

# Communicating performance effectively – the only hope of solving the problem of noise transference between attached domestic dwellings?

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## ABSTRACT

Building regulations in England and Wales have consistently failed to ensure that domestic dwellings are built to standards where occupants are satisfied with the level of sound insulation. Recent judgments have left owner/occupiers exposed to noise without a legal remedy. If occupants complain about noise they risk reducing the selling price of that dwelling.

Dwellings are often marketed on visual aspects rather than performance, people view property but they test drive cars. Lessons from the car industry suggest how a media focus on testing and comparing performance can help drive up standards of features that are not immediately visible such as CO2 emissions and safety.

This paper will present results from surveys of both builders and occupants to show their current attitudes towards sound insulation and regulation. Drawing upon empirical evidence from other industries this paper puts the case that effective rating systems improve performance of products for consumers more effectively than regulation. Looking at successful rating systems in other areas and current noise/acoustic comfort ratings, which have been in existence for over a decade, this paper asks the questions what makes a rating system successful? and what should a noise/acoustic comfort rating system look like in 2006?

## BACKGROUND

Building regulations on sound insulation have been in operation in England since 1965. They have been revised in 1972, 1985, 1992, 2003 and amended in 2004 to include Robust Standard Details.

Prior to the 2003 revisions, compliance with sound insulation requirements was achieved by using deemed to satisfy forms of construction rather than meeting actual dB performance figures contained in the regulations. Under pre 2003 regulations builders would generally satisfy building control requirements by submitting plans showing that a property had complied with a deemed requirement. There was no on site testing and no meaningful on site quality checks.

It was for the first time under the 2003 regulations that compliance was met by meeting actual dB performance figures. Pre-completion testing was also introduced to make sure that homes did achieve required dB standards.

However, the building industry was not in favour of testing and the House Builders Federation successfully argued against it on the grounds of expense and money spent on testing could be better spent on insulation itself by using more robust methods of construction. Testing, it was argued would also slow down the construction process – something which the government was particularly keen to avoid with England's housing shortage running at 370,000 homes.

The building industry was able to use its strong bargaining position to persuade the Government to abandon testing and return the industry quickly back to a deemed to satisfy approach with Robust Standard Details (RSD) coming into force on 1 July 2004. The approval of RSD's meant that regulatory requirements could be satisfied either through

testing under Part E of the 2003 regulations or by opting for RSD's and in doing so avoid testing.

In theory RSD are over engineered to allow for a degree of workmanship error, give a more consistent performance and lower failure rates. But in reality some RSD's have been failing to reach claimed standards ('*Robust detail fails sound tests*' 2006). This is perhaps not such a big surprise. Historically absence of testing has been linked with high failure rates. For example in the early 1980's when testing was introduced in Glasgow, Scotland, overall failure rates were 60 per cent. After testing had been in place for a decade failure rates were reduced to 20 per cent for floors and 7 per cent for walls (Burnett, 1994). Similarly in England 40% of new separating floors and up to 25% of new separating walls were unlikely to reach regulatory standards without testing (DETR, 2001).

Although building regulations have been modified several times since 1965 they have failed on four counts. First they have not solved the problem of builders failing to meet the required standards in the regulations. Second, revisions have actually set lower standards than earlier additions. Third, they fail to provide any incentive to build above minimum requirements. Fourth they have failed to stem the growing number of noise complaints. Official government figures show an increasing trend in the number of noise complaints: 1966 (644); 1974 (4180); 1978 (17,980); 1990 (62,416); 1998 (148,006); 2005 (206,100).

Independent research in 2002 from a house buyers perspective has shown the prospect of noisy neighbours to be the major deterrent to buying an otherwise suitable property with 34 per cent of respondents in the Alliance and Leicester Building Society Moving Improving Index (2002) ranking noisy neighbours as the number one deterrent to buying an otherwise suitable property.

For separating floors the form of measurement, has remained the same and therefore allows direct comparison between the different values contained in the building regulations over the years. Comparison of requirements shows that standards have been significantly lowered. For floors where a lower number equates to better performance, the pre 1985 requirement was 57 dB, between 1985 – 2003 the standard was reduced to 61 dB and in 2003 it was reduced further to 62 dB.

For walls it is more difficult to make like for like comparisons between figures contained in regulations because of changes in measurement. However, according to Professor Rindel the latest 2003 Part E requirements will only yield 20 per cent occupant satisfaction rates and walls built under the alternative RSD's and reaching their required performance levels will yield around 30 per cent occupant satisfaction rates.

Although RSD's set higher performance targets than testing under Part E, no testing under RSD's could prove to be a major problem as historically no testing equates to walls and floors failing to achieve their claimed levels of performance. Further, while RSD's provide a higher standard for separating floors, the figure of 57 dB is only the same as pre 1985 figures - meaning no advancement in 21 years in terms of both the required standard and compliance remaining through deemed to satisfy construction techniques rather than through testing.

While Part E and RSD's cover impact noise for floors they do not cover impact noise transmitted through walls for example from light switches and hard work surfaces supported directly against separating walls. Currently such noises are a significant problem in England. However they are not covered by building regulations and there is currently no recognised method to measure them (Office of the Deputy Prime Minister 2005).

Both the market and regulation are not working to provide occupiers with satisfactory levels of acoustic comfort. Turning to English law what protection does this offer?

### Current legal protection under English law

If complaints made about a noisy neighbour are hidden in the sale process, the seller could face a lengthy legal battle and lose between 15-30 per cent of the selling price of the property if he is deemed to have misled the purchaser over a noise problem (*Darville v Lamb* 1988). Recent cases have made it clear the courts are not willing to apply the law in favour of those suffering from neighbour noise problems. Neighbour noise is not deemed prejudicial to health (*Vella v Lambeth Borough Council and London & Quadrant Housing Trust* 2005), nor is it deemed to be a statutory nuisance (*Southwark London Borough Council v Mills & orrs: Baxter v Camden London Borough Council* 1999).

The above three cases have the combined effect of just about closing all avenues of legal remedy for those suffering from noisy neighbours whether it be due to poor insulation or neighbour behaviour. Rather than protecting occupants from poor insulation or noisy behaviour these three cases combine to send out a clear message that there is no remedy against a landlord or contractor providing the building regulations in force at the time a property was built or converted had been complied with. Further, complaining about a noisy neighbour to the local council, who in turn then fail to solve the problem, as in the case of the seventy three year old Mrs Violet Lamb, and then not revealing the complaint in the sale process can result in devaluing the complainers property – providing a strong financial deterrent for owners not to com-

plain about noise and a good way to reduce statistical figures for noise complaints.

Regulation rather than being the consumer's friend is the industry's protector. Once the industry conforms to the regulatory standards, which it in effect it set itself through RSD's and also polices itself through the NHBC, it is now, after the cases of Southwark and Vella, virtually immune from litigation.

### Successful rating systems?

Where law and regulation fail to improve the performance of products, rating systems have been cited as a low cost alternative way to empower consumers and let them drive the market. Rating has been successful in bringing about positive market changes to a number of industries within a relatively short period of time. Take for example car safety in Europe. When a rating system for car safety was first introduced in 1997 the average score for passenger car safety was just under 2 out of 5 stars. By 2002 the average score had increased to 4 stars and most new cars today achieve 5 stars.

For passengers the difference between a 2 and 5 star rating can mean the difference between death or very serious injury and being able to just walk away (NCAP, 2005). Rating passenger safety had a very real effect on delivering safer cars for passengers to the market place in a relatively short period of time – something which regulation had failed to bring about and achieved safety levels car manufacturers were claiming impossible in 1997.

But perhaps the greatest impact of rating cars for safety was to change the mindset of manufacturers and consumers. Today even the vast majority of entry level cars have anti lock brakes, traction control and electronic stability equipment to help prevent an accident happening in the first place. Even with better safety and all round improvements car prices were 10 per cent cheaper in 2005 than in 1975 when cars were built to very low regulatory safety standards and had fewer features. To put this in to context other forms of highly regulated transport in the period 1975 to 2005 experienced significant price increases. Train travel in real terms over the same period increased 523.33 per cent and bus travel increased by 166.67 per cent (Townsend M., Barnett A., 2005).

Another area where rating has been successful has been in transforming the white goods market with fridges and freezers consuming 20 per cent less electricity after the introduction of labelling (Stamminger R., 2001).

However, when it comes to noise rating systems, success to date has been somewhat limited. Rating systems have been existence in Nordic countries since the late 1990's (INSTA Standard, 1997) but have not met with the same success as the NCAP and rating of electrical goods. While those involved in the construction industry in Nordic countries are aware of the different sound classifications, few people outside the industry have heard about them.

## MY RESEARCH SURVEYS

### Builders survey

Between November 2002 and April 2003 a survey was carried out of all 73 builders on the NHBC major house builders list to find out the acoustic comfort of their new dwellings. A letter was written to all 73 builders from the standpoint of a potential purchaser wanting to know as part of the overall purchase decision how effective each builders attached property was at keeping out noise from other attached properties.

Specific questions were asked about how well flats, terrace and semi detached properties would prevent everyday noises from travelling between properties. Specific noises asked about included televisions, conversation, doors opening and closing, footsteps and flushing toilets.

Out of the 73 builders contacted, 38 responded (52%). One developer proved accurate when predicting that “I suspect that the reply you will receive from developers of new homes is that the level of noise insulation will be to the requirements of the Building Regulations.” Only two of the builders claimed to build to standards in excess of Part E.

The majority of respondents replied along the lines that meeting the requirements of part E was their goal - “I can confirm that all our properties are constructed in accordance with both Local Authority and NHBC requirements.” Some builders saw Part E as prescriptive - “All our new and refurbished properties are built to the current Building Regulations approved document E, which stipulates standards for the resistance of airborne noise between properties.” Others saw them as dictating standards - “The sound reduction properties of, party walls and floors in new homes is governed by the Building Regulations...” Or “You will perhaps be aware that the standards to which we, and indeed our competitors, build are dictated by current Building Regulations.”

The conclusion from this survey was that an overwhelming majority of builders would only build to minimum regulatory requirements for noise insulation.

**UCL staff survey**

The main purpose of this survey was to find out if there was a demand for an acoustic comfort rating system for dwellings in England and if so how much people would be willing to pay for better acoustic comfort.

An on line questionnaire was sent to all University College London staff in December 2004. The staff had until February 14<sup>th</sup> 2005 to submit their reply on line. As this survey was investigating indoor noise transmitted between dwellings it was decided to carry out the survey during the winter months. The winter was chosen because people were more likely to be indoors with their windows closed. Closed windows would help reduce the impact of background noise such as humming traffic which may mask any noise transmitted between attached dwellings. Because of the long Christmas break the surveyed population was given up to nine weeks to complete the questionnaire.

It was decided to survey only UCL staff because they provided a relatively large sample, with easy access, and known profile. Being affiliated to UCL it was hoped goodwill would manifest itself in the form of a good response rate.

It was decided to use an on-line questionnaire because such a method allowed a large number of people to be reached, on a limited budget with limited resources, and data to be collected efficiently.

Staff received an e-mail inviting them to take part in the survey. Interested staff followed a link to the questionnaire which they completed and submitted on line. The anonymity of respondents was preserved because those taking part were not required to submit a name or any unique identifying feature and the researcher was not present when the questionnaire was completed.

Anonymity was important because it allowed respondents to reply in an unconstrained manner. It was felt that respondents may feel reluctant to talk honestly about noise prob-

lems for a number of reasons. Two such reasons were a fear of admitting to a noise problem which, under current case law, is likely to cause a reduction in the value of their property should they wish to sell it, and secondly not being constrained to complain about something that annoys them but at the same time they may feel they have a moral obligation to tolerate for example being kept awake at night by a neighbour’s crying baby.

Only staff with e-mail access could take part in the survey, reducing the sample from a possible 7200 to 6700. There were 1016 responses giving a response rate of 15.1 per cent.

The SPSS package was used to analyse the data. The headline results are in the tables below:

I am currently disturbed by noise coming through neighbouring attached walls and floors

	Fre-quency	Per-cent	Valid Per-cent	Cumulative Percent
Valid Strongly / agree	417	41.0	47.1	47.1
Neither agree or disagree	135	13.3	15.3	62.4
Strongly / disagree	333	32.8	37.6	100.0
Total	885	87.1	100.0	
Missing System	131	12.9		
Total	1016	100.0		

I feel restricted in my own home because I think that neighbours can hear me

	Fre-quency	Per-cent	Valid Per-cent	Cumulative Percent
Valid Strongly / agree	451	44.4	50.3	50.3
Neither agree or disagree	127	12.5	14.2	64.5
Strongly / disagree	318	31.3	35.5	100.0
Total	896	88.2	100.0	
Missing System	120	11.8		
Total	1016	100.0		

Hearing noise through attached walls/floors would deter me from buying an otherwise suitable property.

	Fre-quency	Per-cent	Valid Per-cent	Cumulative Percent
Valid Strongly / agree	903	88.9	89.1	89.1
Other	111	10.9	10.9	100.0
Total	1014	99.8	100.0	
Missing System	2	.2		
Total	1016	100.0		

I would like pre-purchase knowledge of the ability of an attached dwelling to prevent noise from attached neighbours entering it

		Fre- quenc y	Per- cent	Valid Per- cent	Cumula- tive Per- cent
Valid	Strongly / agree	963	94.8	95.0	95.0
	Other	51	5.0	5.0	100.0
	Total	1014	99.8	100.0	
Missing	System	2	.2		
Total		1016	100.0		

I would like pre-purchase knowledge of an attached dwelling's ability to prevent neighbours hearing me

		Fre- quenc y	Per- cent	Valid Percent	Cumula- tive Percent
Valid	Strongly / agree	869	85.5	85.6	85.6
	Other	146	14.4	14.4	100.0
	Total	1015	99.9	100.0	
Missing	System	1	.1		
Total		1016	100.0		

I would be willing to pay higher purchase price for high quality sound insulation

		Fre- quenc y	Per- cent	Valid Percent	Cumula- tive Percent
Valid	Strongly / agree	782	77.0	77.1	77.1
	Neither agree or disagree	150	14.8	14.8	91.9
	Strongly / disagree	82	8.1	8.1	100.0
	Total	1014	99.8	100.0	
Missing	System	2	.2		
Total		1016	100.0		

Amount extra willing to pay for a new property with high quality sound insulation

		Fre- quenc y	Per- cent	Valid Percent	Cumula- tive Percent
Valid	Nothing	141	13.9	14.0	14.0
	Up to 5%	588	57.9	58.6	72.6
	Up to 10% or >10%	275	27.1	27.4	100.0
	Total	1004	98.8	100.0	
Missing	System	12	1.2		
Total		1016	100.0		

The results showed that nearly half (47.1%) of all respondents were disturbed by noise coming through attached walls or floors and just over half (50.3%) felt restricted in activities in their own homes because they thought that their attached neighbours might be able to hear them. Nearly 90 per cent of respondents (89.1%) would be put off buying a new property if they heard noise coming through attached walls or floors.

Regarding pre-purchase knowledge of acoustic comfort, 95 per cent of respondents indicated that prior to purchasing an attached property they would like to know how well it would protect them from hearing noise from attached neighbours and 85 per cent stated they would like to know how much noise they could make in a new attached property without being heard by attached neighbours before they decided to buy that property.

But would people be willing to pay for better acoustic comfort? And if so how much? Over seventy per cent (77.1%) stated that they would be willing to pay a higher purchase price for a new property that gave them better acoustic comfort. Out of this group of respondents 58.6 per cent indicated that they would be prepared to pay up to an additional five per cent and 27.4 per cent indicated that they would be willing to pay an additional 10 per cent or more for better acoustic comfort.

Pearson chi-squared analysis showed that some personal characteristics had a statistically significant affect on some of the answers given.

#### Number of occupants v disturbed by neighbour noise

Number of occupants	Inside my home I am irritated, bothered or disturbed by noise coming through my neighbours walls or floors			
	Strongly agree or agree	Neither agree or disagree	Strongly disagree or disagree	Total
1	54.3%	13.3%	32.4%	100%
2	52.2%	14.0%	33.8%	100%
3	35.9%	17.9%	46.2%	100%

#### Type of dwelling v disturbed by neighbour noise

Type of dwelling	When inside my home I am irritated, bothered or disturbed by noise coming through my neighbours walls and floors (Q6 rec1)			Total
	Strongly agree/ agree	Neither agree or disagree	Strongly disagree/ disagree	
Semi-detached / end terrace	34.4%	14.7%	50.9%	100%
Mid terrace	42.6%	18.1%	39.2%	100%
Purpose built / converted Flat	57.1%	14.3%	28.6%	100%

Number of occupants and type of dwelling were shown to have a statistically significant affect on whether or not a respondent was disturbed, irritated or bothered by noise from a neighbouring attached dwelling. 54.3% of respondents living on their own were disturbed by noise from attached dwellings compared to 35.9 per cent of respondents living in a property with three or more people.

Out of the respondents living in attached dwellings, 57.1 per cent living in flats were disturbed by noise coming through neighbouring walls or floors compared with 42.6% living in a mid terrace house and 34.4 per cent living in semi detached or end terrace properties. Similarly number of occupants and type of dwelling influenced respondents answers to feeling restricted in their activities in their own homes. Those in flats felt more restricted in their activities (59%) than respondents living in mid terrace properties (47.1%) and semi detached or an end terrace property (39%). Respondents living in a dwelling with 3 occupants or more felt less restricted in their activities (39.3%) than occupants living alone (54%).

#### Market conditions for a noise rating system in England

England does not currently have a noise rating system. The UCL staff survey provided evidence of demand for one and

also evidence of a willingness to pay a higher price for better acoustic comfort. However, demand alone is not enough to bring about market change.

At present market conditions in England are unfavourable towards the establishment of a noise rating system. Referring to car safety and electrical goods it was argued that rating can be effective at transforming a market. However, the market for an acoustic comfort rating is in some ways different than the markets for car safety and electric goods. The car market has excess capacity; supply is greater than demand and new safety features provided a new way to entice people to buy the latest model. An NCAP safety rating was, after initial resistance, eventually recognized by the car industry to be an opportunity rather than a threat to profits. Regarding electrical goods with lower energy consumption the British government was committed to Kyoto and was willing to give both political and financial backing to making labelling work.

Faced with a growing housing shortage, acoustic comfort is not seen as a government priority compared to the need to build new homes quickly and a commitment to meet agreed international energy emission targets. In line with its Kyoto commitments, the government has favoured an energy rating for new homes ('Homes to be energy rated' BBC news 2006). However, the Government did not take the opportunity to give compulsory weighting to noise in both its recent decent homes standard or its code for sustainable homes.

Industry is motivated by profit maximisation. In England profit in the construction industry is mainly derived through land deals rather than from houses built on the land. In essence there is currently no incentive nor positive motivation within the building industry or from the government to divert mental energy and investment towards better acoustic comfort. The push to set the free market momentum going to addressing the noise problem is simply not there. Something is needed to start the momentum.

Whilst there are differences in the market between cars and houses they do have one crucial thing in common. For both, elements that are regulated have been shown to improve less than elements that are visible and subject to competition. In parts of the car industry, like safety, that were regulated, regulation proved to be a ceiling to which only an elite group of brands such as Volvo, Audi and Mercedes would rise above. For the bulk of cars regulation acted as a barrier to improve safety standards in the same way regulation is acting as a barrier to improve acoustic comfort for homes. In areas of car performance that were not regulated such as miles per hour, miles per gallon, handling, reliability and comfort – all these improved through competition and media review. Similarly in homes, areas that are visible and competitive such as kitchen fittings have improved.

Only when car safety was made competitive through rating and reviewed by the media did it improve for volume production cars. There have not only been improvements in car structure to score higher stars in the NCAP safety test, improvements have also been in areas not covered in NCAP testing or under regulation such as anti lock brakes, traction control and electronic stability control which help a driver maintain control of a car in difficult driving conditions such as heavy rain, helping reduce the chance of an accident occurring in the first place. Rating and media reviews changed the mindset of the car industry towards safety and have given a momentum to this area that is lacking in the building industry where acoustic comfort is concerned.

If acoustic comfort is to improve it has to break through the regulatory ceiling and the only way to do this is give the me-

dia a tool with which to compare property for noise in the same way NCAP gave the car media a tool to compare safety. Acoustic comfort also needs to be marketed as a positive selling feature rather than avoiding a negative - noise.

From a psychological perspective, Herzberg has shown that what makes people happy is different than what makes them unhappy. His findings can be applied to the house buying process. Research by the Alliance and Leicester Building society has shown that noisy neighbours are consistently the biggest "turn off" from buying an otherwise suitable property. However when it comes to being "turned on" to a property it is location that tops the list followed by a good kitchen and bathroom (Alliance and Leicester 2002). From a marketing perspective positive features such as designer kitchens and bathrooms are more effective at selling a property than removing a negative such as noise.

The media including both the housing press and house review shows regularly broadcast on English television do not deal with the issue of acoustic comfort. It is suggested that this absence of reference is for a number of reasons: there is no history of discussing acoustic comfort when reviewing a property, there is no readily available literature from which to quote performance figures and reviewers and writers do not have the expertise to measure sound accurately. The current media is not equipped to review a homes acoustic comfort.

### **The problems with db based acoustic rating systems**

Decibel based rating systems are not user friendly for end consumers i.e. those people that will end up living in a property nor is the decibel scale helpful to the influential media who review properties. As such a noise rating system with a decibel based interface is unlikely to succeed – simply because the majority of people cannot use it. Even hiding decibels behind a more user-friendly interface is also likely to fail for a number of reasons. Measuring sound accurately involves having the right equipment; right training and access to adjoining properties, limiting a dB based acoustic comfort rating to new properties where developers are willing to grant access (the incentive is for them not to grant access). A dB based system would be likely to exclude old properties from being rated on the grounds that measurement would require accessing another person's property and disturbing, moving or removing furnishings and carpets to carry out measurements in accordance with standard testing methods. Yet it is the old properties that form the biggest part of house sales in England and media reviews.

The methods of measuring noise have changed over time making comparison difficult between properties built under different building regulations. Even if comparison was possible occupants often drill into attached walls. Drilling into attached walls, for example to install wall lights and speakers, may damage the adjoining wall causing noise to flank throughout the cavity and enter neighbouring attached dwellings. A wall that once performed well when new and tested may, when sold, perform to a much lower standard due to modifications and aging of the acoustic barrier.

The industry has made it clear that it does not want sound levels between properties measured. The industry prefers and has successfully lobbied for deemed to satisfy methods of construction under their new name RSD's. It is unlikely the industry will give any support to measurement, rating and reporting on acoustic performance.

To date noise measurement has rarely been able to translate a dB measurement into any useful meaning for non-technical

people. For a rating to be used it would have to apply to all property and be understandable to all people. Understandable to all people would involve communicating performance in terms of what noises can be heard and how loud they are. But the problem is even if performance is described in terms of conversation, crying babies and footsteps in reality no two people, babies or footsteps will generate the same sound making communication for specific properties in these terms nothing more than a guide.

Given current industry and government resistance to testing, any noise rating to work in practice would have to by-pass them both and focus on a rating system that can access the existing media infrastructure. The English obsession with property reviews provides a ready made communication platform upon which to present a noise rating. However because of the problems of a dB based rating system this paper argues that for a noise rating to become reality it needs to be based on design not dBs.

### Proposed rating system



Under a design based rating system more stars would be awarded for being less dependent on an attached neighbour for acoustic comfort. The starting point is to award more stars for fewer attached walls and floors. For example a semi detached property with halls in the centre and all living and bedrooms separated by two hallways, would start with a high rating of for example four to five stars. In contrast a semi with halls at the end of the property and all living rooms pushed to the centre and all only separated by an adjoining wall would start with a low rating such as zero to one star.

A double fronted semi with some rooms next to adjoining properties and other rooms separated from adjoining properties by a combination of hallways and rooms would probably start with a rating of around three stars. For apartments more stars would be awarded for a solid concrete floor than wooden floors.

The system would be flexible, more akin to reviewing a cars handling and liveability than its maximum speed. This would allow different reviewers to take account of each property's unique characteristics such as loft conversions or floor boards running through attached properties.

While stars would be essentially awarded based on design and room separation the review process would encourage space for "other comments" such as additional sound proofing fitted with details of the fitter, materials used and claimed sound reduction performance. While it is unlikely that secondary sound insulation would itself form part of the rating it should be given some recognition. Certification of retrofit sound insulation could be used to encourage the development of brand recognition of sound insulation similar to the computer world where Intel Pentium is synonymous with quality and used inside different brands of computer but does not define the overall performance of the computer.

Also in the comments box could be details of how communal corridor noise could potentially affect flats, details of on site wardens that can be contacted to deal with noise, rules governing DIY work, availability of communal areas and music rooms away from the living areas.

We live in a culture that likes information to be communicated easily. Star ratings have been accepted for many years and provide a comfort zone for industry and consumers to communicate performance. As with other star ratings, it does not matter that numbers are not used for a noise rating. The overall aim of an acoustic rating is to differentiate between likely performances and to drive up standards.

Design is one of the best ways to achieve higher levels of acoustic comfort. Hong Kong has no regulation on the transmission of noise between attached dwellings, yet high levels of acoustic comfort for high density living is achieved through design. Many modern apartment blocks, often of seventy stories, achieve acoustic comfort through solid concrete floors and having no attached walls to neighbouring apartments.

### Why a designed based rating system? – benefits and shortcomings

One of the biggest advantages of a design rating system is that it applies to both existing and new build properties. Being able to rate the existing stock is significant because it is these that frequently change hands and in which the bulk of the population live. The aim of this design based noise rating system is to provide a market information tool so that good and bad acoustic design can be easily identified and discussed by individuals and the media.

Noise is unwanted sound and embraces two concerns. The first is human behaviour – people being 'too noisy' – and the second is the dwelling itself and its ability to prevent the transmission of noise to other dwellings. A design based rating system addresses both these concerns.

It terms of driving up the acoustic quality of new properties, those with good acoustic comfort design would receive a high rating and it would then be for the free market to decide if they should sell for a higher price – results of my survey in England suggest that they would fetch a premium and it is then argued that this price premium should provide an incentive for such designs to be supplied. Similarly it would be for the market to decide if existing homes with good acoustic comfort should also attract a high premium. Price differentials still exist in markets even when demand is greater than supply.

However, the rating cannot change the design of existing dwellings – they are built the way they are. But the rating by simply raising awareness of what is good and what is bad design in terms of acoustic comfort, may have some significant influences in terms of preventing an existing good design becoming a bad one through alterations, for example removing internal structures such as a hallways that act as an acoustic barrier to noise generated in a neighbouring property.

A rating based on design may influence human activity in terms of drawing attention to differences in quality in the hope that people may make the connection that extra care is needed not to generate noise in lower rated properties, the argument being that people should live within the limits of their property, expressed by John Stuart Mill in 1859 as people of right thinking minds can do whatever they like so long as they don't harm anyone else.

The rating itself would be particularly effective if the media would pick up on and promote the idea that when carrying out renovation work sound insulation should also be installed to offset a property's inherent acoustic comfort weakness and in doing so add value, comfort and make it more saleable. The design based noise rating system is part of an integrated

approach to solving the problem of noise. It would provide a comparison tool but this tool would need to be sold. House makeover shows and the Sunday property press would be the ideal 'sales team'. It is difficult to be exact in measuring the effects of installing retrofit sound insulation or guarantee performance. However, if correctly installed, such sound insulation should improve acoustic comfort even if it cannot be measured. This is why as part of the overall market transformation a certificate issued by the installation company is recommended.

A design based rating system communicates performance in a legally uncomplicated way to potential owner/occupiers and for the media/television shows. If numbers and specifics are quoted in error there is the risk of being sued which in itself acts as a disincentive for the media to report on acoustic comfort.

A design based rating system provides the media, the only body under current conditions with any influence, with a tool to communicate good and bad properties in terms of acoustic comfort. While dB based rating systems are more accurate at the time of measurement they are beyond the comprehension of the media and general public. Further, measuring attached walls in terms of dB's may not be as accurate as a design based rating over time. As properties age and change hands, walls dry out, cracks appear and occupants may make changes to adjoining walls and its ability to provide an effective acoustic barrier. The most effective way for a wall to provide acoustic comfort over time is for it not to be attached to a neighbouring wall. Using a design based rating system to award a higher rating for fewer attached walls and floors combined with stars awarded for proven different floor types in apartments overcomes such problems.

### **No rating system is perfect – but they generate awareness and discussion**

No Rating is perfect and rating rarely provides a full picture. Energy labelling is supposed to be about promoting environmentally friendly products but the label does not provide the whole story as it does not reflect the full environmental cost of the product from cradle to the grave. Energy labelled light bulbs don't communicate the eye comfort of different lights, with fluorescent lights and energy saving bulbs not as comfortable to read under as traditional light bulbs. The NCAP does not compare the effects of different size cars in a collision but consumer magazines and television reviews do carry out such tests.

So while NCAP has improved car safety within each class of car the rating does not give a full picture. NCAP rightly receives praise for delivering to the market safer cars. However, more importantly perhaps its biggest contribution to car safety is the change it brought about in both consumer and producer attitudes towards overall safety.

To some acousticians a design based noise rating may seem primitive and unscientific. However, the objective of rating is to give consumers a guide with which to make comparisons and help rational decision making. Given government resistance, industry resistance and difficult market conditions a design based rating system is the only hope for a noise rating system capable of plugging into the existing property review infrastructure in England, provide the media with a review tool and start the momentum rolling towards better acoustic comfort.

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