

FUTURE FOR NOISE CONTROL IN AUSTRALIA?

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Abstract

The Australian Acoustical Society is a professional society with membership from all aspects of acoustics including vibration. As part of its response to the needs of the membership, a listing of the top ten issues of concern was developed. One important concern was the future for acoustics in Australia in respect to all the aspects of noise control – and in particular for transportation and in buildings. This was investigated to identify the factors leading to this concern. One important finding was that changes in the approach of the government have led to a reduction in the technical skill base in government and semi government agencies and in independent research establishments. The current trend is to rely on the voluntary support from the professional community to provide technical support or to contract out focused studies. This is a reactive approach to development of government policy. This paper summarises the investigation thus far and comments on the future of noise control in Australia.

Introduction

Acoustics covers a wide range of subject areas. It is reasonable to say that in Australia the majority of those working in acoustics are involved with the effects, measurement and control of noise and vibration. It is obvious that such acousticians require an understanding of the physical and engineering aspects of acoustics. However the goal is usually to reduce the noise and vibration to acceptable, non intrusive, levels for the community. Thus acousticians must also have a variety of skills including an understanding of the reaction to sound as well as the physiological and psychological effects.

The need for good noise control has become even more important in recent decades. Community standards are increasing and there is a demand for more than a hazard-free environment but one that meets community expectations for the current lifestyles. The challenge to meet these expectations is getting harder. The population density in our cities and towns is increasing and this brings people and living units physically closer together. Coupled with the increasing number of noise sources in our daily life, such as sound systems and kitchen tools, this can lead to greater noise annoyance from neighbours. Larger portions of the population are brought closer to community noise sources like transportation, commercial activities and recreation.

Control and management of hazardous noise and vibration is an essential goal for our community. The results of excessive exposure can include permanent hearing loss, tinnitus, white finger, skeletal problems etc. The costs for control and management of such hazards in the workplace are the responsibility of the management. These costs can be substantial in terms of physical controls and possible effects on productivity.

Control and management of environmental noise, such as from industry, transportation, neighbours etc is a

goal demanded by our community. Costs associated with providing control are incurred by the proponent and also by society. The costs commence at the inception of a project when the noise is one part of the overall assessment and approval process. There are the costs of noise mitigation measures, such as roadside barriers or enclosures in a factory. Mitigation measures such as curfews at airports, limits to flight paths, limits to operating hours etc lead to operational restrictions and costs to both management and society.

When imposing regulations and standards, it is essential for our society to balance the needs and demands of the community with what are reasonable and appropriate costs for the society to bear. The knowledge and professionalism of an acoustician can provide the necessary input for this decision making process.

It is therefore essential that Australia maintains a high level of expertise in all aspects of acoustics both in the public as well as in the private sector. However during the last decade there has been increasing concern by acousticians about the impact of government policies on research, development and education in acoustics, and ultimately on expertise, standards and industrial practice. This was highlighted in a survey of the membership of the Australian Acoustical Society (AAS) to identify the “Top Ten Issues in Acoustics” [1]. Australia used to have facilities which encouraged excellence in a wide range of areas in such as building, environmental, engineering and occupational acoustics and in hearing technology. It achieved a high international reputation and has provided a significant input to international activities such as ISO standards. However, the lack of strong, supportive government policies has seen a severe erosion of the acoustics expertise and facilities. Thus Australia will no longer be a leader in acoustics in the region and will become a follower, reliant on expertise from other parts of the world and which may not be appropriate for Australian conditions.

This paper focuses at the areas of environmental and building acoustics and summarises the concerns of the acoustics community and the effects that are likely to be experienced by Australian society. The comments in the paper are drawn from the input from AAS membership during the development of a report on "The Future of Acoustics in Australia" [to be published]. Some suggestions are made, and further recommendations welcomed, to redress the current situation so that the future needs of our society will be met and Australia can redeem its international reputation in these areas of acoustics.

Building Acoustics in Australia

Acoustic privacy has become vitally important with the increase in medium and high density residential complexes and the encouragement of their locations in town centres. As part of changing lifestyles, modern sound systems are widely used in residential buildings and have the ability to produce higher noise levels. In commercial buildings there is an increased need to maximise the floor space utilisation and this can lead to increasing demands on the sound reduction properties of the walls separating different uses. Noise from neighbours is a commonly cited community complaint. Just as the society demands have been increasing there has been a great reduction in government funded, and hence independent, testing and research facilities involved with building acoustics.

Independent test facilities

Testing the acoustic performance of building materials in accordance with national and international standard methods requires high performance test rooms. Such testing facilities are very expensive to construct and maintain. Their provision within a government facility ensures independence of the test results and that the tests are undertaken in accordance with the required standards.

The CSIRO facilities in Melbourne at Highett were constructed in the mid 1900s and provided the first independent acoustics testing facility in Australia. These facilities are still used for sponsored testing but their future is in doubt because of the proposed move of the CSIRO from the site. When this happens the current rooms will be demolished and there are no plans for reconstruction on the new site.

With the increasing demand for information on the acoustic properties of new building materials and construction methods in the 1960s, testing laboratories were constructed at North Ryde, Sydney. In the 1980s there were pressures for development on the CSIRO site in Sydney and an increasing demand for test data for constructions with very high noise reduction. This led to the decision to demolish the existing rooms and construct new test rooms. The new rooms were completed in the 1990s but have been found to *not* meet the standard requirements. Thus the test facilities have not been commissioned, the costs required to improve the

performance of the rooms would be excessive and they will be demolished. The outsourcing of the design and construction of this facility is considered to be an important factor in the unsatisfactory outcome. Not only must attention to detail be applied at the design stage of acoustic test rooms, there must be careful continuous supervision throughout their construction.

The National Acoustics Laboratory (NAL) at Chatswood, Sydney, has a suite of rooms constructed in the 1980s. They are in high demand as they are the only facility in Australia where the high performance walls can be tested. The future of these facilities is under threat as the entire laboratory site has been sold to a private company well known for its residential/commercial developments. There is a limited year lease contract with an option for a further five years. Demolition of the multimillion dollar 'sound shell' would represent the loss of the only facilities with proven capability. There are currently no plans for reconstruction of this facility but the cost would be approaching 100 million dollars.

There are testing facilities in some tertiary institutions but these are generally limited in their capabilities. Other limited testing facilities are commercial, either within consultancies and serving a range of companies or within large companies. Many of these facilities do not meet all the requirements in the Australian Standard.

Thus there is a reduction in the availability of independent, high quality testing facilities at a time when the demands for higher acoustic performance are increasing along with the development of new building products and systems. If such facilities are not available the options will include testing in facilities of lower quality, use of data obtained from overseas testing (even though the local product may be somewhat different), theoretical prediction, and estimation by an 'experienced' acoustician.

Independent expertise and research

Following the construction of the facilities at Highett, the research undertaken by the CSIRO provided a basis for the understanding of important aspects of sound and its control for the growing building industry in Australia. The high standard and the usefulness of the research outcomes were acknowledged both within Australia and internationally. Much of this was strategic, longer term research projects to investigate particular issues related to the nature of building construction in Australia.

The value of the skilled staff in independent research establishments is far greater than just providing test results. These skilled staff provided leadership and were available to participate in committees establishing performance requirements, such as for the Building Codes Board, as well as Australian and International Standards. They were available when major projects were undertaken by the Australian Government such as the Sydney Noise Insulation Project. In the CSIRO, the staff has reduced in the last decade from 9 to only 1.6

staff working on acoustics. Just some of the implications of this include:

- Development and testing of products and materials in Australia is only undertaken now by the building supply companies, focused on a particular need at that time and hence remain 'commercial in confidence' and not available in the public domain.
- Instead of being able to fully investigate effective constructions that use our resources, Australia is becoming increasingly reliant on information from overseas.
- Heavy rain storms coupled with the use of lightweight long span steel roofs leads to a particular problem in our region. There are some systems commercially available to reduce this noise but there is no longer the opportunity for research on the sources of the noise which could lead to 'smarter' solutions for the problem. The chairman of the ISO working group investigating appropriate testing procedures was from the CSIRO but that position has been cut and hence there is now no skilled input to this committee.
- Impact noise through walls is a commonly reported problem in Australia from those living in apartments. There is not the same level of concern internationally so no research work is being carried out in other countries. There is a desperate need to review the test procedure developed in the 1980s and which has been shown to be inadequate.
- The acoustic provisions in the Building Code of Australia (BCA) were developed in the 1970s. With the changing nature of apartments and of the noises generated by modern life the standards were considered to be inadequate. There is general agreement that the changes are necessary but without a strong lead from skilled personnel from independent government facilities it is taking years for implementation. Much of the input into the process has been provided on a *voluntary* basis by the profession. Consequently there has not been the regular input and careful assessment that is necessary. While the new provisions in the code now exist the outcomes are less than satisfactory, particularly in the case of impact noise. The rating includes additional frequency adaptation term which is included in the ISO testing procedure but was never intended to be *added to* the rating value as it is stated in the BCA.

Environmental Acoustics

Adequate control of environmental noise is an expectation of modern society not just in Australia but throughout the world, as identified by the EU directive on noise [2]. Assessment of the noise impacts is an essential component of the Environmental Impact Statement, Review of Environmental Effects etc required as part of the approvals process for new developments or major upgrades of existing facilities. Regulations, codes

of practice, guidelines etc define criteria for noise levels which are considered to be acceptable in the community and which need to be complied with by new or existing facilities. Establishing these criteria requires the careful consideration of the needs of the various parties. A balance must be made between the reasonable rights to quiet for part of the community and the benefits to the remainder of the community of an activity which may produce some noise. What is technically feasible at reasonable expense must also be considered. Thus those in authorities charged with the responsibilities for establishing, implementing and enforcing the criteria need to have a range of skills including a good understanding of acoustics.

Harmonisation and equality of policies

It is only for matters which are clearly of national importance, such as noise certification for aeroplanes and motor vehicles etc, that noise aspects are the responsibility of the Australian federal authorities. The responsibility for most of environmental noise control is with the appropriate authority within the State or Territory governments. There is a "Memorandum of Understanding" between the States to work towards harmonisation on environmental issues. [3].

Until the 1980s the Federal government department responsible for environmental issues provided the structure and secretariat for regular consultation and cooperation between the state agencies at a technical level. One outcome of this formal arrangement was the production of valuable technical studies on aspects of environmental noise control. These formed the basis of many state regulations and consequently encouraged harmonization. This function gradually ceased and by the 1990s cooperation between those developing and implementing policy in the States became an 'ad hoc' arrangement. There is a structure for meetings of the State Ministers for the Environment and the higher agency bureaucrats but there is no formal structure for the meetings of those at the technical level developing and implementing environmental noise policy.

The lack of a formal structure and no need for reporting means the flow of information among the State agencies is on an 'as need' basis. This means such meetings are triggered by a particular issue in one of the states and there is no structure to allow a proper follow through. Thus a greater harmonization of acoustics policies and procedures is unlikely to be achieved.

This approach to differing policies in the states has the potential for duplication of scarce resources to investigate what is essentially the same issue. Furthermore it discourages proactive strategic investigations in favour of reactive problem resolution. It also confuses the proponents when noise reduction strategies that are acceptable in one jurisdiction may not be acceptable in another. While this may increase the income for those providing expert acoustic advice it undermines the technical and objective basis for such assessments.

Research and development of policies

In the 1970s and 1980s each of the state agencies employed a number of staff with expertise in particular aspects of the environment including acoustics. To assist with the development of appropriate policy these staff were encouraged to do research into particular issues and many undertook additional study to improve their knowledge. There was also funding for research projects undertaken by research bodies including Universities. This not only provided answers to the questions but fostered a wider knowledge base.

In the 1990s, the focus in many agencies changed from having 'subject area experts' within the agency to requiring competencies over a range of environmental issues. It is estimated that the numbers of staff with particular expertise in acoustics within the agencies is currently 50% less than a decade ago. As the senior experienced staff retire, the number with a comprehensive understanding of acoustics issues will further decrease. And this is occurring at a time when the demands of the community for greater acoustic privacy are increasing.

The lack of external funding for public interest research in environmental acoustics is obvious by the lack of any relevant projects in this area being undertaken in the tertiary sector. There has not been any national survey seeking attitudes and reactions to noise since 1986 [4]. The few attitudinal surveys undertaken since then have been related directly to a particular noise source and generally in a specific area. This is a characteristic of short duration, focused research contracts. By their nature these are reactive to a particular problem and there is a lack of continuity from one project to another. This can be compared with the extensive research projects on environmental noise issues being financed by individual countries in Europe or on a multi country basis by the European Union. One example is the RANCH project (<http://www.ranchproject.org/about/>) which will provide a basis for pan-European policies on noise, cognitive effects and health in children.

This lack of research in environmental acoustics in Australia will inevitably lead to even greater reliance on overseas findings. While there is no justification to repeat research just for the sake of doing it in Australia, it is essential to have a good understanding of the topic to assess if the findings are relevant and applicable to the Australian environment and social culture.

Acoustic consultants are faced with the challenge of advising clients of how best to meet requirements, regulations and to avoid complaints from the community. They identified the need for studies in Australia on important community concerns such as sleep disturbance, low frequency noise, transport noise etc. Such research would naturally take into consideration overseas findings but would review and build upon these with consideration of the Australian society. The findings could then feed into the policy development process.

There is one recent example of how Australian research on environmental noise can contribute not only

to Australia but internationally. The Department of Transport and Regional Services has supported the work by Southgate [5] on different ways of presenting aircraft noise information to the community. This was initiated by the strong community reactions to the noise impact from the new runway at Sydney Airport. However the ongoing support for this work has led to a usable software package, applicable for many airports and which is used internationally. This is an example of what can be achieved when the ongoing resources are provided and skills are maintained within an agency or group.

Conclusion

This paper has summarised just some of the concerns about the future for acoustics as expressed by those working in environmental and building acoustics. Acoustics in Australia is clearly at a critical stage. On the one hand there is a clear need for skilled personnel, good laboratory facilities and support for research and development. On the other the government policies are destroying the high quality facilities, eroding support for research and development and drastically reducing the number of specialist staff.

A high level of expertise is required in Australia to ensure that the community expectations of an acceptable acoustic environment in their home and at their work. Unless policy changes are made to foster and encourage acoustics in Australia, the opportunity to become a leader in the region will be lost and Australia will simply become a follower dependent on overseas technology.

References

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