 80% of its current (1986) membership comes from tertiary education and government research laboratories. In the 1970s, the Institute established a national Science Policy Committee to discuss some of the broader issues then emerging in the relatively new field of science policy.
Up to 1983, the Science Policy Committee consisted mainly of representatives from University physics departments, from the Australian Atomic Energy Commission, and from the CSIRO. Richard Joseph, a physics graduate, working in the Department of Science and Technology joined the Committee in 1981. In 1983 he became Secretary of the Committee. The President of the Institute is automatically chairman of the Science Policy Committee, and when Wilson began chairing the Committee in 1983 he decided the Committee needed broadening, "to address the political agenda of Jones". As a result of a plea for new members published in The Australian Physicist six new members joined the Committee, bringing the membership to 14. The new members were Dr Barry Allen, of the Australian Atomic Energy Commission (AAEC), who later acted as technical advisor to the Royal Commission into British Nuclear Testing in Australia; Professor Peter Burley, of the School of Economics, La Trobe University; Ms Jan Powe, Science Master at James Ruse Agricultural High School, who influenced the Institute's policies on the teaching of high school physics; Professor Allen Runciman, Head of the Department of Solid State Physics at the Research School of Physical Sciences, the Australian National University, who led the Working Group on Nuclear Armament and Warfare; John Welch, from TAFE (Technical and Further Education); and myself, as sole representative of Australian industry. The more established members of the Committee were Drs John Harries and Don Lang, from the AAEC, George Fisher, from the CSIRO Department of Food Research, Dr John Macfarlane, from the CSIRO National Measurement Laboratory; and Professor Peter Mason, Foundation Professor of Physics, Macquarie University, a populariser of science in books and
on ABC radio, and future member of the Commission for the Future. Mason left the Committee in 1986 because of ill health and died in 1987. He was perhaps the only member of the Committee who expressed a deep and continuing concern for the social impacts of S&T policy and the need for scientists to communicate more with the public.

The first committee meeting I attended was held on 12 July 1983. Dr Trudi Thompson, editor of *The Australian Physicist* in 1986-87, has described the Council room in the Physics Department of the University of Sydney where the meetings were held, up to 1989:

> The Council Room is a very pleasant panelled room modelled on similar ones in the Oxbridge Colleges. A large painting of Harry Messel keeps a watchful eye on the proceedings.¹⁴⁵

It was a secure, comfortable room from which to view the outside turmoil in science policy. During the excitement of those early Jones years, I came to feel that this distinguished committee was indeed influencing the way Australian S&T policy was developing and, through this policy, exerting an influence on developments in the Australian economy.

Looking back, it is debatable whether the Committee really did exert any direct influence on government policy. Except in its predictable calls for more ARGs funds, which Smith believes were effective in maintaining ARGs funds through 1983 to 1985,¹⁴⁶ all the policy work of the committee was reactive to government reports or calls for submissions to government enquiries, to an agenda set by the government. It simply did not have the resources, given the limited time its members could spare from their work, to initiate new
policies or direct the government agenda. It might also be argued that, in the absence of any obvious long-term government program in the S&T area, the Committee could little more than respond to each separate government enquiry as it arose. Any real influence on government actions, by scientists and technologists, at the time came from direct contact, by Wilson and others, with members of the government departments, or from recommendations from committees such as the ARGC which had defined powers within the government.147 The former is an example of the "policy community", or old boys network, in action, while the latter demonstrates the influence of an official insider group. The influence of the AIP Science Policy Committee was more diffuse, in providing a sounding board and resource for Wilson, and later Fred Smith, at the Committee meetings and in enhancing their role as true representatives of the wider physics community, and for affecting the thinking of the Australian physics community through its publications in *The Australian Physicist*. Of equal importance, in the formation of FASTS, the activities of the Science Policy Committee increased the prestige of the Institute within the wider scientific community.

2.11. The ARGS in 1983

Professor T. F. (Fred) Smith, Professor of Experimental Physics and Chairman of the Department of Physics, Monash University, became, in 1985, both President of the Australian Institute of Physics and Foundation President of FASTS. In 1983, he was Vice President of the
Institute and keenly concerned with ARGS funding. Under his guidance the AIP Science Policy Committee published a paper in *The Australian Physicist* on the state of ARGS funding. The paper concluded: "reversals [are] occurring in every discipline in the physical sciences", and: "the AIP must continue to press for an increase in research funding".148

In response to the Science Policy Committee report, Professor Peter W. Sheehan, of the University of Queensland, Chairman of the ARGC, replied by letter to Professor Wilson that a major concern of the ARGC in the physical sciences was the inadequacy of funds for scientific equipment:

> The QEFARGC is extremely concerned about the state of much of the equipment being used by our outstanding research workers. Modernization of equipment is urgent, but we need more funds in order to do it.149

Professor Frank Larkins, of the Department of Chemistry, University of Tasmania, was another leading scientist keenly concerned with ARGS funding. Professor Larkins, a chemist, was also a Fellow of the Australian Institute of Physics and had moved to Tasmania from the Chemistry Department, Monash University, where he naturally knew Smith. In 1987 he became FASTS's second President. In the RACI's publication *Chemistry in Australia*, Larkins recorded "a very severe setback in 1983" for the ARGS, with "a decline in real terms for the first time" since 1976,150 the year of the Cameron disaster. Chemistry had received only 39% of its requested figure and the percentage of ARGS funds going to chemistry was continuing to decline, from 19.1% in 1973 to 15.3% in 1983.
The concerns of the chemistry community were further expressed by Professor D.R. Stranks, Vice Chancellor of the University of Adelaide, in his presidential address to the Chemistry Section of the 52nd ANZAAS Congress in Sydney. In commenting on the decline in both ARGS and CTEC (Commonwealth Tertiary Education Commission) funds, he remarked that in the past it had been assumed that CTEC funds would adequately cover general research needs and that the ARGS would support the best projects above this level. But CTEC funds were no longer adequate to provide the base funds, he claimed. It was not only chemistry which was suffering but "the nation's welfare and advancement". An investment in chemistry, he told them, was "an investment in Australia's future". He concluded: "The national investment in basic chemical science in Australia is totally inadequate ..."151

Basic research is the most autonomous form of research. Though subject of course to those social and peer pressures which restrict full personal autonomy in any human endeavour, in basic research, the researcher largely determines the subject, the direction, and the pace, of his or her research. All three professors, Smith, Larkins, and Stranks, saw it as part of their roles as professors to defend the funding of basic research. In defending basic research they were also defending the autonomy of science.
2.12. *A Public Voice Needed for Scientists*

Throughout 1983 there were increasing calls for a more public voice for science. Dr Peter Pockley, of the Public Affairs Unit, at the University of New South Wales, speaking at the ANZAAS Congress in Perth (May 1983) called for "the establishment of a national program for promoting public understanding of science". It was the beginning of a campaign which would lead eventually to the National Science and Technology Information Service. He justified the program on four grounds: community support was needed to increase "the science and technology base of the nation's economy"; awareness of the impact of science on a changing world would help "personal comprehension" of the world; public issues would be assisted by rational, scientific processes; and science would contribute to the nation's "culture and intellectual development."\(^{152}\)

Pockley sent a copy of his paper to Professor Wilson, requesting comment from the Institute. Wilson replied in his President's Column in *The Australian Physicist* that the Institute was doing much "to relate physics to school children. It may be that the Institute can however do more to inform the general public."\(^{153}\)

Peter G. Lehman, Editor of *Chemistry in Australia* also asked the question, "Should the Institute [in this case, the Royal Australian Chemical Institute (RACI)] be more active in public affairs?".\(^{154}\)

In August 1982, the RACI's Development Committee had reported that "there was strong support for the Institute being more active in public affairs and government and unanimous demand for more timely reviews of government reports and recommendations."\(^{155}\) In response
to this demand the RACI, in 1983, established its own Science Policy Committee, to "coordinate all input to government". The RACI Science Policy Committee, as with its physics counterpart, however, concerned itself principally with responding to government reports and initiatives, which, Lehman noted, left two areas uncovered: "proposing initiatives directly and the provision of information on contemporary issues to facilitate rational discussion". Amongst such issues, Lehman listed recent public interest in the health of CSIRO staff, asbestos, and the poison 2,4,5-T.

In an obvious plea for support from the science and technology community, during an interview with the ANU Reporter, Jones accused Australian scientists of taking a "vow of silence", in not explaining their work to the public. Newly appointed as a part-time Executive Member of the CSIRO, Justice Michael Kirby, Chairman of the Law Reform Commission, reinforced this theme when he said:

I believe more scientists have to speak out themselves, rather than succumb to what I believe is snob peer pressure against communicating complicated matters to society.

Scientists were speaking out, amongst themselves at scientific conferences, and as individuals in letters to daily newspapers. But, as we have seen, there was no driving philosophical need for the general science community to involve science in politics and, at this stage, no coherent voice for the S&T community to speak out with, other than through the leadership of the CSIRO which was initially antagonist to Jones. Jones was therefore essentially on his own, with dwindling support in Cabinet and mounting opposition from big business and the ACTU.
Notes

2. Ibid., p. 387.
7. Ibid.
8. Ibid.
9. Ibid.
10. Ibid., p. 31.
11. Ibid., p. 32.
14. Ibid., pp. 50 and 172.
16. Ibid., pp. 239-254.
19. as quoted, Jones, op. cit., p. 15.
21. Ibid., p. 934.


C. Freeman, "Technological Change and the New Economic Context", in S. Hill and R. Johnston (Eds.), op. cit., pp. 61-62.

Ibid., p. 59.


C. Freeman, "Technological Change and the New Economic Context", in S. Hill and R. Johnston (Eds.), Future Tense? Technology in Australia, (University of Queensland Press, St Lucia, 1984), p. 64.


Ibid., p. 111.


Transcript of interview with Jones on radio program 2FC, 10 Mar. 1984, as quoted by Joseph, op. cit., p. 46.

K. Joachim, "We are miles behind in research and development: a recipe for disaster", *The Herald* (Melbourne), 26 Apr. 1983, p. 4.


Vernon, op. cit., p. 31.


Vernon, op. cit., p. 31; and Anon., Ascent, 1 May 1983, p. 11.


J. Paine, "The revolution Australia needs", Engineers Australia, 10 June 1983, p. 36.


Vernon, op. cit., p. 29.


Ibid.


as quoted, ibid., p. 4.

Ibid., p. 3.

Australian Academy of Technological Sciences, Developing High Technology Enterprises for Australia, (ATS, April, 1983).


Ibid., p. 1.

Ibid., pp. 1-2, 5, and 10-13; and Espie, op. cit., p. 7-9.

Espie, op. cit., p. 10; and ATS, op. cit., p. 2.


as quoted, Scitech, 3 (7), July 1983, p. 2.

Mills, op. cit., p. 12.

Ibid.

Scitech, 3 (9), Sept. 1983, P. 7.


Mills, op. cit., p. 12.

Davies, op. cit., p. 106.

Coombes, op. cit., p. 25.


Scitech, 3, Aug. 1983, p. 3.

Ibid., p. 5.


Ibid., pp. 118-119.


Davis et al., *op. cit.*, p. 25.


C. Offe, "The attribution of public status to interest groups: observations on the West German case", 197?, p. 129.

Ham and Hill, *op. cit.*, p. 38.


Davis et al., *op. cit.*, p. 100.


Loveday, *op. cit.*, p. 49.

Davis et al., *op. cit.*, pp. 92-93.


Davis et al., *op. cit.*, p. 94.


Davis et al., *op. cit.*, p. 95.

Ibid., p. 96.

Beilharz and Watts, *op. cit.*, p. 27.

Davis et al., *op. cit.*, p. 100.


Ibid., pp. 214-215.
FASTS continued this theme in a meeting, much later, with Ministers Ryan, Button and Jones in October 1986 where they achieved the first government recognition of a skills shortage in Australia.


Note from T.F. Smith to R. Payling, October 1989.


Note from T.F. Smith to R. Payling, October 1989.


G.V.H. Wilson, "President's Column", The Australian Physicist, 21, Mar. 1984, p. 29.

P.G. Lehman, "To be or not to be?", Chemistry in Australia, 51 (2), Feb. 1984, p. 23.
as quoted, ibid., p. 23.

as quoted, ibid.


Part 2: The National Technology Conference

2.13. ANU Seminar on "Science Research in Australia - Who Benefits?"

The Department of Continuing Education at the Australian National University organised a seminar in Canberra on 23-24 June 1983, entitled "Science Research in Australia - Who Benefits?". Whatever its motives in organising the seminar, the conference was a shock for Australian scientists. Having identified the deficiencies in industrial R&D as the fault of management, buoyed by Jones’ enthusiasm for science-based high technology, confident in their espousal of the economic, social and cultural benefits of basic research, and eager for increased government support for R&D, the scientific establishment, to their surprise, found themselves and their institutions under attack and being blamed for the poor success rate in moving the results of basic research into commercial realisation, and for the economic crisis which was seen to have arisen, in part, from this.
The conference began predictably enough with Professor Arthur Birch, President of the Australian Academy of Science, telling the audience the purpose of the seminar was to examine why Australia was not "reaping the benefit of its creative achievements in science, invention and technology". Barry Jones officially opened the conference by stating his commitment to "giving top priority in Science and Technology to generating economic growth". During his speech, Jones was critical of the low level of industrial R&D and especially the attitude of managers: Australia's major problem, he said, was the "almost Pavlovian reaction" of managers to foreign competition. He was also critical of the CSIRO, for not adopting "a more progressive attitude to technological change."

Amongst the members of the science establishment present were: Dr Paul Wild, Chairman of the CSIRO, who chronicled the successes of the CSIRO and discussed the difficulties of switching the CSIRO's research efforts too rapidly from rural industries to information and service industries; Professor Sir Rutherford Robertson, who spoke in support of research, *per se*, "that challenging and enjoyable occupation"; and Professor Ian Ross, deputy vice-chancellor of the Australian National University, who spoke of the general concerns of university research staff: frustrated expectations following the "cessation of growth" in the universities, the shortage of graduate students, and the aging of university research staff.

More critical was Professor Peter Farrell, of the Centre for Biomedical Engineering, at the University of New South Wales. He continued Jones' criticism of R&D expenditure levels by manufacturing industry, but also called for a redirection of policies to promote
the commercialisation of university research. He criticised Australian universities for being far too slow "to form links with industry". 9

Professor Ron Johnston, of the University of Wollongong, told the conference Australia benefited from Australian R&D only through its international scientific reputation; the main beneficiaries of Australian R&D were the researchers themselves, foreign companies and foreign economies. He criticised the size and structure of Australia's science and technology effort which led to little interaction between research and industry and to the marginalisation of science and technology. 10 Australia, he argued, could no longer survive with a marginal science and technology system. 11

Dr Greg Tegart, Secretary of the Department of Science and Technology, amongst more placating remarks, argued that Australia could not afford to "remain locked into outmoded and inappropriate patterns of allocating funds to R&D which have been determined by historical circumstances that are no longer relevant." 12

Dr Stuart Macdonald, of the Department of Economics, University of Queensland, already at loggerheads with the CSIRO over its public accountability did not, however, hold back in his remarks: he criticised the CSIRO for preserving "research directions more suited to a plantation economy", and for being detached from the realities of the recession in its demands for budget allocations above the CPI (Consumer Price Index). He described the CSIRO as "a grand old battleship, too expensive to convert and too valuable to scuttle". 13 But he reserved most of his criticism for government policies - and implicitly for those of Barry Jones - on high technology, and "the mistaken
belief that Australia was well-endowed to launch into high technology industry". 14

Ann Moyal, honorary editor of Search, in what Jean Buckley-Moran describes as her "inimitable forthright style", 15 spoke of what she saw as an incestuous, academically-oriented and self-perpetuating research system in Australia. 16 Uncompromising, she outlined "some serious 'compass errors' in the advisory system by which resources are allocated to R & D", such as the concentration on 'pure' research, and the gap between scientists and "the growing body of scholars of Science and Technology Policy in Australia." 17 Afterwards she wrote, in Search:

Science is under fierce review in Australia. It is none too soon .... Australia has been dominated for far too long by a male gerontocracy of elite scientists who appear more concerned with pushing the barrow for their basic research disciplines than with the overall balance and strength of national science. 18

And in summing up the conference, she wrote:

the complacent attitudes of the scientific establishment, as exemplified by CSIRO's Chairman and by Professor John Swan of Monash University (whose summing up of the final session on 'New Directions' entirely ignored every critical paper including that of the Minister for Science), sorely tempted this writer to subtitle this report, in Dr Wild's inimitable style, 'Wild Asses and Dying Swans'. 19

The response from other critics at the conference was as pointed and savage. Dr Adrian Gibbs, of the Research School of Biological Sciences, Australian National University, also complained that
science was "controlled by a gerontocracy which controls the peer review system, funding and advice to government." "The same old faces," he added, "appear on every committee". Research, someone in the audience volunteered, "is enjoying yourself at government expense". Jane Ford, editor of Scitech, in her report on the conference, described these "younger, more radical elements" in the audience as a "new anti-Academy of Science push". The younger members were reacting against the apparent hierarchical, elitist nature of science; not against the scientific credentials of this elite - these were not in question here - but against their dominance in urgent political issues and their conservative, non-urgent approach to these issues. This aspect of the debate, indeed, hinged on who should speak for science, the established leaders or the community of science. The discussion, reported Ford, "was notable for its clashes of opinion, its open criticism of accepted structures and the willingness of even some of the more establishment figures to speak out". Birch later described the discussion as "frank, fair, lively, informed, [and] sometimes not very polite"; Ann Moyal, he noted, in particular, "did not pull any punches." Professors Fred Smith and John Prescott (of the University of Adelaide and Chairman of the AIP Employment Committee) - both there representing the Australian Institute of Physics - commented later: "the discussion sought to determine who to blame! Fewer claimed to know what to do about it." The virulence and unexpectedness of the attack led naturally to defensive responses from the scientists presented. Professor Robert Porter, Director of the John Curtin School of Medical Research, at
the Australian National University, for example, "stoutly defended
the national and international standing of Australian medical discov-
eries"; 26 Professor Ian Ross remarked that the "major marketable
scientific resource produced by the universities and institutes of
technology" was "people"; and Wild commented on changing directions
in CSIRO. 27 For Wild, Macdonald's remarks about the CSIRO had hit
home. As he prepared for his retirement in 1985, Wild recalled this
conference and Macdonald's reference to the CSIRO as a grand old
dattleship:

My experience of this world is limited. I have, all my life,
had only two jobs. The first which overlapped the war years was
service in the Royal Navy in that grand old battleship HMS King
George V; the second has been service in CSIRO. So you might say
I have spent my whole life in battleships. CSIRO, you may
remember was called a grand old battleship last year by a
disgruntled science analyst who was making an abortive destroyer
attack, ... It was left to a London newspaper, "The Financial
Times" to respond to that taunt. It used these words:

Whether the description of the CSIRO as a "grand old battle-
ship" is fair or not is hard to say. What is not in dispute
is the weight of its firepower, and the range of its guns.
In the campaign to haul Australia's industry and workforce
into the technological present, the CSIRO's position at the
head of the fleet is unchallengeable. 28

The conference, Jane Ford concluded, "revealed deep rifts and
antagonisms in the scientific community and led to the questioning of
many conventional beliefs on accountability, the need for fundamental
research, peer review and in particular whether ageing, scientific
elites should continue to determine the direction of research through
the distribution of funds." Professor Ross's comment on the importance of post-graduate research training was a theme Fred Smith would take up over and over again in succeeding years. In his report on the conference for the AIP, he (along with John Prescott) wrote:

this is perhaps the most important point for the AIP. Unless Australia produces enough scientists and innovative engineers to staff the sunrise industries, the rising sun will plop ignominiously back into the sea.

The degree to which Smith and Prescott were disturbed by the outcome of the conference is well reflected in the following passage of their report; the passage is worth recording here at length because of its defensive tone:

Ironically, it appeared that it was because of its success that the pure research sector came in for so much criticism. It was as if the pure research workers were in some way to blame for the lack of [industrial] development. ... While there may be grounds for directing criticism at the policy makers of CSIRO for their failure to direct more effort towards the needs of industry, it is unfortunate that the university research sector has also been subject to the same degree of criticism. While it is true that more contact between university and industry is desirable, nevertheless it should be recognised that the major function of university research programmes is in the training of higher degree students.
2.14. AIP Seminar on "Physics and the New Technology - Sunrise or Sunset?"

In July, the Victorian branch of the AIP held an evening seminar on "Physics and the New Technology - Sunrise or Sunset?" at the Laby Theatre, University of Melbourne. The seminar may well have been held in response to a paper by Dr Ken McCracken at ANZAAS in May, entitled "W(h)ither Australian Physics", in which he warned that Australia's future prosperity lay with the creation of new "science based" industries, and that unless physicists communicated "this fact to government, then Australian physics will suffer that fate that history accords to all discredited cults."  

The seminar was attended by over 200 people, indicative of the level of interest in science and technology policy at the time. The principal speakers and panellists were Barry Jones, Minister for Science and Technology, Professor Ron Johnston, from the University of Wollongong, Professor Max Brennan, University of Sydney (and new Chairman of the AAEC), Professor Fred Smith, Monash University, Dr Clive Coogan, CSIRO, and Dr Mark Schapper, CRA.

Barry Jones delivered the opening address, commenting at first on the early lead by Australian physics in radiophysics, radioastronomy, computers and electronics, and then shifting to condemning the "absolutely minuscule contribution" of industry to R&D, which meant, he said, that "so many of the concepts that are developed within the academic world, within the research community, just stay at that level". Jones said he was battling the very strong and deeply held view "in the Departments of the Treasury and Finance, and in the Department of the Prime Minister and Cabinet" that Australia was only
good at primary production, that Australia was "not really up to it", that Australia was "not really capable of making an adequate contribution to research and development throughout the world". Jones ended with a warning to scientists:

a lot of the people I find in the scientific and technological community are wonderful people, lovely people, and all that, but they really are politically naive, and they don't really know how to apply political pressure. So as pressure groups go I think the academic community are really non-starters, they're just very poor at that.

2.15. ASTEC 1983

Professor Ralph Slatyer FAA FRS became Chairman of ASTEC in December 1982, following the retirement of Sir Geoffrey Badger, Chairman of ASTEC from its beginnings in 1977. Slatyer predicted an "interesting period ahead for science and technology under the new government" and "an increasingly important role" for ASTEC "in economic and industrial policy making". In particular, ASTEC would be moving more into industrial and economic areas and be placing a greater emphasis on the contribution of science and technology "to Australia's industrial and economic development". In doing this, he said, ASTEC would remain an "effective and an independent authoritative source of advice to the government" and would not be "under the thumb of any one department, particularly the Department of Science and Technology which could be seen to have vested interests." These closing remarks offered little support for Barry
Jones and his department and little joy for the scientific community.

In his Presidential address to the 53rd ANZAAS Congress in Perth (16 May 1983), Slatyer warned scientists and the public the recession would mean that accelerating technological change would see some old companies decline and some new industries grow; that existing industries needed new technology to increase their efficiency; that there was an increased need for R&D, and for education, to maximise human resources; otherwise, he warned Australia faced lower standards of living and higher unemployment. Of special concern, he said, were the low retention rates in high schools, the lack of formal training in mathematics and science amongst many high school teachers, and the declining numbers of students in higher education. Slatyer was critical of both the scientific institutions and industry for the gap between them. Australian scientists, he noted, produced 2% of the world’s scientific knowledge, and were acknowledged leaders in "agricultural, medical and biological sciences"; and yet, Australia produced only 0.7% of the world’s patents, 0.3% of the world’s technology intensive exports, and 0.1% of "sales of technology within OECD". Australian industries, he continued, traditionally lacked in-house R&D. Protected by tariffs, servicing only domestic markets, Australian industries were not export oriented, and tended to import technology, "simply to replace local R&D" rather than attempt to add their own unique, high quality components.

During 1983, ASTEC issued three major reports: on the "Operation of National Research Granting Schemes", on "Technological Change and Employment", dealing with education and training, and on "Incentives for Innovation in Australian Industry". The first report recommended that granting bodies should publicise "areas of strengths
and deficiencies in their field" to aid planning; it supported the continuation of peer review, and called for advanced funding over 2 to 3 years to improve R&D planning and the establishment of special grants for research equipment. In commenting on this report in The Australian Physicist, Professor Peter Burley, of the School of Economics, La Trobe University, wrote that he saw, in the report's recommendations regarding coordination, assessment and stronger secretariats, an advocating of "greater bureaucratisation of what has been largely a management by hard working committees of volunteer experts."  

The report on "Incentives for Innovation" backed the Espie committee's recommendations for boosts to the private venture capital market and tax incentives for industrial R&D, "as a matter of urgency". ASTEC recommended a dual system of tax incentives and grants, which the report estimated would cost the government $200 million in the first year, as opposed to $163 million in existing industry schemes. The ASTEC report formed part of the growing calls for tax incentives for industrial R&D.

2.16. The Debate on Science and Technology Policy 1983

Joseph has identified four broad policy approaches typically employed by governments to influence technological innovation: the stimulation of technological innovation directly; improvements in the climate for innovation; encouragement of specific areas of technology; and rewards for innovation. Policies currently being
considered by the Hawke government, and being discussed within the science and technology community, covered all four of these categories, the recommendations varying principally according to the degree of intervention seen to be necessary by proponents of each scheme. Two extremes in intervention, Joseph describes as "non-interventionist" and "economic nationalist". Non-interventionists as their name suggests emphasise reliance on market forces, or in other words, a "neutral economic environment for innovation", are opposed to government support for key industries, while still offering support for S&T infrastructure in government laboratories and universities, provided commercial activities were left to the private sector.

Economic nationalists, on the other hand, supported intervention in the market place by the government, specifically to achieve "government policy objectives" and to overcome structural weaknesses engendered by long-term technological change. They emphasise planning and coordination, and support national technology areas where there is or could be an international competitive advantage. They are generally suspicious of foreign-based multinational corporations.

The Liberal/National Party governments under Malcolm Fraser between 1975 and 1983 were non-interventionist in the sense that they "espoused minimal government intervention in the private sector" and allowed the concept of a free market to dominate their science and technology and industry policies, though they continued farm subsidies and tariffs. The economic departments and agencies under Hawke were still dominated by this concept; as Davis et al. observed, they shared "the same paradigm". Continuation of this paradigm
explains their opposition to many of the interventionist programs of the Labor party, especially those of Jones on "sunrise industries". Their opposition to intervention in the market persisted, despite many demonstrations of market failure: in tariff barriers, subsidies, recessions, the too slow technological development of Australia's traditional industries, and the virtual nonexistence of new high technology industries. Markets fail to innovate because of the high cost of R&D, because of the fear of risky returns from R&D, and because of the "difficulty of retaining exclusive use of technical knowledge". 50

When the Department of Science and Technology (DST) tried to argue the concept of market failure to support its technology programs, the economic departments argued that market failure was difficult to measure, did not justify intervention, since intervention was expensive and not necessarily beneficial, and, rather, market failure indicated too much government interference and so justified less government interference, such as the reduction of tariff barriers. 51 The market failure argument, moreover, in isolation does not prescribe specific responses to policy questions, such as the proper balance between pure and applied research, nor does it guarantee that government intervention will necessarily be an improvement on market forces. 52 Without changing deeply held views on the appropriate level of intervention it was a difficult argument for the DST to win.

In May 1983, a group of academics in the Technology and Social Change program at the University of Wollongong, with Professors Ron Johnston and Stephen Hill as editors, published the book, Future
Tense? Technology in Australia. Using Joseph's classification, this book sat squarely in the economic nationalist camp. It unashamedly called for government intervention in the market place, recommending a coherent and broad technology policy. Technology was presented as "a dominant, even defining element" of culture and a "constitutive" element of the economy. Arguments against intervention, it claimed, reflected a misunderstanding of the new international economic order and of the role of technology: "we must act to become master of the tools [technology] we use, lest these tools force us to become largely unemployed servants to the high technology interests within the world economy." With its reliance on resources, Australia ran the risk of "becoming a mine for the large industrialized nations to exploit."

The book advocated policies "oriented towards developing and controlling technological capability to support national sovereignty." These policies, it recommended, should range from "education and training, promotion of research in universities, ... subsidies for industrial R&D, ... right through to procurement policy." Above all, the policies in the various government departments needed coordination, within one coordinating body, "probably at ministerial level". The book also supported "selective" policies, arguing "in the new context, not to be selective is to ensure, by inaction, an eventual multiplication of losers." It is interesting to speculate what effect this book had on the call for a national technology strategy, later, in 1983.
The two extremes in approaches to technological innovation were matched by two extremes in science policy, though there was of course no necessary one-to-one correspondence between the members of each. The "non-interventionists" in science policy believed that science functions best when left to scientists, and that this best science would lead to the best good for society. The "scientific nationalists", on the other hand, believed that science would best serve the interests of society if it were planned and coordinated into areas of national priority and related to commercial interests.

A key issue which emerged in the S&T debate in 1983 was the gap between science and industry and the lack of commercial exploitation of scientific discoveries resulting from this. Dr John Dixon, President of the Australian Industrial Research Group, and General Manager of Research at Comalco, agreed:

Australia has the talent and the ability to match most other countries. This is shown by our record in science. Where we miss out is in the application of this scientific know-how to industry. 58

And Ian Kolm, of the CSIRO, considered this "Australia's greatest problem in R&D". 59 But who was to blame, the scientists or the industrialists? The general consensus was that both were to blame, though some naturally felt one group was more to blame than the other. "Many scientists here," Kolm observed, "persevere in the Oxbridge philosophy that science will automatically produce technology", while our industrialists, he added, balancing his criticism, were "lacking the experience to use R&D as a commercial weapon". 60
In the spirit of Hawke's consensus politics, Donald Weiss, President of the Royal Australian Chemical Institute (RACI), advocated "a broad consensus ... between all parties concerned - government, industry, trade unions and the research and educational community".61 Weiss was eager that the RACI should "participate realistically and creatively in the developing national debate on S&T policy."62 In particular, he recognised the need for the RACI to consider its "interaction with other disciplines" on such matters;63 the debate on the gap between industry and academic science required a common voice from the scientific community.

But any consensus with industry would not be easily won. The New South Wales Government S&T Committee, headed by Professor Johnston, released a report on the prospects for technological development amongst private enterprise in New South Wales. The report revealed that, amongst 88 companies surveyed, industrial R&D had declined markedly in recent years, that ignorance of new technology was high amongst senior managers, that senior managers were fearful of taking risks, and, despite the low industrial R&D effort, many companies thought their R&D level was adequate.64 There could be no consensus while the perception of the problem differed so radically between industry and academic science.
In May 1983, the Department of Science and Technology published its Annual Statement for 1982-83. The statement provided government and business expenditures on R&D for the five financial years 1978-79 to 1982-83. Over this period, government R&D funding could be seen to be growing slightly faster than the CPI, but remained moderate by OECD standards at 0.54% of GDP; while business R&D expenditure declined slightly in real terms, being a dismal 0.2% of GDP for 1982-83. Jones described the situation as "woeful" and presenting "a sorry picture of Australia's technological performance". He called on industry to double its spending on R&D over the next five years. Industry's poor performance, he said, was illustrated in Australia's low per capita exports of high-research component goods, with only Portugal, Greece, Iceland and Turkey in the OECD countries exporting less of these goods.

Later in 1983, the Australian Bureau of Statistics (ABS) released its figures on long term trends in R&D. The ABS figures showed that between 1973-74 and 1976-77, industrial R&D (both in expenditure and employment) had fallen by half; little change had followed for 1976-77 to 1978-79; and since then industrial R&D had declined 2% per annum in real terms, with high-technology industries showing the greatest decline in R&D. The ABS figures suggested that increases to AIRDIS had not stemmed the decline and therefore did "not provide any joy for the new Labor Government".

In response to the ABS figures, the AIP Employment and Science Policy committees combined to release a joint paper entitled, "Industrial Research and Development Continues to Fall". The intention
was clear, industry was to blame for the low level of industrial R&D. Uncharacteristically, the AIP paper ended with a long argument against sunrise industries, in favour of key technologies, without showing the relevance of the ABS figures to such an argument. The paper's conclusions showed a clear bias against Jones' policies and towards key technologies, and one must suspect a high level of DST participation in this report. The report was also published in Search, but without the case for key technologies.

2.18. The Budget 1983

On taking over the government, the Labor Party was stunned to find a $9.6 billion budget deficit left by the previous government. The enormity of the deficit threatened all of Labor's plans and election promises. All departments were asked to consider cut backs of from 3-6% for the next financial year. 71

But the Department of Science and Technology (DST) had been cut back heavily by the previous government, much of the department's funds were forward committed, for example, it would be difficult to cut support for the CSIRO by 6% without disrupting capital and research projects, and, through its election promises, the government was committed to increased support for AIRDIS, ARGS and other technology programs. Moreover, as Jones argued before the government's Expenditure Review Committee, the DST programs were essential for industrial recovery and reconstruction. 72 Jones was also considering tax incentive schemes for R&D, following many favourable representations on the matter, and, despite the need for overall cutbacks,
Jones had created a climate, amongst scientists and technologists, which "suggested that there would be more than enough funds and schemes from which industry and researchers could choose".  

The major problem for Jones in the lead up to the Budget, Joseph concludes, was "to maintain the momentum that high technology had during the election campaign". In this, he was supported, at first, within Cabinet by Senator Button, and outside Cabinet by the Espie and ASIA reports on high technology and by the calls for more R&D funding by the ARGC, ASTEC, CSIRO and the Australian computer industry. He was opposed by Finance, Treasury and the Industries Assistance Commission, who objected to high technology "on the grounds that it was 'picking winners'".  

Despite the massive deficit and threatened recession, the 1983–84 Budget increased government outlays by 16.4%, that is, well ahead of inflation, fulfilling Keating's promise to spend the economy out of trouble. Jones' Science and Technology portfolio, however, increased by only 4%. The big S&T winner was industrial R&D, with AIRDIS receiving a $17 million increase, or 31%; a new National Research Fellowship Scheme for research in areas of national interest; venture capital incentives (announced after the Budget); and special funds for biotechnology. Another big winner was the National Health and Medical Research Council (NH&MRC), with a 28% increase, while the ARGS increased by 16%, that is, a 5% real increase, and postgraduate awards increased by only 7%, or -4% in real terms, to $7,330 per annum, "well below an acceptable living allowance," Scitech reported, "and providing little incentive to stay on for postgraduate work". Other areas to receive cuts, in real
terms, were the CSIRO and the Australian Atomic Energy Commission, and the energy, water, defence, and marine science areas.

The Budget results were not in line with the promises that Barry Jones had made and the expectations he had created with scientists. Considering "the tough economic situation", the editor of Scitech considered it "a major victory for the Minister", though this conclusion seems hard to justify. Jones, himself, naturally emphasised the successes in the Budget, for AIRDIS especially, calling it a "boost for sunrise industries". In an interview on ABC radio with Dr Stuart Macdonald, of the University of Queensland, and Kirsten Garrett, from the ABC, he was asked about the large increase for the "widely criticised" AIRDIS and answered by blaming the previous government for the earlier failures of the scheme, and especially the Department of Finance in 1981. He had installed five new members on the AIRDI board, and it was "a dramatically different Board," he told them, "very much committed to the philosophy that I've been espousing in the election. I have very great confidence in them." The interview ended with Macdonald calling for more support for Jones, "from industry and from the community at large. He's been left far too long on his own."

The budget added to the differences between Jones and Wild, with Jones claiming the CSIRO had received a 3.2% increase in funds and Wild that the CSIRO funds had, in fact, been cut. A joint working party from the CSIRO and the Department of Finance was commissioned to study the two apparently conflicting sets of budget figures. The committee reported back, in March 1984, that the CSIRO had indeed suffered cuts in its operating, repairs and maintenance allocations.
in the 1983 budget, resulting in forced cuts to salaries and cuts in operating funds for two thirds of its research programs. The report also concluded that there was a poor working relationship between the CSIRO and the Department of Finance, with misunderstandings on both sides and differences of opinion.\(^8^0\)

2.19. **The ARGS After the Budget**

The 16% increase in the ARGS to $22.4 million was less than the 21% (or 10% real increase) expected and $13 million less than the ARGS had thought necessary. The chairman of the ARGC, Professor Peter Sheehan, said that, despite the improvement, the scheme was still inadequate: "We are not maintaining a minimum level of funding for the excellent projects and I think this is very disappointing."\(^8^1\) Sheehan also spoke of the need for special allocations for young researchers and for equipment. The scheme, he argued, supports some of the best research in the country and had not fared as well as other schemes, such as the NH&MRC; the result had been "a serious downgrading over time in the value of basic research".\(^8^2\)

In November, the ARGC released its report entitled, "The Case for the Australian Research Grants Scheme for 1985", which outlined a major review of the ARGS and provided the justification for increased support for the ARGS in the next budget. The report recommended four new categories of grants: program grants to support the scheme's best researchers; pilot project grants to foster young researchers; equipment grants to upgrade university research equipment; and
fellowships to provide a long-term career structure for talented Australian researchers. These new schemes, it was estimated, would cost an extra $5.5 million, with the equipment grants alone costing $3 million per annum. When added to the existing scheme, the money needed in the next budget was $41.5 million or nearly double the 1983 budget allocation. The report also emphasised the need for Australia's best researchers to increase their international links and contributions.

The report attempted, for the first time, to identify priority areas and areas of special research strength. These included genetic engineering, astronomy, lasers, population studies, and fluid dynamics. They also included my field of surface science, and Professor Fred Smith's field of condensed matter physics, and many others.

Smith reported to the AIP, through the Science Policy Committee, that the increase for the ARGS was only half the 10% real increase promised by the Labor Government, and merely compensated for the decline in funding in 1983. Professor Frank Larkins conveyed similar concerns to the RACI.

2.20. The CSIRO 1983

When the CSIRO was first formed from the CSIR in the 1940s, 58% of its effort was directed to rural industries, 34% to manufacturing industries, and 8% to minerals, energy, water, and community interests. Since then it has shifted its emphasis in response to external pressures, for example, in the 1970s following growing community
concern over environmental issues, the energy crisis, and the projected energy boom. By 1982, the CSIRO employed over 7,500 people in more than 100 laboratories and consumed one third of the government's science budget; it devoted 23% of its efforts to community interests, 17% to minerals, energy, and water, and a much reduced 33% to rural industries, and 27% to manufacturing industries. In 1983 it was asked to increase its effort in high technology, and reportedly allocated 10.3% of its budget for 1983/84 to "technology intensive industry research projects".

The CSIRO received a great deal of criticism throughout 1983. Jones was clearly disappointed with the size of its manufacturing industry effort and with the commercial impact of CSIRO's industrial research, commenting it "is less than might have been hoped for." Industry groups were less restrained than Jones, with ASIA, for example, describing the CSIRO as geriatric and moribund. The CSIRO responded to this criticism by instituting a number of reviews of its manufacturing research effort, including: a report by its Manufacturing Industry Standing Committee which recommended increases in some high technology areas and closer interaction with industry, a new manufacturing R&D policy which provided criteria for selecting new industrial R&D projects, and the setting up of a panel to review its strategic planning activities and its methods of setting priorities. The first two members appointed to the new panel were Professor Ron Johnston of the University of Wollongong and Dr Ken Ferguson, of the CSIRO.
Cabinet was also dissatisfied with the performance of the CSIRO, reducing the CSIRO's budget allocation in real terms and insisting that it become more accountable for its $316 million budget allocation. Toughening his attitude to the CSIRO, Jones directed its Executive "to devote the same proportion of the 1983/84 appropriation to research as was allocated in 1982/83". It was the first time a minister had issued a budget directive to the CSIRO; the task he set could only be achieved through reductions in overheads. "What they are really upset about," said Jones, "is that in the 57 years of the organisation's history it has never had a formal direction from a Minister and from a Cabinet". CSIRO's response, writes Joseph, was "to treat Jones' efforts to promote sunrise industries with disdain". Of his 16 sunrise industries, they selected only four key technologies, in areas where they were already specialised: biotechnology, advanced materials, genetics and information. A more defensive explanation was provided by Dr Paul Wild, Chairman of the CSIRO:

"to make frequent major shifts in research direction [the battle-ship analogy comes to mind] - even if it were possible - would be to risk making no headway in any direction at all. Strategic research is a long-term exercise. It must be sustained to yield results. The bulk of CSIRO's work must continue on its course, although continually under reviews, sheltered from the often fickle winds of scientific and political fashion."

It was an argument guaranteed to gain a sympathetic response from other scientists accustomed to the time scale, typically 5 to 10 years, required for good, long term research. But do such appeals, to
"steady as she goes", work with people not experienced in scientific research, the public, politicians? If this is the best reason for persevering with research projects, and I suspect it is, then the public, and politicians, need to be educated into the extraordinary concentration, dedication, and time, required for successful research.

Implicit in the criticism of CSIRO at this time, but not expressed clearly until later, was the assumption that the CSIRO's concern with long term strategic research should have meant that the CSIRO would prepare for future trends before they were forced upon it by outside pressures. The criticism assumed that the CSIRO should have been working towards high-technology industries in the 1970s so that Australia might have avoided some of the crisis of the 1980s.

During 1983, a public dispute between the CSIRO and one of its critics, Dr Stuart Macdonald, of the University of Queensland, came before the AIP Science Policy Committee. The dispute concerned Macdonald's criticism of the CSIRO's dung beetle program and the CSIRO's heavy handed response. Wild described Macdonald as "a disgruntled science analyst", and Lewis T. Chadderton, Chief of the CSIRO Division of Chemical Physics, called him "An ill-informed observer". I remember the Science Policy Committee meetings where this matter was discussed and I remember being surprised by the strength of the committee's anti-CSIRO stance on this issue. In attempting to moderate the committee's position, I was told that members of the committee were privy to information which substantiated Macdonald's case against the CSIRO. Eventually, the committee published a report in The Australian Physicist entitled, "A Commentary on the Public Justification of Public Research". In criticising
the CSIRO’s treatment of Macdonald, the report said, “the behaviour of the CSIRO in this instance did not befit the organisation’s status as the nation’s premier research institution".98 Ann Moyal, editor of Search, wrote to the committee congratulating it on its report.99 The CSIRO’s reply to the Science Policy Committee’s paper—also published in The Australian Physicist—indicated the CSIRO’s executive had misunderstood the Science Policy Committee as much as they had misunderstood Macdonald.100

Towards the end of 1983, the CSIRO became embroiled in another controversy, this time over the $157 million AAHL—the Australian Animal Health Laboratory—at Geelong.101 This and the dung beetle episode were mentioned by Maximillian Walsh and Jennifer Byrne in The Bulletin, on 4 October 1983.102 They described the AAHL as a "potential white elephant". They also noted that Wild had told a recent seminar that some people were conducting "a systematic and orchestrated campaign to discredit the CSIRO."103 These people, Walsh and Byrne identified as "the bureaucrats who have long resented the privileged position" of CSIRO.104 It takes little imagination to associate these "bureaucrats" with members of the economic agencies. The AAHL controversy brought about a heated debate in parliament and led to a bitter and open rift between Jones and Wild.105 Jones stated in parliament that the CSIRO was "in a position of great embarrassment over the laboratory".106 Wild replied that it was the government which was embarrassed over providing insufficient funds in the CSIRO budget. Much later, he commented:
[The AAHL] was a very easy target for irresponsible academics. They just had to mention foot and mouth virus ... Unfortunately Jones listened to advice that can only be described as mischievous.107

Rumours spread that CSIRO was feeding information to the opposition to attack Jones in parliament. Wild's position as head of the CSIRO was in jeopardy. Jane Ford described the conflict between the two men as "a conflict of personality and philosophy":

one, a brilliant but retiring physicist, committed to scientific freedom, pure research and excellence in CSIRO; the other, a rumbustious, high technology fanatic, committed to new industry development and determined that CSIRO should move into more industrially relevant research.108

With the controversy over the CSIRO, less noticed was the declining fortunes of another major government research organisation, the Australian Atomic Energy Commission, which suffered cuts in funds, in staff, and in particular to its uranium enrichment program.109

2.21. Plans for the National Technology Summit

In June, Barry Jones announced that a National Technology Summit would be held in Canberra on 26-28 September 1983. "The objective of the September conference," the media release stated,
will be to achieve a consensus on the courses of action necessary to implement the Government’s technology oriented policies, and priorities for the development of industry, as part of the Government’s overall strategy for economic recovery.  

Jones highlighted three areas for consideration: high technology (sunrise) industries; making traditional industries more efficient through new technology; and "the provision of a scientific and technological infrastructure for the development and diffusion of new technologies".  

For Jones, the National Technology Summit was a continuation of the consensus policy of the National Economic Summit: "The National Technology Summit is seeking the same goals. We need to plan together, work together and seek a high level of cooperation in the struggle to build a healthy economy". Implicit in the title of the conference and in these remarks was the assumption, Joseph claims, "that new technology had to be confronted as a national issue". So convinced was Jones in the necessity of Australia adopting a national approach to technological change, he adopted the Hawke consensus approach in an attempt to gloss over "deeper political divisions" on science and technology issues, such as Andrew Peacock's aversion to "picking winners", the Industries Assistance Commission's preference for a non-interventionist approach, concerns amongst trade unionists on declining employment in traditional industries, and budget difficulties in the S&T portfolio.
The conference would be limited to 120 invited participants chosen from government, financial institutions, large manufacturing companies, small high technology companies, trade unions, academia, the CSIRO and industrial and professional associations. The range of participants was wider than for the Economic Summit but did not include public interest groups. Selecting the 120 participants was bound to cause problems, not so much in whom to select but in whom to omit. For example, Scitech brought attention to the omission of Professor Peter Farrell (ASIA high technology committee chairman), Professor Don Mathewson (Starlab project) and Dr Bruce Middleton, Secretary of ASTEC, and to the inclusion of "a large contingent of conservative thinkers" from the ACTU and professional associations. After the conference Jones told the National Times that he "gave no apologies for inviting a large proportion of technological 'sleepers' to the conference. It would have been [self-)defeating to surround himself with sympathisers stroking each other".

2.22. The AIP Preparation

Jones informed the DST that professional societies were to be invited to the National Technology Summit and that the AIP was to be one of them. This invitation presumably arose because of the visit by Wilson and Smith to Jones in April and because of the AIP's obvious interest in science policy issues. Dr Ian McLean, a member of the AIP Employment Committee, and Richard Joseph, both physics
graduates, were working together in the DST's science policy section. Caught up in the excitement of the planned event, McLean decided that this was an excellent opportunity for the AIP to make a quality submission to the conference, and he with Wilson and Joseph - often meeting at Wilson's house - spent many hours, including a whole weekend, preparing the submission. In the end it read like a government document and had many features in common with the draft National Technology Strategy which sprang from the conference, hardly surprising considering McLean and Joseph were both government employees and therefore familiar with the style of DST documents. 119

The Science Policy Committee had little time at its bimonthly meetings to consider the document and was happy to leave it to the judgement of Wilson and McLean. The AIP executive Council approved the document after a full morning's discussion with McLean present. In his regular President's column in The Australian Physicist, Wilson wrote about the AIP submission and his attendance at the conference:

I believe that it is extremely important for physicists to indicate their views [at the conference] and to draw attention to the role which they should play in research and development. ... when managers, government and unions get together there is ... a tendency to ignore the need for scientific input and to regard the encouragement of appropriate technology as requiring only political and economical initiatives. It is most important for physicists to stress their interest and their potential involvement. 120

The AIP submission highlighted the role of physics and physicists in technological development, the essential contribution of physics to at least 12 of the ALP's 16 sunrise industries, and the
need for closer links between Australian physics and Australian industry. The submission recommended the inclusion of industrial segments in some tertiary education courses; the establishment of Science Centres, "to encourage positive attitudes to science, technology and industry among school children and the community"; support for the Espie report; and a policy of government preference for buying Australian designed and manufactured goods. Later, Jean Moran commended the AIP for its willingness to get involved in politics but criticised the submission for its concentration on economic matters to the exclusion of "social impact and responsibility".

Little noticed by most Australians, except McLean, during the conference the AIP submission lay on the conference table and at one point the ABC cameras zoomed in on the AIP paper with its looping infinity Logo and then zoomed away. The AIP paper was not included in the official conference proceedings.

It is difficult to assess the impact of the AIP submission. Wilson wrote afterwards in *The Australian Physicist*: "The fact that we had made a submission was commented upon favourably by many of the attendees - quite apart from generally favourable comments on the substance of the submission". Joseph felt it had little direct effect on government policy; later he became involved in the writing of the draft National Technology Strategy and at that stage the AIP paper, he commented, "looked very much like very many others at the time". It was effective, however, in raising the prestige of the AIP amongst the other professional societies which were either not invited to the conference or did not make substantial submissions themselves.
2.23. The National Technology Conference

When the summit finally arrived on 26 September 1983 at the Canberra Rex Hotel, its name had changed to the National Technology Conference. This presumably was to minimise any comparison with the earlier National Economic Summit, though it could not have been Jones' wish, since he began his opening speech with a reference to the Economic Summit. What Jones hoped for in the Technology Conference, he said, was a "shock of recognition", a recognition of the technological revolution sweeping around the world. Here was Jones, the man whose own shock of recognition had come in researching his book, Sleepers, Wake!, arguing that "the entire capacity and direction of an economy rests on its technological base", a concept he asserted which was outside "conventional economic wisdom". He emphasised the fundamental role of R&D, of education and skills, and of Australia's need to face the world. He yearned to win over the conservative members of his audience to the rightness of his cause.

The Prime Minister, Bob Hawke, in his speech at the opening of the conference acknowledged Jones' contribution to "stimulating community awareness and understanding of the complications of technological change". The Labor Government, he said, was committed to getting Australia going again, this meant "strong and steady economic growth", and technological change was a part of the economic recovery. Hawke criticised the protection policies of the former governments, the gap between research and development, and the lack of marketing skills:
Australia's research institutions are too isolated, intellectually and physically, from industry; academia has given insufficient attention to possible economic application of its research; and industry has not conducted enough of its own in-house research and development.131

He pointed to the government's attempts to promote structural change and increase productivity through its support for a strong venture capital market, an expanded role for the Australian Industry Development Corporation, and increases to AIRDIS.

Hawke was followed by over twenty representatives from big and small businesses, from trade unions, tertiary institutions, government research organisations, and the Commonwealth and State Governments. Each spoke on technology issues, but each from their own perspective. The speeches varied from the "ultra-conservative",132 non-interventionist approach from the representatives of the government economic agencies to the "enthusiastic" approach of high-technology proponents such as Professor Tom Stonier of Bradford University who argued, in a post-industrial economy, that without new technology companies would go out of business.133 There was much discussion of the social impact of technological change, especially in job displacement. Wilson commented later: "The very cautious attitude of the unions was somewhat disappointing but understandable." If there was any consensus it was on the need for industry - both established firms and new entrepreneurial firms - to pursue high technology.134

The conference was very much Barry Jones' "show":
He enthusiastically introduced each speaker, usually with an erudite historical reference, hosted the luncheons and dinner, listened to the forums and even corrected any slip-ups in the low technology projectors and transparencies aiding the speakers.¹³⁵

But in the end - in his closing address - Jones finally admitted his "impatience at the conservatism of the proceedings."¹³⁶ "Candor," he began, "compels me to say that the 'shock of recognition' has not been very successful. The sleepers may be waking, but they are still very drowsy".¹³⁷ He berated the participants for not appreciating the dimensions of the technological crisis facing Australia:

in the OECD tables, Australia ranks twenty-third of twenty-four nations in the value of technology-intensive imports over exports, with an imbalance of 9.5:1. This figure alone suggests the need for ringing a few alarm bells or the cackling of geese - but the conference appears to have taken it very calmly.¹³⁸

Wilson noted in Jones' final speech a reference to PhD physics graduates:¹³⁹ "In 1972," he said, "Australia graduated 100 PhDs in physics: by 1982 the figure was 35. I don't think we can stand too much of this kind of 'progress'."¹⁴⁰

Jane Ford wrote pessimistically of the conference:

Australia's first national technology conference ended with no real consensus, no firm basis for a future technology strategy and certainly no 'shock of recognition' pulsing through the majority of old guard delegates ...¹⁴¹
And a despondent Jones told her, "The message seems to have sunk into
the sand ...."\(^\text{142}\)

Professor Wilson's response to the conference was quite different:

I left the conference feeling that it had been of great significance. It had made plain the determination of Government to face up to both the social aspects of high technology and to encourage industrial progress.\(^\text{143}\)

And Ann Moyal writing in *Search* was also optimistic about the outcome of the conference:

Participants had done their homework .... While some entrenched adversary attitudes of industrialists and trade unionists were aired, at the centre of the conference lay a clear recognition that education, training, retraining, and more education was the core of a successful technological society.\(^\text{144}\)

The conference had one particularly unfortunate consequence, it again highlighted the differences between Jones and Wild. During his defence of the performance of the CSIRO, with a pointed reference to Jones, Wild said: "It would be wrong and quite impracticable to swing a major part of the resources of the organisation to point in some new direction each time a new direction is identified."\(^\text{145}\) Later, in a more conciliatory mood, he added:

The Minister and I have many things in common and I mention just two of them. The first is a strong conviction that nowadays the introduction of new technology needs positive government intervention; the second is a special affinity for Mozart piano concertos. ...
I believe that when we meet each other half way, together we could conquer the world - or at least get that engine going full steam ahead.\textsuperscript{146}

2.24. \textit{Jones at the End of 1983}

At the end of 1983, Jones was still pushing the "crisis" rhetoric. On returning from a two-week visit to Japan and Korea, he told reporters:

Australians must pull their collective fingers out. ... The lead times are short, the niches for many high technology products are small and we've got about 12 to 18 months to pick up the opportunities if we are to succeed in the high technology field.

We've got to set national objectives and get moving now.\textsuperscript{147}

But there were signs that interest in new technology was growing, even if slowly. In June, the Confederation of Australian Industry established its Technology Development Policy Committee aimed at ensuring that the business community had a voice in national technology strategies; and in November, the Business Council of Australia established its Science and Technology Committee to ensure, likewise, that the interests of big business were not overlooked, in the enthusiasm over "small, high growth, high technology enterprises".\textsuperscript{148}
Notes

7. R. Robertson, "High Quality Research as a Goal", in A. Birch, op. cit., p. 21.
21 Prescott and Smith, *op. cit.*, p. 17.
41 ASTEC, Operation of National Research Granting Schemes: a report to the Prime Minister, (AGPS, Canberra, 1983).

42 ASTEC, Incentives for Innovation in Australian Industry: a report to the Prime Minister, (AGPS, Canberra, June 1983).

43 ASTEC, op. cit. (O.N.R.G.S.), pp. 3-10; and J. Ford, "Research funds to be raised in Budget", The Australian, 14 Aug. 1985, p. 20.


47 Ibid., pp. 95-96.


51 Joseph and Johnston, op. cit., p. 143.

52 Yearley, op. cit., p. 110.


54 Ibid., p. 209.

55 Ibid., p. xii.

56 Ibid., p. 15.

57 Ibid., pp. 211-212.

58 as quoted by K. Joachim, "We are miles behind in research and development: a recipe for disaster", The Herald (Melbourne), 26 Apr. 1983, p. 4.


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123 Ibid.
124 G.V.H. Wilson, "President's Column", The Australian Physicist,
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Ibid., p. 1613.


Department of Science and Technology, op. cit., p. 91.


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Ibid.


Ibid., pp. 5-6.
The [successful] transfer of technology does not mean the mere importation of capital goods. It means increasing the ability of a society to reproduce and extend the technology as a result of the transfer. T. SHISHIDO, 1983

3.1. Hawke and the Japanese Experiment

Japan emerged as Australia's largest trading partner in the 1970s and 80s. While most other developed countries were experiencing short term and even long term economic problems, the Japanese economy continued to grow, steadily and with growing confidence and relative wealth. By 1987 Japan was the wealthiest nation in the world. Japan's success appeared as a model of industrial and technological progress which many other nations, including Australia, wished - at least in part - to emulate. The Japanese success was seen to depend on a combination of factors: long term government planning, in cooperation with the banks and trading companies, specifically to facilitate the
transfer of resources from ailing or "sunset" industries to selected sunrise industries; high productivity through the careful selection and adaptation of imported technology; employee involvement in production practices; and, underlying all, a national, social unity in commitment to economic success. The exclusion of outside consumer goods from the Japanese domestic market, through trade restrictions, only emerged later as an issue when Australian companies attempted to penetrate the wealthy Japanese market. The early Japanese success with technology was heavily based on the development through engineering of imported technology, rather than the development within Japan of radically new technology through scientific research. This "Japanese" emphasis on engineering success rather than scientific success was taken up a little later by Australian industry and by government policy, so that Australia began to shift its R&D effort from the hitherto strong emphasis on "R", to the "D" side of innovation, at the very time that Japan, and the USA, were placing an increasing emphasis on basic research as a means of maintaining a longer term economic advantage in technology.

T. Shishido, in reviewing the technological success of Japan, and the key role played by the importation, adaptation and exploitation of imported technology, emphasised his country's total, societal response to new technology. "To appreciate Japan's ability for technological development," he wrote, "it is necessary to consider not only the country's policies but also her historical and cultural background." But the very social, and political, nature of Japan's success was a warning for policy makers elsewhere against the slavish copying of Japanese - or any other nation's - economic,
industrial, and technological policies, since these might not transfer effectively, and equitably, into a different political and cultural environment.

By January 1984, Jones' arguments on the need for technological change were apparently winning over the Prime Minister. Hawke told a science student summer school that the task before the nation was "to make technology work for Australia". Australian companies, he said, needed new technology if they were to compete in international markets.\(^5\) During a visit to Japan, some weeks later, he told a business conference he was aware people were afraid of losing their jobs through technological change, but added, in true Jonesian style, that without this change they condemned "themselves and their children to lower relative living standards and a diminished future."\(^6\)

Hawke returned from Japan determined to follow the Japanese lead, to restructure Australian industry through an integrated, national approach "involving innovative industrial and economic planning, retraining, new technology programmes and fresh trade initiatives".\(^7\) In the following month, he established a high ranking ministerial committee on industry restructuring; included were Chairman, Senator John Button (Industry and Commerce), Paul Keating (Treasurer), Senator Susan Ryan (Education and Youth Affairs), Ralph Willis (Industrial Relations), Lionel Bowen (Trade), and Barry Jones (Science and Technology).\(^8\)
3.2. Jones in 1984

Jones was a much sought after speaker at official ceremonies. Early in 1984, he addressed the graduation ceremonies at both Macquarie and Sydney Universities. At Macquarie he spoke, along the now familiar lines, of an intellectual cringe in Australia which honoured sporting achievements above scientific ones, and of the reliance on digging things up which had led to Australia slipping in its international position, especially in the export of high technology goods. There was a need, he said, for the long term planning and insight provided by the research worker, the reforming judge, and the politician ahead of his time. Finally he articulated a major concern of academic scientists: "young researchers in the prime of their professional lives ... are finding it extremely difficult to secure permanent positions." He concluded: "We face a serious risk of a brain drain in this country, perhaps even a massive haemorrhage."

At the University of Sydney, he began: "I am not a scientist. My own training, such as it was, has been in education, history, law and political science .... I have described myself, with some justice, as the Minister for the Future and I often feel that the constituency I am serving best is not yet born ..." The expression "Minister of the future" may well have originated with Clyde Cameron, Minister for Science and Consumer Affairs in 1975, whom Gough Whitlam records as saying, when he belatedly realised the importance of his new portfolio: "I am now convinced beyond all doubt that it will be the Ministers for Science and Technology who will be the Ministers of the future."
There was more than a hint in these speeches of a lone prophet, crying in an intellectual wilderness. The hard slog to convince government, industrial leaders, and even scientists, of the need to bring Australia to a knowledge-based economy was beginning to take its toll on Jones' almost limitless enthusiasm. At Sydney University, he continued:

Candor compels me to report that the scientists generally have not been particularly helpful in raising community understanding about the relationship of science and society. Often they have concentrated on the work in hand, without much - if any - consideration of long term applications. ... So far the academics have been extraordinarily silent. The universities and the scientific community have taken a profile so low as to be indistinguishable from the horizon.\(^{14}\)

The desire of Australian scientists to be left alone with their work, he concluded, must bear some of the responsibility for the failure of Australian companies to bring pure research into commercial products.

3.3. Opposition to Jones

In a submission to the 1984 review of the Industries Assistance Commission (IAC), and in support of the IAC's conservative approach to industry policy, the Federal Treasury once again demonstrated its continued opposition to sunrise industries and to government intervention in support of high technology industries. The Treasury pre-
ferred, so their submission stated, to leave such matters to the
market place: the market will eliminate unsuccessful ventures through
"loss-making", whereas government-nominated industries will merely
ask for more support. Government intervention acts only to weaken
"private innovation and risk taking ... as potential investors and
innovators decide that the best way to 'succeed' is to concentrate on
lobbying for government support." The government should only
intervene when normal market mechanisms fail and only then, to
eliminate the source of the market failure. To combat the argument
that the market in Australia had indeed failed to bring about new
high technology industries and products, the Treasury suggested,
perhaps facetiously, that the Australian community should take
advantage of generous high technology subsidies in other countries,
"by way of cheaper imports". But, how was Australia to pay for
these imports? The Treasury was, in effect, advocating the increased
importation of high value added goods at a time when Australia’s
balance of payments figures were beginning to cause major concern.

In an interview for the DST magazine, Ascent, Alan Coates,
General Manager of the Australian Mutual Provident Society said, in
typical fashion for big business at the time: "Demand for investment
funds in the next few years will not come from the so-called sunrise
industries ..., but from "re-equipping what remains of our industri-
al base with the latest technologies ...". He argued that substan-
tial growth in real wealth would come only from revitalising existing
industries and that any high technology industries which sprang up
would act merely to improve the effectiveness of existing industries.
It was simply not in the immediate interests of big business to
advocate separate, small, high growth industries, outside their business control.

Following the establishment of the Ministerial committee on industry reconstruction, rumours began spreading of the possible formation of a new Department of Industry, Technology and Commerce with the majority of policy personnel from the Department of Science and Technology moving into the new department. The advantages were seen to be that Technology would move into the Cabinet, and therefore be more influential, that Technology would be more closely linked with industry policy, that a clear sign would be given to industry of the importance of technology in industry reconstruction, and that the more active, committed, and innovative technology policy makers from the Department of Science and Technology would help balance the conservative bureaucrats with "hidebound and outdated attitudes" and little knowledge of technology, in the existing Department of Industry and Commerce.¹⁸ The disadvantages would be the effect on Barry Jones of losing such a crucial part of his portfolio and the disruption which would result between technology policy and the research and academic communities. There was, however, no immediate and concerted response from the academic community to these rumours, and hence no effective participation in the political in-fighting going on behind the scenes in Canberra in support of Jones and his Department of Science and Technology.

Nevertheless disquiet was spreading in the science community. In response to fears from the rural sector that the government was planning to cut agricultural research funding in favour of high technology, Jones told a meeting of the Australian Institute of
Agricultural Science that the government would maintain agricultural research funding at present levels but that its funding would not increase as rapidly as other higher priority areas. Besides, he told them, agriculture would benefit directly from developments in high technology, especially in biotechnology. 19

3.4. Industrial R&D 1984

The Australian Bureau of Statistics (ABS) figures for industrial R&D, released in March 1984, showed that, for the three years 1978/79 to 1981/82, spending on R&D by private business had fallen by 4% (in real terms), and employment in business R&D by 8%. The private business sector (excluding government business enterprises) was now contributing only 12% of total R&D funds and, combined with government business enterprises, only 18% of total R&D employment. In contrast, 49% of R&D employment was in government research laboratories and 41% in universities. 20

In May 1984, the OECD released its figures on Australian R&D. These confirmed the ABS results, showing that the business sector (private plus government enterprises) was providing only 20% of R&D funds. In response Jones called on industry to boost its share to 33% by 1990/91 and to 50% by 1995/96. Since it was the government's aim to double the total R&D funding by 1995/96, this meant business R&D would have to increase its spending fivefold, by 1995/96, to meet its enlarged share. The OECD report also identified R&D areas where Australia was relatively weak; these included electronics, chemicals, transport equipment, machinery and basic metals. 21
The poor figures also prompted Sir Gustav Nossal, Director of the Walter and Eliza Hall Institute, and 1984 President of ANZAAS, in his presidential address, to call for the introduction of a 150% tax deduction scheme for industrial R&D, as the only way to boost industry's effort.

3.5. The ARGs 1984

In June 1984, Scitech reported the ARGs was facing "a serious funding crisis with a record number of applications for grants but little possibility of increased funding." 22 Chairman of the scheme, Professor Peter Sheehan went to Jones to discuss the possibility of increased funding, but returned far from optimistic. The committee, he told the press, had received a 40% increase in the number of applications, the biggest increases being in engineering, applied science, and for equipment, but, with the present indication, no equipment applications were likely to be funded in 1985.

3.6. Relevance in University Research

With the growing criticism of the level of industrial R&D, of the need to restructure industry, of the vital role of technology and R&D in industry restructuring, and of the gap between government funded R&D and industry, it was only a matter of time before university R&D would be brought into the debate. In May 1984, the editor of
Scitech noted "growing government dissatisfaction with uncoordinated, undirected and indiscriminate university research policies which pay little heed to national priorities". Senator Susan Ryan, Minister for Education and Youth Affairs, told a graduation ceremony at the University of Newcastle she was surprised at the low level of public concern over the way universities were funded. "University research enjoys support from Commonwealth regardless of how well or badly those funds are spent", she said.

With dwindling university research funds and increasingly difficult access to ARGS grants, the university research cake was being continually split into smaller pieces amongst increasing numbers of university researchers. The number of technical support staff previously able to make up the short-fall in equipment grants, by making specialised equipment, for example, was also diminishing. Despairing of increased funding, many began to consider the idea of more focused support for top quality projects: hence the proposal from ASTEC for a National Research Council (NRC) - incorporating the ARGS, the national fellowship scheme, and other funding schemes - to supervise a more managed allocation of resources. ASTEC proposed the NRC should be sited within the Commonwealth Tertiary Education Commission (CTEC) but this suggestion was opposed, naturally, by the Department of Science and Technology which would lose a prestige area of its responsibility. Fears were expressed that ARGS funds might be reallocated to other areas within the Department of Education and Youth Affairs which contained CTEC. Professor Sheehan, Chairman of the ARGC, suggested moving some CTEC funds into the ARGS but this was, in turn, opposed by CTEC. As a consequence, the NRC proposal was rejected, for the time being.
In August 1984, in *Engineers Australia*, Professor Peter Farrell, former ASIA Committee Chairman, on leave from his position as Director of the University of New South Wales's Centre for Biomedical Engineering, and an R&D executive for a large pharmaceutical company in Japan, launched a stinging attack on the structure of Australian universities:

It is my belief that Australian universities are, by and large, too inflexible, unimaginative and uninnovative .... Our system ... entrenches sameness and mediocrity and encourages conservatism.\(^{26}\)

It is all very well, he wrote, for Senator Susan Ryan to call for greater links between universities and the private sector, the "fact is they [in the university system] do not know how to do it".\(^{27}\) He advocated the government should "employ management consultants to make recommendations as to how responsibility and authority can be delegated more adequately within the system to make universities more productive, responsible, alert and aware of their responsibilities."

The leaders necessary to bring about this change, he continued, would not come from the present university administrators, must not be chosen from the sciences or arts, and must have "industrial experience, high academic qualifications and, more importantly, a track record of productive management at senior levels."\(^{28}\)

Farrell was described at the conclusion of his paper as a "rebel professor", and as "thoroughly disillusioned with what he described as the 'troglodytes and sycophants' of the university system."\(^{29}\)
the light of subsequent events, especially with Senator Dawkins' later handling of tertiary education, Farrell's views on the university system were reflected - or, at least, were influential - in later government thinking. In Farrell's paper and a related talk of his which I attended, at the CSIRO National Measurement Laboratory, in Sydney, about this time, Farrell extolled the virtues of the Japanese system of worker commitment, and of John Elliott's unregulated private enterprise, both concepts I found disquieting.

Hugh Preston, from the Department of Science and Technology, adopted a more conventional approach to the gap between industry and university research when he addressed the Australian Industrial Research Group, in February 1984. The barriers to interaction, he said, arose from three causes: institutional rigidities restricting the movement of personnel between the two sectors; an historical dependence on government funded R&D, in both sectors; and different cultural objectives. "Basic research is an intellectual activity motivated by scientific curiosity and a desire to understand the nature of phenomena"; whereas "Industrial research," he claimed, "has commercial advantage as its main goal". In my experience, neither definition is strictly true, both basic and industrial research are often motivated by a common desire for recognition, in basic research for recognition amongst scientific peers, and in industrial research for recognition by management; nevertheless, the distinction does provide a partial description of the difference in attitude and the resultant "talking at cross-purposes" between academic scientists and industry.
3.7. **The National Technology Strategy: Discussion Draft**

At the end of the National Technology Conference in September 1983, Jones had proposed that the conference reports be analysed by his Department of Science and Technology and then used to form the basis of a draft National Technology Strategy (NTS). The strategy paper would then be sent out to the conference delegates for careful consideration, before calling another conference in 6 to 12 months to discuss "the refined draft and attempt to reach a consensus on a national technology strategy." Jones added:

> We have a most worthy task to perform, the fruits of the successful design and implementation of a national technology strategy will be harvested by generations of Australians. Failure to proceed with development of such a strategy will result in us and our coming generations descending always downward on the ladder of economic growth. That is a cost I am sure none of us wishes to bear.

The second conference never came. Richard Joseph, who worked on the discussion draft at the Department of Science and Technology (DST), noted, in hindsight, that "this draft document was formulated within DST in isolation from the rest of the bureaucracy". This action was seen variously as a bold calculated move by Jones "to crash through the institutional barriers which had hampered his Department", or as an oversight by his DST senior management in allowing a junior ministry to attempt, on its own, to formulate a document which would affect the actions of the entire government,
industry and the community. It meant trouble for the strategy, and for Jones.

Jones released the draft strategy in April 1984. It covered four broad areas: the strengthening of Australia's technological infrastructure, the role of new technology in economic development, social aspects of technological change, and cooperation between all organisations concerned with technological development. "I believe," said Dr Greg Tegart, Secretary of the DST, to the Applied Physics Conference in Melbourne in December 1984:

I believe that the development of a National Technology Strategy represents the most significant step in Australia towards a national commitment to technology as a means of ensuring the future of a healthy and prosperous Australian society.

W.N. Hurst, from the Science Development Division, in the Department of Science, commented later: "We took the view that the Strategy should be assertive and forward-looking. It was to be a strategy statement not a justification".

The overriding aim of the strategy was a "national commitment to technology as a means of achieving social and economic goals". To achieve this the strategy set a number of specific goals to be achieved by 1995 (twelve years hence): 50% of students completing high school, 20% of school-leavers entering tertiary education, 1% of the workforce being retrained annually, rapid growth in key technologies, a healthy venture capital market, total R&D at 2% of GDP with a fivefold increase in business R&D brought about by tax incentives,
and the equitable spreading of the social impacts of technological change.39

The first of 13 "elements" considered in the statement was the R&D system: "A vital and flexible R&D system is needed to underpin our overall technological capability".40 The statement then recommended what must have been seen by academic and other research scientists as the solution to many of their major concerns: attention to "the level and quality of staffing, research equipment and facilities" in tertiary education, and measures to redress falling staff morale; an increase in funding for basic research through the ARGS and CTEC; and increased "relevance of R&D in tertiary education institutes to commerce, industry and the community [not through Draconian measurements but] through arrangements such as the National Research Fellowship Scheme".41

Joseph noted that "sunrise" industries were mentioned only once. "Sunrise industries and key technologies," he wrote, "had been absorbed into a broader policy framework, making them less spectacular than they were in the political debate some 12 months earlier."42 It was part of a progression within the Department of Science and Technology away from Jones' sunrise industries policy which was so unpalatable to Treasury and Finance, to selected key technologies, and then to general technological development. Joseph concludes that this process "may have just helped to confuse and obscure the issues over which disputation took place."43
3.8. Reactions to the National Technology Strategy

The draft strategy appeared initially to have the Prime Minister's full support. He wrote the Foreword and said on its release:

While acceptance of an overall strategy will depend ultimately on an appreciation of the major issues facing Australia in this area by all the parties involved, the release of this paper is an important part of the process of developing an active and coherent approach to technology issues and their relevance for Australian industry growth.44

But soon afterwards he began publicly qualifying this support. It became known that he was "reluctant to give his full backing to the document."45 "I think," he told the CSIRO executive at the opening of the CSIRO Clayton Laboratory on 18 May 1984:

I think it very important that this statement of priorities be submitted to the closest scrutiny. On the basis of a constructively critical dialogue around the issues involved, the development of a relevant, well co-ordinated policy approach in this important area should become possible.46

Immediately upon its release, the document had ruffled the feathers of some powerful members of the Canberra bureaucracy, who saw it eroding their authority. The document cut across many departments (such as education, industrial relations, and industry and commerce) and yet it had been released without their approval. Members of the Prime Minister's own department saw it as "woolly and lacking teeth" and were annoyed at the lack of consultation. Their disapproval was clearly reflected in Hawke's reluctance to continue backing the draft document.
On the other hand, the general reaction of the research community to the document was much more favourable. Put simply, the paper was important to scientists because it placed science and technology in an important and central role in the management of Australia. During his presidential address to the 54th ANZAAS Congress in Canberra, on 14 May 1984, Sir Gustav Nossal described the paper as "one of the most significant and courageous statements to come out of Canberra on any topic in the last decade."47 He went on to justify his assessment in these words:

The Minister's paper is important because it identifies both the essential role of science and technology to long-term economic health and the serious quantitative and attitudinal deficiencies within Australia that currently limit the contribution which our science sector can make. It is a courageous document because, rather than being couched only in general terms, it includes some quantitative indicators by which progress towards goals will be able to be measured and, even more intrepidly, it seeks a change in social perceptions and values that can only be described as truly monumental.48

Professor T.W. Cole (of the School of Electrical Engineering, University of Sydney), at a meeting of the Royal Society of New South Wales, described the draft strategy as "a major contribution to the discussion" of the future of science and technology in Australia. The strategy document was recognised as one of an increasing number of recent "calls for action"; the meeting responded by considering ways in which the Society could answer these calls. Among the possibilities listed were: that the "Society should lobby governments" (as it
had done in the past) and that the "Society could set up interdisciplinary groups to promote research and development and foster communication between specialist societies and industry." Ideas for concerted action within the science and technology community were continuing to grow.

The reaction amongst academics to the document, however, was not universal approval. Dr Richard Badham, of the Department of History and Philosophy of Science, at the University of Wollongong, in a letter to Search wrote that the major weakness of the document was that it did not specify how the public would be consulted on technology issues. The danger was that decisions would "merely represent a pragmatic compromise between the major power brokers [government, business, and trade unions] in Australian society." Just as the "pro-strategy" scientists had focused in on the R&D aspects of the paper of greatest interest to them, so Badham had selected the issue central to his concerns: public participation in decision making.

The Centre for Technology and Social Change at the University of Wollongong accused the authors of the draft document of allowing technological change to be decided in detail by private industry, according to market forces, with only a limited and passive role for government and the public. "In sum," the Centre argued, "lip-service is being paid to consultation and consensus." The authors of the draft were also accused of being internally inconsistent in that the draft assumed technological change was socially beneficial, and would generate economic growth, which in turn would increase employment, while, at the same time, admitting that technological change was "increasingly capital intensive and labour displac-
The Centre advocated that the National Technology Strategy "start with a clear assessment of social goals, and then fit the strategies into meeting these goals." 54

Speaking on behalf of the ACTU, Len Hingley, Federal Secretary of the Australian Bank Employee's Union, said the ACTU supported the education and training aspects of the strategy but was dismayed at the prospect of new taxes to fund the policy, the lack of provision for technology impact studies, and the lack of mechanisms for consultation between employers and unions over the introduction of new technology. "Unions," he told the press, "are 'fed up' with employers and governments paying lip service to consultation with workers over the impact of new technology on the workforce." 55

The Science and Technology Committee of the Business Council of Australia criticised the document for not placing industry and economics in a central role. By considering science and technology policy in isolation, the Committee claimed, "the draft distorts the value of technology treating it as an end in itself rather than as a means of improving our economic performance and prosperity." 56 In reading the draft it is difficult to find where this criticism could be justified. On the contrary, it appears the Business Council of Australia responded unfavourably to the draft simply because it was not couched in economic and business language more acceptable to them, since much of the Council's published criticism was a restatement of parts of the draft strategy in this "more acceptable" language. The Council went further: it criticised the draft strategy for "excessive emphasis on research"; it suggested the proper role of
government in technology policy was "the removal of impediments to the efficient operation of the market process" while simultaneously - and apparently without awareness of the inherent contradiction in their proposal - recommending the government provide incentives "for investment in high risk high technology areas". Underlined in their text is the statement:

The most serious missing ingredient in the current debate and the Draft Strategy is the reward structure necessary to optimise the motivation of the nation's entrepreneurial forces.

Roger Shipton, speaking for the Opposition in Parliament, described the draft National Technology Strategy as disappointing and unsatisfactory. He accused the Minister for Science and Technology of having achieved nothing in his year of office: "He has made no decisions. The strategy is just a repetition of very similar and familiar rhetoric which we've heard before from the minister."

3.9. The AIP and the National Technology Strategy

In April 1984, Professor Wilson decided to make the most of the AIP's submission to the National Technology Conference by sending copies of the submission to all state branches of the AIP and to a variety of organisations both within Australia and overseas, ostensibly to solicit their response. The accompanying letter said, in part: "The Institute believes that it is very important to promote the
contribution that Physics makes to economic and technological development and as well as participate in ongoing dialogue and the exchange of ideas with other organizations." Thus began the idea which eventually led Wilson to recognise the need for the AIP to amplify its voice by joining with other organisations.

The Science Policy Committee’s formal response to the draft National Technology Strategy offered strong support for all aspects of the strategy, differing only in emphasising key technologies, the importance of physics, and the need for measures to address the "grave shortage of secondary teachers of physics." Professor Peter Mason, of the Department of Physics, Macquarie University, unable to introduce social issues sufficiently into the committee’s discussions on the strategy, felt obliged to make a personal submission to the Department of Science and Technology, to emphasise the need for creativity in the workforce, for a "critical" welcoming of high technology, and for an active role for public involvement.

Occasionally, Richard Joseph would invite outside speakers to address the AIP Science Policy Committee: amongst these, for example, were Dr Keith Suter, of the Wellesley College, University of Sydney, who spoke to the Committee about his involvement in the "Nuclear Free Zones" campaign; and, in September 1984, Randall Wilson, Director of Technology Policy, in the Department of Science and Technology, who spoke about progress on the revised discussion draft of the National Technology Strategy. He told the committee that over 200 submissions had so far been received in response to the first draft document, including about 60 from government, 50 from academia, 40 from business, 30 from public interest groups, 20 from individuals, and 8 from
trade unions; most were favourable. He foresaw the final strategy document developing rapidly, though, he added, it was not yet clear what form it would take: a Technology Accord, an Action Plan, or a White Paper.  

Towards the end of 1984, the Department of Science and Technology invited the AIP to form a Review Committee to report on the scientific value of physics research being conducted by Australia in the Antarctic Territories. Smith was Convenor of the three-person committee. "To the best of my knowledge," he wrote to the AIP, "this the first occasion that the Institute has been invited to conduct such a review. It is to be hoped that future invitations to offer advice or opinion to government bodies will be forthcoming." In her government-sponsored review of Australian technology, in *Scientific American*, Jane Ford listed the Australian Institute of Physics as one of the organisations involved in government policy-making.

3.10. **The Revised Discussion Draft**

The Department of Science released the revised discussion draft of the National Technology Strategy in May 1985. The new document had lost the rough but pithy appearance and style of the original and assumed the more formal academic, bureaucratic appearance of other DST and Department of Science publications, such as the Department's *Science and Technology Statement*. It differed radically from the original draft, though it kept the same basic structure of four sections: S&T capability, economic development, social aspects of technological change, and intergovernmental relations.
The revised draft relied heavily on the responses to the first draft. It was more specific in its priorities; it emphasised education, industrial R&D, greater utilisation of new technology by industry, increased interaction between government R&D organisations and industry, the social aspects of technological change, and integration of the S&T strategy with other government policy areas.

The change in tone of the document may be seen in the first of fourteen "policy conclusions", where the emphasis on increased support for basic R&D so pleasing to scientists in the original, had been altered to:

the overall level of basic ... and applied ... research in Australia is generally satisfactory and should be maintained in real terms, but needs to be translated more effectively into economic and industrial benefits. An increased emphasis on commercial potential or application is needed in both universities and government research institutions.66

Commenting later on the revised draft, W.N. Hurst, of the Scientific Development Division, in the Department of Science, said the draft was part of a continuing trend from "policy for science" to "science for policy."67

But despite Jones' intentions, the document remained only "a base from which a Government endorsed paper could now be developed."68 With the dismemberment of his Department of Science and Technology in November 1984, the document came under the influence of the broader industry strategy then being developed within the new Department of Industry, Technology, and Commerce, and was subsequently abandoned.
Smith, by then President of the Australian Institute of Physics, mourned the loss saying that the decision to abandon the National Technology Strategy highlighted "the widening gap between science policy and technology policy that is developing now". The task of achieving a national technology strategy was never going to be easy, he wrote, "but it would now appear that there is little chance that an integrated policy for science and technology will be attempted." Joseph, who also lamented its loss, concluded that the National Technology Strategy was popular "only while the 'crisis' atmosphere prevailed" and while high technology was seen as "the" solution to the economic crisis. By the end of 1984 more conventional economic management approaches were considered adequate.

3.11. The Budget 1984

In early August 1984, speculation grew that a tough science and technology budget was about to be brought down. Cabinet had notified all ministers that new programs would only be funded through cuts to existing programs. Jones was thought to have over $40 million of new initiatives, but his Department could find few areas to offset these in existing programs. Moreover, Jones had had trouble within the Department over his desire to give the proposed Commission for the Future top priority. Many senior Cabinet ministers considered the Commission for the Future a "mickey mouse" project, and this lost Jones support for other funding proposals before Cabinet. "In fact," Scitech reported, "it is believed that only eleventh hour talks at
the beginning of this month saved a number of [existing] programs."71 Joseph commented, later: "There was a general feeling within DST that its Minister could not argue successfully for funds in Cabinet and that he was becoming somewhat of a liability."72

It appears the characteristic most wanted by public servants in their minister is that he or she be successful in Cabinet. Public servants, quite naturally, become frustrated when after months of work their efforts are wasted because their minister "failed to carry cabinet."73 When ministers approach Cabinet, either for more money or for approval for new programs, they are almost invariably opposed by the minister for finance and the treasurer "who will argue for restraint." In particular, the prime minister, the treasurer, and the minister for finance, together, are virtually unbeatable. At budget meetings, Davis et al. comment, it is difficult for junior ministers "to prevent cuts to their departments when opposed by determined, well informed, senior governments figures."74 The task was especially onerous for Jones; as minister, he had to argue before Cabinet but, not being a member of Cabinet, he had no vote in Cabinet. One of the political lessons Professor Smith learnt from the 1984 budget was that just "because Barry Jones says something or it comes from the Department of Science doesn't mean it is government policy .... This is where Barry was his own worst enemy: he was a splendid advocate and there were so many people agreeing with him but none of his ministerial colleagues were taking any notice."75 Jones' failure in Cabinet, Joseph concludes, "highlights the apparent unimportance of trying to 'prove' something in politics to the point where there is unanimous agreement."76
At 8 pm, on Tuesday 21 August 1984, Paul Keating brought down his second budget. The S&T portfolio was given just under $600 million, an increase in dollar terms of only 1.6% over the previous year. The CSIRO appropriation was $323 million, a dollar increase of 1.8%; the ARGS $22.8 million, an increase of 6.6%; the AIRDIS $67.5 million, down 6.0%; the NH&MRC $45 million, up 16% (following a 28% increase in the previous year). Inflation was estimated at 6.5% per annum. The S&T portfolio had, therefore, received an overall cut of 5% in real terms, or 8% relative to GDP, and the ARGS had effectively received no increase at all. The Commission for the Future was to be established, in early 1985. In marked contrast, Senator Button, highlighting the new prominence of industry restructuring in government policy, was able to announce a number of industry initiatives: taxation reforms, extension services, revised assistance to the automotive industry, export and trade promotion, training and retraining, bounties, and management development. Button, in his media release, said the Budget should be seen "as providing further 'positive' assistance to encourage industry revitalisation and restructuring".

The Commission for the Future was announced in the Budget, the seven members of the Commission were appointed in February 1985, and the Director in May 1985, and during the remainder of 1985 several of the secretarial staff took up their positions. One of the seven members appointed to the new Commission was Professor Peter Mason, Foundation Professor of Physics, at Macquarie University, and member of the AIP Science Policy Committee.
The initial funding allocation for the Commission was $250,000. The aims of the Commission were to promote community awareness and understanding of science and technology, to stimulate discussion, and to disseminate information about the social and economic aspects of science and technology and "their potential impact on Australia in the future." Jones remarked: "It'll continue doing what I've been doing when I drop off the perch"; and in typical confronting mood, he added: "Sometimes it is bound to raise questions that the Government won't like but this will be within the right questioning framework with the options clearly laid out."  

3.12. Reactions to the Budget

Two days after Budget night, on 23 August 1984, Barry Jones addressed the National Science Forum in Canberra. "I wouldn't pretend," he began, "that this has been an overwhelmingly expansionary budget for science and technology in 1984/85." The budget, he said, had been framed with an election in mind, "with the utilitarian test of the greatest good for the greatest number and in the shortest time, with the maximum political impact." A Minister for Science and Technology, he explained, was a "Minister for the Future", and therefore represented a constituency without political clout. He was critical of members of the Ministry and bureaucracy who saw the economy as self-correcting and who thought that all that was required of government was to create an economic climate conducive to investment.
In his prepared speech, despite his disappointment, Jones attempted to emphasise the few positive aspects of the S&T Budget, such as the increase in the number of National Research Fellowships. During question time, however, he was asked a series of pointed and emotive questions which brought increasingly agitated responses from the unhappy Minister. It is not clear which question brought about the now famous outburst, whether it was in response to a question by Kim Burgman, Capital 7 TV concerning "short-term pragmatic budgetary decisions" (as reported in search 82) or in response to comments about poor funding and career prospects for young researchers by Dr David Fayle (then a Research Fellow at ANU but later a member of DITAC), but the meaning of his outburst was quite clear: scientists "are the wimpiest collection of lobbyists you can imagine." Given the impact of his statement, and his comments on interest groups, it is worth quoting at length:

look at the way in which interest groups are organised throughout the community. If pressure comes from a powerful union, or from a very powerful trading partner overseas or from some important sector in private investment, then this is significant. But if you sit there in your office waiting for the people in the scientific community to come and exercise pressure you may be waiting a very long time. As I've said quite often to people in the scientific and academic community, you are the wimpiest collection of lobbyists you can imagine. And you're not even able to apply threats. The CSIRO Executive doesn't say, 'Unless you do so-and-so we're going to take a vow of silence for a month'. People would say, you took a vow of silence anyway.83
The impression this statement made on Wng.-Cmdr.(Rtd.) Dr Ron Christie, Vice President of the Australian Computer Society (ACS), was that Jones was in effect saying, "no matter how hard he fought in parliament, nobody else was supporting him in the scientific area. He wanted support, he felt he wasn't getting that support, that we weren't behind him." 84 Don Aitkin, Professor of Political Science, at the Australian National University, however, saw Jones' statement quite differently: "Barry Jones ... appeared to lay the blame on the scientists and educators themselves, much as the previous Government had seemed to blame the unemployed for being without jobs." 85 Jones' outburst prompted Dr Ken McCracken to present a paper, at the Applied Physics Conference in late 1984, entitled, "Whimps of Australia. Arise." 86 Barry Jones' "Sleepers Wake!", it seems, had become "Whimps Arise!".

Scitech described the Budget as "One of Australia's worst science and technology Budgets on record" and reported that Jones had been very disappointed with what he described as a "gloomy" S&T Budget, that he had threatened to resign, or, at least, "of not standing for the ministry after the next election", and that he was "disillusioned with the whole budgetary process." 87 The Opposition picked up on Jones' remarks and hammered the government during the Budget debate in parliament; and Jones was reprimanded by his Prime Minister. 88

The CSIRO estimated it had received a cut of 3.2% in salary and operating funds. An irate CSIRO Chairman, Dr Paul Wild, commented:
What really dismays me is that this Budget is further evidence that electorally science and technology count for almost nothing in Australia. Despite all efforts by our Minister this is one of the worst budgets in our history, not only for CSIRO but for the whole area of science and technology .... A 3 per cent cut means further stagnation: staff cuts, no new blood, little scope to change direction and, most serious of all in a research organisation, wilting morale. ... CSIRO staff feel that the reward for all their efforts has been a kick in the teeth.

All 42 divisional chiefs of the CSIRO signed a telex to the Prime Minister condemning the cuts to the CSIRO. From that point on, as Peter Pockley records, the CSIRO began "some overdue direct lobbying to key ministers with influence in the cabinet (other than their own relatively lowly ranked minister)."

Facing a 21% increase in applications, the ARGS Chairman, Professor Peter Sheehan described the S&T budget as one of the worst on record and criticised the government for not honouring its election promise to increase ARGS by 10% above inflation. "At a time when the Government should have been rescuing the scientific reputation of Australian research it seems bent on regressing it", he said.

Incensed, he wrote to the Prime Minister condemning the low Budget allocation: "Productive work is being prematurely stopped and new and exciting developments in research cannot be supported". Another member of the ARGC, Professor Don Aitkin wrote in The Age:

Those interested in the future of the system had some hopes that a change of Government in 1983 might allow an infusion of new blood into the universities, colleges and the CSIRO, since the Labor spokesmen had made a good deal of noise about the
ALP's commitment to a scientifically and technologically strong Australia.

But soothing noise is so far the sum of Labor's contribution: the recent Budget was a woeful document ... The ARGC responded to the Budget by awarding its controversial 'nil' grants to 256 researchers.

One of the first to respond to the Budget was Professor Arthur Birch, President of the Australian Academy of Science, who issued a Media Release just two days after Budget night. He described the science budget as "disastrous" and criticised "the government's contemptuous incomprehension of the long term aspects of Science."

"We in Australia," he concluded, "are now busy eating our seed corn, and on behalf of my grandchildren, I protest." The analogy with seed corn is explained in astronomer Professor R. Hanbury-Brown's after dinner speech in 1985: "basic research is the seed corn of the future practical benefits which society expects to gain from applied science." A little later, Birch wrote to The Age, on behalf of himself and nine other members of the Academy's Council, to express the academy's "grave concern" over the ARGS allocation:

Failure to provide adequate funding for creative scientific research in our tertiary institutions will not only erode our ability to be truly innovative but, equally seriously, steadily reduce the number of competent and experienced Australian scientists.

On 29 August 1984, Professor Wilson, President of the Australian Institute of Physics (AIP), issued a Press Release strongly attacking the S&T Budget. The Press Release was based on comments he made
at the opening of the AIP National Congress at Griffiths University. The statement is quoted here in entirety because of the important role Wilson played in the formation of FASTS and because it reveals his attitudes to the economic benefits of research and to the role played by the AIP in the National Technology Strategy; it read:

Professor Wilson said that the Commonwealth Government would have us believe that the current economic recovery was due to its good planning and management rather than to chance factors such as the ending of the drought. To believe this one needs to see evidence of proper long term planning rather than panic measures linked to short term electoral advantage. The current budget for Science and Technology must lead to the conclusion that the government has put short term popularity above the future economic and technical strength of Australia.

The Minister, Barry Jones, has correctly stressed repeatedly the importance of Science and Technology Planning to the future of our economy and employment recovery. However, the drastic cuts to the Australian Research Grants Scheme (compared with the original promises of the Labor Party Platform) and to the CSIRO must have the effect of running down our level of technical sufficiency to a level well below its present pathetic state.

Professor Wilson said that the Australian Institute of Physics had made a strong contribution to the National Technology Strategy. He called on the Commonwealth Government to urgently reverse the damaging effects of the budget, pointing out that without a strong national commitment to Science and Technology our future prospects for a strong economy, a high quality of life and low levels of unemployment will just be an illusion.
The issuing of press releases on political issues was unusual for AIP presidents. Talking about those days, Professor Wilson said: "I believe I happened to be President of the AIP at the time that it was suddenly expected of me. There was enormous pressure. Scientists were beginning to feel they were being left behind." Professor Smith added: "The budget of 1984 started to stir people up because they recognised, in spite of being a vocal advocate, Barry Jones on his own wasn't getting anywhere." The same day as Professor Wilson's Press Release, all 15 heads of physics departments in universities and institutes of technology sent a letter to Barry Jones voicing their concern over the "severe decline in support of physics research" since 1978, and urging the government to reverse the trend "by making adequate funds available." The sentiment was well intended but, under the circumstances, the target, Barry Jones, was surely not well chosen.

3.13. Why this Reaction?

Professor Ken Green, a British academic, visited Australia shortly after the 1984 budget crisis. He interviewed 30 people in various R&D fields around Australia including the Canberra bureaucracy, and was able to form an outsider's perhaps more detached view of the crisis, and to make some comparisons with related international trends, especially in the United Kingdom. He began his report on the crisis with a provocative quote from the book by American, Harvey Averch, *A Strategic Analysis of Science and Technology Policy*.
Minor changes in budgets are taken as a major crisis within the scientific and technical communities.... Any percentage drop in funds is seen as disastrous for scientists and research performers, particularly those at universities. They speak as if they have little capability to adapt, substitute and compensate. In contrast, for an increase of a few percentage points, they promise truly significant differences in performance or rate of discovery, and yet the new resources will not be used much differently than the old resources.103

The remainder of Green's paper, however, suggests - at least in the Australian context - that this accusation is unfair and inadequate. Green identified three aspects of the R&D debate in Australia (in common with advanced capitalist countries overseas): a slowing of growth rates for R&D expenditure in the 1980s compared with the 1950s and 1960s; close scrutiny of the way R&D budget funds were distributed; and greater emphasis on linking R&D to national objectives, especially "economic ones".104 These considerations would inevitably lead, he wrote, to "a redistribution of R&D resource" with increases in some areas and cuts in others. "However," forecasting troubled times ahead, he added, "the means of evaluation and redistribution, the institutional mechanisms for setting objectives, and whose interests should be represented in objective-setting, are not clear and are bound to be the subjects of considerable controversy."105 Green concluded that the most pressing issue was an agreement between scientists and the community on priorities for R&D.
It would be most undesirable if the protracted debates over the levels of research funding that have characterised the last few years in the UK were to be repeated in Australia, risking grave damage to the country's research infrastructure.

The emotional side of the response to the crisis within the science and technology community in 1984 was based on a feeling that scientists, in some way, were being blamed for Australia's economic woes, and on frustration from the knowledge that the protests of scientists had no coherent voice to deal with this criticism. "What science has done," said Wilson defensively,

is make a country which is pretty inhospitable into the most efficient agricultural and mining country in the world. ... Now that we are being asked to do something in manufacturing we are delivering the goods there too. For us to be blamed is ridiculous. What scientists have done is what has been expected of them in this country.

In his opening address to the AIP National Congress in Brisbane on 27 August 1984, Mike Ahern, Queensland Minister for Industry, Small Business and Technology, and future Premier of Queensland, told the 200 physicists attending the Congress that the Queensland sugar, mining and cotton industries were "world class performers" largely because of university research and innovation. But, he admonished: "Scientists have been pitifully shy, almost negligent, in promoting the very real contributions of universities to national advancement." The case for science, he said, "should have been mounted
on the public stage. It should have been widely broadcast." He urged
the physics community "to lobby governments to improve the funding
and status of scientific research."\textsuperscript{109}

One way to form an impression of the general interests and
concerns of Australian scientists is to scan through their in-house
journals, such as \textit{Chemistry in Australia}, or \textit{The Australian Physi-
cist}, or the ANZAAS publication, \textit{Search}. A glance through the latter
two, for the six years from mid-1980 to mid-1986, reveals over 600
articles or parts of articles of a non-technical nature of relevance
to science, technology and social issues. Of these, about 25\% deal
with industry and technology (including government support for
industrial R&D, the need to improve the links between
government-funded and industrial R&D, and the impacts of technologi-
cal change). A further 25\% deal with science and technology policy
(including priority setting, the proper balance between pure and
applied research, and the levels of R&D funding). About 20\% consider
the nature and social role of science and the need to communicate
science to the public. About 8\% cover government organisations, such
as the CSIRO; 6\% FASTS and NSTAG; and surprisingly few deal specifi-
cally with university research (2\%). \textit{The Australian Physicist}, much
more so than \textit{Search}, displays a strong concern for nuclear issues
(16\%); women in science (6\%); and the teaching of physics in high
schools (5\%), in particular the need for more physics-trained teach-
ers to teach physics.

As an example of these concerns, the New South Wales Education
Department adopted, during the 1980s, the concept of a generalised
Science teacher, that is a teacher capable of teaching all aspects of
science: biology, chemistry, geology, physics - despite these being examined as separate subjects for the Higher School Certificate. This concept of a "generalised" science teacher was unacceptable to the physics community; it preserved a concept of the universality of science, imposed on the science community by educationalists - that is, non-scientists - when scientists themselves saw science rather as a network of well-defined specialities, or subjects. The physics community was further alarmed at the shortage of physics-trained teachers in New South Wales schools. Writing in *The Australian Physicist*, R.A. Brown, of Macquarie University, said: "This policy ... will lead to a further and catastrophic decline in the standard of physics teaching". When later the AIP approached the New South Wales Education Department, it was refused permission to conduct a survey of the qualifications of science teachers in New South Wales.

The Council of Australian Postgraduate Associations (CAPA) released a 150-page report entitled, "The Role of Postgraduates in Australian Research". The report stated that postgraduate scholars contributed a major part (40-50%) of university research and, through this, a major part (12-15%) of the national research effort. Despite this, they were poorly remunerated, were poorly accommodated, and were provided with poorly maintained and inadequate equipment. Dr George A. Christos, a postdoctoral fellow in the Department of Theoretical Physics, at the Australian National University, wrote a long and compelling article in *The Australian Physicist* outlining "some of the appalling conditions faced by non-tenured researchers in academic life in Australia, [and] the ways in which the situation is
steadily worsening ..." The conditions and career prospects for postgraduate students and post-doctoral fellows were a major concern to academic scientists, as was the fear of a brain-drain of talented young people away from their science or lost overseas. Scientists could not help but feel concern for their young colleagues experiencing such difficulties.

Hence the emotional response within the S&T community to the 1984 Budget was based in part on these other concerns, for these other troubled areas of science and technology. In commenting on the eventual split within the Department of Science and Technology, Smith wrote:

it not the prospect of inter-departmental rivalry between Science and Industry, Technology and Commerce that I regard as the most alarming situation for the future, but rather the policies being followed by the Department of Education. The shortage of appropriately trained physics teachers and the emphasis on a qualitative, descriptive presentation; the restrictions on the number of places in tertiary education; the pressure to reduce post-graduate numbers; the ageing population of university physicists; these are all gloomy portents for the future of Australian physics.

Aitkin expressed these broader concerns in a letter to The Age:

the universities and colleges are greying, recruitment of young researchers has almost come to an end, and the research output of the tertiary education sector, which was something to rejoice at in the 1960s, is no longer remarkable. Australia’s capacity to cope with the scientific and technological challenges of the future - let alone to profit from them - is growing daily more doubtful.
The scientific community in Australia is sufficiently small for difficulties being experienced in one sector to generate a sympathetic response throughout the whole community. Difficulties within the CSIRO or the universities, for instance, are rapidly communicated and felt by other scientists outside these organisations. This communication is not so much between scientists of different disciplines, such as between biology and physics, but between scientists with similar or related interests in different organisations, who meet on committees or at conferences, or ring each other for advice on research problems.

Commenting on a similar crisis in Britain, Ince wrote in 1986:
"The scientists themselves seem to be undergoing a crisis of confidence" brought about "by what they see as an acute shortage of funds" and by the uncertainty resulting from all the inquiries into science and scientific organisations. The disappointment over ARGS, in Australia, was merely the final straw added to their concerns.

3.14. The Budget in Context

Aside from the announcement of major new programs, much of the impact of Commonwealth Budgets, especially in the non-industrial sector of S&T, occurs through small shifts in emphasis, that is, a little more here or a little less there. When these shifts continue for some years, they have far-reaching effects on the overall balance of S&T activity, not just within major government agencies such as
the CSIRO or major granting schemes such as the ARGS but within all
government departments, agencies, and socio-economic objectives.

Consider, by way of illustration, two agencies or schemes which
initially have identical budget allocations. If the first of these is
allowed to grow annually at 3% per annum while the second is reduced
by 3% per annum, then after ten years the first agency will have
nearly twice the budget allocation of the second.

To place the 1984 S&T budget in perspective we need to go ahead
several years and then look back, a luxury unavailable to the people
of 1984. From this perspective the changes announced in the 1984
budget appear as relatively small shifts amongst a number of overall
long term trends.\textsuperscript{117}

The determination of long term trends, however, requires some
means for converting actual expenditures into so-called "real" or
"constant" figures, and growth rates into "real" growth rates. Normally
this involves adjusting expenditures for inflation, relative
to some nominated year. The Consumer Price Index (CPI) is often used
informally for this purpose, though the CPI is merely a basket of
price indicators chosen to represent average consumer spending, and
is not necessarily valid for S&T which has a different balance of
costs. One could therefore choose from amongst a number of available
S&T inflation indices; these generally give similar long term trends
but can differ markedly from year to year. A better measure for
"real" trends in S&T is Gross Domestic Product (GDP).

Gross Domestic Product (GDP) is a measure of the value of goods
and services produced in Australia less the cost of their production.
In more technical language it is "gross national expenditure plus
exports of goods and services less imports of goods and services". \textsuperscript{118} Growth in GPD would seem an ideal measure of R&D (and S&T) growth since one aim of R&D - particularly business R&D - is to increase the value or quality of goods and services and to reduce their production cost. The more goods and services there are, the more R&D and S&T necessary to monitor, control, maintain, improve, modify, or find alternatives to, to meet changing demand and competition.

GDP also includes a component due to population increase, or more specifically to increase in the work force. For the six years from September 1979 to August 1985, the Australian labour force grew at an average of 1.9\% per annum. \textsuperscript{119} If a budget allocation is maintained only according to increases in the CPI, while the population increases, then in fact, the per capita budget allocation will decline in real terms. The ten year trend, from 1976/77 to 1986/87, in the growth in Australia's GDP is remarkably constant at 3.0\% per annum, except for a drop in 1982-83 associated with a high annual inflation of 11.5\%. The GDP recovered quickly after 1983-84 when annual inflation dropped dramatically. A large part of the growth in GDP is attributable, therefore, to the 1.9\% growth in the Australian labour force.

For the ten years 1976/77 to 1986/87, the increase in Commonwealth Support for R&D, compared with GDP, was -0.1\% per annum. Commonwealth support for R&D was therefore essentially keeping pace with GDP. When compared with Commonwealth outlays, however, the R&D rate dropped to -0.8\% per annum. Thus, while successive budgets over this period showed a continuing commitment to increased support for R&D, it is apparent that government support for R&D was not seen by
government as a solution to Australia's economic woes since R&D was not allowed to take a larger share of the budget outlays. This is not to suggest that R&D support should be tied to budget outlays, merely that trends in budget outlays indicate trends in government priorities.

It should also be noted that the official category "Commonwealth Support for R&D" used over the period does not include the amounts which the universities and other tertiary institutions spend on research from their general recurrent grants and equipment grants. The R&D component of teaching and research academic salaries, which is calculated at an average of 0.3, is a significant component of this figure. Much of this funding comes under the control of the Commonwealth Tertiary Education Commission (CTEC). This additional expenditure represents another 39% on top of the Commonwealth Support for R&D and despite the questionable nature of the figure of 0.3 for all university academic salaries, the amount is too large to ignore. When this extra amount, plus tax incentives for industrial R&D are included, the real long-term growth rate in "total" Commonwealth budget support for R&D becomes 0.0% per annum, compared with GDP. This "long" term trend, relative to GDP, in constant 1985-86 dollars, is shown in Figure 3.1. The position on the graph of the 1984 budget contribution gives no indication of the ensuing crisis.

Table 3.1 provides a summary of the R&D expenditures, relative to GDP, of the six Commonwealth agencies with the largest R&D budgets. Table 3.1 highlights the progressively difficult position of these agencies; overall, the agencies were behind by 1.1% per annum. The long term growth in the Antarctic Division reflected government awareness of the political significance of the Antarctic Territories.
Figure 3.1 The long term trend in total Commonwealth budget support for R&D in Australia, relative to GDP.
Table 3.1

The Long Term Trend in R&D Expenditures of the Six Commonwealth
Agencies with the Largest R&D Budgets, Relative to GDP

<table>
<thead>
<tr>
<th>Agency</th>
<th>Long term trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1976-77 to 1986-87 (%) per annum</td>
</tr>
<tr>
<td>CSIRO</td>
<td>-1.6</td>
</tr>
<tr>
<td>DSTO</td>
<td>-3.5</td>
</tr>
<tr>
<td>Telecom</td>
<td>-1.6</td>
</tr>
<tr>
<td>AAEC (now ANSTO)</td>
<td>-4.0</td>
</tr>
<tr>
<td>Antarctic Division</td>
<td>1.3</td>
</tr>
<tr>
<td>Bureau of Mineral Resources</td>
<td>0.6</td>
</tr>
<tr>
<td>Total, all Agencies</td>
<td>-1.1</td>
</tr>
</tbody>
</table>

Table 3.2

The Long Term Trend in the Major Commonwealth R&D Granting
Programs, Incentives and Bounties, Relative to GDP

<table>
<thead>
<tr>
<th>Department</th>
<th>Long term trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1976-77 to 1986-87 (%) per annum</td>
</tr>
<tr>
<td>Industry, Technology and Commerce</td>
<td>12.3</td>
</tr>
<tr>
<td>Health</td>
<td>8.9</td>
</tr>
<tr>
<td>Primary Industry</td>
<td>-0.4</td>
</tr>
<tr>
<td>Science</td>
<td>1.7</td>
</tr>
<tr>
<td>Education</td>
<td>-2.7</td>
</tr>
<tr>
<td>Resources and Energy</td>
<td>6.5</td>
</tr>
<tr>
<td>Transport</td>
<td>-17.9</td>
</tr>
<tr>
<td>Total</td>
<td>5.0</td>
</tr>
</tbody>
</table>
A summary of Commonwealth expenditure, relative to GDP, of the granting programs of the various Commonwealth Departments is provided in Table 3.2. Over the same ten years 1976-77 to 1986-87, the major Commonwealth R&D granting programs, including incentives and bounties to industry, grew at 5.0% per annum relative to GDP. During this time, several Departments showed major gains in their R&D extramural schemes, notably: Industry, Technology and Commerce, Health, and Resources and Energy. Wool Research (in Primary Industry) and Postgraduate Awards (in Education) both declined at -3.0% per annum, while the level of Transport R&D grants dropped away from its high of $8.3 million in 1977-78.

The two largest Granting Programs were the National Health and Medical Research Council (NH&MRC) grants and the Australian Research Grants Scheme (ARGS) grants. Growing jealousy over the success of the NH&MRC amongst physical scientists supported only by the ARGS (outside CTEC) had disturbing consequences for FASTS in its formative years, particularly when it was learned how many members of FASTS, especially its biologists, increasingly depended on NH&MRC grants. For the ten years 1976-77 to 1986-87, NH&MRC grants increased from $10.3 million to $59.0 million, that is, at 7.9% per annum, relative to GDP. The ARGS declined for the same period from $11.6 million to $30.0 million at a rate of -0.7% per annum. Through reductions in overheads from $4.5 million to $2.5 million, the actual ARGS grant allocations grew at the marginally better rate of 1.4% per annum. During those ten years, the combined humanities and
social sciences component of ARGS grant allocations grew from 12% of grants to 21% of grants, so, as a consequence, the combined physical and natural sciences component of ARGS grant allocations grew at only 0.2% per annum.

Since 1984 the main target for the government has been Australia's manufacturing industry, whose total R&D effort was recognised as lagging far behind that of most of Australia's major trading partners. Business spending on R&D had dropped from 0.42% of GDP in 1968-69, to 0.24% of GDP in 1976-77, then to a long term low of 0.19% of GDP in 1983. In 1976, around 44,000 people (or 0.72% of the workforce) were employed in R&D in Australia. Some seven years later, in 1983, despite a 14% increase in the Australian workforce still only around 45,000 people (or 0.65% of the workforce) were employed in R&D.

A lack of competitiveness in parts of Australia's manufacturing industry and declining profitability in the primary sector, overall, had pushed Australia's export-import position down to dangerously low levels. In 1983-84, the annual current account balance, a main indicator of our trade position with the world, contained a deficit of $7,283 million. By 1985-86, the annual deficit had increased to $14,364 million. Through 1983-84, despite the efforts of the then Minister for Science and Technology, B.O. Jones, and others to raise awareness of the need in Australia for competitive technological development, Australian business appeared unable or unwilling to increase the level of its R&D spending.
Beginning in 1985, to create a more favourable climate for innovation and entrepreneurial endeavour, the Commonwealth government introduced the 150% taxation deduction scheme for industrial R&D, the licensed Management and Investment Companies (MICs) scheme, and the National Research Fellowship scheme to promote more effective interaction between industry and academic research. But since total Commonwealth support for R&D was maintained constant relative to GDP with an increasing proportion going to assist industry then the increase for industry (and Health) was at the expense of R&D support for other areas, namely the major research organisations, the CSIRO, DSTO, and AAEC, and a number of granting schemes, including Wool Research, the ARGS, and Post-Graduate Awards. The budget of 1984 was merely a part of this trend.

In his analysis of the trends in university research expenditures, for the years 1974 to 1981, Professor Ron Johnston concluded (in 1985) that "the available data do not support the [academic] scientists' views that basic research is grossly underfunded and has suffered a dramatic decline." His conclusion was based largely on trends in university expenditures, relative to constant dollars rather than GDP, and on a comparison of Australia's higher education expenditure with the average expenditures of medium and large OECD countries, this time relative to GDP. The discrepancy - between the data and the scientists' views - he attributed largely to a concentration by the scientists on the ARGS and other "free" funds and their neglect of indirect expenditures - salaries and overheads - incurred by the government in supporting academic research. These indirect expenditures Johnston showed had had the biggest increase. In 1983,
Australia was estimated to have spent 0.29% of GDP on higher education. This percentage has fluctuated only slightly, around 0.3%, since 1968. So Johnston was correct in saying there has been no dramatic decline, overall, in higher education R&D spending, although, as Johnston also points out, there has been a tightening of "free" money. The total figure also does not account for changing numbers of university staff.

A true comparison with other countries is less obvious, and more fraught with inconsistencies in accounting for social and political differences between countries. The expenditures recorded in the 1986-87 Science and Technology Statement show medium R&D countries spent an average of 0.39% of GDP on higher education R&D, and large R&D countries spent 0.38%. Australia is classed as a medium R&D country, and, contrary to Johnston's analysis, its 0.29% is well below both these more recent figures. Indeed, on a GDP basis one might expect little difference in the grand averages between OECD countries since GDP partially accommodates the differences in the sizes of countries, whereas the definition of medium or large R&D performance is based simply on total dollars spent on R&D, so Australia's trailing position is even more disconcerting. Grand averages also tend to disguise the differences between countries, and one should note that the USA, Japan, F.R. Germany, Sweden, Switzerland, the Netherlands, and Austria spend considerably higher percentages of GDP on higher education R&D than does Australia. Which merely raises the question, should Australia trail the average or should it join the leaders?
Notes

2 See, for example, ibid., pp. 259-264; and E. Boyer, "How Japan manages declining industries", Fortune, 10 Jan. 1983, pp. 34-39.
3 Shishido, op. cit., p. 264.
4 Ibid., p. 262.
6 Ibid.
7 Scitech, 4, Mar. 1984, p. 5.
8 Ibid.
10 Ibid.
11 as quoted, ibid.
14 Ibid.
16 Ibid., p. 21.
18 Scitech, 4, Mar. 1984, pp. 5-6.
19 Ibid.
24 as quoted, ibid., p. 2.

27 Ibid., p. 194.

28 Ibid., p. 196.

29 as quoted, ibid.


32 Ibid., pp. 1637-1638.


34 Ibid.

35 Department of Science and Technology, National Technology Strategy: Discussion Draft, (DST, Canberra, 1984), pp. 3-4.


38 Department of Science and Technology, op. cit. (1984), pp. 3-4.

39 Ibid., p. 1.

40 Ibid., p. 5.

41 Ibid., pp. 5-7.


43 Ibid., p. 124.


48 Ibid.


Ibid., pp. 4-5.

Ibid., p. 7.

as quoted, *Scitech, 4*, June 1984, p. 15.


Ibid., p. 16.

*Scitech, 4*, May 1984, p. 4.

G.V.H. Wilson, circular letter, 4 April 1984. [AIP file D159/84]

AIP Science Policy Committee minutes, 5 July 1984.

Ibid.


Department of Science, National Technology Strategy: Revised Discussion Draft, (Department of Science, DITAC, Canberra, May 1985), p. vi.


*Scitech, 4*, Aug. 1984, p. 3.


Ibid., p. 79.


Ibid.

Ibid., p. 246.

Ibid.


Ibid.


D. Aitkin, *op. cit.*

P. Sheehan, "'Commitment not Honoured' - ARGS Chairman", *Search*, 15 (9-10), Oct./Nov. 1984, p. 257 ??.


104 Green, op. cit., p. 69.
105 Ibid., p. 70.
106 Ibid., p. 87.
109 Ibid., p. 40.
115 Aitkin, op. cit.


Ibid., p. 137.

Department of Science, Australian S&T Budget Brief 1986, (Department of Science, Canberra, 1986), pp. 9-11.

Ibid., pp. 10-11.

Ibid., p. 10.

Ibid., p. 12.

Payling, op. cit.


Department of Science, Science and Technology Statement 1986-87, (Department of Science, Canberra, 1986), p. 45.

Ibid.
There is no doubt that as a community science and technology society members have been singularly unsuccessful at influencing government and convincing the media and the public of their importance. T.F. SMITH, 1985

Part 1: (November-December) 1984

4.1. Rumours of a New Department of Industry, Technology and Commerce

With growing government interest in the restructuring of industry, rumours of a giant department encompassing trade, industry and technology continued to spread. Senator Button was known to favour the combining of industry with technology and to be embarrassed by his department's continually quoting programs from the Department of Science and Technology in its reports. The new super department would
resemble Japan's MITI (Ministry for International Trade and Industry) which so impressed Hawke during his visit to Japan earlier in the year. Opponents of the new department were concerned that it would be too big and that the innovative parts of the Department of Science and Technology would be overwhelmed by the older style, "bureaucratic thinking" of the Department of Industry and Commerce.²

During October the rumours on DITAC gained conviction and there were further rumours that Barry Jones and the Minister for Defence, Mr Scholes, would not be re-elected by Caucus to the next ministry. The Minister for Trade, Lionel Bowen, it was said, was fighting hard to prevent parts of his Trade department from moving into Industry. In the bureaucratic tug-of-war over the reorganisation of portfolios, a compromise was suggested for the Department of Science and Technology to hand over only the operational areas of technology but retain technology policy. Some members of Jones' own department, however, were rumoured to want another minister, one with more "clout", which weakened Jones' position further. Finally in a city of rumours, Canberra, it was rumoured that Senator Button was considering standing down after the election.³

Scitech reported that the rumours about Jones' shaky future had created "mixed feelings within the bureaucracy and the scientific community":

Everybody acknowledges that he has done a superb job at talking up science and technology and raising public and parliametary awareness of its importance to economic and social development.
However, many, even his ardent supporters, also admit that he seems incapable of putting any of his rhetoric into action and of getting Cabinet support for his proposals. He is known to abhor the whole numbers game in Cabinet and this is seen as a major weakness.  

4.2. The Debate on Tax Incentives for Industrial R&D

Professor Ralph Slatyer, Chairman of ASTEC, returned from a visit to Israel, Austria, Norway and the Netherlands, convinced that the government needed to increase its support for industrial R&D. All four countries had various forms of government support for industry, including grants, tax incentives, cheap loans, subsidies, and adequate venture finance; they had also learnt that success depended on market pull rather than research push. This implied research directions should be more tailored to the market. The visit also strengthened Slatyer's awareness of the need for closer ties between government R&D and industry.  

Support for tax incentives was also forthcoming from members of the Department of Industry and Commerce, and Hawke was known to be sympathetic; but the Departments of Finance and Treasury were opposed on the grounds that the proposal was open ended in cost and therefore difficult to plan and estimate. The proponents of the scheme argued, in return, that an increasing cost in the scheme would at least mean that industry was responding by increasing its R&D, something not achieved so far with any other scheme. Treasury countered by
arguing that there had to be a choice between tax incentives and grants; that government could not have both. 7

In October 1984, Jones instructed his department to prepare a submission detailing the case for and against tax incentives. Jones himself had been unenthusiastic about tax incentives, Tegart, Secretary of the Department of Science and Technology (DST), was opposed to them, and other members of DST were arguing that tax incentives would only confuse the industrial R&D scene. The DST submission helped decide the Prime Minister to defer any decision about tax incentives until after the proposed Tax Summit planned for 1985. The DST submission had the further effect of aligning the DST against tax incentives in opposition to the Department of Industry and Commerce. The subsequent introduction of tax incentives and their immediate and apparent success further pushed the DST into the background of decision making. 8

4.3. More Relevance in University Research

In September 1984, Hawke met with the Australian Vice Chancellors Committee (AVCC). He told them that the universities must look to obtaining more research funds from outside sources. Universities needed to conduct more "collaborative projects with business and industry," he suggested, and continued more pointedly:

For too long research in Australia has been too much divorced from development. If measured against the yardstick of relevance, there is clearly a need for our scientists to lift
their game .... The fault lies on both sides - with researchers disinterested in the application of their product, and with industrialists not sufficiently aware of the benefits to be derived from a vigorous research effort. ...

This problem will only be overcome if researchers reach out more deliberately to understand and provide for the needs of industry and if industry itself puts much greater effort into defining its requirements more precisely and embarks on the even more difficult task of persuading educationalists and researchers to redirect their interests.9

His final remark plainly suggests researchers were more resistant to change than industry to restructuring; and, therefore, if in the past both parties were to blame for the gulf between them, in the future any continuing difficulty between research and industry would mean researchers must carry much of the blame. Clearly researchers would no longer be allowed to avoid industry.

Continuing the theme of relevance, Ruth Morschel, of the Strategic Policy Branch, in the Department of Science and Technology, wrote in Ascent: "Knowledge generated by research should be effectively applied so that the society which sustains that research effort reaps the benefits." The absence of links between government and academic R&D and industry, she wrote, prevents the widespread "industrial application and commercialisation of new technology".10

If scientists, particularly academic scientists, were slow to take on industrial research, it was because of the innate and long-term value they continued to see in basic research. For some, to abandon basic research would be to abandon science. But would they acquiesce, this time, "with astonishing ease" as Haberer alleged they had always done in the past?: "permitting, with only token opposi-
tion, the destruction of colleagues and scientific institutions, and the perpetuation of obvious assaults upon the integrity of science itself.\textsuperscript{11} The concentration on benefits in Morschel's paper and in others around this time is totally focused on economic advantage. Scientists were being asked to change their directions in an atmosphere where the culture of science - and the educative and social benefits of science - were being subsumed into a hoped-for quick economic return. The individual scientist's response to this may well have depended on how urgent he or she perceived Australia's economic troubles to be, necessitating in one extreme an all hands to the pumps approach, and in another, a continued search for long term solutions which accounted for social and cultural values besides economic ones. The government, notwithstanding, gave the impression of wanting the R&D scene to change direction abruptly.

The appropriate balance between pure and applied research was one of the most frequent debating issues for scientists at this time. The Australian Physicist carried a series of articles on the subject through the 1980s and it is clear that Barry Jones read at least some of this material.\textsuperscript{12} The editor of the journal in 1986-87, Dr Trudi Thompson, commented in her editorial column: "This debate has continued ad nauseam ever since I started my career in Physics during World War II."\textsuperscript{13} Dr J.P. Wild, Chairman of the CSIRO, for example, wrote a paper entitled, "Applied Physics or Physics Applied?" in 1981, his theme was "there is nothing impure about the applied, and nothing inappplicable about the pure"\textsuperscript{14} Professor R.E. Collins, at the time a member of the AIP Science Policy Committee, wrote, in 1983, "Is applied physics academically respectable?", in which he disagreed
with the attitude that applied physics "was a lower level activity ... involving poorer science or a less scientific approach";\textsuperscript{15} and Dr A.G. Klein, future AIP President, wrote, in 1985, "Pure, leading to Applied Research",\textsuperscript{16} of which the title speaks for itself, and represents the most common argument used by scientists in support of pure research. But this protracted debate within science on the relative merits of pure versus applied, in Australia, as in Britain,\textsuperscript{17} appeared to resolve nothing.

Industrial research in our universities threatens the present "cultural" and normative values of science. Science, and physics in particular, is a craft or trade. Postgraduate research training is an essential part of learning this trade. As M.J. Mulkay writes: "Membership in a scientific research community entails acceptance of the intellectual standards defining what kinds of problems and solutions are legitimate".\textsuperscript{18} In attempting to break new ground in fundamental research, the student is imbued with this "universality" of his or her subject. Manufacturing industry, on the other hand, is concerned with the production efficiency of particular process lines, these, after all, are where their products for commercial gain are produced. Research into the particular and unique properties of any one production line has no intrinsic scientific value unless the results obtained can be related to the generic properties of all such production lines. There is a danger that industrially trained postgraduate scientists will have too narrow a view of problem solving and be out of touch with the broader scientific community. It would be unreasonable, however, to expect politicians who have not undergone an apprenticeship within the scientific community to recognise or understand the socialising aspect of basic research.
One interesting offshoot of the debate on pure versus applied science was that it was often assumed that universities did only pure research. A study at the University of Melbourne in 1984 suggested, on the contrary, that universities did a considerable amount of strategic and applied R&D, as much as 67% of all academic research. It was also generally assumed that industry did little pure research, but if pure research is identified with the unplanned, the undirected and the hopeful, as distinct from research with a particular and immediate industrial application, then, in my personal experience, Australian industry has pursued a large percentage of its research in this way, in the past. Again, from personal experience, the trend in academic research towards short-term industrial problems has occurred even more so in industrial research, which leaves one pondering: who will be left to do the long-term work?

Much more important at stake than some abstract debate on pure versus applied research was the very value of research, itself. It was generally assumed by scientists that research, in providing new knowledge and insights into the world, was inherently good, irrespective of its immediate or eventual utilisation. Barry Commoner, Professor of Botany at Washington University, expressed this scientific conceit back in the 1960s:

Behind every technological innovation ... is the source of the knowledge which technology applies to the solution of a given problem - the free inquiry into nature that we call basic science.
So well recognised was the value of all research amongst scientists, that many scientists when pressed to justify the value of their work would immediately respond by describing some supposed economic and technological benefit lying somewhere down the track. The specific fruits of the research were not be predictable but the value of the work was unquestioned.

Salomon suggests that governments support scientific research for four reasons (in order of priority): "military objectives" (less relevant in Australia, with its relatively small component of defence R&D), "prestige" (less relevant, surely, in Australia with its tall poppy syndrome, and especially in times of economic difficulty), "economic motives" (a dominant theme in Australia in the 1980s), and finally, "the advancement of science for its own sake". But, for government, even the last of these is essentially utilitarian in character because of the economic "benefits" which might some day flow from basic research. Science as a cultural or educational activity, he writes, has "no greater claim for state support than any other cultural [or educational] activity". As a consequence, in the utilitarian/managerial climate of the 1980s, scientists felt constrained more and more to offer only economic justification for their work.

At the heart of their defence, though they may not have expressed themselves in these terms, was the discredited linear model of innovation. This model presented the development of new technology as a linear chain, starting with discoveries from scientific research, then progressing through development, and demonstration, to market application. Scientific research, as the initiator of the
new technology, was seen therefore as the most important step in this process, with the resulting danger that development of the discovery into commercial gain would be so down graded by comparison as not to be followed up, allowing the commercial value of the discovery to go overseas. It represented a "science-push" perspective, and failed to acknowledge modern scholarship on the importance of "market pull" in technological development. An alternative attitude contrasting, sharply with the science push perspective (and in marked contradiction to Commoner's statement above), was expressed by Trevor Cole, Professor of Electrical Engineering at the University of Sydney, in his talk given to celebrate the centenary of the university in 1985:

"technology develops mainly from technology and only occasionally does an input from science make a significant shift in technology. Indeed, it is often the technology which drives and extends science ..."^25

One might have expected an engineer to value technology over science. The two forces, science push and market pull, when combined, have been called the "boot strap" model of innovation, in which science and technology both benefit from advances in either. All such models oversimplify the complex social and political interactions which relate scientific and technological advances. "The major point of relevance here," as Johnston writes, "is that many politicians and increasing numbers of the public no longer accept the 'science push' model."^27 Throughout the period of interest, 1983 to 1985, scientists employed the linear model in their defence, perplexed, in their naivete, in the argument's lack of success.
The traditional arguments used in favour of basic research, and hence of the ARGS which in part supports it, were social, cultural and economic. But given the economic climate of 1984 these arguments could be easily overturned, by saying that Australia could no longer afford expensive, nonproductive sociocultural activities, nor rely on the vagaries of possible long-term return. If we accept Professor Fred Smith's alternate argument that the principal role of university research was the training of postgraduate researchers in leading-edge science, then this argument too could be overturned by arguing that Australia could not afford to have some of its best talent unproductively occupied on some esoteric topic of minuscule community interest and of doubtful economic return when they could be just as well occupied on an applied science topic of direct relevance to Australian industry. After all, applied research, as many academics then acknowledged, could be just as challenging as basic research. The question of funding for university research - or the CSIRO - then became one, not of justification, but of politics, of who should decide how university research is conducted. Should academics, as experts in their fields, be left alone as in the past to decide their research for themselves or should government policy direct research to fulfil national objectives? And then, who should determine these objectives, and who should decide if particular research efforts meet these objectives? Instead of bemoaning the absence of national objectives, for R&D, or science and technology, scientists could have taken a lead here. It was clearly this political dimension which scientists, in repeating worn-out justifications, were not address-
4.4. The Science Crisis Grows

In October 1984, Professor Peter Andrews, of the Victorian College of Pharmacy, formed a new lobby group: Workers in Medical and Pharmaceutical Sciences (WIMPS), with the combined aims of lobbying politicians for more funds for drug research, and of supplying the media with information to "raise public awareness of the importance of science and technology". Another member of the new group, Dr John Funder, of Prince Henry's Hospital, Melbourne, in good humour suggested an alternative name, Bloody Awful Negative Government Endangered Research (BANGER) and Professor Andrews added, "This has some support. We'd rather be BANGERS than WIMPS."²⁸

In an editorial in Chemistry in Australia, Professor Athel Beckwith, President of the Royal Australian Chemical Institute (RACI), discussed the question, "Are we wimps?". He agreed with Jones that "Scientists in general and chemists in particular are notoriously reluctant to speak out, believing that the rectitude and validity of what they advocate is so transparently obvious, as indeed it is to them, that there is no need to enter what some see as the rather disorderly area of public debate." But, he added, "scientists, including many chemists, are willing, indeed eager, to express their views publicly if sufficiently provoked".²⁹ Such a provocation, he said, was the shock of the 1984 Budget: members of the Council and Branch Committees of the RACI had immediately written to ministers and the press expressing their dismay "at the recent cuts in research funding".³⁰
But the mood was changing, as Peter G. Lehman noted in his final editorial for Chemistry in Australia. Lehman reported a shift he had noticed in the Engineering and S&T (E,S&T) community "from rage to rational argument." Following the Budget there had been "heated exchanges, recriminations, threats and apportioning of blame, from both sides." This rage had produced heat but nothing productive. Now, since August, the Engineering and S&T community had returned to reasoned argument. Prophetically he concluded:

To me, the emergence of this new-found and redirected voice of educationists, scientists and industrialists, heralds the beginning of a movement, or at least a groundswell of informed opinion. Provided it can be sustained and fully developed it could eventually convince even the most intransigent government of the singular importance of E,S&T to the future of Australia.

4.5. The CSIRO Speaks Out

Dr Paul Wild addressed the National Press Club on 24 October 1984. He told the audience that his recent outbursts and those of others within the CSIRO were not, as commonly assumed, a knee-jerk reaction "to the Budget and Barry Jones' challenge that scientists were the wimpiest lobbyists he's come across" but the articulation of a concern which had been growing for some time. Since 1978 the funds for CSIRO research operations (after adjusting for inflation) had been cut by one third. Including university research, he added, "the
whole area of science and technology in Australia has been sorely neglected." He asked: "Why are there no votes in Science?" The answer he provided, towards the end of his speech: "neither side considers it important enough to make an issue of." He may also have added that Thomson's well-meaning bipartisan approach before the election of 1983 had removed the controversy necessary for political debate. In past budgets, cuts to the S&T portfolio had come mostly in the final, arbitrary, pruning stages of the budget preparation, Wild claimed, "because scientists don't squeal, they only whimper. But all that has got to change." In a radical initiative - given CSIRO's history - to bring about that change, Wild announced that CSIRO officers were to be encouraged to talk publicly about their work and to participate in public debates "on issues relevant to their expertise."

Five days later, on Saturday, 29 October 1984, Lewis T. Chadderton, Chief of the CSIRO Division of Chemical Physics, a highly respected division of the CSIRO and home of the much vaunted Atomic Absorption Spectrometer, spoke on the ABC's "Science Show". His talk was entitled, "Research in the CSIRO death by a thousand Budget cuts." As The Australian Physicist reported when publishing his paper, the opinions he expressed closely reflected "the attitudes, concerns and opinions, of many of the officers of the CSIRO, and of the lay public." Chadderton began, and I quote at length:

"Sleepers Awake!" was the exhortation. And we thought they had! The charismatic Barry Jones was appointed Minister. A national Science and Technology conference confirmed the need for the harnessing of science for the nation. At last - a
government of consensus - a government with the guts to gear up technologically for a real Australian future!

Can it truly be a cause for wonder that Australian scientists should so vehemently vilify Mr Keating's budget? It is unprecedented, and uncharacteristic, that with one voice, scientists from both CSIRO and the universities should howl with fury at such mean myopia. A leading newspaper columnist has alluded to some well orchestrated and most successful publicity campaign on the part of the CSIRO. It's simply not true! The spontaneous outrage expressed revulsion at the sacrifice of a brightening Australia on the altar of short term political gains.\textsuperscript{36}

Progressive budget cuts, he said, had reduced the numbers of permanent research and support staff, had cut vital and viable projects, prevented the hiring of young researchers and stifled creativity. He supported Jones' enthusiasm for high technology, and for moving the emphasis in the CSIRO from primary to secondary industry - a pity the support came so late. He accused industry, the users of government R&D, of being unwilling to spend their own money on R&D and of maintaining a "silence of guilt" during the cuts to government R&D. Fulfilling Daniel Greenberg's prophecy about the Cosmos Club simmering with talk of a new Dark Age,\textsuperscript{37} he concluded his talk with these words:

\begin{quote}
It would seem, for science and technology, to be the threshold, of a New Dark Age!

If the sleepers ever wakened - then they slumber once again! So would the last sleepwalker pause, for pity's sake, and snuff the candle out?\textsuperscript{38}
\end{quote}
J.J. Landsberg, of the CSIRO Division of Forest Research, in a guest editorial for *Search*, described the 1984 budget cuts to science as myopic, wrong, and dangerous. He argued for continued R&D support for the rural sector, which accounted for 45% of GDP and was responsible for the 1984 economic recovery following the breaking of the drought. Australia, he wrote, was an inhospitable land, with areas of poor soil, foreign pest species, soil erosion, salinity, and other problems: "The rural industries will not remain productive without research support." 39

The outcries from the CSIRO met with little sympathy from Hawke as he prepared for an early election. He preferred his government to concentrate on the more direct task of industry restructuring. 40

4.6. **The Combined Meetings of Staff**

In October and November 1984, mass meetings were held in Sydney and Melbourne to protest at cuts in funding for the ARGS. The meetings were called to defend basic research, not to tackle the broader political issues of science nor to address national objectives in R&D. Dr Harry Edwards, Opposition spokesman on Science and Technology, addressed both meetings and called on Barry Jones to resign in protest at the poor funding of the ARGS. 41 At the combined meeting of universities staff (convened by FAUSA on 1 November 1984), in the Stephen Roberts theatre at the University of Sydney, Professor Peter Sheehan, Chairman of the ARGC, told the gathering that the erosion of basic science was nearing crisis proportions. Allowing for inflation,
the average ARGS grant was now 64% less than when the scheme began 18 years earlier, in 1966. Then, the ARGS provided 23% of research funds for state universities; now the ARGS provided only 14%. The government, moreover, had not honoured its election promise to increase the ARGS by 10% per annum above inflation for each of the next three years.42

In a related speech - the Charles Joseph La Trobe Memorial Lecture in Melbourne - Professor Sheehan said (quoting from the Science Council of Canada) there were two reasons for supporting basic research: "the search for a deep and penetrating understanding of the world" and as "a profoundly significant investment that leads to future practical benefit".43 It was vital, he said, that leading-edge research be seen as an investment rather than as consumption:

What could be important in the future shouldn't always be replaced by what seems urgent at the moment, and allowance has to be made for innovative and exciting research projects conducted simply for their own sake.

The proper orientation to science is to view pure and applied research as feeding back into each other, so each may benefit from the other. With adequate funding of both basic and applied research, Australia will be better able to face the future as a country that is informed about its own problems and the problems of the world.44

Dr Peter Pockley, outspoken Advisor on Public Affairs, at the University of New South Wales, also addressed the protest meeting of universities staff in Sydney.45 In a similar speech delivered about two weeks later (Sunday 18 November 1984) on the ABC radio program "Ockham's Razor", he said:
The members of the academic community ... are slipping seriously in their capacity to influence governments ... [We need to] accept that politicians .... are seldom moved by abstract notions or the cool rationality of academic discourse. They are influenced most by the immediate pressures on them. As Mr Barry Jones says, "in politics, the important always gives way to the urgent." 

The position could be retrieved, he suggested, by concerted and sustained effort in the media and by efforts on two fronts: the lobbying of all ministers with influence on R&D funding, and the promotion of increased public understanding of science and technology. To achieve this, he said, academics and government scientists needed to overcome institutional barriers:

in reality, there is no such thing as, say, "CSIRO science" or "University of Sydney medicine" or "University of New South Wales technology" or "Macquarie University history" or what-have-you. We proclaim the universality of our subjects, and that is how we should be presenting ourselves and our work to the public, cutting across institutional boundaries.

And it was to the scientific societies he then turned to undertake this task: "The resources of bodies such as the academies and societies may be limited, but, put together, they would constitute a formidable force".

Pockley had justified his appeal to the societies on the naive basis of the "universality of science", or rather, in his words, the "universality of our subjects", but the very existence of specialist
societies, or subjects, testifies against the universality of his cause. The overcoming of institutional barriers and the bringing together of the science community through their societies would not be an easy task to accomplish or maintain.

4.7. The ARGS Case for 1986

In November 1984, the ARGC released its Case for Funds for 1986. It began with a quotation from a recent letter to the Committee from Prime Minister Hawke, dated 28 June 1984:

It is the Government’s objective to encourage and support excellence in research wherever possible. Quality and opportunity will be key criteria for this support. 48

Hawke’s words to the ARGC ran counter to his relevance rhetoric at the earlier AVCC meeting and wrongly gave the impression that he appreciated the importance of excellence in academic research, which scientists associate with peer recognition. The Report challenged Hawke to match his promise with increased funding for the ARGS. The Committee judged $56 million was needed to fund all excellent programs at an adequate level in 1986, more than double the $24 million received for 1985 grants in the 1984 Budget. "Basic research maintained through the Scheme," the Report stated, "sustains the skills base of science in Australia and the national interest of the country depends on its preservation." 49
4.8. The Meeting of Australia's Major Scientific Societies

John Barker, in an editorial in July 1984, challenged his readers in The Australian Physicist to define science and technology. I responded by defining what, in my own view, constituted a scientist and a technologist. In so doing, I recognised there were at least two distinct definitions in vogue. For the professional or practising scientist, a "scientist" is defined by his or her area of study, be it physics, chemistry, biology, geology, etc; physicists, especially - in my experience - have a particularly strong sense of identity with their subject. This idea of identity with a particular scientific community was used by Thomas Kuhn in the development of his concept of the "paradigm":

A scientific community consists of the practitioners of a scientific speciality. To an extent unparalleled in most other fields (except within a religion), they have undergone similar educations and professional initiations; in the process they have absorbed the same technical literature and drawn many of the same lessons from it.

The "scientific community", then, exists within a scientific speciality rather than across the whole S&T population. The alternative definition, which I called the sociological view, was more determined by what the scientist did, rather than by the field of study: by his or her scientific method. Hence sociologists, economists, medical practitioners, lawyers, could consider themselves scientists if they applied analytical methods or, more particularly, if they expected...
analytical solutions to problems in their field. When science is defined in terms of subject and those scientists seek a public voice for science, it follows naturally that they will seek to express that voice, not through an amorphous science body, such as an Academy, but through the scientific society which represents their subject. A federation of like-societies is merely an extension of this view of science; it is not a proclamation of the universality of science.

Professor Wilson’s media release, described earlier, from the AIP Congress in Brisbane, was discussed shortly afterwards in an ARGC meeting at which Professor Wilson was present. The committee, evidently in like-mind with Peter Pockley, discussed at length the merits of lobbying and what the scientific societies should be doing about it. After the meeting, Professor Bruce Stone, of the Biochemistry Department, La Trobe University, decided that Wilson (and the AIP) was the obvious person (and society) to organise the scientific societies. "Bruce was a very persistent character," Professor Wilson told me, "he began telephoning me every week and writing to me nearly every week: 'Why haven't you got the societies meeting to form a lobbying group, yet?'. I must say, it was the pressure from Bruce Stone that got me fired up".53

Prompted by Stone, Wilson wrote in his President’s Column in The Australian Physicist: "Lobbying by the AIP has been increasing for quite some time and I have no doubt that this trend will continue; there are now suggestions that the various scientific professional institutes combine to improve the effectiveness of their lobbying." In this, he wrote, the scientific societies would not be acting like most lobbyists who consider only the interests of their clients with
one-sided arguments: "In our case the motivation is not financial self-interest but a firm desire to see Australia with strong science and technology". 54

Wilson convened a meeting of scientific societies on Wednesday 21 November 1984. Quite simply he contacted the heads of a small number of societies that he knew personally and informed them of the meeting. "They were all very enthusiastic," he said. "They all turned up and with almost zero publicity a number of others rang me from areas I wasn't even aware of, in the biological sciences, to ask if they could please come. It seemed no one wanted to miss out." 55

Prior to the meeting, Wilson - as President of the Australian Institute of Physics - issued a press release entitled, "Historic Meeting of Australia's Major Scientific Societies". The meeting, the statement announced, would be attended by six societies (Physics, Mathematics, Chemistry, Biochemistry, Cell Biology and Microbiology), representing "over 20,000 of Australia's scientists". 56 The societies would meet for the first time: "to discuss a common approach to continued representation of scientists to Australian Governments." The meeting was called, it continued, because "of concern over the erosion by successive federal governments of support for basic research" and as a response to "the recent disappointing budget" and "the low profile being given to basic science".

One of those invited to the first meeting was Professor R.G. (Gerry) Wake, of the Department of Biochemistry, University of Sydney, and President of the Australian Biochemical Society. Like Wilson, he became involved only after a good deal of prodding from Professor Bruce Stone who, as a biochemist, wanted the Australian
Biochemical Society involved. Wake was acutely aware of the detrimental effect the distraction and time such involvement would have on his research work. He, like many of the scientists involved in the formation of FASTS, would much rather have been left alone, to carrying on with their research. In this regard, he told me: "It is virtually impossible, at least in the area of biochemistry that I work in, to really do anything of significance unless you dedicate yourself totally to it." For Wake, politics was not an integral part of science, but a burden to be carried in unusual circumstances when imposed upon scientists from outside. The seriousness of the plight of science in 1984 was perceived to be such that scientists like Professor Wake were prepared to give up a considerable amount of their time in support of a more public voice for science.

By Wednesday morning of 21 November 1984, the six societies had become eight, adding Agriculture and Parasitology. They met in the Australian Academy of Science building in Canberra and were joined by representatives of the Academy, who voiced strong support for the plans of the societies. The meeting decided "to act as an ad hoc steering committee to initiate cooperative actions of all of Australia's scientific societies", in effect a Federation of Societies was decided upon, and the delegates then spent much of the remaining part of the morning discussing a statement (drafted largely by Wilson) which would be released, afterwards, at a Press Conference (also arranged by Wilson), scheduled for 2 pm.

The press release issued by the meeting accused politicians of not coming "to grips with the fact that basic science underpins high technology" and of allowing the funding of the ARGs to drop to an
alarmingly poor state, where the rejection rate for new applications had "risen from 54% to a record high of 74% for 1985". The statement called upon "the Prime Minister and the Leader of the Opposition to state their specific policies on future support for the ARGS, NH&MRC, the CSIRO and University research ..." The statement concluded with the pledge: "For our part we wish to stress the determination of Australia's scientific societies to work together to ensure that science plays its full role in guaranteeing the future economic, cultural and educational prosperity of Australia." Wilson, President of the AIP and convenor of the historic meeting, told the afternoon press conference:

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.

At this stage, the embrionic Federation was a federation of science societies only, principally concerned with gaining recognition for the importance of basic research and with increased funding for the ARGS.
4.9. The National Committee for the Promotion of Science and Technology

In October 1984, the Science Policy Committee of the Australian Academy of Science formed a National Committee for the Promotion of Science and Technology (NCPST). The Committee was to be chaired by the newly appointed Fellow, Professor Max Bennett FAA, Director of the Neurobiology Research Centre, University of Sydney, and would fulfil three terms of reference:

1. To take actions to raise the esteem in which science is held in the Australian community.
2. To persuade the present and future Australian Governments of the necessity to fund science adequately.
3. ... to collect information over a broad range of science illustrating Australian excellence, and the beneficial influence Australian research and Australian scientists have had, and are likely to have, on our technology and society.61

The committee aimed, in effect, to take on Lakoff's first political role for scientists, that of "advocate".62

In his formal report detailing the formation of the NCPST, Bennett expressed the three concerns which most prompted the Academy of Science to act: first, the lack of recognition within the Australian community of "the achievements and goals of scientists and technologists" has had "serious repercussions in the way Governments view the scientific and technological community"; second, "no readily identifiable means exist for dialogue to take place between scientists and Government"; and third, "not enough is known of the state of Australian science and technology, in order to reach sensible
conclusions concerning financial support." Bennett also expressed to me a further concern within the Academy, an anti-science attitude growing within the Australian society and the government.

Awareness of an anti-science attitude worried many in the scientific community at this time; for some it was the continuation of the anti-science sentiment of the 1960s, and the tightening of government control of science in the 1970s, for others it was "a swing to irrationality" in the 1980s. The external expression of this anti-science attitude was therefore not restricted to just the low funding of science and a lessening of the regard for pure research, but extended to the blaming of science and scientists for all the negative products of technology then plaguing the world: nuclear weapons, nuclear power, pollution, unemployment, etc., and further, to alternative movements such as fundamentalist revivals, creationism, UFO societies, occultism, and the "New Age". Professor A.J. Birch, President of the Academy, revealed his concern for anti-science when he wrote:

Australian governments ... are almost anti-science. This is not surprising, since they presumably represent the views of the general community. Scientists are dismayed, since to them the results of science - cultural and practical - appear to be overwhelmingly beneficial.

As a relatively new member of the Academy, Bennett's efforts to involve the Academy in overt political activities, which the NCPST represented, were roundly criticised by a number of the more senior members of the Academy. He was told it would take many years to get an effective science lobby going and that it would probably be a fiasco. It is hard to think of a greater indictment of scientific
elitism and hierarchy then this, that a leading Australian scientist recently rewarded for his contribution to science by being elected to the Academy should be subjected to such criticism, or of the depths some members of this hierarchy would descend to, to maintain the supposedly apolitical nature of science. Professor Howard Worner, in the unique position of being a member of the Council of the Australian Academy of Science and a foundation member of the Council of the Australian Academy of Technological Sciences, described Bennett as a "real champion", with very strong views on the funding crisis. He attributed Bennett's enthusiasm for the Academy's involvement in and support for the Federation. Wake also commented: "I think it was just fortuitous that Max Bennett came in as a Fellow of the Academy ... I think that without Max Bennett ... things probably wouldn't have got going." 68

The Council of the Australian Academy of Technological Sciences, on the other hand, was likewise concerned with the trends in S&T funding but did not wish to be seen to be too strongly involved. The Academy of Technological Sciences was supportive of the meetings of concern, of the NCPST, and of the Federation but lacked a champion like Bennett to convince it to make a strong commitment. As a young academy, dependent on the government for grants, and with a number of extremely conservative members of Council, the Academy could not afford to be offside with the government or be seen to be too radical. 69

The NCPST held its first meeting on 1 December 1984. The members, corresponding members, and observers (or ex officio members) totalled 21 people, selected to represent "the entire Scientific and
Technological community", including: the universities (10), CSIRO (4), high technology companies (2), medical research (1), astronomy (1), ASTEC (1), NH&MRC (1), and ARGC (1). Many were Fellows of the Academies and several were Presidents of professional societies. Among the 21 were: Drs R.W. (Bob) Crompton FAA (Head of the Atomic and Molecular Physics Laboratories, Australian National University) and Ken G. McCracken, both active in the AIP; Professor Athel L.J. Beckwith FAA, President of the RACI and a member of Wilson's ad hoc committee and future member of the Interim Federation Committee; Dr Steve J. Redman FAA, another future member of the Interim Federation Committee; Dr Jan M. Anderson, future Vice-President of FASTS; and Professors Worner and Sheehan and Dr J.P. Wild. Professor Bennett also sought advice from the Medical Research Advisory Council whom he described as "the most effective Scientific lobbyists in the country." 70

The meeting on 1 December 1984 established three further working parties to deal with each of the three terms of reference. Dr Peter Pockley was to chair the working party on the media; Dr Bob Crompton on science and government relations; and Dr Terry Beed (from the Australian Social Research Centre, REARK Research), in association with Professor Bennett, the state of Australian science and technology, beginning with physiology. The working parties met frequently from January to March 1985.

The meeting on 1 December 1984 also considered the formation of two secretariats, one in Canberra to handle Science and Government Relations, and the other in Sydney, to provide a Science Information Service. These two secretariats, it was estimated, would cost about
$400,000 annually to run. To maintain the independence of the secretariats from pressures outside the S&T community, it was thought appropriate that the S&T community should provide the necessary finance itself. It was also decided that a Federation of S&T societies should be formed, to organise the financing of the secretariats.71 As a first step, the Academy set aside $33,000 "from special bequest funds" to aid the establishment of the secretariats.72

4.10. The Federal Election 1984

Hawke called an early election for 1 December 1984, just 19 months after winning his first federal election in 1983. The rural recovery - following the breaking of the drought - and good GDP figures, which Keating claimed made Australia the fastest growing economy in the world, allowed the Prime Minister in his election speech to announce that the crisis, "the worst economic crisis for more than fifty years", was over.73 The decision facing Australia, he told the electorate, was how to ensure that the benefits of recovery were "fully and fairly shared by all sections of the community". Just as the Labor Party had been the best and only party to manage the crisis, now the Labor Party was the best and only party to manage the recovery. Part of this management process would be the control of a national industry reconstruction and the application of the world's best technology:
To succeed in building a dynamic, prosperous and secure Australia it is essential that we have available and apply the world's best technology. The strengthening of technical and applied scientific education is essential to this end. Our pure scientific research effort has been at the forefront of the world, and we will continue to maintain the very large Australian Government effort in scientific research through our Universities and CSIRO. But we have to recognise that our application of new technology to many areas of industry has lagged behind.

Sustained high growth in Australia will require greater and more systematic application of the best technology to all our industry. 74

To this end, Hawke announced increased funds for Management Investment Companies (MICs), a 150% tax incentive scheme for industrial R&D, and a continuation of AIRDIS. The high technology strategy of the 1983 election platform was gone, replaced by applied R&D and by management of the economy. 75 Hawke's words promised continued pressure on government funded research to move towards industry.

A secret Labor Party poll in August ranked the three most popular ministers after Hawke as: Paul Keating, the Treasurer, Bill Hayden, Foreign Affairs, and Barry Jones, Science and Technology. Jones' popularity within the Labor Party membership was also confirmed at the National Conference in July when the Party endorsed his S&T policy with only minor amendments. 76 Despite his lagging popularity with his parliamentary colleagues, Jones was so obviously popular with the electorate that it was decided to employ him extensively in the election campaign, at a variety of fund-raising gatherings and academic conferences. 77
The Federal election on 1 December 1984 saw a small swing (2%) against the Labor government and a loss of seven seats, leaving Hawke a comfortable 16 seat majority in an expanded House of Representatives. The electoral setback caused some disquiet within the Labor ministry and some ministers publicly criticised Hawke's handling of the campaign. But, undeniably, the government had a clear mandate to continue with its policies.

4.11. DITAC Formed

Early in December 1984, Hawke announced his second ministry. The Technology Development Division, MIC scheme, AIRDIS, and other technology programs of the Department of Science and Technology were moved into a new Department of Industry, Technology and Commerce (DITAC), under Senator Button. The remaining science programs, the CSIRO, the Commission for the Future, the Australian Patents Office, the ARGS, and the Antarctic, were maintained within a new "rag bag" Department of Science, under Barry Jones who was also made Minister for Small Business and Assistant Minister to Senator Button. It was a severe demotion for Jones, and hence for Science, while Technology gained by joining the portfolio of a Cabinet Minister, ranked third in the Cabinet.

The split between Science and Technology caused a great deal of controversy within the science community, but characteristically little action. I proposed at an AIP Science Policy Committee meeting shortly after the announcement of the new ministry that the AIP
should protest publicly at this new disaster for science. Painstakingly science, with Jones' prodding, had begun to establish closer links with technology and hence with industry. All of these gains were now threatened if technology could be seen to exist without close links with science. Despite my entreaties, the Committee simply moved onto other items on the agenda. The message seemed cold-bloodedly clear: Jones was not worth fighting for; Jones was dead, long live Button.

The absorption of technology within the bureaucratic, conservative, DITAC meant the end of "the spectacular rhetoric of the Jones era"; the emphasis shifted from grand visions of technological change and the post-industrial society to one of specific programs and reviews of performance. But, in some perverse way, the split between Science and Technology within the government, strengthened the desire of the scientific societies to work with the technological societies and explains, at least in part, why FASTS became a federation of scientific and technological societies.

After the announcement of the new ministry, Senator Button explained why Technology had been joined to Industry; it was as if Jones' success was his undoing:

In that regard I would like to pay tribute to my colleague Barry Jones for what he has done in the course of initiating that process of change - his very boundless enthusiasm, his knowledge and his ability to overview the field in the manner of an historian; ... He has had a major part to play in initiating debate and understanding on science and technology issues.

One of the logical outcomes of that heightened awareness is that technology must move much closer to industry, both in the world of industry and the world of government.
4.12. The OECD Report on Science and Technology

In a strange coincidence, the split between Science and Technology occurred as an OECD committee was reporting on the first OECD review of Australian science and technology since 1974. The committee described the split as "perverse"; Science and Technology were too closely intertwined to be separated in government. The committee was strongly supportive of Jones' efforts "in stimulating discussion of technological questions in 1983-84". They were critical of the low level of industrial R&D, of the cultural blocks to interaction between researchers and industry, of the low funding for universities, and of the prevailing attitudes which undervalued Australia's technological achievements and capabilities. They recommended that industry should provide more of the funding for R&D, that the CSIRO should obtain more of its funding from industry, that university funding especially for equipment should be increased, and that support for basic research through the ARGS should be increased.

During a one day meeting in April 1985 to discuss the OECD committee's draft report, a dispirited Jones told the meeting he "did not hold out much hope for increased funding [for science] and pointed out that science was not part of the political culture of the 1980s."
4.13. The Economy 1984

On 5 December 1984, four days after the election, John Menadue, Secretary of the Department of Trade, warned a meeting of the Export Development Group of New South Wales, that Australia's increasing foreign debt threatened Australia's standard of living. In 1983-84, Australia's gross foreign debt stood at $41,000 million, up $13,000 million since 1982-83, and 48% of export earnings were now going to repay interest and foreign capital debts. Australia, he told them, must increase its exports or reduce its standard of living.84

Notes

4 Ibid.
6 Ibid., p. 2.
8 Ibid.


Ibid., p. 66.


G.V.H. Wilson, "President's Column", The Australian Physicist, 20, July 1983, p. 133.

Johnston, op. cit., p. 49.


A. Beckwith, "Are we wimps?", Chemistry in Australia, Feb. 1985, p. 44.

Ibid.


Ibid.

Ibid., pp. 88-89.


Ibid., p. 227.


Ibid., p. 229.


Scitech, 4, Nov. 1984, p. 16.

P.W. Sheehan, "ARGS funds down by 64%", Chemistry in Australia, Feb. 1985, p. 46.

Anon., "Basic Research and the National Need", Ascent, 6, Apr. 1985, p. 16.

Ibid., p. 17.

P. Pockley, "Changing public and political perceptions of academics", Paper presented at a meeting in the Stephen Roberts Theatre, University of Sydney, to protest against the cuts in funding for research, 1 Nov. 1984, also in Chemistry in Australia, Feb. 1985, 48.


Ibid.


Ibid., p. 1.


R. Payling, "Defining the Scientist and the Technologist", The Australian Physicist, 21, Sept. 1984, p. 188.


G.V.H. Wilson, "Historic meeting of Australia's major scientific societies", Press Release, no date, but prior to 21 Nov. 1984.

G. Wake, interviewed by R. Payling, at University of Sydney, 10 April 1987.


M. Bennett, Notes on the National Committee for the Promotion of Science and Technology, 1985, Appendix 1. [AAS files]


M. Bennett, Notes on the National Committee for the Promotion of Science and Technology, 1985, p. 1. [AAS files]

M. Bennett, conversation with R. Payling, University of Sydney, 1 May 1987.


M. Bennett, conversation with R. Payling, University of Sydney, 1 May 1987.

G. Wake, interviewed by R. Payling, at the University of Sydney, 1987.


M. Bennett, Notes on the National Committee for the Promotion of Science and Technology, 1985, p. 2. [AAS files]
Ibid., pp. 3-4.


Ibid.


Ascent, 5, Nov. 1984, p. 46.


Scitech, 5, Apr. 1985, p. 5.

Part 2: (January-April) 1985

4.14. The Restructuring of Industry

Shortly after the announcement of his new, enlarged department, Senator Button addressed a National Science Forum luncheon and called on Australian industry to raise its low level of R&D. He criticised business for regarding R&D as an expendable item "which can be cut when the going gets tough", and large business, in particular, for not doing enough R&D. He also blamed the Federal Government for not setting the right financial environment for innovation.¹

He had convinced Hawke to include the new 150% tax incentive scheme for industrial R&D in the ALP's election promises, and the scheme, he promised the audience, would play a key role both in encouraging the level of industrial R&D and of developing links between companies and government funded researchers and academics.²

"This is tremendously important," he declared a little later. "The companies will begin to employ researchers from the universities and CSIRO and this will start the whole process of interchange and industry interaction."³ The development of links between groups is a key to Button's policies at this time.
But despite Button's optimism, his Department, the Department of Industry, Technology and Commerce (DITAC), was reportedly having problems with the details of its new taxation scheme, due for commencement on 1 July 1985. The difficulties hinged on the definition of R&D, specifically what would be acknowledged as R&D within the scheme, and on mechanisms to prevent abuse of the scheme. Treasury and Finance, the old bugbears of the Department of Science and Technology, were concerned about its potential for abuse and the open-ended cost. Throughout the first half of 1985, Paul Keating and the Treasury reportedly made concerted attempts to have the scheme deferred until late 1986. Fortunately for Button, Hawke continued to back the scheme, because of his election promise, and several business leaders spoke out against deferral of the scheme; big business had most to lose from any delay in the implementation of the new scheme. Harris Bolton, a Director of the Confederation of Australian Industry, declared:

We would be horrified if the [150% tax] concession was not introduced this year. It has widespread support amongst our membership and many companies are planning to expand their research facilities because of the tax concession.

Mr Keating's move raises the question of who is running the country ... If the concession is delayed it means that all the good work that Mr Hawke has done in recent weeks in restoring business confidence will go down the drain.

Button and his Department continued pressing hard to gain Cabinet commitment to the new scheme. Eventually, Button won. He did, however, have to accept some restrictions on the scheme, suppos-
edly to prevent abuse. These included the registration of all companies claiming R&D expenses, a minimum spending of $50,000 on R&D by each registered company, and the exclusion of equipment not used exclusively for research. This latter condition was insisted upon by Treasury despite the wishes of DITAC.

News that the scheme would come into force on 1 July 1985 as promised was met enthusiastically by business and industry. Delays in presenting the final details of the scheme, however, led to a great deal of confusion during the first 18 months of its operation. Companies were forced to grapple with the accounting complexities of the scheme without proper guidelines from DITAC or the Taxation Office.

4.15. Still More Relevance in Academic Research

At the National Science Foundation luncheon, and afterwards, Button hinted at changes to the CSIRO: "I'm concerned about the need for change in CSIRO. It's always been a sacred cow that has debarred people from asking critical questions about what it is doing". He also targeted CSIRO's international publications: "It is a horrifying thought," he said, "that through the publication of these papers overseas international companies have been able to pick up some of our best ideas." Here was an attack on the very international and open nature of science. Here at last was a truly powerful critic of the CSIRO, determined to bring about major change. But this time there was no attempt to bail out into the Prime Minister's Department
or covert attempts to undermine the Minister. Why? Had the CSIRO executive learnt its lesson with Jones? Was the less articulate and retiring Button less of a threat? Or, had the tide run so much against the CSIRO and scientific research that they dared not risk another confrontation?

Shortly afterwards, Senator Button was invited to meet the Australian Vice-Chancellors' Committee (AVCC), the first time a minister for industry had ever addressed such a committee. He told them of the need to direct university R&D to be more involved with industry:

We have entered a time when the links between the intellectual products of advanced research in the sciences and engineering and the physical products of industry are becoming closer and more direct.9

The funding situation for universities will improve, he said, once "universities have demonstrated their participation in national challenges", and suggested the ARGS's single criterion of excellence should be broadened to include national benefit.

Taking his lead from such statements by Senator Button, and similar ones by Senator Ryan, Minister for Education, that universities should become more accountable in their research activities, Professor Noel Dunbar, Head of the University Council of CTEC (the Commonwealth Tertiary Education Commission), wrote to university vice-chancellors suggesting universities should review the way they distributed their research funds. He wrote:
Clearly, not all research projects can be expected to yield results of immediate usefulness, but it is not clear that the present approach, which characteristically allows staff to follow their individual interests, is likely to result in the best use of the limited funds available.\textsuperscript{10}

He suggested that funds could be concentrated to support researchers with proven research ability while allowing others to concentrate more on teaching. Was this a first sign of acquiescence or a reasoned response to the need for change? The letter was greeted unfavourably by both the AVCC and by FAUSA, who saw it as undue interference in university internal affairs.

Professor Smith’s response to Dunbar, published in \textit{The Australian Physicist}, was to restate his principal position on the role of university research:

I would maintain that the primary role of the university is to provide an undergraduate education and post-graduate training. These activities, in particular the latter, are best served by involvement with the mental discipline and rigours of original research. This is not to deny the intellectual challenge of applied research. Indeed, there are ample opportunities for research of a fundamental nature that is directly relevant to problems faced by industry. However, such research cannot be undertaken successfully without the interest and commitment of industry beyond short-term pragmatism. This has been sadly lacking.\textsuperscript{11}

Smith’s criticism of industry’s lack of response followed months of effort to interest industry throughout Victoria in the expertise and facilities in his department at Monash University, and to establish
joint tactical research projects with industry. His efforts met with almost total indifference.

In the February issue of *The Australian Physicist*, Dr Brian Window, of the CSIRO National Measurement Laboratory, Sydney, published a stinging attack on the irrelevance of much of physics research in Australia:

Physicists are anything but fools. With a *sole* criterion of excellence, they avoid areas of technological relevance, with all the competition, aggression, patents, secrecy and even espionage, and concentrate on the more gentlemanly pursuit of technologically irrelevant knowledge, with its friendly international club of researchers. Life is much more pleasant. But does the [Australian] community want all the best talent in what have been called "sheltered workshops for intellectuals"? 12

The government's response on recognising this, wrote Window, has been to "discard the established academic community (including CSIRO) and to stimulate industry research [instead]." 13

4.16. *The CSIRO 1985*

At the end of 1984, Dr Paul Wild formed five working groups (composed of CSIRO staff and outside representatives) to review the CSIRO's operations, with the purpose of transforming the organisation through a 5-year strategic plan into a business structure aimed at national benefit rather than academic research. The working groups would have till May 1985 to consider such issues as: the balance
between rural and manufacturing programs, priorities, assessment of research performance, staff redundancies, and the linking of the CSIRO with industry.\textsuperscript{14}

Early in 1985, Jones made a dramatic and unsuccessful attempt to bring legislation before parliament to reform the senior management of the CSIRO and to place a non-scientist at the head of the organisation. It was to be the first of a series of steps to reform the whole organisation of the CSIRO. (His move has curious parallels with attempts in 1917-1918 by Prime Minister William Hughes to appoint a non-scientist as head of the Advisory Council - forerunner of the CSIR and of the CSIRO).\textsuperscript{15} Jones' move was strongly opposed by Button and Hawke, and Jones was reported to have received another reprimand from the Prime Minister, this despite Hawke's unhappiness with the performance of the CSIRO and despite Jones' earlier belief that both Button and Hawke were behind him.\textsuperscript{16} Dr Paul Wild, Chairman of the CSIRO, and Professor Arthur Birch, President of the Australian Academy of Science, were both known to be unhappy with the idea of a non-scientist running the CSIRO.

At a meeting attended by Hawke, Button, Jones, and Professor Ralph Slatyer, Chairman of ASTEC, it was agreed that, before any major changes were made to the CSIRO management, ASTEC should conduct a major, six-month inquiry into the structure and future directions of the CSIRO.\textsuperscript{17} Jones was unhappy with the idea of yet another enquiry but Button backed Hawke on the issue.\textsuperscript{18}

When the requests for submissions to the enquiry were posted on 7 May 1985, the ASTEC review of the CSIRO had broadened to a more general "Review of Public Investment in Research and Development in
Australia", with initial reference to the CSIRO. The Prime Minister's media release of 7 May 1985 stated:

Despite the changes [within CSIRO], there has been growing questioning in recent years of CSIRO's role in relation to the needs of the Australian community and industries, particularly the manufacturing sector.

Wild wrote of the ASTEC review: "CSIRO is without doubt one of the most reviewed organisations in the world. I know only too well that many of our staff are sick and tired of reviews, ..." Nevertheless, he welcomed ASTEC; presumably, the CSIRO had less to fear from ASTEC than some other less sympathetic government bodies.

In March 1985, Wild addressed a meeting of the Australian Industrial Research Group (AIRG) At the meeting, he dismissed the current atmosphere of criticism of the CSIRO as being based on current policies and priorities rather than on the policies and priorities operating when the research work was initiated. Professor Smith, sympathising with this point of view, wrote in The Australian Physicist:

The incessant criticism that is being directed at the research scientists for their failure to direct their efforts towards investigations of social benefit ignores the very considerable contributions that have already been realised from scientific research in Australia.
Wild continued, defending his organisation’s research record and criticising industry "for its failure to take up commercial opportunities and interact with the organisation." Business was not making the same effort to get close to the CSIRO, he told the meeting, as the CSIRO was in getting close to industry. Professor Slatyer also spoke at the AIRG meeting, commenting on the low level of industrial R&D and the need for Australian companies to become more competitive and export oriented.24

4.17. Preparations for the National Meeting of Concern

Following the first meeting of the National Committee for the Promotion of Science and Technology (NCPST), its chairman, Professor Max Bennett, contacted Professor Wilson, head of the "ad hoc" committee of scientific societies. He presented Wilson with the NCPST’s detailed plans for two secretariats. They then discussed the possibility of a joint meeting of their two groups to consider the establishment of the NCPST’s two secretariats and the Federation of Scientific Societies. Wilson later said of Bennett’s plans:

The Academy’s plans were extremely ambitious and would have cost the world; and the Academy didn’t have any money on that scale. So Max’s line was: "Why don’t we combine and get a Federation going as a consequence of the two separate initiatives."25
Wilson then contacted the other members of his committee who approved the idea of a combined meeting. Bennett, for his part, was impressed with Wilson's placating manner and his ability to overcome the fears of some of the more skittish people involved. Wilson and Bennett then issued a joint letter on 18 January 1985 to a number of scientific societies informing them of the activities of both groups and of the planned joint meeting.

When the NCPST next met on 1 February 1985, it was recommended that technological societies should also be invited to the joint meeting. Dr Ken McCracken, Professor Howard Worner, Wilson and Bennett then compiled a list of 68 scientific and technological societies, and, on 8 March 1985, issued invitations to the joint meeting which was to be called a Meeting of National Concern on Science and Technology.

In a guest editorial for *Search*, Wilson wrote of the aims of the joint meeting:

The aims of this meeting will be to establish a Federation of Australian Scientific Societies and to discuss the relationship between this Federation and the NCPST. It is hoped that this relationship will be such that the societies, through the Federation and the NCPST, will work together to ensure success in raising the esteem of Australian science and in the provision of adequate funding.

He concluded:

The desire of Australian scientists and their societies to cooperatively promote science has gathered significant momentum. It may not be an easy path but it is imperative that this
momentum be maintained and directed to successful cooperative ventures. 29

On 6 March 1985, Wilson and Bennett issued a second joint letter announcing details of the meeting of National Concern to be held at the Australian Academy of Science centre in Canberra on Tuesday 16 April 1985. The letter said that both Button and Jones were expected to address the meeting.

Bennett had hoped Wilson’s committee would organise the details of the proposed Federation, and, in particular, the selection of nominees for the Federation’s first Executive. Unfortunately, Wilson was heavily occupied with his duties as Rector of the Australian Defence Force Academy and had then left for overseas at this critical time. Alarmed that nothing was being done, 30 Bennett decided to approach a “number of Presidents and Councillors of Scientific and Technological Societies during early April, in order to form an Interim Federation Committee”. 31 As a consequence Bennett spent much of the time in the weeks leading up to the joint meeting on the telephone. 32 One of the presidents he contacted was Professor Fred Smith, the newly appointed replacement to Wilson as President of the Australian Institute of Physics (AIP). Smith agreed to Bennett’s request that he nominate as chairman of the Interim Federation Committee. “I was incredibly pleased,” Wilson said later, commenting on Smith’s nomination, “because I thought I might be heading for a job I would not be able to do properly because of the time involved.” 33
By the time Bennett had approached Smith, Smith had already formed some strong opinions on the proposed Federation and the two secretariats. On assuming the position of President of the AIP he had come across the joint letter of 6 March 1985 by Wilson and Bennett and wrote immediately on 15 March 1985, to Dr John Harries, the new Honorary Treasurer of the AIP, and other members of the new and old AIP executive:

While I favour the concepts embodied in the two [secretariat] proposals, in particular that concerned with relations with government, I am concerned at the level of funding required. If both Secretariats are to be formed a total of close to $400,000 will be required. The meeting of the eight major scientific societies claimed a total of 20,000 members, which would mean approximately $20 per member and this makes no distinction between the level of membership. I do not believe this would be acceptable, or appropriate.

My view is that we should first establish the Federation of Australian Scientific and Technological Societies (FASTS) before embarking on the sensitive area of funding. As far as I am aware, there has been no formal structure proposed for such a federation and obviously such matters will have to be resolved before a united approach to the establishment of the Secretariats can be contemplated.34

In discussions with AIP members and with members of a number of other societies, Smith found a unanimous view that the societies were not prepared to put a lot of money into a venture run by the Academy. One member told Smith: "This is what the Academy should be doing and why should they come to us just to pay for it."35
Smith then discussed these responses with Crompton and Bennett and, as a consequence, the Academy agreed simply to put forward their proposals for two secretariats and allow the societies to finance and take responsibility for the venture. The Academy would facilitate wherever possible and then bow out. So the direction had changed, from a Federation which did the work of the Academy to one which cooperated with the Academy.36

Crompton and Pockley continued working on separate proposals for the two Secretariats. At the meeting of the NCPST on 28 March 1985, and in a telephone conversation on 2 April 1985 between Bennett and Crompton, it was decided that the joint meeting on 16 April 1985 should be asked to establish only an interim committee to work out the details of the Federation. The meeting would be asked to establish a Trusteeship for the Secretariats, and agree in principle to the formation of the Secretariats, to establish a finance committee, and to compel each society to make "an immediate financial commitment to provide the necessary working finance". The finance committee would aim initially at getting 50c per member from each of the scientific societies, but up to $5 per member was thought possible. Overriding these matters, it was considered "imperative that the Federation be in operation before the end of the year" and that a second meeting of the societies be planned for September 1985, at which "the full financial structure and the legal basis of the Federation" would be determined.37

On the night before the National Meeting, Wilson, Crompton and Bennett met to revise the constitution for the Interim Committee and the resolutions to be agreed to by the meeting, both the constitution
and resolutions having been prepared initially by Peter Vallee, Secretary of the Academy.

4.18. The National Meeting of Concern on Science and Technology

The News Release of 9 April 1985 announcing the National Meeting of Concern on Science and Technology proclaimed: "The first-ever gathering of representatives of the entire scientific and technological expertise of Australia": 68 scientific and technological societies plus the two national academies with total membership of over 100,000. Allowing for cross-membership the total number represented at the meeting was estimated at 80,000. The News Release emphasised the role the NCPST had played in organising the meeting; Wilson's ad hoc group of eight scientific societies appeared merely as an adjunct. Senator John Button was to address the meeting but Barry Jones, who had also been invited to speak, was, unfortunately, overseas. The primary goal of the meeting was to provide "the first opportunity for scientists and technologists to bring their acts together in the common pursuit of a broad base of public understanding and political support."

The meeting was held in the Ellerton Becker Building (popularly known as the "Dome" because of its flying-saucer like shape) of the Australian Academy of Science, Canberra. The meeting opened with speeches from Professor A.J. Birch, President of the Academy, and Senator Button, Minister for Industry, Technology and Commerce. Professor Birch said it was "an historic occasion", a "groundswell
from the grass roots" of science, with the Academy acting as a catalyst. The aim, he put simply, was "the public benefit": the public, he said, would benefit from "authentic information and views on science and technology" and from the long-term benefits which flow from "adequate support for research in science and technology." He defended fundamental research: "I believe too," he said, "that the cultural importance of science is profound. Australians are missing one of the major outcomes of human development if they do not realise and enjoy the often unseen subtleties and beauties of our magnificent and frightening Universe."

Senator Button said he, as an industry minister, was particularly pleased to speak at the meeting because it showed a developing link between science and technology and industry. The meeting also showed, he said, that scientists from a wide range of activities were prepared to discuss the place of the profession "in Australian life and industry." While admitting that one of the main purposes of the meeting was to discuss funding, Button said that funding should be seen within "the context of government industry and technology policy". In the past, he explained, Australian manufacturing industry had relied on high tariff walls and import-replacement. A strong, government funded R&D base had grown to support this. But today, manufacturing industry must become more competitive internationally, or go under; industry must restructure, be outward looking and do more of the R&D itself. This process, he said, "will cost money - public money ... and in a tight budget situation it will have implications for existing research bodies ... It throws upon them the onus for getting better value for money from their budgets, and for
critical and continuous evaluation of programs." He admitted that the
CSIRO had experienced funding cuts; but, with projected government
expenditure of $135 million for 1985/86 on industrial R&D (including
$80 million for the 150% tax concession, in revenue foregone), the
government was increasing its overall R&D spending but in areas of
greatest need.

Less welcome to the audience, Button also expressed his reserva­
tions about the value of the current level of basic research, arguing
that it was a community decision and rejecting any one-to-one rela­
tionship between basic research and future benefit. Smith wrote
later, in The Australian Physicist, that Button was "quite blunt on
the subject of basic research in his opening address" and commented:
"There is no doubt that the basic scientific research community is
being placed under substantial pressure to move into applied Research
and Development to compensate for the poor performance in
industry."40 Button ended his speech in his convivial fashion by
welcoming the planned Federation of societies and the opportunity for
dialogue with it.

The meeting was next addressed by Professors Bennett and Wilson,
chairmen of the two committees which had joined forces for the
National Meeting of Concern. Bennett, who also acted as Chairman of
the meeting, blamed manufacturing industry for the low level of
support for R&D:

the basic research community is being encouraged to move into
either applied research or experimental development, to make up
for the disastrous level of support of experimental development
from industry. The basic research community is deeply concerned
that government support for its activities is about to decline because of this national priority of getting the experimental development effort moving.41

But the purpose of the meeting, he reminded them, was not to discuss the current concerns of the S&T community but "to put in place mechanisms which will allow for such dialogue ... in the future."

Professor Wilson began by saying that this was a meeting of "Concern": successive Australian governments had "not shown enthusiasm over basic research", the level of private support for research was "abysmal", and the concern of Australian scientists had risen to a critical level "through the great disappointment over the last Federal Budget". The government, he said, was stimulating industrial research "at the expense of grossly inadequate support for basic research."42 The Australian Institute of Physics had tried for some years to gain increased support for Australian research but the recognition came "that no one society" could "adequately carry out" this task on its own. He therefore recommended the formation of the Federation of Australia's Scientific and Technological Societies and of the two Secretariats, which would be operated by the Federation. He said the two Secretariats were "of outstanding importance for the future of Australia". He supported Professor Fred Smith's nomination as Chairman, for "his ability and energy". He concluded: "I am certain that the cooperation between Australia's institutes and societies which stems from this meeting will prove to be of lasting significance."
Drs Bob Crompton and Peter Pockley then spoke in support of the two Secretariats: on Government Relations and a Science and Technology Information Service, respectively. Crompton began by saying that "scientists as a whole have extremely poor channels of communication with governments" and then described the proposed Secretariat on Government Relations as "a lobbying spearhead". In the political climate of 1985, he said, because of the "enormous pressures" on government, adequate funding comes only through "overt and well orchestrated lobbying activities." His statement brings to mind a pluralist democracy facing "economic difficulties" and "policy overload". It also suggests the style of lobbying suited to Hawke's consensus politics. The lobbying task of the proposed Secretariat, Crompton proposed, would be conducted on three levels: news items in newspapers, radio and television at critical times in the budget process; personal contacts between scientists and government officials; and "the maintenance of a data base" on S&T funding and manpower. The Secretariat was thus poised to fulfil the first two of Lakoff's political roles for scientists: advocate and adviser. The Secretariat would require three full-time staff and one part-time consultant and cost an estimated $213,000 per annum. Crompton concluded:

It is ambitious and costly, but when the cost is spread throughout the whole scientific community the cost per head is trivial compared to the benefits likely to accrue to science in this country and therefore to Australia itself.
Dr Peter Pockley began his speech with a striking image of the anonymous figure of science and technology trying to gain the attention of a passing audience, waving its arms and uttering "some complicated words strung together in a tortuous syntax". When the figure shouts, "Help!", the passersby pause for a moment, some heckle, and then pass on.\textsuperscript{44} If we scientists, he explained, have not painted a picture of our world for others to appreciate then we should not expect them to understand our problems, or the value of our work:

No artistic company, no public media service, no scientific research program has any fundamental resources other than those based on three factors, namely, the recognition of its quality, the acceptance of its public standing and the loyalty of its followers. One abandons any one of these at peril.

This view of science is far removed from the scientist's usual position of the intrinsic and self-evident worth of scientific endeavour. This science is on par politically with all other human endeavours.

The Information Service, Pockley described, would provide a free network of "reliable and articulate experts" on S&T matters and collate information on R&D in Australia "in terms which are meaningful to reporters, students, teachers, politicians and the public."\textsuperscript{45} The Secretariat would require at least one full-time director and two other part-time staff and cost an estimated $185,000 per annum.
4.19. The Audience

Sixty eight societies were invited to the meeting and only 15 of these sent apologies. The largest societies were the Institution of Engineers, Australia with 35,000 members, the Australian Computer Society, with 9,500 members; the Royal Australian Chemical Institute, with 7,500 members; and the Australian Geoscience Council, with 7,000 members. Amongst the smallest societies were the Australasian Society of Phycology and Aquatic Botany, with 104 members; the Society of Crystallographers in Australia, with 120 members; the Australian Society for Biophysics, with 150 members; and the Australian Academy of Technological Sciences, with 154 members. Present, in addition, were invited representatives from government departments, the CSIRO, AVCC, ASTEC and others.

Amongst the attendees was Dr Colin D. Branch, President of the Australian Geoscience Council (AGC) and Director (Resources) of the South Australian Department of Mines and Energy. In late 1984, while serving as an ex-officio member of the Australian Academy of Science's National Committee for Solid Earth Sciences, he had heard "persistent rumours" that concerned groups were meeting, but had, at that stage, received no official invitation for the Australian Geoscience Council to become involved. By persistently ringing officers in the Academy, through February and March 1985, he eventually received an invitation for the AGC to be represented at the April meeting. Three other geoscientific societies, all members of the AGC, were also invited to send representatives, and they jointly agreed that, as President of the AGC, Branch should speak on their behalf.
Before the meeting, a most unfortunate incident occurred which caused Branch to be even more determined "to have the voice of geoscientists heard clearly". He writes:

While talking to one of the organisers before the meeting [the person is not identified] it was indicated to me that the geoscientific societies had been omitted because their inclusion could cause an adverse public reaction as a consequence of the perception held by many of the environmental impact of mining.

For Branch this indicated "a narrow, biased viewpoint within the organising committee", which afterwards created unnecessary ill-will in the Australian geoscientific community.46

Another society not well disposed towards the aims of the meeting was the Australian Computer Society, represented by both its President, Alan W. Coulter, and Vice President, Wing Commander (Retired) Dr Ron Christie. Both were of the opinion before the meeting that the original Academy proposals were too extravagant.47

And the Federation did not appear to be offering anything that the Australian Computer Society did not already have: "We already have media exposure," Christie explained, "we have an eye on publications, we have our own offices, a national office and branch offices, we are a national body, and we have a large number of members."48
4.20. The Resolutions

The Academy's strategy for the meeting required that three predetermined series of resolutions be put to the meeting, and approved by the meeting. The first group consisted of three unobjectionable, broad statements on the need for greater cooperation and communication between societies and for increased public awareness of science and technology issues. These sentiments were agreed to by the meeting and in addition the meeting affirmed:

1. its belief in the importance to the community of maintaining the quality of Australian science and technology, and its wish to see their full potential for the national benefit realised;
2. its support for progressive and balanced expansion, in real terms, of the nation's effort in basic research, applied research and experimental development.

The second series of resolutions concerned the formation of an Interim Federation Committee, to draft a constitution and organise the finances of the Federation of Scientific and Technological Societies, with the details of the Federation to be put before a second meeting of the societies in six months time. The Interim Committee was to consist of 10 members covering a broad range of disciplines with a mix of small and large societies.

The third series of resolutions concerned the Secretariats - which would come under the control of the Federation - and the need for an annual funding at a rate of $5 per member, with an immediate contribution of $1 per member to fund the Interim Federation Committee.
Wing Commander Christie reacted strongly against this programmed organisation of the proceedings:

We arrived at the first meeting and people stood up and presented us with a blueprint: this is the order of business, these are the fees, this is how we will do it, etc. It was well thought out, ... if you had an army all ready in being it was a good plan of attack, but there was no army in being and it was a presentation to a lot of very independent people.49

Alan Coulter, President of the Australian Computer Society, spoke in favour of the Federation, which he said could "be achieved fairly quickly without a great deal of cost to the member Societies", but said he was concerned that the meeting's papers and agenda linked the Federation with the Secretariats which could undermine support for the Federation: "The formation of the proposed Secretariats is a matter of a wider debate which indeed could erode the basic demonstration of a solidarity of purpose by forming a National Federation."50

Obviously still stinging from the academician's comments before the meeting, Dr Colin Branch referred "to Button's address in which he spoke of the mining and petroleum industries as producing a considerable proportion of our national wealth" and then spoke strongly "about the way the geoscience sector had been ignored in the lead-up to the meeting of concerned scientists," yet, he added, the "AGC in its particular field had already established an organisation which could be a model for other groups of scientific and technological societies." The AGC, he told them, consisted of 7,000 members in nine societies and 12 related organisations which had formed into one umbrella organisation in 1983.51
At one stage during the proceedings a good deal of dissent was voiced, especially from the back of the auditorium. Christie recalls:

I can remember people standing up at the back saying: "Well, I come from such and such Society [possibly Laurie Gillard of the Royal Aeronautical Society] and we've got 120 members and if you think our members are going to pay $10 a head to join something which we don't even know what it's going to do and keep somebody in beer and pretzels and talk to journalists then you've got rocks in your head." There were a couple of people who weren't quite as forthright as that but who spoke along similar lines. In reality the whole thing could have folded on that first day.52

Dr M. Rickard, Senior Vice-President of the Geological Society of Australia, said he was "cool" on the Government Relationships Secretariat proposal. Noel Herbst, Executive Director of the Australian Institute of Metals (AIM), said he foresaw conflict if the Federation was dominated by academics and the CSIRO: "There is a conflict here," he said, "and don't think you can push it under the carpet."53 There were other calls for more industry/technology society representation. The Australian Academy of Technological Sciences, it was suggested, should take responsibility for nominating more technology societies. Herbst reported to the AIM:

The feeling of the assembled societies was that there was a need for a Federation of Australian Societies.

There was, however, a demand for a more balanced approach than that originally proposed by the N.C.P.S.T. where there was little representation from those organisations such as the A.I.M. and the A.I.M.F. [Australasian Institute of Metals Finishing], who were predominantly concerned with the manufacturing industry.54
Sally White reported in *The Age* that "the tension of sectional interest vibrated during much of the meeting".55 And *Scitech* reported:

Overall, the meeting was enthusiastic about the formation of the federation but the importance of sectional interests was very apparent with much argument during the day over funding and the need for the secretariats.56

Professor Wilson noted some anti-academy feeling in some of the comments made by societies: "Societies wanted the recognition and responsibility alone; there was some unhappiness initially that the suggestions were coming from the Academy which had, in some minds, an elitist view."57

Considering the central role of the Academy in organising the National Meeting and the general concern amongst scientists for the funding of science, this anti-academy sentiment is curious. Bennett said later that many people had unreasonable expectations of the Academy. The Academy, he explained, was set up with the joint purpose of the pursuit of excellence in research and the dissemination of knowledge. The lobbying of government was not really within its reason for being. It was proper, nevertheless, he argued, for the Academy to assist in the setting up of an organisation outside the Academy to lobby government on its behalf.58 Smith also commented:

a lot of people in the Academy do not see the function of the Academy is to represent the broad scientific community. The Academy's function is first of all to serve as a body which represents leading members of the scientific community.59
In a survey of the members of the Academy conducted in 1980 to determine what the members saw as the principal role of the Academy, Ann Moyal found:

half of the respondents saw this [role] as the promotion of excellence in scientific research, while the remaining half saw it variously as giving independent and responsible advice to government, maintaining and advancing Australia's international contacts in science, providing a national centre for scientific discussion and debate, and informing the public about the development and the social implications of science.60

Many of these activities they were now proposing to hand over to the Federation.

The meeting finally approved the setting up of the Interim Federation Committee (IFC) but not the Secretariats, leaving it as a matter for the IFC to consider. Indeed the meeting determined that the Interim Federation Committee should not be constrained to the format suggested by the NCPST. The Academy responded by saying that if the format adopted by the Federation was too far removed from its proposals then the Academy reserved the right to consider its own organisation. When, later, FASTS failed to establish an information service, the Academy went ahead to form its own National Science and Technology Information Service.
The preliminary selection of the ten societies for the Interim Federation Committee was organised by Crompton prior to the meeting, to ensure representation of a broad range of scientific fields, but the final selection on the day was influenced by Bennett's desire to have some of the strongest critics of the Federation inside the committee where their criticism could be employed constructively. Smith was elected Chairman; he told me afterwards: "I must confess at that time I felt singularly unprepared for the whole business because I had not been intimately involved in the planning." Professor Geoff Wilson was elected Co-Chairman. Branch stood because of his desire to give the Australian Geoscience Council a voice in the Federation. Christie accepted nomination, explaining later, somewhat incredulously, in the light of future events: "I'm one of those volunteers that are always pushed from the background." Dr Bob Anderssen, President of the Australian Mathematical Society, was appointed Treasurer. Laurie Gillard, of the Royal Aeronautical Society of Australia, accepted but later withdrew; and Dr E.N. Fitzpatrick later replaced Dr G. Thomas as agriculture representative. The meeting allocated one position on the IFC to an industry society. The Australian Institute of Metals later nominated H. Campbell Coe, Director of BHP Melbourne Research Laboratories; Coe was also a member of the Australian Industrial Research Group. By an unfortunate oversight the Interim Federation Committee did not contain a representative from the Institution of Engineers, Australia. Of the original eight scientific societies at the historic meeting in November 1984, five were represented on the IFC.
A constitution for the IFC was put to the meeting and approved subject to two references to the Secretariats being removed. This left the primary aim of the IFC the formulation of a constitution for the Federation and consideration of its financing. The constitution did, however, give the IFC some latitude in initiating other activities:

The Interim Federation Committee shall also give further consideration to the activities proposed by the Meeting for the Federation and initiate such activities as it considers reasonable provided that adequate funds are held by the Interim Federation Committee.

4.22. Reactions to the National Meeting of Concern

Sally White wrote in The Age newspaper, and I quote at length because of the personal insight it gives:

Professor Fred Smith looked rather lugubriously into his champagne glass. "I feel rather stunned. It seemed to be such an enormous leap and it was done so quickly." ...

Since Tuesday his colleagues have been offering their congratulations - and commiserations because the professor will have his work cut out in the six months the committee has to draft a constitution acceptable to its diverse membership.

It is hard for the outsider to realise the significance of the scientists' decision to join forces to explain the value of science and technology to an often unreceptive nation.
One of the greatest problems with scientists, Professor Smith says, is the lack of cross-fertilisation between diverse specialities. "Very often they simply do not understand the thinking or the approaches of other scientists outside their own disciplines," he says.

But a start has been made with the endorsement of a federation. That, in itself, was something for which it was worth breaking out the champagne.64

And Smith himself wrote in The Australian Physicist:

I was honoured to be asked to act as its [IFC] chairman. I see this not merely as a personal honour but more as a recognition of the leading role that the Institute [of Physics] has taken in stimulating discussions on science policy.65

In a guest editorial for Search, he added:

I will not pretend that fulfilling the obligations placed upon the Interim Federation Committee is going to be easy. From the outset, it must be recognised that FASTS is for the benefit of all members of the scientific, engineering and technological communities. It is not intended to serve the aims and interests of one selected segment. This will necessarily require good will and an effort at understanding by all involved. I believe that the successful establishment of FASTS is so important for the future of Australia that the Interim Federation Committee must not fail.66

Jeffrey Skellar, reporting in Nature, concluded: "The scene is set, then, for the emergence of science (and some scientists) from the shadows where they have languished politically for so long."67
Notes

2. Ibid.
5. Scitech, 5, May 1985, p. 3.
9. as quoted, Ibid., p. 19.
10. as quoted, Scitech, 5, Apr. 1985, p. 17.
13. Ibid.
26 M. Bennett, conversation with R. Payling, at the University of Sydney, 1 May 1987.
27 M. Bennett, Notes on the National Committee for the Promotion of Science and Technology, 1985, p. 4. [AAS files]
29 Ibid.
30 M. Bennett, conversation with R. Payling, at the University of Sydney, 1 May 1987.
31 M. Bennett, Notes on the National Committee for the Promotion of Science and Technology, 1985, p. 4. [AAS files]
32 M. Bennett, conversation with R. Payling, at the University of Sydney, 1 May 1987.
36 Ibid.
37 M. Bennett, Notes on a telephone conversation with R. Crompton, 2 Apr. 1985.

P. Pockley, "The political and public initiation of science and technology - or - on painting and peopling the landscape", National Meeting of Concern on Science and Technology, Canberra, 16 Apr. 1985, also in Ascent, 7, Aug. 1985, p. 16.


Ibid.


Ibid.


Ibid.


M. Bennett, conversation with R. Payling, at the University of Sydney, 1 May 1987.


64 White, *op. cit.*, p. 15.
It needs no critical exertion to reduce utterly to dust any deductions drawn from history. It is merely necessary to select some larger or smaller unit as the subject of observation ...

L. TOLSTOY, War and Peace, 1869

The dominating influence on the Australian economy and politics through the period 1983 to 1985 was the economic downturn and the threat this posed to Australia's world position and internal standard of living. Australia faced growing debt abroad, and higher inflation, interest rates, and unemployment, and the growing social problems which accompany difficult times, low morale, crime, family conflict, and a growing disparity between rich and poor, within. The economic downturn brought calls for increased government intervention, from some, and calls for more conservative monetary and free market policies from others, particularly from within the major economic agencies, the Treasury, Finance and the Industries Assistance Commission. The response of the new leader of the Labor party, Bob Hawke, to the economic downturn was "consensus". During the 1983 election campaign, he promised consensus would bring all Australians together
again to tackle their common economic problems; but, after the
election, this public consensus became in effect a consensus amongst
the major power brokers: government, big business and the ACTU. Some
saw this as a thinly veiled form of corporatism and warned against
the loss of democratic power it threatened for the Australian public.
The Hawke consensus also accompanied an historical trend amongst
insider groups to form larger, more influential umbrella organisa-
tions; the Hawke initiative accelerated this process, especially in
the case of FASTS.

As an early step towards consensus, the new Labor government
convened a National Economic Summit in May 1983. The Economic Summit
served to emphasise the marginal role of science and technology in
Australia. Science and technology organisations were deliberately not
invited to the Summit, and Jones and his controversial technology
paper were specifically excluded, by Hawke.

In response, Jones called his own National Technology (Summit)
Conference. Out of this rose the even more controversial National
Technology Strategy which, because it put so many government depart-
mental noses out of joint, contributed to Jones’ loss of influence
with Cabinet. For the Australian Institute of Physics, the National
Technology Conference had the fortunate consequence, however, because
of the Institute’s submission and Wilson’s presence at the confer-
ence, of raising the prestige of the Institute within the science and
technology community.

The economic downturn in Australia was matched by the continuing
spectacular rise of Japan. Hawke’s enamour with Japan’s economic
success led to an emphasis within government policy on industry
restructuring, rather than on Jones' much criticised sunrise industries policy. This emphasis led eventually to the formation of DITAC (the Department of Industry, Technology and Commerce), and the consequent demise of Jones' Department of Science and Technology. It represented a major blow to Jones' fortune.

Within all this, the science and technology community was struggling to come to terms with the new economic and political situation, which promised, especially after 1984, less money for basic research and less autonomy for all government funded research bodies, in particular in the way this reduced amount of money would be allocated and increased the need for priorities. The new situation threatened not only the distribution and growth of Australian research but attacked the very nature of that research and of the supposedly free and apolitical science which nurtured it.

Up to this point, leading scientists had formed parts of official insider groups, ASTEC, the ARGC, ad hoc S&T committees; they had influenced government policies through their involvement in policy communities, and in formal responses to government enquiries. But in the new climate, they were, as Jones accused them, "politically naive", and not good as a "pressure group". Specifically, the science and technology community lacked a central, and powerful, voice with which to speak to government, to business, and to the Australian public. But at the very time when, driven by the threats to science funding, scientists were beginning to speak up and take a more active role in science policy, they came under increasing criticism for the apparent irrelevance of much of their research. The criticism succeeded in undermining their authority, their prestige and hence their influence.
Principal amongst the scientific organisations being criticised was the CSIRO. Historically, the CSIRO has maintained a major research effort in primary industry, and has claimed many successes in this area; but, partly because of the long-term nature of scientific research, partly because of the non-transferability of scientists between different scientific disciplines, partly through conservative management, and partly from its sheer size, the CSIRO struggled in its efforts to shift its direction towards more industrial research. It was not quick enough or early enough for the government's liking. In addition, the CSIRO lost credence over its handling of the multi-million dollar Australian Animal Health Laboratory and for its mistreatment of Stuart Macdonald and his criticism of the CSIRO's dung-beetle program.

But the CSIRO was not alone. University research was also coming under increased criticism for poor management of its research funds and for the irrelevance of its research to the pressing economic needs of the nation. Leading university researchers responded, in the main, by defending the value of basic research - often via the discredited linear model of innovation - without addressing the underlying political problem of who should decide what research is done, with public money.

The government continued on with its program ignoring their outcries. Given the tight economic position, the R&D cake would not be increased. Given the need to raise the low level of industrial R&D to foster industry reconstruction, through increased government support for industrial R&D (chiefly through the 150% tax incentive scheme), there would of necessity be less money for basic research.
Leading academic researchers decried this decision as economic pragmatism, as sacrificing the long-term future of the country for short-term political gain. Their disappointment meant even more trouble for Jones, because of his election promise to increase funding for basic research through substantial increases to the ARGS.

But the government agenda went further. Since the value of basic research is largely unrecognised outside the academic and science and technology communities, there appeared, to outsiders, no strong arguments in favour of academic scientists being allowed to continue to decide the direction of their own research work, using public funds without reference to public need. On the contrary, it was argued this *laissez-faire* approach had led to no readily identifiable major economic advantage to Australian industry, and had instead contributed to what was well-recognised, the gulf between academic research and commercial exploitation. Despite scientists arguing that this gulf was largely the fault of industry with its low level of industrial R&D, the government began pressurising academic scientists to redirect their efforts towards industry.

Academic scientists had lost twice: money and autonomy. They came to feel they were being blamed for Australia’s economic woes. This emotional aspect of the science debate was further fuelled in their minds by an awareness of the general aging of the academic community, of the plight of their post-graduate students, and of the poor prospects for their undergraduate and post-graduate students for careers in science. High school and undergraduate students were increasingly turning away from the sciences to the more lucrative fields of economics, business, law, medicine, and computing.
They could expect little sympathy from the politicians. The federal parliament - including Cabinet - which sets broad policy directions for the Australian economy consists largely of lawyers, accountants, and professional politicians, who have little knowledge or even interest in science and technology matters and who, as a consequence, treat such matters as peripheral to their major concerns. Their backgrounds and interests force science and technology into the background of federal politics.

Amongst the many, often conflicting, ideas influential through 1983 to 1985 - consensus, free market, intervention, economic relevance, the value of basic research - of special interest to the S&T community was the concept of a Post-industrial Society, pressed so forcefully and articulately by Barry Jones. Post-industrial Society, to them, represented profound technological change. Technology was seen as central to a modern economy, and technological change the most important long-term social issue. In its economic aspect, how was Australia to adapt to this technological change, to remain competitive internationally? The answer seemed obvious: through science and a scientifically literate society.

The Post-industrial Society thesis - in conjunction with the theories on long-waves in economic activity and the central role of invention in generating economic activity - produced Jones' Sunrise Industries policy. It contributed indirectly to the first version of the National Technology Strategy, and directly to the raising of expectations amongst scientists of the essential and important role scientists would play in the new and future society. Scientists were therefore all the more frustrated at the apparent apathy even antipa-
thy amongst politicians towards science and technology and the obvious marginal nature of science in Australian politics.

When the science and technology community received its first articulate and committed Science and Technology minister in Barry Jones, in the main, it welcomed his arrival and agreed with his policy directions. But when their expectations were unfulfilled in the 1984 federal budget and Jones had fallen from political favour and influence, they were prepared not only to dump their foremost political spokesman in favour of the more powerful but scientifically doubtful, John Button, Minister for Industry, Technology and Commerce, but blamed their failure to back him on his shortcomings as a politician. Jones had been opposed in Cabinet by two of Cabinet's most powerful ministries, Treasury and Finance; it was a most unequal fight. Throughout 1983 and 1984, Jones had repeatedly asked the scientific community to speak up, to support his policies. They had done so, largely ineffectually, merely as individuals; they had not supported him en masse, simply because there was no mechanism in place to do this. In hindsight, the scientific community should have formed FASTS in the good times of the 1960s or during the less certain years of the 1970s, so that it was there in place when needed by Jones in 1984. The advantage he might have derived from this is evident in the way Button was able to force his 150% tax incentive scheme for industrial R&D past the Treasury and Finance with the support of industry and the Confederation of Australian Industry.

The needs and concerns of the science and technology community, though contested from time to time, as in the Australian Association of Scientific Workers from 1939 to 1949, or, more recently, at the
ANU Seminar on "Science Research in Australia - Who Benefits?" in 1983, are largely expressed through the heads of the scientific hierarchy, the university professors or their equivalents in government laboratories and the heads of scientific societies. These heads of science, though the most politically active of Australia's scientists, nevertheless tend to speak up for science in defence of the status quo. Hence, it was largely through their efforts that basic science was defended in 1984 and FASTS formed in 1985.

Geoff Wilson, along with Fred Smith, met Barry Jones in April 1983, soon after his appointment as the new Labor Minister for Science and Technology. Wilson attended the National Technology Conference in 1983, contributed to the National Technology Strategy through his society's submission, was outspoken following the 1984 federal budget, called together a small number of heads of leading societies in November 1984, joined with Max Bennett to call the National Meeting of Concern in April 1985 (which approved the Interim Federation Committee), and served on the Interim Federation Committee. For his contribution to the formation of FASTS, he was appointed to the inaugural position of Past-President of FASTS. His efforts and those of Fred Smith, who chaired the Interim Federation Committee and became FASTS's first President, as well as the many reports of the AIP Science Policy Committee, helped raise the prestige of the AIP to the point where the scientific community looked to the Institute for leadership in forming FASTS.

Peter Pockley recognised early the need for an increased public voice for science in Australia. His persistence was influential not only in the eventual formation of the National Science and Technology
Information Service but in galvanising the more reticent leading members of the S&T community to speak up for science.

Paul Wild disrupted Jones' early attempts to raise the profile of science and technology within the government program when he attempted to bail the CSIRO out of Jones' department immediately after the election in 1983, and entered a very public dispute with Jones over changes to the CSIRO, damaging both the prestige of the CSIRO and the support for Jones. He was, however, outspoken after the 1984 budget in support of greater R&D funding and encouraged other officers of the CSIRO to be equally outspoken on trends in government support for R&D.

Another campaigning for increased R&D funding was Peter Sheehan. His concerns, especially over inadequate funding for scientific equipment, were communicated to the scientific community, through Smith and the AIP Science Policy Community to the physics community, and through Frank Larkins to the Chemistry community.

Members of the ARGC, particularly Bruce Stone who pressurised Wilson and Gerry Wake into action, played a crucial role in the formation of FASTS by providing the early motivation of more funds for the ARGS and by providing a meeting place for leading scientists to discuss the parlous state of Australian science.

Also outspoken, especially after the 1984 budget, was Arthur Birch who protested through media releases and letters to politicians and newspapers. Another and newer academician, Max Bennett, then took on the challenge to form the Academy's National Committee for the Promotion of Science and Technology. It was his enthusiasm, despite criticism from others within the Academy, which brought the Academy
of Science into such an open and political position in the science
and technology debate and to support so generously the formation of
FASTS. He joined with Wilson to call the National Meeting of Concern
and was responsible for much of the preparation leading up to that
crucial meeting. Within his National Committee for the Promotion of
Science and Technology, Bennett was well supported by Peter Pockley
and Bob Crompton who took on the responsibility for building cases
for the two aborted Secretariats.

Though FASTS represents the political interests of a community
of 60,000 Australian scientists and technologists, a surprisingly
small number of names from this large community recur repeatedly in
the events leading up to the formation of FASTS: Wilson, Smith,
Pockley, Bennett, Birch, Farrell, Wild, Sheehan. When one considers
the leading position of many of these in the science hierarchy and
the essentially non-political role adopted by most Australian scien-
tists in the pursuance of their research and scientific careers, it
is soon obvious that the number of scientists actively involved in
politics, in science policy, in communicating science to the public
in Australia is remarkably small. Any criticism of those actively
involved must therefore be moderated by criticism of the many who are
not actively involved. If the voice of the many is not heard, who is
to blame?

The small active number involved in the formation of FASTS not
only had to agree on the need for such an organisation, amongst
themselves, but had then to carry the great bulk of non-active
scientists along with them. Yet, so convinced were these few of the
enormity of the crisis facing Australian science and of the extent of
the disquiet within the Australian scientific community, they had no hesitation in their claiming to represent the "grass-roots" of Australian science. Their convincing other members of the executives of scientific societies - most of whom held similar views on the size of the crisis in Australian science - to go along with them would clearly prove a much easier task than convincing the great mass of scientists and technologists, over the long term, of the need for FASTS.

The thesis began with the contention that science was intrinsically political, in its hierarchical structure, its networks, its reward structure, its roles as advocate, advisor, and adversary in science and technology issues, and its rational approach to politics. It follows from this that the early failure by scientists to address these political aspects of science doomed science to a marginal role in Australian politics and gave an opportunity for non-scientists to determine the politics of science. Up to 1984, an apolitical science had meant there was no effective political voice for science, in Australia. In facing up to the new politics of science, of which the formation of FASTS is a major first step, scientists have had to come to terms with a dilemma that hitherto they had held the highest form of science to be disinterested, that is, apolitical science.

The magnitude of the crisis in 1984 which produced FASTS indicates the essentially internal nature of this crisis; it is not explicable simply in terms of the reaction to the small shifts in R&D funding in the 1984 federal budget. As Sally White reported in The Age following the decision to form FASTS: "It is hard for the outsider to realise the significance of the scientists' decision to join
forces to explain the value of science and technology to an unreceptive nation."\textsuperscript{2} The marginal and powerless position of the scientific community in 1984 demonstrates the inadequacy of a definition of science which excludes the broader social and political aspects of science. The politicalisation of science which FASTS represents means scientists, down to the grass-roots, will have to come to terms with these broader aspects of science, not external to science but internal to science, if FASTS, over the long term, is to succeed and survive.

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