

Using Multimedia Technologies for Describing Noise Impacts

David T. Dubbink, David Dubbink Associates, San Luis Obispo, California

New media technologies can be used to de-mystify the complex metrics used to describe noise impacts. For example, community groups and local decision makers can address noise management problems working with realistic noise examples, shaped to reflect local situations. Our experience using such technologies to address a variety of noise issues in different community settings has led us to a more fundamental problem. Not everyone is interested in improving community understanding of noise issues – or even interested in addressing such problems. Decision-makers and supporting professionals who are committed to having open exchange and dialogue need to recognize this. The design of effective programs can also demand change in organizational practices.

It is possible to use new media technologies to provide community decision makers with realistic acoustic simulations of the consequences of different noise management actions. The availability of low cost, easy to use planning technologies empowers community groups. It permits them to self-evaluate “What if?” questions and experience the answers. As the technologies become increasingly accessible, there is a potential for shifting the power balance between technologists, noise producers and communities. The following discussion relates how new media has been applied to noise management issues and describes the diverse reactions of noise producers, real estate sales interests and community groups.

Delivery Strategies

The Interactive Sound Information System (ISIS) developed by the author, is constructed around the proposition that the best way to communicate information about noise impact is to use real sound examples. Community decision-makers are not noise specialists and framing noise management problems in ways that can be directly experienced provides real benefits. Some of the most effective and well received applications of the ISIS technology have been dramatizations of the acoustic implications of competing noise management strategies.

Those of us who work with community noise issues are quite accepting of ideas or technologies that can improve communication. Much of the success of the ISIS package is a reflection of the professional commitment of engineers and planners to improve their dialogue with their constituencies. We are proud of our work and we want people to understand. We believe that informed decisions will be better decisions. However, this commitment to the direct sharing of information is not universal. It may not even be the dominant point of view, as personal experience and some structured studies will demonstrate.

When the ISIS approach to presentation of noise information was in its earliest development stage, its potential for presenting vivid acoustical portraits emerged as a ‘problem.’ Residents of some southern California communities were organizing opposition to a proposed high-speed rail line. I had obtained recordings of the Japanese *Shinkansen* and the French *TGV* and worked out a strategy for playing the recordings at levels matching positions marked on a map. The project’s proponents could demonstrate this at public meetings. Initially, the sponsors were quite interested in my proposal, but when they hired a new public relations advisor, they lost their enthusiasm. The new public relations strategy was to emphasize positives – the speed of travel and the economic benefits. One axiom of Pub-

lic Relations is to not dwell on problematic issues. Under the new program the provision of noise information was not a priority or even appropriate for discussion.

The idea of presenting noise examples as a means of explaining noise metrics has been quite actively resisted. In opposing the use of the ISIS package as an aid to testimony in litigation related to a ban on Stage II aircraft, one attorney stated:

[The] ISIS noise measurement is a highly subjective, indeed visceral, presentation that would not be relevant . . . keeping in mind that single event noise levels for every jet aircraft type are recorded and published by the FAA, and that single event noise levels are not the issue in any event, the spectacle of reconfiguring the courtroom to accommodate this presentation is particularly jarring.¹

Tables of numbers describing noise impacts are acceptable, but it is not acceptable to listen to the sounds themselves, as that involves “the dangers that are concomitant with computer generated evidence’s dramatic power to unduly influence . . .”² We agree with the idea that the direct experiencing of a noise event provides a wholly different experience than seeing a number describing the event. Direct experience is visceral, and a loud sound can be quite jarring, but these sensations are part of the experience. Hearing the sounds can be more informative than reading a table of numbers describing the events.

A person committed to increasing understanding of community noise issues should give careful attention to the forces that work in the opposite direction. There is a growing literature on “Risk Communication” that provides some interesting structures for addressing such issues. Before examining this literature, it is useful to provide a description of the ISIS package and some of its effective applications.

The Interactive Sound Information System

The Interactive Sound Information System (ISIS) is an established, computer based package for presenting information about noise in the environment. The current release is based on technology that has been under development since 1988. Like earlier versions, the present version of the ISIS package makes use of real noises, recorded digitally and played at precisely controlled volume levels. This enables people to listen to sounds such as aircraft flyovers at different locations, or move from outdoors to indoors and evaluate the effectiveness of differing noise mitigation strategies.

The system was designed to communicate noise information to non-specialists. With its interactive design and integration with sound analysis technology the system can be used to respond to the question that is so central in addressing community concerns about noise – “What is this going to sound like at my house?” The interactive nature of the program makes it possible to test “What if?” situations and respond to specific questions.

Agencies use ISIS for staff training. One of its most important applications has proved to be providing decision-makers with clear information about the acoustical consequences of project alternatives. Programs can be customized to reflect specific noise management issues.

The latest version of the ISIS package makes use of the multiple advanced audio and graphic technologies. The sounds are digital and the software includes a digital equalizer to adjust frequency levels. Graphics include virtual reality animations and compatibility with standard Geographic Information Systems. The user interface is uncomplicated and modeled on

¹Based on a paper presented at NOISE-CON 2004, National Congress on Noise Control Engineering, Baltimore, MD, July 2004.

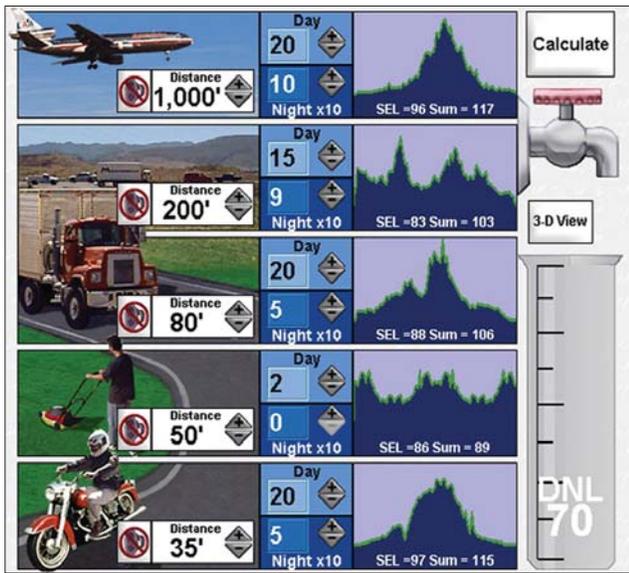


Figure 1. 24 hour noise addition.



Figure 2. Flyover animation.

conventional web page interactivity.

The complete program set has more than 20 separate interactive sequences, which can be selectively chosen and organized to fit the needs of a specific presentation.

The training features of the ISIS package deliver information about the nature of sound, its measurement and the features of noise management programs. The training components step through a progression of descriptive illustrations and acoustic experiences that demonstrate basics such as decibel levels and decibel addition, A and C weighting. The program builds to a consideration of alternate noise metrics such as SEL, L_{EQ} and Time Above. Then the program moves to illustrate how individual sound events are accumulated into 24 hour measurements such as DNL. Figure 1 shows a screen capture of this feature. All of the sound sources can be heard and changing the counts of day and night noise events changes the DNL totals. The program also includes a "Library of Sounds," which represents an extensive collection of environmental sounds. Many of these sound events include animations such as those illustrated in Figure 2.

A major strength of the system is its flexibility. All of the sounds, graphics, text and animation moves that are seen in the program are specified in a standard database. This has enabled us to create focused presentations that treat specific community issues at specific locations. Figure 3 shows a graphic taken from an acoustical illustration of how moving an airport taxiway might impact classroom instruction in a neighboring military training center. Figure 4 illustrates how an airplane would sound flying over a specific site. While the two

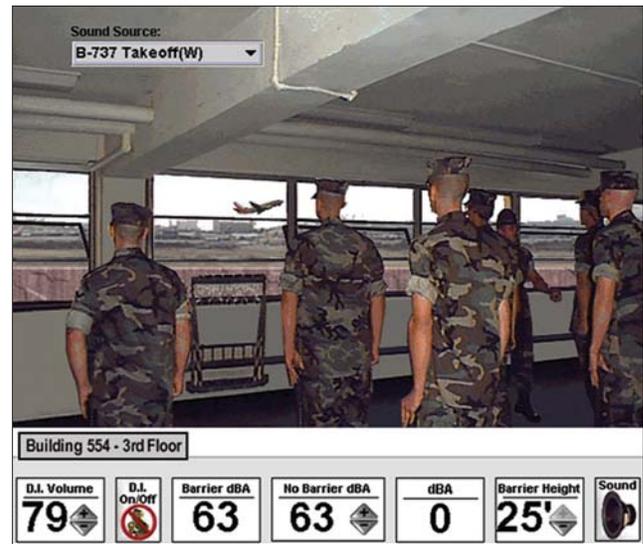


Figure 3. Instruction speech recognition.



Figure 4. Sound level at selected location.

scenes look different, sound different and are in different languages, the underlying program code is the same. All that has been done is to change the sounds, graphics, text and animation effects in the ISIS data base.

The literature on communication of risk and hazard information offers an interesting conceptual framework that can be applied to "noise communication." This literature concerns organizations dealing with dangerous materials and what they say to workers and neighbors who are placed at risk. In addition to listing the conventional options for communication (news media, community meetings, etc.), they consider the corporate/organizational setting. They say that, "those who are communicating risk must first reach this internal audience."³ They raise the question of whether there is an institutional commitment to open dialogue with impacted persons, or hostility and rigidity.

Within the world of environmental noise communication there are greatly differing levels of institutional commitment to the disclosure of noise information. Much of my information is necessarily anecdotal but there are some excellent examples illustrating the differences among organizations to open communication of noise issues.

I recounted the rise and fall of interest in communicating information about the acoustic consequences of a high speed train proposal. Less anecdotal, but conforming evidence comes from a study of the attitudinal differences among potential

noise communicators at U.S. Air Force installations. We sent a prototype of an ISIS presentation to a cross-section of base noise officers, which was followed up with phone interviews. Opinions were polar. The split was about 50-50, with half the noise officers welcoming the noise communication technology and the others worrying about its potential for causing trouble. Again, the objective of the latter group was to steer away from the problematic issues and not provide fodder for complainants.

A scattering of cities require sellers of real estate to disclose noise exposure problems to buyers. Even with this requirement in place the responses are mixed. A study of 660 sales agreements for properties near the Oceana Naval Air Station in Virginia showed that in 41% of the cases reviewed, sales agents had understated the true level of noise exposure in the purchaser disclosures. The state of Arizona requires airport noise disclosure in real estate sales but again, there appears to be a variety of local responses. Inspection of several web sites designed to 'disclose' information shows both clearly structured and informative sites and sites with maps that are illegible.⁴ Cities near San Francisco International Airport were urged to pass local real estate disclosure requirements. Half of the impacted cities did so and half did not.

There are numerous examples where proposals to require real estate noise disclosure have failed because of widespread opposition.⁵ The authors of a recent study on noise compatibility regulations were baffled that such an effective and inexpensive means of addressing noise problems was being used by only 8% of U.S. airports.⁶

Clearly, not everyone agrees that noise management information should be readily available and clearly communicated. Surveying the attitudes of cities, air force noise officers and real estate agents, it appears that roughly half of potential noise communicators are supportive of such efforts.

The Australian government's emphatic effort to make noise information 'transparent' is particularly remarkable in light of the less than whole-hearted support given noise disclosure efforts in so many other places. It is interesting that the motive force behind the Australian effort came out of the failure to properly inform the affected community of the impacts of runway expansion at Sydney's airport. Non-disclosure proved to have a heavy political cost.⁷

Encouraging a frank and open disclosure of noise information is somewhat like promoting a curative medicine with a taste some people find unpleasant.

Recognizing the Problem

There are two lessons that can be drawn from this insight. One has to do with the recognition that there is widespread institutional resistance to open communication of noise information. The second has to do with selecting strategies for easing the resistance.

Organizations that work with community groups find it advantageous to present themselves as being honest and forthcoming. Our experience suggests that there are limits to this commitment. A noise specialist working in the service of any large-scale organization would be advised to pay careful attention to how information is moved from insiders to those outside of the organization, and not only noise information. One very useful strategy used by management consultants is to examine how any bit of information makes its way through an organizational structure.⁸ How much leeway and initiative is given to lower level staff, or do all actions require review and approval by layers of higher authority? Another analytic test is the "sally forth" strategy – initiate some modest effort to provide broader access to noise information and watch what happens.

Improving Communication

When it comes to improving on opportunities for more open communication of noise information, there are a number of options. First, there is likely a diversity of opinion within any

organization about the value of disclosure. There will be people who support this point of view. Analysts who have studied the way that organizations adapt to new technologies speak of the need for a 'Champion.'⁹ Certainly, our best ISIS success stories involve situations where we have had strong support from well-placed people within the client organization. Find allies within the organization who are committed to improved communication. Make alliances.

Caron Chess, Director of Rutgers University's Center for Environmental Communication, has suggested ways of dealing with management officials who feel threatened by open disclosure.¹⁰ She describes the characteristics of successful institutional settings for open communication as follows.

- There are upward flows of information within the organizational structure.
- Everyone is involved in communication, not just the public affairs staff.
- There are numerous ways for the community to get information about the organization's activities.

Some of the same strategies that are useful for dealing with a hostile audience can be useful in dealing with resistance within organizations. Strategies have to do with appreciating the sources of concerns and responding to them. Resistance is a mix of practical concerns (such as legal liability, prior negative experience) and subjective issues (such as fear and apathy). Promotion of organizational support involves addressing both the practical concerns and the subjective worries about noise exposures.

Also, it is appropriate to note that the promotion of institutional change involves not only the promotion of the desired activity, but also pointing out the problems inherent in alternate behavior. The public furor that took place in Australia over noise mis-communications is a notable example. While it might be uncomfortable to supply potentially disturbing information, not doing so can lead to greater problems.

Conclusion

The resolution of community noise problems requires not only accurate data about noise impacts, but also an effective means of exchanging information. The Interactive Sound Information System (ISIS) is representative of the ways "new media" technologies can be used to de-mystify the complex metrics used to describe noise impacts. The availability of such technologies, however, is only one part of the solution. It also requires community leaders, decision-makers and supporting professionals who are committed to open exchange and dialogue.

References

1. National Business Aviation Association, Inc. and General Aviation Manufacturers Assoc. v. City of Naples Airport Authority, Memorandum of Points and Authorities in Support of Plaintiffs' motion in Limine to Exclude the "ISIS" Noise Reenactment, 2003, p 2.
2. *ibid*, p 5.
3. Lundgren, R. and McMakin, A., *Risk Communication*, Battelle Press, 1998.
4. The Scottsdale (AZ) Airport web page has a clear map and a helpful discussion. http://www.scottsdaleaz.gov/airport/Noise_Sub_Disclosure.asp. For a lesser mapping example, look at the Real Estate Department posting for Luke AFB: <http://www.re.state.az.us/documents/lukemap.ppt>.
5. Even U.S. airports with 'progressive' attitudes toward noise control such as Scottsdale and Naples, FL have found it difficult to enact disclosure requirements.
6. Cidell, J. S. and Adams, J. S., "The Groundside Effects of Air Transportation," University of Minnesota Center for Transportation Studies, 2001.
7. Australia Department of Transport and Regional Services, *Expanding Ways to Discuss and Assess Airport Noise*, 2000. A copy of the document is available at <http://www.dots.gov.au>.
8. Schein, Edgar, *Organizational Culture and Leadership*, 2nd Edition, Jossey-Bass, 1997.
9. Campbell, H. J. and Masser, I., *GIS and Organizations*, Taylor & Francis, London, 1995.
10. Quoted in Lundgren and McMakin, *ibid*, p 42.



The author can be contacted at dubbink@noisemanagement.org.