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The Employment of German Scientists in Australia after World War II

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ABSTRACT *Soon after the end of World War II the Australian Government brought scientists of defeated Germany to Australia. They were to work in government institutions and private industry to contribute their expertise to improving Australian science and to improving Australia's industrial efficiency. The Allied powers occupying Germany were engaged in a scramble to appropriate German expertise for the next phase of the arms race. The Australian Employment of Scientific and Technical Enemy Aliens Scheme (ESTEA) instead channeled its personnel to basic science and industrial research. The personnel were part human reparations, part invited experts. This curious scheme offers insight into attitudes towards industrial regeneration in a previous era, and the importance of context in shaping attempts to alter existing scientific and industrial cultures.*

Keywords: Australian industry, ESTEA, German scientists, reparations, innovation, industry policy.

One of the most curious and exotic instances of government policy in Australian history occurred in 1945 with the end of World War II. The period witnessed the development of the 'Employment of Scientific and Technical Enemy Aliens' Scheme (ESTEA). Under this scheme, German scientists and technicians were brought to Australia and contracted to government departments and authorities, to universities, and to private industry. This scheme represents a remarkable event in Australian cultural, scientific and industrial history, yet its existence had, until recently, been completely forgotten. This neglect has been redressed by Uta von Homeyer.[1]

The ESTEA scheme is of considerable significance in its economic and industrial dimensions because it facilitates an interpretation of Australia's economic history that is contrary to conventional wisdom. An influential strand of economic history has it that the twentieth century Australian economy was an exemplar of inefficiency and lack of innovation, essentially isolated from the international economy and cocooned behind a fortress built on tariff protection, wages arbitration and the White Australia Policy.[2] In essence, little happened of importance in terms of economic dynamism until 'microeconomic reform' began in the 1970s.

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This orthodox account is remarkably cavalier about the past and naïve on the sources of innovation and efficiency. The ESTEA scheme demonstrates that concern for economic dynamism has existed in the past. Moreover, the successes and weaknesses of the scheme provide lessons for understanding the context in which dynamism is facilitated or impeded.

Origins

The principle of expropriating the talents of German scientists was developed opportunistically by the USA and the UK for American and British 'military–industrial' research. The British and American military establishments belatedly broke from their arrogant presumption of superiority over German war-making capacity after significant losses in the air, ocean and field.[3]

Australian involvement began with a cable from the Secretary of State for Dominion Affairs, Lord Addison, to the Department of External Affairs in September 1945.[4] Addison reported that the USA and the UK were in the process of obtaining German scientists and technicians for employment in those countries and that the British Dominions were invited to join the arrangements. As the appropriate machinery was being erected, Addison inquired whether the Dominion governments had need of any German scientists. Details were also enclosed regarding initial British intentions, which were (formally) to employ the Germans 'on Defence Research Work in order to develop military potential at Germany's expense', and to employ them strictly on a short-term basis.

Australia was later informed that the British authorities had extended their interest to the use of such scientists and technicians in 'civil industry'. The Board of Trade's German Department issued a circular to that effect in December 1945. The Government was still to be firmly in control of the agenda, with employment to be in trade associations or government-administered research establishments, but with the prospect of occasional loaning out to individual firms. This civil scheme was to be administered separately, under the 'Darwin Panel' (after its chairman).

The cables from Britain imply an approach arising out of rational consideration. However, Bower tells an alternative story. Bower documents that British and American attempts to deal with German scientists were chaotic.[5] Initially, they decided to appropriate German techniques and equipment as the only means to bridge the massive technology gap; only gradually did they confront that they needed the personnel to make effective use of the material booty. There followed an unseemly scramble for bodies. Some scientists were highly prized, such as Werner von Braun and his rocket scientist associates, who were spirited into the US illegally by one military faction; so also were Helmuth Walter and his submarine scientist associates spirited into Britain.

But the scientists presented problems. The allies did not want them resurrecting a research capacity on German soil. In the UK and the US, some significant groupings were ambivalent about having German scientists on their own soil (fear of public antagonism, disgust for Nazi atrocities, concern for potential espionage); but neither did each ally want the scientists to be appropriated by any of the others. By late 1946, the British hoped for a compromise with the Americans on defence-related personnel against the Soviet Union. The planned channelling of scientists into civil industry was not a coherent strategy to help British industry but a default decision due to the bad odour of the alternatives. Offering scientists to the dominions was probably decided in the same pragmatic spirit.

External Affairs contacted Australian federal departments regarding British proposals. However, initial feedback (in January 1946) was generally negative. John Jensen, Head of Munitions, replied: the Department does not regard the suggestion made as practical of application to any of the activities in which it is concerned. Frederick Shedden, Head of Defence, expressed a comparable lack of interest.

J. J. Dedman, Minister for Post-War Reconstruction, then wrote to the State Premiers in April 1946, requesting expressions of interest. Only John Cain of Victoria replied in the affirmative, and on behalf of the State Electricity Commission (SECV), concerned with more effective use of its substantial brown coal deposits.

The Australian bureaucratic infrastructure already existing in Europe was a significant ingredient in the administration of an Australian scheme from the European end. The Australian Scientific and Technical Mission (ASTM) was an arm of the Department of Post-War Reconstruction, with personnel in London and Berlin. In December 1945, the Australian Government was granted a separate presence (the Australian Military Mission) within the Allied Control Commission, the body governing occupied Germany.

J. R. S. Cochrane, Head of the ASTM, was a major protagonist for an Australian scheme and contributor to its character.[6] Cochrane concluded that German experts might be better employed in Australia in civil industry 'to exploit to much better advantage particular branches of science and industry in which Germany was ahead of us, and to develop new branches of industry'.[7] Cochrane articulated that 'in the long run such methods are much the best way of obtaining reparations of real value from Germany. . .'.[8]

Cochrane devised the list of initial priorities—brown coal; synthetic liquid fuels; metallurgists ferrous and non-ferrous; and the production of alumina from low grade ore.[9] He argued the case with David Rivett, Chairman of the CSIR, and N. K. S. Brodribb, Controller-General of Munitions Supply (in London for a Science Conference), to bring around their respective institutions. Cochrane found fault with other aspects of the British approach, namely the preference for more eminent (and older) people and the temporary nature of the contract. Cochrane preferred to pursue people under 40, from whom 'greater value' could be obtained, and to give them permanent residence, after a period of probation (in practice, a period of nine months).

A meeting of select ministers in August 1946 (Prime Minister, Attorney-General, Ministers for Post-War Reconstruction and Immigration) agreed to proceed with a scheme in principle, although Prime Minister J. B. Chifley was concerned to defer the matter until after a federal election in September. The scheme was presented to Cabinet and passed on the 10 December.[10]

The Administrative Structure in Australia

The development and administration of the ESTEA scheme occurred under the auspices of the Secondary Industries Division of the Department of Post-War Reconstruction, renamed the Division of Industrial Development in 1948 (henceforth DID).[11] The Division was representative of the Department in which it was housed. It employed many capable people with a variety of professional qualifications, some of whom would not have been in the public service but for the war. With depression and war behind them, they were imbued with the need for

strategic action to shape a qualitatively different and better world. They had a 'can-do' mentality to complement their technical and organisational capacities. The Director of the Division, Harold Breen, although a career public servant, also embodied these attributes.

The Division's brief was the health of the manufacturing industry, a sector that had expanded dramatically during the war.[12] Its proponents were concerned to maintain the viability of the sector in peace-time—they saw a viable manufacturing sector as critical to sustaining an expanding population to ensure security in the region, population growth being then supported on a bipartisan basis. An integral dimension of this vision was attention to efficiency and innovation. This concern was seen not merely as the means to survive in a 'competitive international economy', but as a good thing in itself. The concern reflected a technocratic dimension to the Division's personnel and its work. This is the context in which the ESTEA scheme was devised. This technocratic dimension gave the Division its strengths but also was responsible for some of the insensitivities that arose in the handling of its human material during the scheme's administration.

This context highlights why the employment of German scientists was organised on an industrial-science basis in Australia and not on a military-science basis, as in the UK and the USA. There was no military-science establishment in Australia, and no sister military–industrial establishment, in spite of the country just having come successfully through a weighty domestic industrial contribution to world war.[13]

Defence became interested later in using German scientists in military applications but this was probably a result of passively following the lead of the British, rather than adopting a domestic strategic initiative. This was in evidence in the Long Range Weapons Program (admittedly a programme in which Australia was a junior participant with Britain). When a team of German rocket scientists under Dr Eugen Sanger offered themselves to the ASTM in mid 1949, the prospect was not taken up.[14] The Commonwealth Investigation Service (ASIO's predecessor) was a thorn in the side of ready employment of 'aliens' in areas of security concern, and some defence personnel may have been similarly concerned, but it appears that lethargy on the part of the Australian defence establishment was also a factor. As it happened, several of the German scientists came to be employed in the Defence Research Laboratories and the Aeronautical Research Laboratories (incorporated into the DRL in 1949), but defence research was not the centre of gravity of the scheme.

Breen, DID's Director, was self-conscious and assertive regarding the Australian distinctiveness. Australia's industrial development was not comparable to that of the British, and Australia did not have their government departments and research associations. Breen elaborated how the ESTEA scheme fitted into a pre-existing ambition:

> for some time past this Division has been emphasising to industry the necessity for them to employ high-grade scientists and technical men on their staffs with a view to improving their production methods. The answer has always been that there are not men available with suitable qualifications. That statement has been supported by CSIR as a result of their researches into industrial problems.[15]

On firm character, Breen noted that the Australian firms were of two kinds. The large ones, typically with overseas head offices, were not necessarily interested in

the German scientists. This characterisation fitted ICI, but the Australian-owned BHP also declined to participate. Breen continued:

> the other branch of private industry is the smaller Australian owned and developed units to whom we have been preaching the desirability of employing high-grade technical men. In this field lies Australia's greatest possibility of utilising German scientists.

To this end, Breen distributed information on the scheme to the representative industry bodies (Australian Chamber of Manufacturers, Metal Trades Association, etc.).

In practice (predictably), the scientists were employed by government instrumentalities and medium to large private companies. However, some scientists were employed directly by the Division to reach a broader audience.

Character and Tensions

The principle of using advanced German intelligence was one thing; enacting the principle was of a different order.

The scheme was an administrative labyrinth. That it survived and thrived is a testament to the tenacity of those responsible within the Division.[16] Its survival is also a testament to the decisiveness of the Labor Government and rudimentary efficiency of the contemporary federal public service, when the comparable less complicated scheme in Britain was an administrative fiasco. Treasury dutifully funded the scheme, in spite of initial opposition, and through a change of government in December 1949.[17]

Regarding administration, the existence and interest of qualified personnel had to be ascertained; so also the interest of Australian institutions in specific skills. Locating and getting to the individuals for interviews was difficult. The scientists/technicians had to undergo a demanding selection process. The contracted personnel, and later their families, had to be transported and supported through war-ravaged Europe, a process increasingly dangerous as the Cold War heated up. Transport from Europe was rationed—British ships were restricted to persons of British nationality, so the scheme had to use more expensive Italian ships. Currency exchange was restricted; indeed the Currency 'Reform' of 1948 wiped out the scientists' meagre savings in German currency. The remittance of funds out of the scientist's salary for the support of his family in Germany had to be organised (all but three of the scientists were male); after 1948, the funds were topped up out of the public purse.[18] Accommodation in Australia was scarce and, when obtained, generally substandard and expensive. Administrators had to absorb and deal with the personal problems of relocation and assimilation. These problems had to be surmounted as a prelude and accompaniment to ensuring a productive relationship between scientist and employer.

The scheme may have been destined for early truncation. By early 1948, the Americans had reversed their ambitions to disable the German economy and prevent Germany-based research, to that of reconstructing the non-Soviet zones. Account now had to be taken of the importance of men to the German economy before they could be released. The American zone effectively became off-limits to the scheme. By 1949, the Germans were increasingly in charge of their own affairs, and selection had to be vetted by the Federal Labour Ministry. Surprisingly, the

German administration was accommodating, and the numbers selected increased after 1949.

The ambiguous status of the personnel is important to an understanding of the exotic nature of the scheme. Were the personnel merely chattel, as befits the initial conception of their treatment as reparations? From this perspective, they were indentured labourers, special perhaps, but indentured to work on prescribed terms. Or were they privileged migrants, to be given favourable treatment in the garnering of their expertise? In practice, their status was contradictory. It needs to be emphasised that the proponents and administrators of the scheme had limited manoeuvrability and had to work within the opportunities and constraints of the environment.

There are elements that cater to the 'chattel' perspective. British officials handling German scientists, part of the BOAR (British Army of Occupation on the Rhine), were known as the 'Enemy Personnel Exploitation Section'.[19] Indeed, one scientist wrote to the Australian authorities, after seeing an advertisement in a German publication, claiming perceptively 'how may Australia, which entered the war for idealist reasons solely and was not invaded by German troops, now ask for reparations? Therefore, I recommend you, not to take slaves for the progress of Australia, but free men willing to give their best'.[20] One scientist, Otto Bayer, described as one of the worlds' great organic chemists, was interested in migration to Australia, but only as a 'free man, not as an alien'. However, the Department of Immigration (and its Minister, Arthur Calwell) was steadfast in opposition, and Bayer could not be considered.[21] German scientists could come as enemy aliens or (in that period) not at all.

Regarding intellectual property, any inventions were to be appropriated by the government (or possibly the employer), through a stringent patent clause in the contract, essentially copied from the British contract. One of the semi-official organisations, through which DID advertised the scheme in Germany, objected to the patent clause as having 'the smack of enemy subject about it'.[22]

In terms of processing, the Australian selectors were nonchalant in knocking back applicants whom they thought were not of the first rank in accomplishments or potential. Approximately 3500 applications were received (some had replied to advertisements in the German press), highlighting that rejection was the typical fate of applicants.[23] Many others were knocked back for lack of a suitable employer, sometimes after considerable delay following application.[24] Some were rejected on the grounds of age. Applicants were subject to a personality test and some applicants were knocked back on that criterion. Although the personality screening had its humorous aspects,[25] it was judged as necessary for the viability of the scheme.[26] In general, the ability to 'pick and choose' from the Australian end overrode any consideration of desperation of the individual's circumstances.

The salary was 'normal', rather than at a level befitting those of presumed exceptional talent (albeit some scientists did gain decent salary rises after several years' employment). Salary levels and working conditions were also constrained by employer reluctance to promote individuals to a level commensurate with their status and talent. For those on the government payroll, the salary structure was imposed by the rigid structures of public service employment, enforced by the Public Service Board. Moreover, a pettiness was superimposed upon the formality. The general structure of pay for the workforce had increased after an arbitrated increase in the basic wage in 1948. This had flowed through to the general public service, but the scientists were not included in the benefit as they were not under

the 'award' system. The Public Service Board had rejected a discretionary adjustment for the scientists, and the Director of DID found himself making a supplication for reconsideration of the situation.[27] Underlying this situation was a hint of 'you're lucky to be here, so don't complain'.

Indeed, by Australian standards, their presence was exceptional—migration of German nationals at that time was prohibited. In September 1948, Arthur Calwell, Minister for Immigration, announced an easing of restrictions on migration of particular nationalities.[28] The preference for British stock was being watered down to cater to the imperative of rapid population growth. Germans were included in the list, but the ESTEA group remained 'privileged' because most of those admitted after 1948 were as Displaced Persons who were strictly indentured to work under orders, typically at hard manual labour.[29] Such was the spirit of the times—take it or leave it.

There was also the matter of security considerations. The scheme was structured on the principle that security checking would be done by American and British forces and that cleared individuals be made available to the Australian scheme. Australia's security apparatus, the Commonwealth Investigation Service, was apprised of this arrangement at the beginning.[30] Nevertheless, the CIS gradually established a campaign of criticism of the ESTEA procedures—the CIS wanted to be accorded an active role and status in policing Australia against enemies of the State.[31] Much energy was expended in processing correspondence from CIS and from the new security organisation, ASIO, after its creation in March 1949. The DID was inclined to be disdainful, if diplomatic, in its dealings; whereas defence-related establishments were more accommodating.

The security agencies gained renewed vigour from a telegram from the UK in February 1949 notifying the dominions of Britain's concern about the security dimension of German scientists.[32] The British concern was wholly to do with its own peculiar and inadequate treatment of the German scientists, and the British were oblivious of the situation in Australia. Nevertheless, the British telegram generated a flurry of domestic inter-agency hand-wringing and correspondence, with the consequence that the CIS and ASIO were given enhanced legitimacy.

These developments enhanced the difficulties of those trying to escape adverse conditions and enhanced the insecurity of those scientists resident in Australia.[33] The incoherence of the security agencies' preoccupations is reflected in the fact that they slid between chasing Nazis to chasing Bolsheviks without confronting the qualitative transformation involved. Thus anyone who was German and located in Soviet-controlled territory was doubly suspect. On the domestic front, the scientists worked under the formal threat of being retrenched if 'Australian or British scientists with suitable qualifications are available', while facing a long wait for naturalisation.[34]

Scale, Personnel and Individual Contributions

In total, about 150 scientists and technicians were employed in Australia, with their date of beginning employment ranging from August 1947 to November 1953.[35] Of the 150 personnel, 24 were employed (initially) within the Commonwealth bureaucracy, 10 with the CSIRO, 10 with the Defence Research Laboratories, four by the PMG, seven by other public bodies, five by universities, 31 by the Snowy Mountains Authority, and 59 directly by the private sector. The Snowy Mountains Authority was a late-comer to the scheme but became an enthusiastic supporter and contractor.

The professional skills embodied in the personnel included (in rough order of numerical importance) engineers, surveyors, chemists and chemical engineers, physicists, metallurgists, food technologists, cartographers, geodetic engineers, microanalysts, geologists, electrical engineers, ceramicists, and aeronautical engineers.

Perhaps the most well known of the scientists were the first two who were contracted, Dr Friedrich Danulat and Mr Erich Bruggemann. Danulat was the inventor of the 'Lurgi' process for extracting gas from brown coal, and Bruggemann was a chemical engineer and designer of the Lurgi plant. Danulat and Bruggemann were employed by the SECV and the private Metropolitan Gas Company to make productive use of the huge deposits of low quality brown coal reserves. Scientists from these organisations had been working for decades on gasification and had gasified black coal, but Victoria's coal deposits (as well as those in South Australia and Western Australia) were problematic. The Victorian Government had been desperate to escape dependence on unreliable NSW coal supplies. Indeed, the status of the ESTEA scheme itself may have been given fillip by the evident public purpose of Danulat and Bruggemann's task. The State Government created the statutory Gas and Fuel Corporation in 1950 to fund an expensive Lurgi gasification plant in Morwell, originally intended for transport and industrial fuels as well as for domestic use. One insider claimed (in a rare public compliment) that 'without [Bruggemann's] experience and expert guidance the problems and difficulties of the enterprise would have multiplied exceedingly'.[36] Apart from gas supplies, the scale of the project gave a fillip to economic development in Victoria, and a depressed region in particular.[37] The 'gasification' project was eventually overtaken by the development of Bass Strait oil and gas reserves, the Morwell plant closing in 1969.[38] Bruggemann stayed on in Australia, first with Pyrox Ltd and ultimately as Chief Executive of Lurgi Australia.

In general, information on the experience of the German scientists is fragmented. Occasional details are embodied in the intermittent formal reports by employers to DID. Homeyer has patiently pursued information through personal interviews of some scientists, their immediate relatives and work colleagues.[39] We can take for granted, by virtue of the elitist selection criteria, that the people who arrived were generally of the highest calibre. One or two were disappointments to their employers. However, several were not utilised to the best of their skills, the employers failing their special charges. For example, Dr Fritz Wienert, a chemical engineer, struggled with a productive use of potash deposits in Western Australia for over four years, asking for better treatment, before taking a job in 1952 with Union Carbide in the US with salary and conditions in a different league to those experienced in Australia.[40] Dr Karl Kumetat, an organic chemist with skills in photography, was under-utilised by the CSIRO in dairy research.[41] The most significant quantum of under-utilisation was for the scientists employed at the Defence Research Laboratories, Maribyrnong, by 1950.[42]

Other scientists found a good fit in their organisations, whether public or private, giving exemplary service to their organisations and, ultimately the country. The PMG was an active seeker of personnel from the beginning of the ESTEA scheme; this paid off in terms of the group assembled—Drs Albert Seyler, Ernest Rumpelt, Frederick Ruf and Wilhelm Otto. The PMG had systematically evaluated its needs in a variety of specialties in electronics, radio and telecommunications, and its homework was rewarded.[43] Seyler made a substantial contribution to electronic research (especially television and video) in Australia. Seyler is also

credited with creating a more innovative and outward-looking culture within the PMG's research laboratories.[44]

Microanalysts made an impact, at the CSIRO's Division of Industrial Chemistry, and the University of Melbourne. Dr Joseph Unterzaucher was only in Australia for five months in 1948 (replacing the short-term visitor, Dr Karl Tettweiler), but in the design and construction of apparatus, and the advice to others, he was considered valuable by his employer.[45] He was replaced by Dr Karl Zimmerman, who brought a formidable reputation for organisation and innovation, and who subsequently headed the microanalytical group in the Organic Chemistry section of the CSIRO.

Professor G. Jayme, a cellulose chemist, came in an advisory capacity for the Division and Australian Paper Manufacturers, writing reports on the use of Australian hardwoods for paper-making, and on cellulose production for rayon yarn.[46] Jayme's role was continued by Dr Udo Schenck, who enjoyed productive employment with APM until ultimately returning to Germany for personal reasons.[47]

Dr Heinz Gorges was an aeronautical engineer, employed on the design and construction of supersonic tunnels at the Aeronautical Research Laboratories at Fishermen's Bend. He had been working with the British Ministry of Supply and considered such an important 'catch' that the usual probationary period was atypically waived. His skills were subsequently utilised at the High Speed Aerodynamics Laboratory at Salisbury. He was recruited by the US in 1958.

The Bureau of Mineral Resources employed cartographers, one of whom revolutionised map-making by introducing plastic from his knowledge of European practices. The prospect was for better quality, reduced costs and standardisation of product across Australia.[48] This was at a time when geological surveys, on an extensive scope, were being pursued in the search for much-needed mineral resources – ultimately extraordinarily successful.

The Department of Labour and National Service had the services of Dr Albert Dresler, a physicist and lighting theoretician. The DLNS at that time was vitally concerned with working conditions and with workplace productivity, and Dresler was an ideal specialist. He made a significant contribution to enhancing the use of daylight in industrial design. He had an enormous impact on the 'illuminating engineering' profession in Australia, partly through his extracurricular teaching at RMIT.[49] These people are representative of the contributions in a variety of specialist fields in which expertise was undeveloped in Australia.

There were also important positive outcomes of a more indirect nature from the presence of such talented individuals.[50] Some individuals, by virtue of their comprehensive approach to their work, served as mentors to their colleagues, subordinates or students whose own contributions have been enhanced as a consequence—for example, Seyler at PMG; G. E. Michelson at Pope; Dr Werner Schweitzke (physicist) at the DRL at Salisbury; Augustus Kamphausen (glass and instrument designer) at Melbourne University, and Dresler at the DLNS and RMIT. There were also enhanced linkages between major German companies and the Australian economy involving technological transfer—for example, those established through the coal experts Bruggemann and Richard Gartner.

In the later phase of the scheme, the DID increasingly employed German scientists directly, using them in an advisory capacity for broad industry-related issues. Through these individuals, in particular, German scientists reached smaller businesses, and their reports exposed some industry-wide practices to greater scrutiny. In particular, in late 1951, DID asked its consulting scientists for reports on

industries related to their expertise, covering all dimensions of firm operations such as factory planning/layout, production planning, attitudes to research, product quality and quality control, and so on.[51]

Of most significance was a detailed and sober report on manufacturing industry in general by Mr F. Kreide.[52] Kreide visited 300 factories across mainland Australia, indicative of the seriousness of his approach. Kreide claimed that many new factories were reasonably well-managed, well laid out and with modern equipment. However, this was in contrast with many firms that had grown rapidly from small scale, without the requisite alteration in business practices. This situation was especially prevalent in engineering 'jobbing' shops. Kreide also found inadequate attention to production planning, and to product quality and inspection procedures; poor labour efficiency (poor training, excessive turnover, verbal rather than written instruction for machine operators, poor management–labour relations, etc.); and significant wastage of materials and energy.

This was a systemic issue for Australian industry, both in terms of scale, and in terms of its inherited culture generating the generalist 'small businessman', largely self-taught. There was increasing attraction to 'the American way', without confronting the scale necessary to make mass production viable. Kreide emphasised that the small Australian population made impossible the general adoption of American techniques and that European techniques, involving more specialist machinery, provided better models.[53] There was also the more intangible element of inter-business relations. Kreide noted the importance in Germany of cooperative industry associations that exchanged information for mutual benefit and of semi-government authorities with government support that underpinned such institutional development. Australia lacked such institutions, and it was appropriate that they be developed here, especially for small business viability. Kreide envisaged that DID, already operating towards this end, would play an important role in an institutional support network.[54]

Inherent Weaknesses

What of the overall picture? One contemporary DID officer has noted that, in retrospect, the scheme might have been better organised for maximum effect. The scheme brought out first rate scientists and technicians, and a significant percentage were contracted to specific employers. The officer claims that the Germans' skills were unduly appropriated by individual firms and agencies, and would have been more productively employed on industry-wide engagements.[55] Certainly, individual firms benefited considerably. For example, by late 1951, Pope Products had employed four Germans and was requesting more.[56] In particular, Michelsen, with an expertise in small electrical motors based on previous employment with Siemens, revolutionised production at Pope and was a key figure in its profitable expansion.[57]

Yet the prospect of organising the scheme on industry-wide lines was illusory. Funding was a crucial concern. The Division itself employed a handful on a full-time basis as general consultants and wanted to employ more, but was restricted to a maximum of two at any one time under a 1951 Public Service Board order that had rationalised staffing in the Division.[58] Industry itself was not sufficiently well-organised or collectively-minded to fund an arrangement along industry-wide lines (as noted in the Kreide report). Indeed, the absence of research associations, supposedly a focal point for comparable schemes in the UK and the USA, was an

important early consideration in developing the Australian scheme with an orientation towards organisation-specific employment.

Regarding organisational structures, appropriate organic links were rare or non-existent. For example, two experts had been contracted to ACI Ltd to initiate the manufacture of high grade plate glass and glassware. However, ACI then wanted skilled workers to take advantage of the process and to teach those skills locally.[59] Domestically, technical training was weak (at least outside of Victoria)—the reason why the NSW Government established the University of Technology in 1949. The DID had been grappling with this problem of demand for 'lower level' technicians for some time, but had limited authority to satisfy the need. Plans had been developed in the last days of the Labor Government to facilitate the selection and migration of skilled tradesmen from Britain (who would be culturally acceptable to locals). The intention was that the DID would use its officers and expertise to facilitate contact between potential migrants and potential employers. The Overseas Scientific and Technical Experts Employment Scheme was established.[60] However, the parameters could not be focused as with the ESTEA scheme, and it was a casualty of cuts to DID staffing (of which more below). The SMHEA was by now organising its own recruitment in Germany for such skills, but that Authority had the scale to do so. For private firms, increasingly, gaining a technically skilled workforce was dependent on the 'free market', and all the information deficiencies that that entails, especially at the international level.

A more significant reflection of this failure regarding skills linkages was in the conditions of employment of the seven scientists at DRL. As their spokesman Dr Rudolf Bauer noted:

> These people can only be expected to work to their full capacity . . . if they are employed under conditions similar to the ones under which they are used to work, and not as 'glorified laboratory assistants'. . . . [To utilise their theoretical knowledge effectively] the German scientists should be given as many assistants and co-workers as they can possibly be expected to cope with so that a direct transfer of experience can take place.[61]

A well-conceived scheme would have envisaged such integrated structures and their associated demands ahead of time. However, catering to such demands requires a relatively coordinated administrative structure spanning government agencies and business that was not compatible with Australia's political heritage, heavily influenced by philosophical liberalism. Ironically, the German scientists had lessons for Australia not merely regarding theoretical principles and applications, but also regarding the more intangible dimensions of organisational design and culture. It was unfortunate that the scientists were not afforded the environment commensurate with their capacity, but it is predictable that that would be the case. The inadequacy of Australian organisations was a reason for importing the scientists in the first place. It is relevant that the situation did not improve for the DRL scientists after their complaints were aired to authorities, highlighting the entrenched character of the institutional culture.

Last Days

The ESTEA scheme was wound down during 1954. The world had changed substantially since 1945. The German economy was now sufficiently robust as to

make migration for relevant personnel unpalatable. The demographics were themselves opposed to longevity—the Australian authorities wanted personnel of eminence but also not too old; essentially a particular cohort of experienced people who faced disrupted conditions were the target group. Living standards in Australia were generally only passable. Germany now offered significantly higher salaries and better working conditions and social security; scientists were still willing to migrate, but the terms had shifted against opportunist exploitation of their talents.[62]

Certainly there was no initial expectation of a long-term programme—the scheme lasted beyond the expectations of all its administrators. In addition, demand from private employers had stagnated. Deflationary macroeconomic measures in 1951–52 had created a mini-recession for secondary industry and put executives on the defensive.[63] However, the Snowy Mountains Hydroelectric Authority had taken up the slack in aggregate terms. The SMHEA had a narrower focus but was seeking workers from a broader spectrum of the skills hierarchy, especially engineers and skilled tradesmen, and was actively seeking migration from Germany in its own capacity.[64]

A significant factor in the scheme's demise was the winding down of the capacities of the bureaucratic apparatus that administered it. The Division of Industrial Development experienced dramatic attrition after August 1951, so the institutional support base for the program was undermined.[65] The Menzies Government engaged in a blood-letting of selective public service positions, one element of restrictive macroeconomics measures to offset the Korean-War induced domestic boom. The process provided the occasion to attack DID in particular, product of an ideological disposition that the bureaucracy should not be in the business of assisting the private sector.[66] This view was more prevalent in significant parts of the bureaucracy (especially the Treasury and the Public Service Board) than in the Cabinet itself. Moreover, it was a view that applied discriminatingly—to the manufacturing sector in particular, and not to the agricultural and mining sectors which were contemporaneously receiving significant bureaucratic support.

DID was evidently naïve in terms of the institutional support necessary for the appropriate utilisation of its experts and in terms of the external pressure to be exerted on employers, public or private, when employers were at fault. However, DID was itself increasingly marginalised, especially with the gradual shift in priorities under the Coalition Government. The emasculation of the Division's Technology and Management Branch through downsizing had the immediate effect of inhibiting the employment of any additional scientists for general advisory work—negotiations for contracting consultants in inorganic chemistry, electrical engineering, metallurgy and plastics had to be terminated.

More fundamentally, this process involved the destruction of what culture had existed, even if quarantined, to support the strategic use of outside expertise for assisting manufacturing sector dynamism; the associated resources were eradicated accordingly.[67] Large companies like BHP or ICI had their own direct links to the power-brokers, and were disdainful of system-wide interventions. What concern for productivity survived the early 1950s was channelled into salvation through improved managerial skills (especially with the growth of the Australian Institute of Management) and the improvement of manager–worker relations, albeit much of that concern remained at the rhetorical level. The cultural cringe embodied in the perennial importation of British technology was refashioned into the importation of American technology.

The centre of gravity of the manufacturing sector's environment (there were exceptions) moved from the positive dimension of technological and organisational improvement to the passive dimension of reliance on import licensing in the 1950s and tariff protection in the 1960s. This is the germ of truth in the conventional account of Australian industry—that trade barriers facilitated the nurturing of inefficient firms. For economists, only the cleansing power of the free market mechanism could resolve this unsatisfactory state. But the economists' political and bureaucratic counterparts (led by Chicago-trained Secretary to the Treasury, Roland Wilson) had killed off the kernel of an alternative policy structure that attempted to address unsatisfactory business practices substantively.

The group that brought out the German scientists and technicians were conscious of the institutional matrix in Germany that produced the scientific–industrial nexus—the exemplary institutions of technical training, the research institutes, and large-scale science-based industrial corporations. Domestically, the German personnel were placed in most of the organisations that were indigenous substitutes (if sometimes imperfect) – the CSIR/CSIRO, the Defence Research Laboratories, the PMG and the SMHEA, and some private firms with research capacity (like Pyrox, Timbrol and Email). In Australia, such institutions, however worthy, were consciously isolated from each other and there were significant gaps in the structure (technical training, university research, large-scale private sector research). During the 1950s, the consciousness of the importance of such structures for industry was beaten back and its reproduction wilfully neglected. Fifty years later, in spite of the successes of the CSIRO in industrial research and commercialisation, Australia is still struggling to create an institutional matrix that entrenches a productive scientific–industrial nexus. The trauma of world war allowed conventional modes of thought to be broken for a period. However, deeply embedded conventions of behaviour have proved persistent.

That the ESTEA scheme could have left so little mark on the historical record is instructive in its own right. At the pedestrian level, it is a reflection of the fact that few government programmes are ever systematically reviewed. However, other factors are involved. Several individuals' contributions have sneaked into the secondary literature—Seyler and Bruggemann—and Dresler has found an academic champion. But personal egotism, apprehension about admitting collaboration with people with whom Australians were only recently engaged in a horrible war, and an arrogance that is the reverse side of the cultural cringe, all probably contributed to restricting exposure.

A decade after the beginning of the scheme, Harold Breen felt compelled to write to Dr R. S. Andrews, then Chairman of Gas and Fuel Corporation, and a major local figure in brown coal science. Breen complained strongly to Andrews of the lack of recognition of the role of the Commonwealth authorities and of Danulat and Bruggemann in the literature on brown coal gasification and in the kudos associated with the opening of the Morwell plant.[68] Breen was right—the literature generally has Victorians claiming most of the kudos for themselves. Ian Wark, the head of the CSIRO's Division of Industrial Chemistry, could write a history of his organisation without any mention of the German scientists in his team.[69] Those scientists employed in private industry have disappeared into the black hole of a sparse field of corporate histories. More generally, the destruction of the Division of Industrial Development committed knowledge of the Division's activities and orientation to obscurity. Economists, essentially ahistorical, not only dictate current priorities on industrial policy but also dictate how economic history will interpret

the past. Within this adverse culture, the curious case of how German scientists were brought to Australia to expand its industrial horizons has been of no interest whatsoever.

Notes and References

1. Uta v. Homeyer, 'The Employment of Scientific and Technical Enemy Aliens (ESTEA) scheme in Australia: a reparation for World War II?', *Prometheus*, 12, 1, 1994, pp. 77–93; Uta v. Homeyer, 'The Recruitment, Deployment and Experiences of German Scientists in the Post World War Two Period: An Historical Evaluation', Ph.D. thesis, Centre for Multicultural Studies, Flinders University, 1995.
2. C/f Bob Catley, *Globalising Australian Capitalism*, Cambridge University Press, Melbourne, 1996.
3. Tom Bower, *The Paperclip Conspiracy: the Battle for the Spoils and Secrets of Nazi Germany*, Michael Joseph, London, 1987.
4. Cables D.1736 and D.113, 18 September 1945. National Australia Archives, MP188/1: 1/6/6839 Part 1A.
5. Bower, *op. cit.*, Chs 7 & 8.
6. Cochrane was a chemist, and had managed munitions explosives factories since 1928. He returned to that employment in 1950 until his death in 1955.
7. Cochrane to Breen, Secondary Industries Division, 25 June 1946. MP188/1: 1/6/6839 Pt.1.
8. Australia was also a recipient of reparations in the form of industrial machinery. MP1540/66.
9. Brown coal was an obvious choice. Alumina presented a significant problem with production then mooted in Tasmania, driven by defence considerations, and the ore having (until the 1950s) to be sourced from Malaya. The list was essentially a hastily constructed wish-list; it was soon transcended by the manifestation of demand for and availability of specific skills.
10. Agendum 1266A, Employment of German Scientist and Technical Personnel in Civil Industry in Australia, 6 December 1946. A2700, Vol. 30. Cochrane's priorities were pragmatically augmented with the addition of electronics, and the status changed to that of 'some of the fields in which Australia can benefit . . .'.
11. After the election of the Menzies' Government in December 1949, DID was located in the new Department of National Development.
12. Evan Jones, 'Post-World War II industry policy: opportunities and constraints', *Australian Economic History Review*, 42, 3, 2002, pp. 310–331.
13. When initially informed of the possible use of German scientists in January 1946, Shedden noted that the War Cabinet had recently approved of setting up a Scientific Advisory Committee as part of the higher machinery of the Defence Department (Shedden to Secretary, External Affairs, 15 January 1946. MP188/1: 1/6/6839 Part 1A). But the Committee was not established until late 1947, and the appointed Scientific Adviser, an Englishman A. P. Rowe, was pathologically concerned with security, and the Defence and scientific communities fractured on this issue. See C.B. Schedvin, *Shaping Science and Industry: A History of Australia's Council for Scientific and Industrial Research, 1926–1949*, Allen & Unwin, Sydney, 1987, p. 334.
14. MP1748/1: GW/S/40. The scientists had been working with the French and stayed with that country. Sanger returned to Germany in 1954 for lack of productive activity, had been sought unsuccessfully by the Russians, and was wooed to join other Germans in Egypt in 1959. Nasser's rocket project was in turn discerned by Israeli intelligence and, after diplomatic pressure on Bonn, Sanger was recalled to Germany in 1961 and died soon afterwards. Sanger, an early leader in rocket research, ended up on the margins of the great power carve-up of German brain power. See Michel Bar-Zohar, *The Hunt for German Scientists*, Hawthorn Books, New York, 1967, Ch.13.
15. Breen to Cochrane, 9 April 1947. MP188/1: 1/6/6839 Part 2A.

16. In particular, Joseph Cochrane (later Arthur Simpson) in London, and George Sharwood in Melbourne.
17. The financial burden was lessened when private sector employers were induced to pay for the transport of individuals (and of their families) contracted to them.
18. After the currency reform, the Australian pound went from obtaining 40DM to obtaining 10DM. Support of families (300–400DM per month) would have consumed half of the scientist's gross salary. As a consequence the payments were heavily subsidised out of the DID budget.
19. A3317: 293/46.
20. Letter of 12 March 1947 received by Prime Minister's Department, A461/8: AC387/1/1.
21. Breen/Cochrane correspondence, October–November 1946. MP188/1: 1/6/6839 Part 1A.
22. A. J. Simpson (Cochrane's replacement at ASTM, London) to DID, 1 May 1952. MP188/1: 1/6/6839 Part 2A. In practice, patent rights appear to have been more flexibly applied.
23. One telling vignette of the subtleties of 'acceptability' occurred with the interrogation of Friedrich Ruf, a talented telecommunications engineer. Australian personnel expressed apprehension that Ruf's wife might be 'of the Chinese or Asiatic race'. The reply came from other officials that she was White Russian, and that she had already gone through a race test under the Nazis in 1937 in gaining permission to marry! MP188/1: 1/6/4011.
24. MP1540/66: 436/28/1 Part 1.
25. For example, Victor Garten passed the test admirably. He is described as a: 'moderately tall dark spare type with a fairly serious attitude. Intelligent and lucid. Can be commended as a very suitable type both for CSIR and Australia'. The family 'all appear healthy good types who are of the middle class homeloving type'. MT105/8: 1/6/4009.
26. 'The technical proficiency and the personal attributes of those selected have created a favourable impression. The selective screening by the representatives of the [DID] has been largely responsible for the success of the scheme.' Stevens (Secretary, National Development) to Casey (Minister), 30 November 1952. MP188/1: 1/6/6839 Part 2A.
27. Hartnell to PSB, 12 December 1950. MP1881/1: 1/6/6839 Part 2A. The request proved successful, but only after seven months had passed.
28. MP188/1: 1/6/6839 Part 2A.
29. 'The Department of Immigration has set its face against any relaxation of the rule that all DP's who go to Australia under the Mass Resettlement Scheme must accept employment offered them, and remain in such employment for not less than two years. . . . You probably know that robbed of all technicalities the medical standard required of DP's is that they should be fit to undertake manual labour in any part of Australia.' Noel Deschamps, Australian Military Mission, to R. J. Harris, Recruitment Service, 12 October 1950. A9306: 106/5.
30. Dedman to State Premiers and relevant federal Departments, 10 April 1946. A461/2: AB387/1/1.
31. C/f A6122/43: 1419; MP188/1: 1/6/1690. A belated attack on the adequacy of security was mounted in a series of articles by Gerard Ryle and Gary Hughes, *The Age* & *Sydney Morning Herald*, 16, 17 and 21 August 1999. The articles claim that 32 of the scientists had backgrounds in various Nazi organisations. Curiously, Mark Aarons, an authority on war criminals in Australia, cites these articles and then discusses only one ESTEA scientist—Kurt Rohnstock, previously an 'important officer' in the German Air Ministry, employed by the Snowy Mountains Authority as a valued geodetic surveyor. Mark Aarons, *War Criminals Welcome: Australia, a Sanctuary for Fugitive War Criminals Since 1945*, Black Inc. Books, Melbourne 2001, p. 293.
32. Sec. to High Commission for the UK to Prime Minister, 9 February 1949. A462/11: 450/2/1.
33. The security hubbub is important in its own right, but cannot be pursued here. An indication of its irrational dimensions is that a witchhunt was set in place of employees of defence establishments who were naturalised Australian or British citizens, not of Anglo-Celtic stock. A6122/43: 1419.

34. MP208/1: 5/80/102, passim.
35. A full list of names, addresses, employers and occupations is included in MP188/10. This list is a fortuitous product of DID's compliance with ASIO's concern that there existed security risks amongst the arrivals. About 12 returned to Germany in less than 12 months or their arrival, most being on short-term advisory contracts, a couple returning for personal reasons. Others returned to Germany after some years in residence; the majority made their homes in Australia.
36. Ray Proudley, *Circle of Influence: a History of the Gas Industry in Victoria*, Hargreen, Melbourne, 1987, p. 225.
37. Homeyer, *op. cit.*, 1995, p. 182.
38. J.T. Woodcock (ed.), *Victoria's Brown Coal—A Huge Fortune in Chancery*, Australasian Institute of Mining and Metallurgy, Melbourne, 1984; Proudley, *op. cit.*
39. Homeyer, *op. cit.*, 1995, Chs 5, 6 and 7.
40. MT105/8: 1/6/3993.
41. MT105/8: 1/6/5277.
42. 'We are extremely dissatisfied and disappointed with the limited outlet offered of professional activities and with the poor prospects of our professional future.' Collective letter to Casey, Minister for National Development, 21 February 1951. Copy in A6122/43: 1419 (ASIO file).
43. MT105/8: 1/6/5441. Intelligent recruiting was facilitated by the interviewing of T. F. Ward, a PMG engineer, fortuitously doing postgraduate work in the UK, and seconded to the ASTM.
44. Ann Moyal, *Clear across Australia: a History of Telecommunications*, Nelson, Melbourne, 1984; Homeyer, *op. cit.*, 1995, p. 202.
45. Unterzaucher's wife, in his absence, was discovered to have tuberculosis, which illness prohibited her migration to Australia.
46. Cellulose production was a preoccupation with Breen, as basis for a commercial textile industry (Breen had induced Cortaulds to establish in Australia) but also to secure supplies in case of war.
47. Homeyer, *op. cit.*, 1995, p. 103.
48. The source of this anecdote is a parliamentary hearing in which the Department of National Development was defending its activities. The cartographer is unnamed, but three were employed by the Bureau of Mineral Resources—H. F. Boltz, W. Krause and H. Joechel. Parliament of the Commonwealth of Australia, 1952–53, Joint Committee of Public Accounts, *Fourth Report, Department of National Development, Minutes of Evidence*, p. 59.
49. J. Derrick Kendrick, 'Dresler: pre-war, post-war and postscript', *Lighting*, 20, 2, 2000, pp. 26–28.
50. Homeyer, *op. cit.*, 1995, Ch.6.
51. DID to Drs Pohl, Muller and Wagner and Mr Kreide (later Dr Leinweber), 10 December 1951. MP188/1: 2/302/1475.
52. January 1952. Copy in MP188/1: 2/302/1475.
53. Appropriate technology for a country with a small population, vast differences and interstate rivalries was a problem long confronted by Australian producers when faced with technology being generated in Britain and the US. See Jan Todd, *Colonial Technology: Science and the Transfer of Innovation to Australia*, Cambridge University Press, Melbourne, 1995. The deeper problem is that this 'shop-floor' awareness was never institutionalised and addressed explicitly through policy initiatives.
54. A June 1953 report by Dr Paul Leinweber covered similar ground. Leinweber's report is even more critical of Australian industry than the Kreide report, but it is more impressionistic and less reliable. Some additional points from Leinweber deserve mention—the government could forget about exports by many manufacturing industries as long as inhibiting factors of high wages, high unit costs and inattention to quality control were not addressed; there was inadequate attention to workplace safety; and the Standards Association of Australia did not deserve respect. Leinweber also found a reluctance of many business managers to discuss problems or accept outside advice, a culture in urgent need of change.

55. Interview, Neil Crowley, Melbourne, 24 June 1996. Crowley was not associated with administration of the ESTEA Scheme.
56. DID Weekly Reports, CP982/3/1.
57. Homeyer, *op. cit.*, 1995, p. 176.
58. MT105/8/2: 1/6/6983.
59. Hartnell to Minister, 12 February 1950. MP188/1: 1/6/6839 Part 2A.
60. MT105/8: 1/9/1035.
61. Bauer to Hartnell, DID, 2 February 1950. Copy in A6122/43: 1419. See also n.42.
62. The situation was evidently different in the US, where funding for military science expanded, indeed escalated after Sputnik in 1957. Bar-Zohar estimates that Germany lost 4,000 research workers in the 1950s, well over half going to the US in the late 1950s. This was part of 40,000 scientists and engineers that migrated to the US between 1949 and 1961, the basis for the expression 'brain drain'. Bar-Zohar, *op. cit.*, Conclusion.
63. Minutes of 30th meeting of the ESTEA Committee, 3 June 1952. MP188/1: 1/6/6872.
64. C/f A9306/1: 353/4.
65. The DID was gutted of staff and programme responsibilities during 1951–53; the remnant was subsumed within the Department of Trade in 1956.
66. Evan Jones, 'The purse strings and the policy process: bureaucratic shaping of industry policy capacity after 1945', *Australian Journal of Public Administration*, 60, 1, 2001, pp. 21–33.
67. The relevant bureaucrats were acutely aware of the changed financial priorities and its adverse implications for their role. Note correspondence during July–October 1952. MT105/8/2: 1/6/6983.
68. Breen (then Secretary of Defence Production) to Andrews, 16 January 1957. MP1038/2: Box 3, Folder 28.
69. Ian W. Wark, 'The CSIRO Division of Industrial Chemistry 1940–1952', *Records of the Australian Academy of Science*, 4, 2, 1979, pp. 7–37.