CHAPTER 16 in CORPORATE TIES THAT BIND:
An Examination of Corporate Manipulation and Vested Interest in Public Health

Spin in the Antipodes-
A History of Industry Involvement in Telecommunications Health Research in Australia

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> The potential for conflict of interest can exist whether or not an individual believes that the relationship affects his or her scientific judgment. Financial relationships (such as employment, consultancies, stock ownership, honoraria, paid expert testimony) are the most easily identifiable conflicts of interest and the most likely to undermine the credibility of the journal, the authors, and of science itself (1).
>
> The International Committee of Medical Journal Editors, 2007

> As universities turn their scientific laboratories into commercial enterprise zones, and select facility to realize these goals, fewer opportunities will exist in academia for public-interest science – an inestimable loss to society…The roles of those who produce knowledge in academia and those stakeholders who have a financial interest in that knowledge should be kept separate and distinct" (2).
>
> Sheldon Krimsky, 2003

Introduction

In March 2009 three Australian neurosurgeons, Drs. Vini Khurana (3), Charles Teo (4) and Richard Bittar (5), wrote a 'Letter to the Editor' to the medical journal *Surgical Neurology*. Titled "Health risks of cell phone technology", the letter expressed the neurosurgeons' concerns over what they considered was a serious emerging public health risk from the ubiquitous use of the cell phone and the increasing evidence for harm, including brain and salivary gland tumours, male infertility, behavioral disturbances and electrosensitivity. The authors concluded by strongly recommending that children's cell phone use should be restricted (6).

Khurana and Teo, with co-authors Michael Kundi, Lennart Hardell and Michael Carlberg, have also written a peer-reviewed paper published in *Surgical Neurology* titled "Cell phones and brain tumors: a review including the long-term epidemiologic data". This paper concluded that "there is adequate epidemiologic evidence to suggest a link between prolonged cell phone usage and the development of an ipsilateral brain tumor" and "it is likely that neurosurgeons will see increasing numbers of primary brain tumors, both benign and malignant" (7).

On previous occasions Khurana, Teo and Bittar have publicly expressed their concerns over what they were seeing in their surgeries. For example, Dr. Teo stated in a *60 Minutes* interview (April 3rd, 2009) that he was seeing a rise in the incidence of brain cancer and as a result the public should be informed as to all the potential causes of the disease. Teo said that he was "incredibly worried, depressed at the number of kids I'm seeing coming in with brain tumours….Just in the last three or four weeks I've seen nearly half a dozen kids with tumours

which should have been benign and they've all been nasty, malignant brain tumours. We are doing something terribly wrong" (8). Khurana shared Teo's concerns as he too was" seeing too many young people with such tumours" (9).

Teo's concerns were backed up by statistics from the UK that found brain tumours were now apparently the leading cause of childhood cancer mortality in the UK. While childhood leukaemia mortality had decreased 39% between the years 2001 to 2007, childhood brain tumour deaths had increased by 33% over the same period. In addition, according to a U.K charity, Brain Tumour Research, in 2009 more children and adults under the age of 40 were dying from brain tumours in the U.K. than from any other form of cancer and that the incidence was increasing with some experts seeing a recent doubling of brain tumour cases (10).

Concerns over an apparent increase in brain tumour incidence in young people also were raised in U.S. Congressional hearings in September 2008. Ronald Herberman, Director of the University of Pittsburgh Cancer Institute, testified that in his examination of government statistics the incidence of brain cancer has been increasing over the last ten years, particularly among 20-29 year-olds. Herberman pointed out that as the latency for brain tumours is more than ten years and if cell phone were responsible for the increase, brain tumour rates might not peak for at least another five years. At the congressional hearings both Herberman and David Carpenter, Director of the Institute for Health and Environment in Albany, N.Y., cited research findings by Lennart Hardell from Sweden that indicated people who started using cell phones before the age of 20 were five times more likely to develop a glioma, frequently a type of malignant brain tumour. According to Carpenter, "this observation is consistent with a large body of scientific studies that demonstrate that children are more vulnerable than adults to carcinogens." Carpenter stated at the hearing that "the evidence is certainly strong enough for warnings that children should not use cell phones." He warned that, "The failure to take [strong preventive action] will lead to an epidemic of brain cancer" (11**)**

Concerns also were raised in France with the Environment Minister, Jean-Louis Borloo announcing legislation in January 2009 that would ban advertising of the mobile phones to children under twelve years of age – and he would legislate a ban the sale of any phone designed to be used by those under six (12).

In March 2, 2009 the Russian National Committee on Non-Ionising Radiation Protection (RNCNIRP) issued official advice that the "health of the present generation of children and future generations is under danger" from cell phone use and therefore the committee has recommended that cell phone use be restricted for people under 18 years of age. The RNCNIRP called for the dissemination of information specifically for parents, teenagers and children on the dangers of cell phone use and called for the banning of cell phone advertising targeting children (13).

In addition to the above concerns, in April 2009, Professor Bruce Armstrong, the head of the Australian section of the international thirteen nation Interphone Project , studying the possible long-term hazards from cell phone use **(below)**, saw that for long-term users a suggestion of an increased risk of gliomas on the same side of the head that a cell phone was usually used and as a result recommended that cell phone exposures should be limited, especially for children (14).

Earlier, in June 2000, Australian calls for concern over the unrestricted use of cell phones by children were expressed by the Commonwealth Science and Industrial Research Organisation (CSIRO) in 2000 and the Australasian College of Nutritional and Environmental Medicine (ACNEM) in 2003. Dr. Gerry Haddad, head of the CSIRO's Telecommunications and Industrial

Physics Department, stated in Senate hearings that there was a need to “restrict use of mobile phones for children for essential purposes...a precautionary principle would seem to be a good idea” (15

In 2003 the Australasian College of Nutritional and Environmental Medicine (ACNEM) published a paper by this author that detailed reasons why extra precautions needed to be taken for children and cell phone use. The paper included a number of statements of concern specific to this issue from scientific and medical organizations internationally. These included the U.K.’s Independent Expert group on Mobile Phones (IEGMP), the International Institute of Biophysics, Germany, the German Interdisiplinary Association for Environmental Medicine and the World Health Organisation’s Director General Dr. Gro Harlem Brundtland to name a few. The ACNEM paper concluded with the question: “Is it worth the risk” to continue to allow unrestricted cell phone use by children (16)?

In stark contrast to the above concerns, however, Australian Centre for Radiofrequency Bioeffects Research (ACRBR), until it closed in June 2011, was apparently of the opinion that it was worth the risk. On the ABC Lateline program (April 4, 2009) Dr. Rodney Croft, then Director of ACRBR, stated: “There really has been a lot of research done to date and the research has very clearly shown that there aren’t any effects. With children, I really don’t think there is any evidence suggesting that this might be a problem. There isn’t anything to suggest that we may have to be a little bit more cautious” (17). To visually back up ACRBR’s dismissive viewpoint on children and cell phone use on the ACRBR web site was an animated GIF image that included images of children happily using cell phones (18).

The Interphone study

Differing expert interpretations of scientific findings on cell phone use are seen in statements over the findings of the 13 nation Interphone study, which examined brain tumour (glioma and meningioma) risk in relation to mobile phone use in the participating countries (19).

As for the overall findings, Dr Elizabeth Cardis, Director of the Interphone study stated the following:

> The study is very complex and the interpretation is not clear. And we have not demonstrated consistently that there’s a risk, but I think it’s really important to note that that does not mean that there’s no risk. We have a number of elements in the study which suggest that there might actually be a risk, and particularly we have seen an increased risk of glioma, which is one type of malignant brain tumor, in the heaviest users in the study—in particular on the side of the head where the tumor developed and in particular in the temporal lobe which is the part of the brain closest to the ear so closest to where the phone is held, so that’s the part of the brain that has most of the exposure from the phone (20).

Dr Christopher Wild, Director of IARC, said in the IARC press release, of the study findings:

"An increased risk of brain cancer is not established from the data from Interphone. However, observations at the highest level of cumulative call time and the changing patterns of mobile phone use since the period studied by Interphone, particularly in young people, mean that further investigation of mobile phone use and brain cancer risk is merited."

Professor Elisabeth Cardis added in the press release that:

"The Interphone study will continue with additional analyses of mobile phone use and tumours of the acoustic nerve and parotid gland. Because of concerns about the rapid increase in mobile phone use in young people − who were not covered by Interphone −, CREAL is co-ordinating a new project, MobiKids, funded by the European Union, to investigate the risk of brain tumours from mobile phone use in childhood and adolescence"(21).

In stark contrast, however, Rodney Croft, Director of ACRBR, simply summed up that the "The Interphone results provide a clear indication that there is no association between mobile phone use and brain tumour rates - or at most, that if there was ... it would be too small to be detectable by even a study of Interphone's magnitude" (22).

Despite Croft's dismissive statements, on May 31, 2011, due to the Interphone findings, the IARC classified radiofrequency radiation from wireless (mobile) phone use possibly carcinogenic to humans (Group 2B) (23).

Readers at this point would be forgiven if they found somewhat confusing the huge disparity between ACRBR's stance on **the safety** of **cell** phone use and those of Khurana, Teo, Bittar, and the rest. In order to seek to clarify why such a disparity exists this paper looks at the development of the Australian research effort into the possible hazards of cell phone use and the commercial and political influences that have been brought to bear on the scope, interpretation and use of that research. Also examined are the --------- organisations ---------- that have taken over the research after ACRBR's closure in June 2011.

The starting point for this enquiry is to examine the important role previously played by the Commonwealth Scientific and Industrial Research Organization (CSIRO) which was the prime mover in creating the first Australian telecommunications frequencies (**24**) standard setting committee under the auspices of the Standards Association of Australia (SAA) in 1979. During this time, and later under Standards Australia, CSIRO's Division of Radiophysics took the position that technology should be applied with public safety as a prime consideration.

The CSIRO and radiation politics

The history of the CSIRO, Australia's premier scientific research organization, begins in 1916 when the federal government established an Advisory Council of Science and Industry (ACSI). The goal for ACSI was to gather information on Australian scientific work, undertake research, review existing research and collect and disseminate scientific information to the public. In 1920 the Commonwealth Institute of Science and Industry (CISI) was established, under the directorship of physicist and statistician Sir George Knibbs.

In 1926 the British government's Balfour Declaration established the British Commonwealth of Nations and the Empire Marketing Board was created to foster closer economic, scientific and technical cooperation between Commonwealth countries. As a result, the Australian Prime Minister Stanley Melbourne Bruce arranged for Sir Frank Heath of the British Department of Scientific and Industrial Research to report on reorganising CISI. His report resulted in legislation being passed in 1926 that established a successor agency, the Council for Scientific and Industrial Research (CSIR), charged with carrying out scientific research for the benefit of primary and secondary Australian industries. Scientific advice to the government on the setting up of CSIR argued strongly that creative scientific research required a type of working environment not usually found in government departments. As a result, CSIR was set up as a

statutory authority with a governing council to oversee appointments and staff management run by an Executive Committee of three. In 1936 the government extended the role of CSIR to provide scientific assistance to secondary industry. With the creation of the National Standards Laboratory, the Aeronautical Laboratory and the Division of Industrial Chemistry in the years 1937-40, CSIR played an important part in the rapid wartime development of Australian industry. As part of the wartime effort CSIR established the Radiophysics Advisory Board and the Division of Radiophysics in 1939. After the war, research expanded to include areas such as building materials, wool textiles, coal, atmospheric physics, physical metallurgy and assessment of land resources.

Because of conflicts between the need to maintain its scientific freedom during the early years of the 'Cold War' with the Soviet Union, CSIR ceased all secret or 'classified' work of a military nature under the Science and Industry Research Act of 1949 and was reconstituted as CSIRO, the Commonwealth Scientific and Industrial Research Organization. Over the next 30 years CSIRO research covered almost every area of primary, secondary and tertiary industry. In addition it expanded into areas affecting the community, such as environment, human nutrition, conservation, urban and rural planning and water supplies. In 1978 the approximately 30 existing research divisions were grouped into areas of compatibility called Institutes, with Directors appointed to oversee an integration of planning, research and resources within their area, such as agriculture, industrial technologies or minerals. In 1986 a Board of external members plus a Chief Executive to lead CSIRO was formed. Among other changes was a decentralisation where much of the central administrative work was devolved to the Institutes.The current corporate structure of CSIRO is a result of the Board Review's recommendations of the Board Review, from 1996. The Chief Executive is supported by four Deputy Chief Executives who oversee part of the research activities and one or more corporate functions. The Institute structure was abolished with fewer but larger divisions established. These divisions operate as semi-autonomous business units reporting to the Deputy Chief Executives. Sector Advisory Committees have been established to provide advice on strategic research directions and to improve "the interface with industry and society" **(25).**

As mentioned previously, the CSIRO was the driving force in creating Australia's first national telecommunications radiofrequency and microwave (RF/MW) standard setting committee in 1979, as well as assisting in drafting the first Australian RF/MW exposure standard (AS 2772-1985). CSIRO took an active interest in non-ionising radiation health effects, from cell phones to ultrasound, and played a leading role for many years on the radiofrequency standards committee, having high regard for public health and safety.

In early 1994 Spectrum Management Agency (SMA)[21] commissioned the CSIRO's Division of Radiophysics to undertake a comprehensive review of the available worldwide research on the biological effects of RF/MW exposure on the human body (**26**). Funding for the study came from the national carrier Telecom (later Telstra), and the carriers Optus and Vodafone and the review report was authored by Dr. Stan Barnett from CSIRO's Ultrasonics Laboratory, Division of Radiophysics.

Barnett's report listed many well-documented adverse bio-effects from exposure to RF/MW at power levels well below the threshold for thermal effects (**27**), which the Australian and International exposure standards were based on. It also listed many laboratory studies that reported bio-effects at power levels well below the maximum standard limit of 1mW/cm^2, with implications for possible adverse effects on the human immune system. The importance of non-thermal interaction (**28**) with the human body was a central feature of the CSIRO report. For example, in the Section 9.0, "Mechanisms of Interaction" it is stated (in part):

> The reported effects are unexpected from the existing knowledge on physical interactions since they do not appear to be described by classical intensity or dose-response relationships. It seems to be unlikely that a single bio-physicial interaction mechanism will be adequate to explain all of the reported non-thermal effects of RF and microwave radiation (REMOVE REFERENCE here)

In his report, Barnett pointed out that the research database to date was inconclusive, and called for the establishment of an effective research program to determine threshold levels for the onset of RF/MW bio-effects. This research was to span from the level of molecular biology to whole-body physiological reactions and included consideration of possible non-thermal low-level bio-effects. CSIRO considered that the creation of an independently verified database was necessary to be able to develop meaningful safety standards and achieve the trust of the public. The report went on to recommend specific areas of research that it felt was needed and called for the formation of an expert committee to oversee such a program (**29**).

The CSIRO report, however, was very controversial as it contradicted the opinion of the telecommunications industry that there were no known non-thermal effects from RF/MW. The report also brought into question the credibility of government policy to promote telecommunications and as a result, the report was classified "Confidential" and withheld from publication. This was the case until its existence was leaked to the magazine Communications Day and the office of Australian Democrats Senator Robert Bell in March 1995 (**30**).

The CSIRO report, after its distribution by the Australian Democrats, became an alternative source of expert knowledge for the public who were concerned about possible unintended hazards from the rapid proliferation of wireless technology. This development would have been of concern to the federal government as it was a majority shareholder in Telstra and therefore had a vested interest in protecting its investment and promoting telecommunications technology and its safety. Sociologist Sheila Jasanoff has written of similar situations where "the credibility of governmental actions in contemporary knowledge societies depends crucially on the public evaluation of competing knowledge claims and the consequent production of reliable public knowledge"(**31**). Considering Jasanoff's words, the CSIRO report could be seen as a threat to the government's credibility in relation to government statements on the safety of telecommunications technology.

After pointing out research priorities in the report, CSIRO's Department of Radiophysics (**32**) applied several times to the National Health & Medical Research Council (NH&MRC) for funding to research the potential effects of mobile phone radiation on DNA and cancer. However, despite the fact that the Division of Radiophysics was arguably well qualified to conduct the research, it was in both instances rejected. This rejection was possibly due, not only because the government considered CSIRO to be in conflict with government policy, but because various people from government, Telcom (Telstra), Optus and Vodafone had claimed that the CSIRO report was merely a blatant attempt to gain research funding (**33**). If CSIRO had been successful in gaining funding for research it would have been conducted by their own researchers who did not necessarily share government and industry views on the safety of telecommunications technology. The history of CSIRO's telecommunications policy on standard setting illustrates that they consistently weighed up conflicting viewpoints on safety. The knowledge thus generated by a CSIRO research program would have been considered as an unknown quantity (a 'loose cannon' so to speak) with the potential to conflict with both government and industry policy and generating what Jasanoff called "competing knowledge claims".

The government subsequently removed the CSIRO from any involvement with the mobile phone research program later established by NH&MRC, and was also removed from any future involvement with non-ionising research altogether in 2003 (**34**). It was at a time when the federal government was instigating changes to the CSIRO management, appointing an executive with experience in venture capital expertise to build partnerships with industry and re-model CSIRO as a profit-centred corporate business. In January 2001 the federal government appointed Dr. Geoff Garrett as CEO of CSIRO and he was re-appointed in April of 2005. One of Garrett's pledges to the government when he first took up his post was to increase external funding to CSIRO by encouraging industry partnerships and commercialising patents for CSIRO discoveries. One initiative was to replace key CSIRO executives with people with "venture capitalist expertise" (**35**). In an October 2005 interview on CEO Insight, Australia's leading web site for corporate CEOs, Dr. Garrett talked about "traditions that need to be preserved and those that were simply historical responses to conditions that may no longer apply". A major part of Garrett's changes was in the area of communication, which he considered to be 60% of the overall necessary changes to the organisation. Garrett saw as essential that with communication, key stakeholders – by which he meant industry- needed to hear the same messages (**36**).

In order to 'improve' CSIRO communication, in May 2002 Garrett removed Julian Cribb as Director of National Awareness (public communication) at CSIRO. Cribb, the principal of Julian Cribb & Associates, specialists in science communication, was eminently qualified for his former communications appointment at CSIRO. He was Adjunct Professor of Science Communication at the University of Technology Sydney and had authored a book with Tjempaka Hartomo titled; *Sharing Knowledge, a manual for effective science communication* (**37**).

In early 2004, Dr. Garrett with the approval of Science Minister Peter McGauran took an unusual step by announcing the creation of a new CSIRO senior staff position of "Director of Communications" as one of his initiatives to make CSIRO into more of a money making "corporate business" instead of an agency doing research predominantly in the public interest (**38**). A number of CSIRO staff objected, since the position had been created and imposed on the organisation from above, and not by any normal procedures involving the scientific committees of the organization (**39**). In spite of these objections, Donna Staunton was selected and took up the new staff position at CSIRO, on March 1st, 2004, on a three year contract staff position with salary of around $330,000 a year, placing Staunton in the top four earners in CSIRO at roughly three times the salary of a senior research scientist. When CSIRO management made a brief announcement to their staff of her hiring it did not mention her background qualifications but said she "is highly regarded in political and corporate spheres" (**40**). According to science journalist, Dr. Peter Pockley, writing in Australasian Science, it was widely considered that Staunton was selected on Garrett's personal recommendation (**41**). The job specification did not require the appointee to have any experience in science or its communication. Staunton stated that her expertise is in "risk management and reputation management" (**42**). According to her consultancy's website at the time Staunton "brings a very deep knowledge of the corporate sector to this business. She understands the way the corporate sector needs to successfully interact with its many stakeholders – the media, government, shareholders, the investment community, staff, customers and the general public" (**43**). As CSIRO Director of Communications, one of Staunton's tasks was liaising between the media and agency scientists, essentially working as a censor through which agency scientific findings would be put before releasing to the media and public (**44**).

Donna Staunton's previous experience illustrated that conflict of interest was a non-issue in the

new corporate CSIRO. She had previously been a lawyer with the legal firm Clayton Utz where her job was to handle work for tobacco cases on behalf of the industry. She later became Chief Executive Officer of the Tobacco Institute of Australia and Vice President for Corporate Affairs of the Philip Morris Group (**45**). Guy Nolch, Editor of *Australasian Science* raised concerns over Staunton's tobacco past on March 30, 2004 when he wrote that: "It's unlikely that trust in science can improve in Australia when public comment from its premier scientific research organisation if filtered by a manager who has used science to put corporate interests ahead of community health" (**46**). Nolch, put it more strongly in a May 28, 2004 email to CSIRO CEO Dr. Garrett: "Staunton's appointment is an endorsement by CSIRO of the tobacco industry, and signals CSIRO's desire to employ the methods Staunton used to put the interests of the tobacco industry ahead of the interests of public health" (**47**).

Stanton also held a position on the board of the Institute of Public Affairs (IPA), an organisation that proclaimed that it was "Australia's Leading Free Market Think Tank". As for its position on climate change, IPA considered global warming a natural cyclic event and all climate scientists who thought otherwise were suffering from the disease of "Mother Earthism" with a "touching belief in the Garden of Eden, the halcyon state of the Earth in times before the wicked Industrial revolution" (**48**). Such strong statements were in sharp contrast to the CSIRO's climate change division where they have stated: "Over the past 200 years, human activities have significantly altered the world's atmosphere" (**49**). As a reflection of how the CSIRO had changed under the guidance of Garrett and Staunton, in 2005 the Media, Entertainment and Arts Alliance (MEAA) gave CSIRO management a special commendation in its George Orwell Awards for those who have done the most to suppress press freedom.

According to investigative journalist Stewart Fist a close link is seen between the Liberal Party, the tobacco industry and Staunton in that the then Deputy Leader of the Liberal Party, Julie Bishop, was previously a lawyer at Clayton Utz from 1983 to 1998. While working at the firm, Bishop as managing partner, worked on behalf of the Tobacco Institute fighting a high profile passive smoking case (Burswood Casino) and opposing an active anti-smoking lobby in Western Australia. In their intersecting roles Bishop and Staunton would have been close working associates. After resigning from Clayton Utz Bishop became a Liberal candidate for the federal seat of Curtin and won the seat in the election held in October 1998 (**50**).

The NH&MRC and radiation politics

Even though the Liberal government had eliminated CSIRO from the non-ionising radiation issue altogether by 2003, the 1994 CSIRO recommendations for a research program were later largely adopted by the NH&MRC, the national peak body offering grants for health and medical research. The CSIRO report had called for an expert committee to be established to oversee an Australian research effort that would critically evaluate the dosimetry and bio-effects of published studies, and create direct lines of communication between research, regulatory and political sectors. It would also design research protocols for critical areas of research and collaborate with international organizations to verify research (**51**).

In 1996 NH&MRC did establish an expert committee along the lines of the CSIRO recommendations. Concerned about the potential involvement of the telecommunications industry in this process, Sarah Benson, a researcher for Senator Lyn Allison, wrote to the NH&MRC in early December 1996 asking about industry representation. On December 30 Richard Morris, Assistant Secretary of the Health Research Branch, replied, stating that members of the telecommunications industry would not be involved:

> In regard to your concern about the involvement of industry in the NH&MRC process, let me assure you that members of the NH&MRC Expert Committee will be active researchers without links to the telecommunications industry. This independence from industry is seen as being of great importance to NH&MRC (**52**).

Despite this assurance from the NH&MRC, when it came to appointing a key expert radiation adviser to its EME Expert committee, they chose Dr. Ken Joyner, Motorola's Director of "Global EME Strategy and Regulatory Affairs" (**53**). Dr. Joyner has also represented the Australian Mobile Telecommunications Association, an industry group, on the telecommunications standards committee (**54**) and had also represented the Mobile Manufacturers Forum (**55**).

Such a complete reversal of their former stance that "independence from industry is seen as being of great importance" was most likely a result of direct political interference by the federal government. Joyner has been closely associated with the formulation of government policy on RF exposure. This is seen in the Bioelectromagnetics Newsletter of July/August 1998. In his article titled "Australian Government Action on Electromagnetic Energy Public Health Issues" Joyner's affiliation was given as representing the Australian Federal Department of Communications and the Arts (**56**).

When asked by Senator Lyn Allison about the advisability of Dr. Joyner being appointed to the NH&MRC Expert Committee to advise on submitted proposals for mobile phone research, Minister Senator Richard Allston saw no conflict of interest because (in part):

> Dr. Joyner's involvement in the EME Expert Committee in relation to communications technology is as an individual and not as a representative of the telecommunications industry or his employer, Motorola (**57**).

Despite Allston's assurance of Dr. Joyner's advice being independent from Motorola's corporate objectives, it must be noted that Motorola has been active in attempting to influence mobile phone research internationally. For example, Motorola has played a central role in the European Union's cell phone research effort. This was not without complaints. As reported in Microwave News (1999) there was a fair amount of discontent on part of European scientists with Motorola's involvement with the EC research and telling European scientists how to spend research funds (**58**).

The NH&MRC has long established conflict of interest guidelines for a wide range of possible situations with a requirement for "Disclosure of interests" which applied to membership of the EME Committee. To quote:

> "In the case of direct pecuniary interest, members may not take part in any decision to which the potential conflict of interest pecuniary interest applies, and must physically absent themselves from all or any part of a formal meeting or other discussion at which the matter in question is being discussed" (**59**).

If this requirement was vigorously applied then it is difficult to see how Dr. Joyner could have been involved at all when the matter in question was mobile phone research. However this requirement could conveniently be waived because of an opt-out clause that states: "the Chair of the Expert Committee, in consultation with the other uninvolved members of the Expert Committee, will determine the extent to which a member may be involved in the discussion or decision concerning the matter involving the potential conflict of interest" **(60).**

In January 2009 Dr. Joyner announced that he was leaving his Director position at Motorola after 12 years and was "looking for new opportunities to work in the telecommunications industry" (**61**). In that same year, Dr. Joyner was listed on the NH&MRC's Peer Review Honour Roll which acknowledged its many peer reviewers and external assessors who had exhibited "excellent track records and wide-ranging expertise in Australian and international health and medical research fields". However, under the section "Administering Institution/Employer" he was listed as simply "consultant" (**62)** even though during his time on the NH&MRC committee as an expert reviewer, his employer was Motorola.

Joyner was later appointed as expert advisor on the **thirteen** member Victorian Radiation Advisory Committee. This committee advises the Minister or the Secretary on any matters relating to the administration of the radiation legislation referred to it by the Minister or the Secretary. In other words, when radiation issues arise for the government the committee's advice would very much influence the state government's position. Dr. Joyners' inclusion on the committee coincided with the Victorian government's decision to mandate the statewide roll-out of new wireless electrical meters (called advanced or smart meters) in all homes and other buildings. This caused a significant level of public opposition and even spawned a new political party specifically opposing the roll-out of the new meters. This opposition was primarily a result of health complaints reported by some people after the meters were installed. These complaints would obviously be sent to the Radiation Advisory Committee for its expert advice. Dr. Joyner was the only person on the committee to give such advice as he was the sole member with expertise in "non-ionizing radiation" (**63**). In this respect it is essentially a committee of one.

The ACRBR and radiation politics

In 2003 the NH&MRC awarded $2.5 million in funding to establish a so-called "Centre of Excellence", the Australian Centre for Radiofrequency Bio-effects Research (ACRBR), based at the Royal Melbourne Institute of Technology (RMIT) University in Melbourne, Victoria. ACRBR was to investigate and advise on possible biological effects arising from exposure to radiofrequency radiation (RFR) from telecommunications technology. The person selected by the NH&MRC's EME Committee to take up a position as the first Director of ACRBR was Associate Professor Vitas Anderson (**64**), a close associate of Dr Joyner, and a former Telstra employee who represented Telstra's interests on the former Standards Australia TE/7 standards committee. On that committee Anderson opposed CSIRO's scientific position regarding the existence of nonthermal bioeffects from telecommunications RFR, which he saw as purely hypothetical. He saw the real task as being the need to "comfort the community" about the safety of wireless communications (**65**).

In 2001 Anderson appeared on the Australian SBS TV Insight program The Mobile Phone Debate. Anderson appeared at the behest of the transnational public relations agency Burson Marsteller , one of the world's biggest PR firms, well known for its work on behalf of the tobacco industry (**66**), and the industry group the Australian Mobile Telecommunications Association (AMTA) of which Burson Marsteller is listed as one of AMTA's "Support Industries"(**67**). Anderson was introduced on the program as a "Mobile Phone Industry Consultant" (**68**).

As taken from the transcript of that program, Anderson's views on the mobile phone health issue were as follows:

> "The issue of mobile health effects is something that's been looked at for a long time and it's something that's been under review almost continuously, at least for the last 20 years quite

> intensively, and the evidence that we have to date, clearly indicates that there is no real reason for concern from the evidence that we have so far" (**69**).

The presenter, Gael Jennings, later asked Anderson: "Are you saying that as a scientist, you don't accept that there may be a mechanism whereby cells can be harmed in the laboratory, you don't accept that research? Are you saying that?" To this Anderson replied:

> "Well, actually it's not just a matter of myself not accepting it. Actually, it's merely the consensus of the general scientific community. There has been review, after review, after review on this topic. You'll find that some agencies may recommend one [a precautionary approach] in terms of dealing with the social issues of mobile phones but in terms of a health effect, there really is no substantive reason to recommend a precautionary approach" (**70**).

Anderson further elaborated his doubts about a precautionary policy for mobile phones in a paper titled, "Mobile Telephony and the Precautionary Principle – A Phoney Debate?" published in Radiation Protection in Australasia in 2001. Anderson considered that the precautionary approach itself generated risks. Anderson wrote that:

> "In its worst form the PP [precautionary principle] can create arbitrary and onerous regulatory measures without regard to new community risks and costs that may be generated, e.g.: denying or delaying public access to the social, economic and public safety benefits of mobile telephony; redirection of limited community resources away from more important public safety issues; protracted legal argument (and costs) over the vague definitions inherent in the PP; undermining of the integrity of the scientific method in determining the true level of any health risk from direct exposure to low level EME; Inappropriate occupational and public risk behaviours based on an exaggerated concern of EME as implied by the PP" (**71**).

Anderson then introduced the concept of a precautionary approach to the precautionary approach, when he concluded that:

> There is little published data to quantify these risks, though a strong prima facie case exists for a cautious approach to the PP. A considered decision on the PP that protects the public interest will require quantitative analysis of the risks generated by the PP described above (**72**).

Considering the above it was surprising that the issue of a conflict of interest was not apparently raised at the time about Anderson's appointment as the first Director at ACRBR.

With research into the effects on public health from non-ionizing radiation exposures being taken from the CSIRO by the government, RMIT University became a base for ACRBR.

RMIT University is "renowned for collaborating with industry, providing solutions, new ideas and processes that deliver real outcomes for business" (**73**). A cooperative relationship with Telstra was ensured by the already close working relationship between the two organizations. RMIT University was also home to the "Telstra Home Team: a different way of thinking", a team consisting of 5 postgraduate researchers funded by Telstra. The Team "undertakes research projects for Telstra while studying full time at RMIT" (**74**). RMIT University was also a partner in the Australian Telecommunications Cooperative Research Centre (ATCRC), whose focus was on "developing and commercializing the technologies that will drive a new generation of

telecommunications" (**75**). RMIT University, therefore, was charged with conflicting duties of both commercialising communications technology and researching for possible health effects from that technology. This should have raised the question of a possible conflict of interest within the university.

In order to answer the conflict of interest question it is necessary to consider RMIT University's Conflict of Interest policy, "Business risks to the University", where it is stated that a conflict of interest may exist when:

- The potential for employees to act in a way which is not, or is perceived not to be, in the best interests of the University.
- The potential for financial loss by the University because of the employee's actions.
- The potential for the boundaries between the University and its interests, and the external company and its interests to be blurred.
- The potential for the University to be joined in legal proceedings because of the employee's position on the board (**76**).

Although these points seen straightforward for addressing individual (employee) conflicts of interest this chapter will examine how these can be interpreted in various ways, especially when it comes to the larger issue of institutional conflicts of interest.

With such a close working relationship between RMIT University and Telstra, there is little risk of a conflict of interest arising between the two as both have a shared interest in developing and commercializing the technology. Such shared goals between university and business interests were first termed the "university-industrial complex" by Martin Kenney in the title of his 1986 book "Biotechnology: The University-Industrial Complex". Kenney, an assistant professor of agricultural economics at Ohio State University, raised concerns over the development of close business ties between many universities and large biotechnology corporations, and how this "university-industrial complex" would affect educational institutions, agriculture, and society in general (**77**).

Sheldon Krimsky in "Science in the Private Interest" (2003) examined the ethical quandary whereby university research has generally become deeply entangled with entrepreneurship and commercial interests - to become what Krimsky called an "inevitable tide of corporate and academic partnerships and the commercialism of knowledge". Krimsky concluded: "As universities turn their scientific laboratories into commercial enterprise zones, and select faculties to realize these goals, fewer opportunities will exist in academia for public interest science -an inestimable loss to society" (**78**).

In relation to the first three points in RMIT University's conflict of interest business policy (above), a conflict of interest could arise, for example, if ACRBR researchers at the university found evidence that telecommunications technology had adverse health effects. This was a concern mentioned by Telstra in bold type in its 2004 Telstra Annual Report where it was stated, under the heading "Risk factors" that "[t]he establishment of a link between adverse health effects and electromagnetic energy (EME) could expose us to liability or negatively affect our operations"(**79**). Consequently, any research effort into this possible link would be of vital importance to Telstra, not because of the truth it may uncover but its potential to adversely impact on litigation, regulation and the corporation's bottom line. It is interesting to note that in the same year Telstra was informing its investors that a risk existed, it was also telling the Australian public that there was no health risk from their use of mobile communications (**80**). As for the focus of Telstra's corporate research interests, according to Krimsky (2003) "corporations

view science not as a generator of truth but as one among many inputs into production" (**81**). Thus, depending upon what ACRBR research finds, the following could apply in relation to RMIT University's Conflict of Interest policy:

If a link between telecommunications technology and adverse health effects were found by ACRBR researchers at the university, this would pose a risk to both Telstra's and the university's operations – and also the university's shared ventures with Telstra. Thus, if this were to be the case, it could conceivably be said that the researchers who had found the risk had inadvertently acted "in a way which is not, or is perceived not to be, in the best interests of the University" and the interests of its partner Telstra. This situation would create a "potential for financial loss by the University because of the employee's actions". Such a situation would be likely to create conflict between Telstra's corporate interests and the university's interest in maintaining an unblemished image as an esteemed research organisation.

In relation to RMIT University's conflict of interest policy on the "potential for the University to be joined in legal proceedings…", it is worth noting the case of Dr. James Kahn and his employer, the University of California at San Francisco. Kahn had conducted a study on the effectiveness of an AIDS vaccine. When he found that the vaccine was ineffective, the drug company that provided the funding refused to supply more data and took action to block publishing of the study. Much to the credit of the university, rather than admonishing Dr. Kahn for creating a conflict with their corporate sponsor, they supported Dr. Kahn with the publishing of the study in the Journal of the American Medical Association in 2001. The company then proceeded to file a $7-10 million legal case against both Dr. Kahn and the university (**82**). Besides a conflict of interest, this case clearly demonstrates the pitfalls that can occur in university-industry partnerships when research uncovers scientific findings not to the liking of the industry partner (**83**).

However, while ACRBR became the centre stage for Australia's research on the health impacts of telecommunications equipment, the situation was quite the opposite at CSIRO. In September 2003 Dr. Stan Barnett, author of the CSIRO report, circulated a letter to announce that he had been forced to accept "involuntary redundancy" from CSIRO and that his division had been told by senior management to cease all further research into the bio-effects and safety of ultrasound and non-ionising radiation. This was despite the fact that CSIRO ultrasound research had found that pulsed Doppler ultrasound, widely used in Australia on pregnant women, could cause significant heating of up to five degrees in the foetus, particularly near the bones. Barnett's research also indicated that foetal tissue was vulnerable to physical change from the heating, including cell differentiation, which could have significant consequences for the developing foetus. Barnett had stated that the clinical implications of possible non-thermal effects from the use of ultrasound had not been fully evaluated, and that the ultrasound scientific database was incomplete and could not keep pace with technological development of modern equipment (**84**). Barnett's preliminary ultrasound work raised serious questions about a widely used technology that was being increasingly promoted as a safe procedure for the unborn child. For that reason a priority was evident to continue the research in the public interest. However, if further research confirmed Barnett's findings, there was the potential for a substantial risk for both the ultrasound industry and medical facilities using the equipment.

Barnett stated in his 2003 letter that:

> CSIRO has chosen to stop all research into bio-effects and safety of diagnostic ultrasound and cease any involvement in safety of non-ionising radiation in general. It seems that research for the good of the community is not considered a priority area

unless it is politically attractive or able to attract funding from industry. Clearly, that is not the case for safety related research in a taxpayer-funded research organization (**85**).

Henceforth, any research into possible health impacts of mobile phones or other health issues related to telecommunications would be solely through the NH&MRC's EME committee, ACRBR and its partner Telstra.

It has been argued on many occasions that the best people to involve in research are people with expertise in the field, and most of these people obviously work for industry. This was the argument put forward by Senator Richard Alston, Minister for Communications, Information Technology and the Arts in 1998. As a justification for selecting Dr. Joyner as the radiation advisor to NH&MRC's Expert EME Committee he stated: "If experts who have had any involvement with industry in the past were excluded from participation, it would be almost impossible to establish an Expert Committee" (**86**). What Alston didn't mention, however, was why CSIRO and its proven expertise on the issue were not represented on the committee. Senator Alston would have been aware that an expert radiation advisor, or several for that matter, could most likely have been drawn from the CSIRO's Division of Telecommunications and Industrial Physics (TIP). If this had been the case then NH&MRC's EME Committee would have not needed any industry representation in order to do their task. After all, this was of great importance to NH&MRC in 1996 when, as mentioned previously, an NH&MRC senior spokesperson stated: "independence from industry is seen as being of great importance to NH&MRC" (**87**). Obviously, from the government's perspective, the advice of Motorola on telecommunications health research issues was preferable to that of independent scientists from CSIRO.

Although RMIT University has a conflict of interest policy in relation to individuals, there is no provision for addressing possible institutional conflicts of interests. Therefore no questions were apparently raised about possible conflicts when Telstra became a major part of the ACRBR research team. Ray McKenzie, from Telstra's EME Research & Standards section, was appointed Research Director at ACRBR (**88**). Under the heading of Distinguished Directors of ACRBR Dr John Stocker, a Telstra Director, was also listed (**89**). At an October 2004 joint ACRBR/Telstra Workshop, held at the Telstra Research Laboratories in Clayton, Victoria, Professor Mays Swicord was an invited participant. Swicord was referred to as a representative from the Mobile Manufacturers Forum, Geneva and an "internationally renowned RF Bio-effects researcher". Swicord was also a senior scientist for Motorola and has been editor of the Bioelectromagnetics Newsletter. According to the ACRBR website this Workshop "provided the ACRBR with an update on international industry and academic perspectives on the Bio-effects Research area" (**90**). This is a clear indication of the close partnership between industry and academia where conflicts of interest can morph to becoming a shared interest.

Earlier that year Swicord reported in the Bioelectromagnetics Newsletter on the heat shock protein (HSP) workshop held in Helsinki, Finland, in April 2004, which was hosted by Dariusz Leszczynski of the Finnish Radiation and Nuclear Safety Authority (STUK). However, Swicord omitted from his report much of Leszczynski's data that supported a HSP effect even though the findings had been one of the major reasons for organising the workshop. As a result of this significant omission, a group of Bioelectromagnetics Society members called for an editorial board to ensure that this would not occur again (**91**). Swicord's omission of inconvenient data confirms Krimsky's observations that corporations on numerous occasions have suppressed study findings that they funded when those findings were in conflict with their commercial interests (**92**).

Institutional conflicts of interests

Most institutional conflict of interest policies deal with individual trust and responsibility, however of greater concern is the lack of safeguards in organisational partnerships, such as those between RMIT University/ACRBR and Telstra. Such safeguards are obviously needed in order to prevent institutional conflicts influencing the representation and interpretation of research results. This problem has been explored by Harold Barnes in his book "Social Institutions – In an Era of World Upheaval" (1942). According to Barnes, institutional conflicts of interests can have a far greater impact on an organization than individual conflicts of interests as they set an expected level of behaviour (establish an institutional culture) for all members of the organization. Barnes found that this can affect the actions of dozens or even thousands of individuals, both within, and outside an organization (**remove reference here**). In relation to universities he found that:

> "Faculty members depend heavily on the institution's administration for their salaries, promotions, tenure, space, teaching assignments, annual increases, and committee assignments. This power relationship makes it extremely hard for faculty members to be truly independent and objective toward the demands or perceived demands of the institution. This imbalance of influence provides an avalanche of pressure for expediency, conformity [and] intellectual lethargy" (**93**).

Thus, the institutional conflict of interest issue in relation to Motorola and Telstra employees influencing and directing the research effort at ACRBR would most likely result in an overall research program that conforms to the objectives of these corporations. This situation is clearly reflected by the statement published on conflict of interest in 2006 by the International Committee of Medical Journal Editors (quoted in part):

> "Conflict of interest exists when an author (or the author's institution), reviewer, or editor has financial or personal relationships that inappropriately influence (bias) his or her actions (such relationships are also known as dual commitments, competing interests, or competing loyalties). These relationships vary from those with negligible potential to those with great potential to influence judgment, and not all relationships represent true conflict of interest. The potential for conflict of interest can exist whether or not an individual believes that the relationship affects his or her scientific judgment. Financial relationships (such as employment, consultancies, stock ownership, honoraria, paid expert testimony) are the most easily identifiable conflicts of interest and the most likely to undermine the credibility of the journal, the authors, and of science itself" (**94**).

The potential for conflict of interest was also addressed in a national conference titled "Conflicted Science" in July 2003, and sponsored by the Centre for Science in Public Interest (CPSI) in the USA. The conference examined how the increasing commercialisation of science is undermining science itself. At this conference, journalists, researchers and university professors from a wide range of fields (from environmental planning to paediatrics to criminal justice) recounted how the commercialising of science was stifling or corrupting their disciplines. The conference concluded that there was a significant societal loss of trust in 'science', even when it came from what appeared to be independent sources. Non-profit organizations, public universities, and health charities, all too often dependent on corporate money, have become the messengers for corporate interests. Investigations by the CSPI has shown that "[t]here is strong evidence that researchers' financial ties to chemical, pharmaceutical, or tobacco manufacturers directly influence their published positions in supporting the benefit or downplaying the harm of the manufacturer's product" (**95**).

Rejecting "counterintuitive" research (96)

One of the research studies considered by the NH&MRC's EME Expert Committee was a study by Dr. Pamela Sykes from Flinders University in Adelaide, South Australia. Syke's study, funded by the government's EMR Program, involved exposing mice to GSM cell phone radiation at a power level of 4 Watts per kilogram (4W/Kg). The aim was to test for changes in DNA, one of the issues CSIRO wanted to research had funding been approved. Her preliminary study findings, published in Radiation Research, November 2001, found that the exposed mice had fewer DNA changes than expected. Although this might suggest a beneficial or protective effect from the microwave exposure Sykes pointed out in her paper that some proven genotoxic agents can also express this same effect, suggesting that cell phone microwave exposure may be genotoxic (**97**). Sykes then applied to the EME Expert Committee for further funding to continue the investigation with a larger number of mice to see if her finding could be replicated. The review committee turned this request down because they claimed that her preliminary results were "inconclusive" due to the small number of mice used in the initial study and that the findings did not support her original test hypothesis that exposure to RF promotes more DNA breakages than normal in transgenic mice. The expert committee concluded that, as the study found less DNA breakages than what would normally be expected in non-exposed mice, there was no point in conducting further research in this area (**98**). This conclusion, however, failed to address the issue of possible genotoxicity that was raised by Sykes. Microwave News (2001) notes that the EME committee stated, "[a]lthough it may be interesting, from a perspective of scientific curiosity, to further explore the phenomena…is, however, unfortunately outside [our] scope." The committee then suggested that Sykes re-apply to NH&MRC for a grant that was not specifically tied to RF bio-effects. This application was, however, also rejected. The committee wrote back, stating that while it "recognized the great potential significance of her results", it considered them "somewhat counterintuitive" (**99**).

The use of the word counterintuitive as a reason to reject research findings is of concern as it indicates that an assumption had been made that as Sykes' findings did not fit with what would have been expected they did not need to be further investigated. It is expert decision making at a level of 'intuition' or 'common sense' and therefore outside the norms of scientific objectivity. It indicates that a dismissal of the importance of Sykes' preliminary findings was made because it conflicted with the official stand of the Australian government (and industry) as stated in a government fact sheet: "Although there have been studies reporting a range of biological effects at low levels, there has been no indication that such effects might constitute a human health hazard, even with regard to long-term exposure." And: "The weight of national and international scientific opinion is that there is no substantiated evidence that exposure to low level RF EME causes adverse health effects" (**100**). Therefore research findings that ran counter to this frame of reference could be rejected as 'un-useful' knowledge.

A comparison can be made here with research conducted by Dr. Ross Adey et al , and published in Cancer Research in April 2000. This research exposed Fisher laboratory rats to an RF signal simulating exposures that would be expected in the head of a digital mobile phone user. Overall, the two-year study showed a trend towards a reduced incidence of central nervous system (CNS) tumours in the exposed rats in comparison to unexposed controls, thus indicating a protective DNA repair effect from exposure. Although this could be considered as evidence of danger of mobile phone use causing brain tumours, Adey et al pointed out that that the findings needed to be followed up because they indicated a possible non-thermal (low-intensity) effect. To quote: "[T]here is considerable evidence in the literature to support the suggestion that low frequency modulated radiofrequency fields are capable of interacting with biological systems when applied at athermal (non-thermal) levels, involving interactions with key messenger and

growth regulating enzyme systems." Adey et al went on to explain that the findings of the study were consistent with an action of the RF fields in lowering tumour incidence and suggested further research into non-thermal exposures (**101, 102**).These suggestions cast doubt on the mobile phone industry's assertion that athermal (low intensity) RF exposures were of no consequence, as there could be no interaction with biological tissue at levels that did not cause heating. Adey's request to Motorola for further funding to do a replication was refused. Motorola then confiscated all the essential equipment, including field generators and exposure chambers. Adey stated in a sworn affidavit this was done "to ensure that we could not pursue any further studies" (**103**).

Considering that a standard practice in science is to replicate of a study in order to establish a biological effect, it could be surmised that further research to explore possible biological effects from low intensity RF exposure did not suit Motorola's interests. With both Sykes' and Adey et al 's research, the unwillingness to attempt a replication of scientific findings of an effect (protective) between RF exposure and DNA suggests the findings were "counterintuitive" to strongly held beliefs that there can be no biological effects from RF exposures below the heating threshold.

As Jasanoff (2005) pointed out, political controls over science are pervasive in restricting scientists' "ability to pursue certain lines if inquiry, the conditions under which their advice is sought, and the extent to which research trajectories are subordinated to political imperatives…" (**104**). It can be argued that this was certainly the case with the government's removing CSIRO from the issue and establishing a research effort under the firm guidance of the telecommunications industry.

Swinburne University takes up the banner

In June 2011, Rodney Croft as Executive Director of ACRBR announced, that as of June 10, 2011, the organisation would cease operations because it had been unable to secure further funding to continue its research activities. Croft did announce, however, that many of the Directors would be able to continue their radiofrequency research but no longer under the banner of the ACRBR (**105**). A number of the former ACRBR directors then continued their work under the banner of the Bioelectromagnetics Research Group, part of the Brain and Psychological Sciences Research Centre (BPsyC) at the Swinburne University of Technology. The Swinburne group had long been associated with ACRBR.

To quote from the university website:

> "The Bioelectromagnetics Research Group explores biological and health effects of exposure to electromagnetic fields (EMF) such as produced by mobile phones, broadcast towers and power lines, particularly how this may affect the brain. It incorporates measurement and analytical tools for assessing EMF exposures in the environment and inside living systems, and an in-vitro laboratory (the Cellular Neuroscience laboratory) for conducting biological experiments. The centrepiece of the Group is the Radiofrequency Dosimetry Laboratory. Specific research interests include EMF safety exposure assessments, complex modeling of EMF and thermal patterns inside living systems, bioelectromagnetic cellular studies and biophysical aspects of neurophysiological equipment. (led by Professor Andrew Wood)" (**106**).

The Radiofrequency Dosimetry Laboratory is jointly funded by Telstra Corporation and the University and consists of equipment formerly used by the Telstra EME Safety group. As well as

being available for research projects it is used by Telstra for checking compliance of Telstra's assets with several Team Telstra employees assigned to the Lab (**107**).

Such a close working relationship between the University and Telstra is not new, In fact the Chancellor of Swinburne University, Mr. Bill Scales (2005-2014) was previously Telstra's Group Managing Director, Regulatory, Corporate and Human Relations, and Chief of Staff at Telstra. He was also Telstra's Director of IBM Global Services Australia Ltd. and a Director of the Telstra Foundation (**108**).

Industry-Based Learning

Rather than maintaining an arms-length from industry, Swinburne has a long history of working along side industry with a program of Industry-Based Learning that was introduced into Swinburne engineering programs in the 1960s. To quote:

> "Swinburne's industry connections extend well beyond the classroom. We collaborate with industry from the earliest stages of research through to commercialisation, drawing on partnerships for resources, financial support and industry-based expertise.We also deliver customised training and short courses to businesses and organisations. Swinburne is a leader in the delivery of workplace training, with more than 15,000 students studying in their workplace. Our students also benefit from relevant and effective industry engaged learning, such as taking an Industry-Based Learning placement as part of their course, working for host organisations. Industry representatives sit on our course advisory boards, ensuring curriculum anticipates the future needs of industry so we can help develop work-ready graduates" (**109**).

Swinburne University may well be a suitable academic institution for meeting the needs of industry by conducting product development research and training graduates for a future career in industry. However, as with RMIT examined previously, an academic institution that is focussed on what industry needs is arguably a highly unsuitable place for conducting research that may pose a risk to an industry partner. This should be especially be the case when that partner (Telstra) has previously stated in writing its concerns over research which could established a link between its activities and adverse health effects thereby exposing it to possible liability or negatively affect its operations (**110**).

Swinburne and the Internet of Things (IoT)

In 2011 Swinburne partnered with Greenwave Systems, a home energy management company to open an Energy Management Research Centre (EMRC). Greenwave is a software and services company whose singular focus is to drive the mass adoption of Internet of Things, a concept where every device we use will one day all be connected wirelessly via the Internet (**111**). EMRC 's activities include "training and technology transfer of new intelligent solutions for energy management in smart grid to business and community in Australia and internationally" (**112**). Essential to the concept of the Internet of Things is the introduction of smart metering technology (**113**), also called Advanced Metering Infrastructure (AMI) which sends building electrical consumption data back to the utility via. a 900 Mhz radio frequency signal. This raises a conflict of interest if Swinburne's Brain and Psychological Sciences Research Centre is called upon to research possible health issues that directly conflict with EMRC's goals.

The problem of university/corporate partnerships was examined in a 2012 report by the Union of Concerned Scientists. Their analysis examined the effect on scientific inquiry when powerful corporate interests are involved in research. The report found that corporations "exert influence

at every step of the scientific and policy-making processes, often to shape decisions in their favour or avoid regulation and monitoring of their products and by-products at the public's expense". The report highlighted five ways how corporations are able to influence scientific inquiry:

- Terminating and suppressing unfavourable research
- Intimidating or coercing scientists and academic institutions into silence with threats of litigation and loss of jobs/contracts
- Manipulating study designs and research protocols
- Ghostwriting scientific journal articles that actually promote their products.
- Publication bias (selectively publishing positive results and burying or underreporting negative results) (**114**)

The Australian Centre for Electromagnetic Bioeffects Research (ACEBR)

In August 2012, Federal Minister for Health, Tanya Plibersek announced the establishment of a new $2.5 million NH&MRC Centre of Excellence, the Australian Centre for Electromagnetic Bioeffects Research (ACEBR) to be based at the University of Wollongong and led by Professor Rodney Croft, now head of the School of Psychology at Wollongong (**115**). One of the central university partners of the ACEBR research effort is the previously mentioned PBsyC research group at Swinburne University. As stated on the Swinburne University's web site: "ACEBR has embarked on a multidisciplinary 5-year research program to address the most pressing radiofrequency (RF) radiation exposure questions to better protect the health of the Australian community". Among other things, Swinburne's research focus will be on accessing characteristic RF EMF emissions, exposure scenarios and corresponding exposure levels for new and emerging RF technologies (**116**). Besides Wollongong and Swinburne universities, RMIT University, IMVS Pathology and the Victor Chang Cardiac Research Institute are involved in the research effort (**117**).

Future trends: ACEBR Science & Wireless 2013

Overall the proposed future ACEBR research program is very impressive but what role will industry and other vested interests play in possibly influencing this research to protect their own interests? To possibly answer this question a brief examination of ACEBR's Science & Wireless 2013 seminar "Health & Future RF Technologies" is an indication. In the seminar acknowledgements, the following was stated: "The ACEBR gratefully acknowledges the financial support of the National Health & Medical Research Council of Australia and Telstra Corporation, which has enabled SW2013 to run".

The focus of the 2013 seminar was on new and emerging wireless technologies with presentations by industry representatives on 4G and especially RF transmitting smart meter technologies. It stands to reason that a discussion of smart meters featured prominently at the seminar. In Victoria there was, and is, an active and vocal level of public opposition to the roll-out of smart meters and a number of concerned citizens were in attendance at the seminar. Much of this opposition was based on a growing number of Victorians reporting health problems after a smart meter was installed on their homes, often located externally on a bedroom wall (**118**). What was especially concerning these people was that even though these health complaints were being reported world wide (**119**), after smart meters were introduced, absolutely no research had been conducted into these complaints (**120**).

In Rodney Croft's introduction to the presentation by Mr. Mike Wood from the Australian

Mobile Telecommunications Association (AMTA) on "4G telecommunications technologies", he said the following, in part:

> "Clearly what we see here is a whole lot of new technologies which are going to come about. How do we know what's going to be most relevant to us? Well, in the short term I think that our industry representatives are going to give the best indicator of this" (**121**).

The presentation by Mr Richard Hoy from the industry trade group Energy Networks Association was titled *"Smart-meter technologies"*. In his talk he focused on the public's concerns that smart meters may affect health due to their RF transmission. As for the WHO's International Agency for Research on Cancer (IARC) 2013 ruling classifying radiofrequency (RF) radiation from wireless phones as a class 2B possible human carcinogen **(eliminate reference)** he pointed out that typical smart meter exposures were far less that from a mobile phone, suggesting that this therefore was not a concern. He mentioned that there some 20 years research on the frequencies used by mobile phones and that the results of this research "apply even more so to the signals that are coming out of smart meters." He said that these transmissions only occur in short bursts, which might be quite a few but typically are less than 1%-3% of the time ("very short transmission period"). Hoy said that by drawing some conclusions from the mobile phone work " we can pretty much decide where we are going" (with smart meter health issues). He claimed that "it can be said that there is no substantive evidence for health effects from exposure to AMI (smart meter) RF fields." In regards to electrosensitivity (EHS) in people claiming to be affected Hoy quoted a WHO document that stated that EHS had no clear diagnosis criteria and there "is no scientific basis to link EHS symptoms to EMF exposure. He then added; "this gives the industry some relief" and that "no health effect from smart meters has been proven scientifically". Hoy concluded by saying that "some further research into people's concerns about smart meter health effects could be worthwhile". Note that he referred to research into "people's concerns", and not the reported health effects (**122**), perhaps suggesting a psychosomatic disorder was at play.

Hoy's claim that mobile phone research data can be directly applied to smart meter exposures is open to argument as there are significant differences in exposure. Consider:

The claim that smart meters transmit only 1%-3% of the time paints a deceptive picture. Hoy mentions that the meters are transmitting very short bursts but not that they are doing this constantly. These bursts can happen up to 190,000 times over a 24 hour period.(**123**) As examined in 2013 by Richard Tell Associates smart meter emissions generally happen all through the day meaning that most smart meters remain relatively active in terms of brief signals being transmitted (**124**).

As an example see **Figures 1** and **2** (**125**)

Figure 1. Measurements taken outside, 1 metre from a smart meter on a suburban house in Melbourne, Victoria.

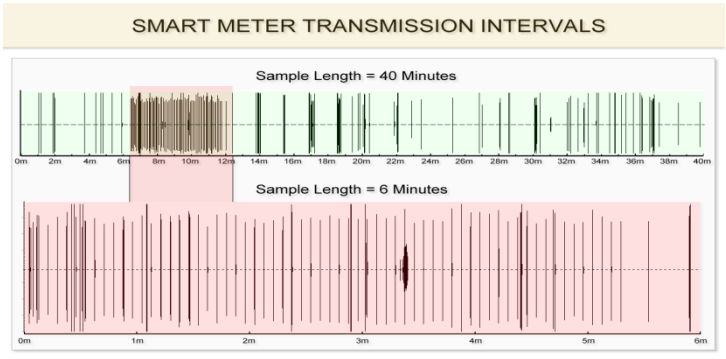
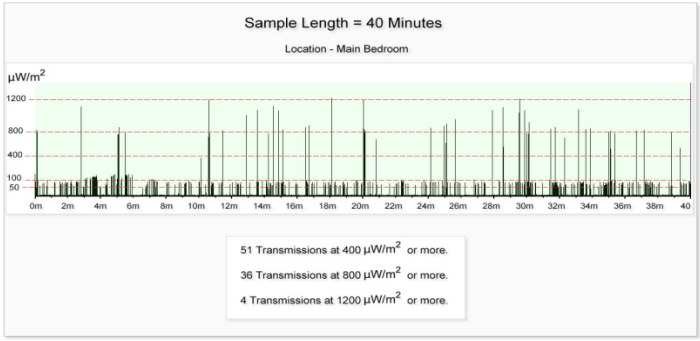


Figure 2. The same house, this time with measurements taken by the bedhead of an adjacent bedroom from the smart meter.



The frequency used may also be an issue

Besides the constant pulsing of smart meter emissions there is the issue of the frequency range used. In 1976, Lin concluded that 918 MHz energy constitutes a greater health hazard to the human brain than does 2450 MHz energy for a similar incident power density. In addition studies of diathermy applications consistently show that electromagnetic energy at frequencies near and below 900 MHz is best suited for deep penetration into brain tissue (**126**). So a possibility exists that in situations where people are sleeping in close proximity to an active smart meter, the combination of the frequent transmission bursts at around 900 Mhz constitutes is a new and unique human exposure situation, quite unlike using a mobile phone, that may have unintended biological effects, especially on sleep.

A Pandora's Box

As many of the health complaints (mainly an inability to sleep) are coming from people who have had a smart meter installed on a bedroom wall, close to their bed, this should be a high priority research area for ACEBR. Such a research program would necessarily include sleep studies to determine if smart meter transmissions interfere with sleep patterns. This is straightforward research but the implications for a positive finding (an effect on sleep) are enormous for the development and roll-out of new technology, the so called Internet of Things. Obviously this research would have to be done with a firm 'firewall' between the researchers and industry affected by the possible findings of that research.

ACEBR's Science & Wireless 2013 seminar "Health & Future RF Technologies" dovetailed quite nicely with Swinburne's and Greenwave System's joint Energy Management Research Centre (EMRC). As EMRC is focused solely on developing and promoting future RF technologies, this is a clear conflict of interest when it comes to objectively investigating claims of possible ill health from these technologies.

Concluding discussion

This examination of the history of telecommunications research in Australia indicates that the telecommunications industry sector, aided by a government policy to encourage economic development, had conducted a very successful campaign strategy. This was firstly, to eliminate

CSIRO's independent involvement, and secondly, to become actively involved in the research effort themselves with a goal to ensure that industry goals would never be endangered by research that could possibly find that their technologies were a possible hazard to health. All this was orchestrated under the Howard Liberal government (March 1996 to December 2007), which had been a major share-holder in Telstra and obviously was acting to protect its investment.

However the Howard government's actions were not limited to telecommunications. Hamilton and Maddison's book *Silencing Dissent* (2007) exposed how from 1996 to 2007, the Howard government systematically undermined dissenting and independent expert opinion in many areas of scientific debate. Those attacked were charities, academics, researchers, journalists, judges, public sector organisations, even parliament itself (**127**).

The uncomfortable truth is that it was this caldron of suppression of alternative scientific viewpoints that gave birth to the current research effort on possible bio-effects from telecommunications technology in Australia.

It must be said here that there are obviously benefits for university/ industry partnerships in the area of technological development. The problem arises, however, when the same university is also involved in medical health research that may conflict with its technological development partnerships with obvious financial implications. The challenge, at this late date for Australian universities is how to maintain an effective 'firewall' between the two. As David Korn wrote in JAMA in 2000:

> "Conflicts of interest are ubiquitous and inevitable in academic life, indeed, in all professional life. The challenge for academic medicine is not to eradicate them, which is fanciful and would be inimical to public policy goals, but to recognize and manage them sensibly and effectively" (**128**).

Will Australian universities as well as the NH&MRC and ACEBR address this problem? If so, how would they make the necessary changes? And do they even want to consider it? These are questions that urgently need to be answered.