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Housing Health and Safety Rating System

Report on Development

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Legal Research Institute, University of Warwick

July 2000

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CHAPTER 1
Introduction

BACKGROUND

1.01 This report details the development of a new Housing Health and Safety Rating System to replace the current Housing Fitness Standard.

1.02 The current Housing Fitness Standard was introduced in April 1990 by the Local Government and Housing Act 1989 to replace a standard which had been in use for over 35 years. Various aspects of the new standard and the associated changes to the enforcement regime were criticised almost immediately. The main objections were that it did not include a requirement on internal arrangement or one on thermal efficiency, and that there was no power to require the closing of a part of a dwelling.

1.03 Between 1990 and 1995 several Private Members Bills were sponsored to amend this new Fitness Standard. While these did not receive Government support, the Department of the Environment (the Department) commissioned research into the interpretation and application of the standard and into the affects of buildings on health and safety.

Figure 1 The Housing Fitness Standard (section 604 amended, Housing Act 1985)

"...a dwelling-house is fit for human habitation for the purposes of this Act unless, in the opinion of the local housing authority, it fails to meet one or more of the requirements in paragraphs (a) to (i) below and, by reason of that failure, is not reasonably suitable for occupation:

(a) it is structurally stable;

(b) it is free from serious disrepair;

(c) it is free from dampness prejudicial to the health of the occupants (if any);

(d) it has adequate provision for lighting, heating and ventilation;

(e) it has an adequate piped supply of wholesome water;

(f) there are satisfactory facilities in the dwelling-house for the preparation and cooking of food, including a sink with a satisfactory supply of hot and cold water;

(g) it has a suitably located water-closet for the exclusive use of the occupants (if any);

(h) it has, for the exclusive use of the occupants (if any), a suitably located fixed bath or shower and wash-hand basin each of which is provided with a satisfactory supply of hot and cold water; and

(i) it has an effective system for the draining of foul, waste and surface water;

and any reference to a dwelling-house being unfit for human habitation shall be construed accordingly."

Research

1.04 In 1993, *Monitoring the New Housing Fitness Standard* (DOE 1993) was published. This research, carried out by the Legal Research Institute at Warwick (LRI), reported on how local authorities interpreted and applied the Fitness Standard. It also reported on comments and criticisms made by local authority officers of the standard and the associated enforcement and grant regimes.

1.05 Comments included that new requirements were needed to allow assessment of internal arrangement, thermal efficiency, the local environment, fire safety and radon. The report also identified legislative anomalies in definitions, enforcement procedures and the various standards, which could apply to dwellings. It also showed that local authorities were not coping with the existing number of dwellings failing to meet the Fitness Standard.

1.06 Further research was carried out by the LRI into renovation standards achieved following enforcement action and grant aid (LRI 1996). This found a wide variation in the standards local authorities required and little informed reasoning in determining the standards.

1.07 The Building Research Establishment (BRE) published two reports in 1995 – *Building regulation and health* (Raw and Hamilton 1995) and *Building regulation and safety* (Cox and O'Sullivan 1995). These reports summarised the findings from research into the potential effect of building design and condition on the health and safety of users. They also commented on the legislative and administrative controls which might regulate design and condition to protect users.

1.08 In order to rank the dangers to health and safety, the BRE reports used a system of risk assessment. This showed the potential for harm which could result from each danger, the severity of the harm outcome and the strength of supporting evidence. Using this approach, these reports showed that some of the most serious health and safety hazards in the housing stock were outside the Fitness Standard. These included excessive cold, slip, trip and fall hazards, fire hazards and radon gas.

THE FITNESS STANDARD REVIEW

1.09 The Government announced, in 1996, that it would undertake a Review of the Fitness Standard. This included consultation and further research to inform the policy review.

Review of controls

1.10 The LRI, with the BRE, were assigned to review the controls on minimum standards in the existing housing stock. This research included a literature review, a review of the legislation for overlap, consistency and gaps, interviews with professional bodies and experts, and a survey of local authority officers using the Fitness Standard.

1.11 The review identified two major faults to the Fitness Standard. First, it did not cover all the potential health and safety hazards which could be found in dwellings. And second, the pass or fail approach did not distinguish between dwellings which were dangerous and an immediate threat to occupants and those which failed but were only a minor threat to health.

1.12 The review also identified legislative anomalies and difficulties. These included apparently unnecessary differences to the format and wording of Notices, a lack of uniformity and association between different statutory standards and requirements, and that some standards could not be enforced in respect of council owned dwellings.

1.13 The report (LRI 1998) on this research suggested two options to overcome the identified problems and criticisms – minor changes or major reform.

1.14 The minor changes suggested included that:

a) The assessment could be made cumulative;

b) Additional matters such as *energy efficiency, internal arrangement, fire safety,* and *air quality* (particularly *radon gas*) could be included in the Standard;

c) There should be a single definition of a dwelling and a single standard applicable to all dwellings;

d) Wherever possible there should be consistency towards housing hazards throughout housing and related legislation;

e) that a power to enable closure of part of a dwelling should be reintroduced; and

f) that powers of enforcement over council dwellings should be introduced.

1.15 The suggested minor changes would address some of the problems identified by the review. However, they would not overcome the second major fault to the standard: the pass or fail approach.

1.16 The proposal for major reform included that a new system of housing assessment should be developed, a rating system, to identify those dwellings which pose the greatest threat to occupants' health. Such a system should require evaluation by reference to an assessment of the health risks, informed by recent scientific studies of the relationship between housing conditions and health. It should also be capable of ranking both dwellings and housing condition according to the seriousness of the health threat posed.

1.17 It was also proposed that there should be a fundamental review of the enforcement mechanisms used by local authorities to apply housing standards. It was recommended that new duties should be introduced, similar to those imposed to control conditions at work under the Health and Safety at Work etc Act 1974. These duties could be applied to landlords, owner-occupiers and tenants, and accompanied by new powers of enforcement geared to reflect the seriousness of the risk of the threats to health and their imminence (LRI 1998).

1.18 For the tenanted sector, both public and private, it was suggested that a duty should require a landlord to provide and maintain a dwelling in a condition which was safe for occupation by persons who may be particularly vulnerable (such as the elderly, or young children) to whom it may be let.

1.19 To support the recommendation for the development of a Fitness Rating System, a feasibility study was carried out.

The viability of a rating system

1.20 The feasibility study, carried out by the BRE and the LRI, concluded that a system could be developed which could include all potential hazards, emphasising the effect of defects and assessing the likelihood of an event and the probable health outcome (LRI 1998).

1.21 It was accepted that the physical assessment procedure could be geared to the practical inspection of the dwelling fabric and facilities. However, it was proposed that the rating approach should focus on the threats to health and safety that any defect or deficiency presents. It was this "effect of the defect", rather than the defect itself, which would lead to determining the severity of the health risks and thereby the extent to which the dwelling was not reasonably suitable for occupation in that condition.

1.22 On completion of an inspection, the conditions would be rated by determining the severity of each health and safety risk present. This would be done by assessing the probability of any defects or deficiency causing a hazardous event against the likely health outcome of that event. To do this, a rating system could be used which would place the emphasis on the highest risks and unhealthiest dwellings, a very high (say 1 in 10) probability of a fatal outcome would represent a million times more serious risk that a low probability (say 1 in 10,000 chance) of minor harm.

1.23 The study concluded that a system could be developed to include all potential hazards and provide a means of rating them to reflect the severity of the threats to health and safety arising from conditions. It was recognised, however, that considerable development, testing and piloting would be needed to achieve a practical and fully operational system.

The consultation process

1.24 In February 1998, both a Consultation Paper and the feasibility study report *Controlling Minimum Standards in Existing Housing* (LRI 1998) were published. The Consultation Paper asked for views on various issues relating to the Fitness Standard and the associated enforcement regime. These included:

a) Should a Rating System be developed to replace the Fitness Standard?

b) Should there be a duty on local authorities to enforce a minimum standard?

c) Was there a need to harmonise legislation relating to minimum standards? and

d) Should there be a means to enforce minimum standards in council housing?

1.25 The Consultation Paper responses were overwhelming in support for the development of a Rating System. The responses also supported retaining a duty on local authorities, harmonising the legislation and applying minimum standards to local authority houses.

1.26 As a result of the consultation process, the Minister announced in July 1998 that a Rating System would be developed.

THE DEVELOPMENT PROJECT

1.27 The Department commissioned the Legal Research Institute to develop a Rating System. A Development Working Group was formed, led by representatives of the Department's Research, Analysis and Evaluation Division responsible for managing the project. Also included were representatives of the BRE who provided additional technical support.

1.28 A Steering Group was set up by the Department's Housing Renewal Policy Division. The Steering Group was formed from representatives from the Department of Health, the Welsh Office, the British Property Federation, the BRE, Loughborough University, and experts in environmental health and housing policy and practice.

1.29 The stated objectives of the development project were to:

a) Devise a logical and practical means of assessing and grading dwellings from a health and safety perspective, with such a system being capable of replacing the current Housing Fitness Standard;

b) Develop an electronic dwelling hazard survey programme for use with hand-held computers;

c) Make recommendations for the interpretation of the results, including banding and action levels; and

d) Assess the implications of a hazard based assessment system for enforcement and suggestions for options for action.

1.30 The outputs from the project were to include an electronic survey programme, a paper based survey procedure, and guidance on the rating system, its application and interpretation.

1.31 Although each aspect of the development influenced and impinged on others, for convenience this report is divided into six sections:

a) Aims and Assumptions;

b) Potential Housing Hazards;

c) The Survey Procedure;

d) Rating Hazards;

e) Interpretation of the Hazard Ratings; and

f) The Guidance.

CHAPTER 2
Aims and assumptions

PRINCIPLE BEHIND THE RATING SYSTEM

2.01 The aim of the research was to develop a system to assess how safe and healthy was the environment provided by a dwelling. The adopted principle behind this was that:

A dwelling, including the structure, the means of access, and associated outbuildings and garden, yard and/or other amenity space, should provide a safe and healthy environment for the occupants (or potential occupants) and any visitors.

2.02 To achieve this:

a) a dwelling should be free from both unnecessary and avoidable hazards; and

b) where any hazard is necessary and unavoidable, then the likelihood of an occurrence and the potential harm which result should be reduced to a minimum.

2.03 For these purposes:

'Hazard' means the effect which may result from a fault and which has the potential to cause harm;

'Harm' (or health outcome) is an adverse effect, such as an illness, condition, symptom or injury, to the health of a person; and

A 'Fault' is a failure of an element to meet the currently perceived ideal for that element, whether that failure is inherent, such as a result of the original construction or manufacture, or a result of deterioration or a want of repair or maintenance.

Further definitions are contained in the Housing Health and Safety Rating System: Guidance.

THE FUNCTIONS OF A STANDARD OR SYSTEM

2.04 The current Fitness Standard is used for several different purposes, including:

a) as a bench-mark for local and national house condition surveys;

b) to identify dwellings with unsatisfactory conditions, where the owner or occupier may qualify for housing grant towards the cost of carrying out remedial works;

c) to identify dwellings with unsatisfactory conditions which may be subject to enforcement action; and

d) to determine the standard to be attained by the carrying out of works on enforcement or as a result of grant-aid.

2.05 Any system intended to replace the current Fitness Standard should be capable of being used for all these purposes.

Requirements to be met

2.06 The Working Group also decided that the developed system should:

a) be a comprehensive health and safety based system, including all the main hazards which may be found in housing;

b) be hazard based – i.e. be based on the effect of defects;

c) provide a means of measuring the severity of the risks to health and safety;

d) be evidence-based, using available medical and scientific information;

e) be practical in its application; and

f) be capable of being incorporated into legislation and justified in court.

2.07 The system should include all the main potential housing hazards and not just those matters covered by the existing Fitness Standard and those suggested for inclusion (see Figure 1). It should also be capable of being extended as and when new hazards were identified in the future.

2.08 A part of the assessment under the current Fitness Standard involves consideration of the effect of a failure on the suitability for occupation (see Figure 1). The intention was that greater emphasis would be given to the effect of any fault. This would stress that it was not the scale of the defect or its cost to remedy which was important in the assessment, rather than the severity of the hazard that resulted from the fault.

2.09 Hazards come in different forms. Some would lead to relatively instant outcomes, such as a fall resulting in physical injury. Others would be more insidious, such as exposure to disease or cold. And others would lead to an outcome some time in the future, such as exposure to radon or asbestos fibres. To be effective, the system would have to provide a real measure of the full range of hazards and a means to compare different types of hazards as discussed in Chapter 5.

2.10 The system would use available evidence on the accidents and health conditions which could be related to housing conditions. In doing so, it would promote further investigation into the relationship between health and safety and dwelling design and maintenance. Being based on evidence, the system would be capable of calibration as new information became available, and would provide a means of assessing the health and safety impact of housing strategies.

2.11 Not only should the system be sound in theory, it should have to be practical. The time taken to assess a dwelling should be much the same as that taken now to determine whether or not a dwelling is fit. An electronic survey programme could also make the transcribing from forms or notes unnecessary which could save time and avoid mistakes.

2.12 The system would be a means of assessing condition. But if it was to replace the current Fitness Standard, it must be capable of being incorporated into the legislation. This would mean it would have to be possible to define lines or levels which could be related to enforcement and grant regimes.

2.13 The system should also be logical and understandable by all those likely to use or be affected by it. Those using the system would have to have confidence in the decisions they made based on the information and the process proposed.

2.14 These requirements underlay the whole of the development process and were used to support the decisions made.

CHAPTER 3
Potential housing hazards

INTRODUCTION

3.01 The first task of the development process was to draw up a list of the main potential hazards which may be found in dwellings, and provide details for each.

IDENTIFYING HAZARDS

3.02 The list of potential hazards was based on those described in the two reports published by the BRE, *Building regulation and health* and *Building regulation and safety* (Raw and Hamilton 1995, Cox and O'Sullivan 1995). Also included was fire safety using information from a then unpublished BRE report, *Building regulation and fire safety* (Cox et al, forthcoming).

3.03 The System was to be hazard based, identifying the threats to health and safety and the matters which would remove or minimise those threats and those which would contribute to them. This approach differed from most current housing standards, which specify the condition of the structure, and the facilities and amenities which should be present.

3.04 To relate the hazards to current standards, it was necessary to determine the functions and minimum performance expected of each element, facility and amenity to satisfy the standards. For example, the functions of external walls include providing protection from the climate and for privacy; the functions of a sink include clothes washing, washing of cooking and eating equipment and food preparation. The affect of the failure to meet these functions was identified as the hazard. For example, not being able to wash eating equipment can lead to food poisoning.

3.05 Not only should the System address the severity of any threats to health and safety, it should also reflect the minimum requirements considered necessary for every-day life. To ensure the approach and the list of hazards covered were complete, the list was compared to current minimum standards (such as the Housing Fitness Standard).

3.06 As well as comparing the hazard list to current housing standards, it was measured against recognised fundamental principles to be met by a dwelling. These principles were drawn from various sources (e.g. American Pubic Health Association 1939, Ranson 1991) and included:

a) Physiological needs;

b) Psychological needs;

c) Protection against contagion;

d) Protection against accidents.

Hazards and occupiers

3.07 Statutory housing standards are directed towards the design and state of the dwelling. They deal with what should be present to make a dwelling suitable for occupation, concentrating on those matters which can properly be considered the responsibility of a landlord (owner). Although more complex for owner-occupied dwellings, the same principle applies. Therefore, it is possible to make a distinction between the "owner" responsibilities and those of the "occupier".

3.08 Any system intended to replace the existing Housing Fitness Standard, should be directed to the hazards which could properly be considered within the responsibility and control of a landlord. Some hazards, such as environmental tobacco smoke, were considered outside the responsibility and control of a landlord. These were not included in the list.

List of hazards

3.09 The list of the 24 main hazard categories and 15 subgroups is shown in Figure 2. The hazards are not in any set order.

Figure 2 **Potential housing hazards**

- Hazards associated with Excessive Indoor Temperatures – including from Excessive Cold and Excessive High Temperatures
- Fall Hazards – including Falls on Stairs, Steps or Ramps, Falls on the Level, Falls between Levels, Falls involving Windows or from Balconies and Landings, and Falls associated with Baths etc
- Hazards from Fire
- Hazards associated with Hot Surfaces and Materials
- Hazards associated with Damp and Mould Growth etc
- Hazards from Carbon Monoxide etc – including from Oxides of Nitrogen, Sulphur Dioxide, Volatile Organic Compounds, and Biocides
- Hazards from Radiation
- Electrical Hazards
- Hazards from Noise
- Hazards from Lead
- Hazards from Asbestos and Other Particulates
- Hazards associated with Entry by Intruders
- Hazards associated with Crowding and Space
- Hazards from Explosions
- Hazards associated with Domestic Hygiene – including associated with Pests, with the Design, Construction and Maintenance, and the Storage and Disposal of Household Waste
- Hazards from Inadequate Provision for Food Safety
- Hazards associated with Inadequate Provision for Maintaining Personal Hygiene
- Hazards associated with Inadequate Sanitation or Drainage
- Hazards from Contaminated Domestic Water
- Hazards from Structural Failure
- Hazards from Inadequate Lighting
- Hazards from Uncombusted Fuel Gas
- Entrapment and Collision Hazards
- Hazards from Poor Ergonomics

THE HAZARD PROFILES

3.10 Once a list had been produced, profiles were prepared. For each hazard, the profile:

a) Provided a definition, describing what was included;

b) Gave details of the potential for harm;

c) Identified any particular vulnerable group;

d) Described the 'Ideal' against which conditions would be judged; and

e) Gave details of relevant features which might increase or reduce the severity of the hazard.

Definition

3.11 The definition clarified what was to be included within each hazard and what was excluded. For example, in the case of Hazards from Falls on Stairs, Steps or Ramps, the definition stated that changes in levels of less than 300mm were excluded, but all other internal and external changes of levels were to be included.

3.12 The decision that changes of levels of less than 300mm should be excluded was made to avoid assessing an isolated step or high threshold, such as may be found in bungalows, in the category of Hazards from Falls on Stairs etc. Such a hazard would be included in falls on the level instead,

Potential for harm

3.13 For each hazard, details of the number of reported occurrences which resulted in harm were given. This information showed the importance of the particular hazard both by the number of occurrence and the severity of the outcomes. The sources of this information included *Building regulation and safety* and *Building regulation and health*, the BRE's analysis of Home Accident Surveillance System and the English House Condition Survey, and a BRE survey of falls on stairs. Further details of the statistics used are provided in Chapter 5.

3.14 Information was also given on how each hazard affects human health, including any physiological and psychological effects.

Vulnerable group

3.15 For some hazards, a particular identifiable group of the population would be more vulnerable than others. In some cases this might be those already suffering a health condition, such as a heart condition or asthma. However, for the purposes of the system, vulnerability was limited to the age range and excluded those who could be registered as chronically sick or disabled.

The Ideal

3.16 An Ideal was described for each hazard. This was the currently perceived circumstance which either prevented the hazard, or reduced the probability of a hazardous occurrence to a vulnerable person or reduced the severity of the outcome of an occurrence.

3.17 Satisfying the requirements of the current Regulations, the supporting Approved Documents and relevant British Standards and Codes of Practice would achieve the Ideal for the majority of hazards.

3.18 For some hazards, it is possible to reduce the health and safety risk even further than compliance with the Building Regulations. In these cases, the Ideal may therefore be a higher standard that the Building Regulations. This means that dwellings with these additional features would receive a lower rating score than those complying with Building Regulations only. In practice, the difference will be negligible and would not result in any action.

Relevant features

3.19 The relevant features of a dwelling which may avoid a hazard or may reduce the likelihood of an occurrence or the severity of the outcome were described. This information was gathered from reported research and from the principles and performance requirements.

3.20 It was apparent that in some areas at least there was a limited amount of information on the scale of contribution particular features had to increasing, or mitigating against, hazards, hazardous occurrence or the severity of outcomes. This identified the need for further research. In one area, that of stair features which may have contributed to a fall, the BRE carried out a study to inform the system.

3.21 The relevant features were those matters which should be taken into account in a survey and in the assessment of hazards and would inform the survey procedure.

USE OF THE PROFILES

3.22 The Profiles of Potential Hazards form a major part of the Guidance on the Rating System (see Chapter 7). There have been several revisions since the original draft, some to take account of suggestions and comments, others to include updated information.

CHAPTER 4
The survey procedure

INTRODUCTION

4.01 The Rating System shifts the emphasis onto hazards – the effect of faults. Because of this shift, it was necessary to devise a survey procedure which would ensure all faults and all hazards could be identified and recorded.

REQUIREMENTS FOR A SURVEY PROCEDURE

4.02 For a survey procedure to be effective, it should:

a) Be capable of taking all potential housing hazards into account;

b) Allow a hazard-based survey to be completed in a similar time to current survey procedures used by local authorities taking into account the office time in writing up surveys;

c) Be practical and logical in its approach and in its use;

d) Be understandable by those using it and by others such as owners, occupiers and the courts;

e) Require professional judgement of conditions.

4.03 The Rating System was to take into account a wider range of hazards than the current Fitness Standard (or other housing standards). However, in reality the assessment was a more structured, formalised and informed adaptation of the processes that local authority officers, particularly environmental health officers, already used.

4.04 Assessing whether a dwelling was unfit by reason of a failure to satisfy a requirement in the Fitness Standard involved determining the effect of that failure on the occupation. Similarly, determining whether premises were a Statutory Nuisance (under Part III of the Environmental Protection Act 1990) required an assessment of threats to health resulting from the state of the premises.

4.05 The assessment for the Rating System would need a knowledge of the consequences of the failure of an element (a part of the structure or a facility) to satisfy its functional requirements. Again, this was not new to environmental health officers.

4.06 Although the Rating System emphasised hazards, there was no suggestion that the survey procedure should require a hazard by hazard assessment of a dwelling. The approach adopted was the traditional room by room, element by element method of identifying hazards, finishing with an assessment of the hazards. As well as being both logical and efficient, this approach

was analogous with that for assessing Fitness – first identifying matters which may lead to a failure of a requirement, then determining whether that failure makes the dwelling not reasonably suitable for occupation (see Figure 1).

4.07 As the survey method was logical and the assessment more structured, the System should be readily understood and explainable.

4.08 The assessment of many housing conditions, particularly those arising from deterioration, relies on professional judgement. The survey procedure would have to allow and require it. This would be particularly important if any assessment was to be justified in a court, as it would be the surveyor who would be questioned and cross-examined.

THE ELECTRONIC SURVEY PROCEDURE

4.09 Electronic data capture equipment such as hand-held computers had been in use for sometime for energy rating of dwellings and for local stock condition surveys. The Department decided that devising a new survey procedure provided an opportunity to investigate the potential of such equipment and software for hazard surveys.

4.10 To ensure that the programme utilised and made the most of computer features and capabilities, the survey procedure development started with investigating the possibility and potential for devising an electronic survey programme. If this was possible and effective, formulating a paper survey procedure based on an electronic programme would be relatively straightforward. While the reverse might be equally true, it was less likely that adapting a software survey programme from a paper survey would make the most of computer features and abilities.

4.11 Adopting a hand-held computer for the survey procedure would have several advantages. These include:

a) it would enable relatively complex surveys to be conducted without having to carry and navigate through lengthy forms;

b) it would standardise the information collected both within local authorities and nationally by recording details from pick-lists;

c) it would allow easy transfer of survey results from the hand-held computer to a PC without retyping or data entry, also avoiding the introduction of errors;

d) extensive advice and guidance could be contained in help screens to assist surveyors during surveys; and

e) the formula for rating hazards could be incorporated into the programme, so that results would be generated at the time of the survey (see Chapter 5).

The hand-held computer

4.12 Before a survey programme could be devised, it was necessary to choose a hand-held computer. This would affect the programme language, the screen display and the method of entering data.

4.13 Various hand-held computers were investigated. Factors considered included battery life, robustness, ease and means of data entry, display size and quality, memory size, and the costs involved.

4.14 There were four main options for the device. One manufacturer, Psion, produced two types of devices – a folding computer rather like glasses cases with a keyboard and relatively large touch-screen and the "Workabout", a keyboard only device with a small screen. The second was the only device purpose-designed for surveys. Another device was the 3Com PalmPilot – a relative small touch-screen only computer. The fourth option was a range of devices from various manufacturers using the Microsoft Windows CE operating system.

4.15 After consideration, both those using the Windows CE operating system and the Psion devices were discounted. The Windows CE devices were not adopted because of concerns reported in the technical press about the reliability and speed of the operating system, and Psion devices because the unit cost, survey programme development and licensing costs were high.

4.16 Of the hand-held computers available, the PalmPilot seemed the most appropriate. The advantages were ease of use, a reasonable screen size, a relatively long battery life and a low unit cost. In addition, design software with a relatively low licensing cost was readily. Information could be transferred from and to the hand-held via a cradle for connection to a PC running Windows 95, 98, NT or 2000.

4.17 Other hand-held manufacturers, including IBM and Handspring were developing models which would use the Palm Operating System. This meant that any survey programme written for that operating system would not be limited to a single model or manufacturer.

The survey programme

4.18 The aim was to develop a structure for the survey procedure and programme that would meet existing requirements and record information for rating hazards. Ideally, the structure of the programme and survey procedure would be capable of surveying a range of types of dwellings, including bedsits with shared facilities, self-contained flats and detached houses.

4.19 To fulfil the requirements for both the Rating System and current practice, the survey programme and procedure should:

a) ensure the dwelling could be properly identified;

b) provide for recording a basic description of the type, design and construction of the dwelling;

c) allow for any faults to be recorded, whether or not they contributed to hazards, so that remedial action, if considered necessary, could be determined;

d) provide sufficient information to enable an appropriate specification of remedial action to be drawn up, if necessary;

e) allow for all hazards to be identified, recorded and rated; and

f) ensure the relevant features contributing to each hazard could be identified and recorded.

4.20 Current survey procedures have developed over a long period and follow a general methodical pattern. This helps ensure each room, area and elevation is surveyed without unnecessary retracing of steps or revisiting of locations. It seemed sensible to follow a similar methodical approach for the same reasons.

4.21 For the interior, the approach adopted was to treat each room or area in the same way. For all parts including rooms and hall etc, basic information would be collected including details of heating, lighting and ventilation. For kitchens and bathrooms, the additional facilities would be recorded. This meant that the same programme structure could be used for any dwelling, irrespective of size.

4.22 The programme structure for surveying the interior comprised five stages:

a) The recording of basic details, including position, floor construction, window type and means of heating;

b) The recording of any fault identified (for these purposes, a fault would be a defect, whether inherent or not, to any element of the structure or fabric or any facility, or the absence of any element or facility);

c) For each fault recorded, the surveyor would be asked whether it contributed to any hazards and, if so, which;

d) The surveyor was asked to rate each of the hazards; and

e) Whether or not a fault contributed to a hazard, the surveyor was asked if remedial action was necessary.

4.23 A prototype programme was written for the hand-held computers. Data entry for the PalmPilot computers was easiest by tapping the screen with a stylus. To make full use of this, wherever possible the survey programme would provide drop-lists of answers, buttons or check boxes. An additional advantage of this approach was the standardisation of terms used.

4.24 For this prototype programme, after the general dwelling information, the survey was limited to the five stages for three basic elements in any room or area – ceilings, walls and floors. Field testing and piloting would show if the structure would work and whether any changes or refinements should be made.

4.25 Four main issues would be tested through the field trials and the piloting – the structure of the survey programme, the hand-held computers, the hazard rating procedure and the Guidance. The testing of the first two of these is discussed in this Chapter. The development and testing of the hazard rating procedure is discussed in Chapter 5, and the development of the Guidance in Chapter 6.

THE FIELD TRIALS

4.26 Three independent environmental health consultants, who had had considerable experience of inspecting dwellings and of applying the current Fitness Standard and other minimum standards, were used for the field trials. The choice of the hand-held computers and the structure of the survey programme had been discussed with them during the development of the prototype programme and had been tried out in two trial properties.

4.27 The Field Trials took place over two days and were to include surveys of dwellings using the prototype survey programme. Representatives from the BRE's Healthy Building Centre, the BRE's Housing Centre and the Department attended and participated.

4.28 After a briefing on the hazards to be covered and an explanation of the survey programme, the participants carried out surveys of three dwellings. These surveys were carried out jointly, allowing issues to be discussed and navigation through the survey programme to be overseen. On the second day, participants carried out independent surveys of dwellings. The trials finished with a thorough debriefing and discussion of the structure of the survey programme and of the procedures for rating hazards.

Findings from the field trials

4.29 There was a consensus from those who had used the programme that the hand-held computers were relatively easy to use. The main criticisms were of the screen size and poor screen definition. While a larger screen size would make more data visible to inform decisions, the disadvantages (considerably shorter battery, cost per unit and heaviness) outweighed the gains. It was decided to investigate other PalmPilot models.

4.30 There was general approval for the basic structure of the survey programme which appear practical and straight-forward, although the trials showed that some changes were necessary. These included allowing for recording more than one type of floor construction per room or area, and more than one form of heating provision. Other changes related to the hazard rating procedure (on which see Chapter 5).

4.31 Another issue raised was whether the programme should require the surveyor to indicate where an element was satisfactory. Once basic descriptive details were recorded for a room or area, the programme required surveyors to record any fault to an element. Where no faults were recorded, it was assumed that the element was satisfactory. Where there were no faults to a room or area, the surveyor moved to the next room or area. Changing the programme to require the surveyor to record which elements were satisfactory would be easy to make, but add considerably to the survey time. This was an issue which would be brought up again during the piloting.

PILOTING BY LOCAL AUTHORITIES

4.32 Sixteen local authorities were invited to participate in piloting the survey programme (and rating methodology – on which see Chapter 5). The exercise was organised in three phrases. Four authorities for the first and third phase, and eight authorities for the second phase. This phasing meant that the necessary equipment, materials and backup were available for each phase. It would also allow for any modification and changes to be made and tested between phases.

4.33 A fourth special pilot was also arranged to enable officers from the Department involved in the development to experience the system.

4.34 Each authority was asked to nominate two officers for the piloting. Each officer carried out surveys of about 15 dwellings of varying types and condition. Both officers inspected each dwelling; one using their normal inspection procedure and applying the current Fitness Standard, the other using the developed survey procedure and rating the hazards.

4.35 Each of the first three pilot phases followed a similar pattern. The officers were briefed and provided with the equipment and documentation (see Chapter 6). They piloted the system over two to three weeks and then attended a debriefing session. The fourth phase was a truncated version, lasting only two days.

4.36 The briefing included an overview of the background to, and progress of, the development of the system. A detailed explanation of the survey procedure was given together with a demonstration of the use of the hand-held computers and the programme. This included a simulation, asking the officers to rate example hazards shown on photographs.

4.37 For the debriefing, the officers would be asked to complete a questionnaire aimed at obtaining general impression of the hand-held computers and the survey programme. The questionnaire also gleaned comments on the rating procedure, the guidance and the principle of the hazard rating system. Additional comments and specific issues were gathered during the discussions.

4.38 For the first phase, three authorities were supplied with the original model hand-held computers (Palm III) and one with a later model (Palm V) which had better screen definition and increased memory.

4.39 Each computer was pre-loaded with a survey programme developed from that used in the field trials. This programme remained limited in its extent. It covered basic dwelling details, information on the construction and details of occupation. It allowed for certain aspects of rooms and areas to be surveyed, including ceilings, walls, floors, windows, other means of ventilation and space heating. For these room elements, faults could be recorded and any hazards arising from them. Where hazards were recorded, the surveyor was asked to rate them. No provision was made for surveying the exterior.

4.40 For phases 2 and 3, all authorities were supplied with later models of the hand-held computers. These had improved screen definition, increased memory and improved the operating speed. The pre-loaded survey programme had been a revised and extended for this phase, although still did not provide for surveying the exterior.

4.41 The debriefing from the first phase provided considerable information on the programme and the procedure generally. It highlighted problems and difficulties which needed to be resolved before further piloting.

4.42 The debriefings from phases 2 and 3 showed that most of the changes made to the survey programme to deal with issues raised during the previous phases had been appropriate and that the overall structure of the programme was sound. However, suggestions were made from both which would improve the programme and procedure.

Findings from the piloting

4.43 One of the main aims of the piloting was to test the structure of the electronic survey programme. Many of the comments, however, related to the content and terminology, suggestions for various shortcuts and requests for a facility to repeat similar findings.

4.44 The first phase showed that there were problems with the programme despite the previous field trials. These included that the programme did not always record data which had been entered. Even so, the results showed the structure, with some minor changes, was capable of further development. Most of these problems were solved by the second phase, and none appeared to remain for the third.

4.45 Many officers felt that using the computer survey programme was more time-consuming and limiting than traditional paper-based surveys. One, however, thought it might be quicker and some acknowledged that they had speeded-up during the pilot. It was also acknowledged by some that more information was being recorded than normal. In addition, these comments only related to carrying out surveys and did not include the time that would be taken writing up notes or entering data from forms.

4.46 There were several comments on the amount of information recorded by the survey programme. It would seem that the type and extent of detail recorded currently depends on the reasons for the carrying out the survey – i.e., different information would be recorded on a grant survey and an enforcement survey. This would also be the case for different types of dwellings such as houses in multiple occupation. This suggested that there might grounds for developing add-on programmes to cover the collection of additional information.

4.47 Another important suggestion was for the provision of means to move directly from one part of the programme to another and back, such as from one room/area to another or from the interior to the exterior.

4.48 Although few, if any, of the officers were familiar with hand-held computers or the touch-screen data entry, the responses were generally positive. Most criticisms were from the first phase, where the early models were used and related to the visibility of the screen and the speed of response from the machine. These problems appeared to have been eased by the later models. There were opposing views on the screen size, some considered it too small, others found it no problem.

4.49 There were few comments on some of the advantages of using a computer, such as help screens summarising the guidance and the appropriate screen appearing depending on answers given on the preceding screen.

4.50 A minority were opposed to using a computer survey programme and wanted reassurance, which was given, that they would not be forced to use one and that a paper hazard-based survey would be possible.

THE RESULTS OF THE FIELD TRIALS AND PILOTING

4.51 While considerable time, effort and thought had been put into the development, the trials and the piloting highlighted several problems which were addressed. They provided much useful information and suggestions which has contributed considerably to the development.

4.52 Despite the short time-scales involved, and although there were some problems and faults with the initial system as developed, the piloting confirmed that the principles involved had considerable support.

4.53 Again, despite the problems, there was still much support for the idea of a computer survey programme. Most officers were positive, or expressed no negative opinion, about it.

4.54 Opinions on the hand-held computers were widely spread. Most officers thought they had got used to using them relatively quickly, and found them easy to use. Although some officers did not like them, most were either positive or ambivalent. The early problems of screen definition and slow reaction speeds were overcome with the later models.

LOCAL HOUSE CONDITION SURVEY TRIAL

4.55 During the development, a local authority approached the Department requesting permission to use the Rating System as a part of a local house condition survey. Although not part of the original development programme, this gave an opportunity to test the viability of the system for such purposes.

4.56 Briefing of the surveyors was over two days. The principles and rating procedure were described. Two dwellings were surveyed and rated, followed by discussion and debriefing. This trial confirmed that the Rating System could be used as a part of a house condition survey and applied using a paper survey. Details of the integration of the Housing Health and Safety Rating System with condition surveys are contained in *Collecting, Managing and using Housing Stock Information.*

CONCLUSIONS FROM THE TRIALS AND PILOTING, AND FURTHER DEVELOPMENT

4.57 The main conclusion drawn from the testing was that the structure of the survey programme was sound. It enabled all the necessary information to be collected to ensure hazards could be identified and rated. It also enabled defects and deficiencies to be recorded which could be used for determining the appropriate remedies. In addition, the approach and structure was also robust enough to be used for surveying a wide range of dwelling types and sizes.

Paper surveys

4.58 Having devised a sound structure for the electronic survey programme, translating this to an explanation for a paper survey was uncomplicated. It was also an opportunity to establish various conventions to be adopted, to ensure surveys and reports would follow the same format.

4.59 The experience of the local house condition survey confirmed that there were no problems in carrying out equivalent paper surveys.

4.60 As well as written instruction for a hazard based survey, a flow chart was been produced to give a diagrammatic representation of the stages involved. This is contained in the Guidance.

Electronic survey programme

4.61 The development of the electronic survey programme continued, building on the findings from the trials. One issue from the trials which required further investigation was the hazard rating procedure and scoring screens for the programme (on which see Chapter 5).

FINAL PILOTING

4.62 Once the rating procedure and scoring screens were agreed, the final version of the survey programme was completed. This included sections to cover all internal rooms and areas, internal amenities (such as central heating systems), external elevations, external amenities (such as gardens and access paths), and whole dwelling issues (such as fire precautions).

4.63 Final tests were then arranged. Officers from seven authorities carried these out. Five of the officers had not been involved in previous trials, although four of the authorities had provided officers before. The officers were given a background briefing and taken through practical exercises on rating hazards. They were supplied with hand-held computers preloaded with the survey programme and with a draft of the Guidance.

4.64 The officers carried out surveys of a range of dwellings and reported back on their experiences. All were positive about the survey programme, and those who had been involved in previous trials commented that the programme was much improved over earlier versions. While some considered the process took longer than current surveys, one felt it was only a few minutes longer. Nearly all the comments and suggestions related to adding check boxes and options to drop lists. This required only minor programming work to complete the programme.

CHAPTER 5
Rating hazards

INTRODUCTION

5.01 The intention of the research was to develop a means of rating hazards identified during a survey which would:

a) Take into account the likelihood of a hazardous occurrence;

b) Take into account the severity of the possible harm outcome(s);

c) Be capable of comparing different types of hazards;

d) Provide a numerical value of the dangerousness of each hazard;

e) Be practical and readily understandable; and

f) Be useable in a diversity of dwellings.

5.02 The relevance of the various factors is discussed below before the development of the hazardous rating procedure is described.

Likelihood of a hazardous occurrence

5.03 A fault to an element or particular dwelling feature may influence the likelihood of an occurrence which could result in harm. A low window sill may increase the likelihood of a small child being able to lean out of the window, or climb onto the sill. A safety catch limiting how wide a window may be opened will reduce the likelihood of a child being able to lean out of that window. Particularly steep stairs may increase the likelihood of a misstep which could result in a fall. The likelihood of an occurrence is therefore important in rating hazards.

Outcomes and spread of outcomes

5.04 While the likelihood of two hazardous occurrences may be the same, the outcomes in terms of harm to the individual may differ widely.

5.05 For example, the likelihood of poor ergonomics causing harm may be the same as the likelihood of exposure to excessive cold causing harm. However, the most likely outcome from the former would be a strain, while for the latter it would be death.

5.06 Similarly, because of its design or condition, the likelihood of a fall out of a window may be judged to be 1 in 10. If that window is in a ground floor room, with a drop of three feet to the ground, the outcome may be minor bruising. If a similar window is in a room on the tenth floor, the likelihood may remain the same, but the outcome would be much more severe.

5.07 As well as a most likely outcome from a hazardous occurrence, there may be a other possible outcomes. The most likely outcome from a fall on stairs may be judged to be a severe sprain, but it may also be considered that bruising is a possibility or a broken limb. Therefore both the most likely outcome and the spread of outcomes is important to rating hazards.

Comparing hazards

5.08 The types of hazards which may be found in dwellings vary. Some may result in a relatively instantaneous event, such as a fall. Others are more only have an effect if a person is exposed to them over a period of time, such as the excessive cold. While for others the outcome may not be observed for some time, such as exposure to radon or asbestos fibres.

5.09 The most dangerous possible outcome from some hazards will be greater than that from others. For example, by itself, poor lighting will not result in death, but exposure to Carbon Monoxide could do so. The procedure would have to be able to reflect this.

A numerical value

5.10 The intention was to derive a numerical value for each hazard. This would provide a simple method for comparing different hazards and the condition of different dwellings. It would also provide for limits to be set. Values above a certain limit could indicate remedial action was needed, and a target value could be set to be achieved after that remediation.

5.11 A further objective was to devise a rating system which was mathematically sound and generated a numerical value which could be related to other non-housing hazards. This would enable housing conditions to be compared to other hazards and risks.

Practical and understandable

5.12 Any procedure for rating hazards would have to be practical. It is to be used by local authorities and others to assess and compare dwelling conditions. If the procedure involved complex evaluations and calculations which would take excessive time, it would be neither practical nor acceptable.

5.13 It would have to be understandable, not just by those applying it, but also by owners and occupiers. It would also have to be capable of being explained and justified in courts.

Useable in a diversity of dwellings

5.14 The developed System should be capable of evaluating and comparing conditions in a wide range of dwelling types found in England and Wales. This would include small terraced houses, large detached houses, brick and stone built cottages, and flats within larger buildings. If possible, it should also be capable of being used to assess and compare conditions in bedsits with shared facilities and common parts, and in park homes.

THE HAZARD RATING FORMULA

5.15 Although the procedure for rating hazards underwent several changes, the underlying principles were established early on in the development. The original formula to generate a hazard rating was proposed by the BRE and incorporated all the variable factors involved. This formula generated a hazard rating from the sum of the products created from multiplying the likelihood of each of four Classes of Harm which may result from an occurrence.

Likelihood

5.16 The likelihood or probability of an occurrence is often expressed as a ratio; for example, 1 in 10 or 1 in 1,000. This ratio provided the first figures for the formula.

Classes of harm

5.17 The four Classes of Harm were the most serious from those devised in previous work by the BRE (Raw and Cox, forthcoming). The BRE carried out a number of tests to categorise a wide range of different forms of harm into seven Classes based on the extent of the severity which could be attributed to each harm. This enabled different forms of harm, such as physical injury, illness, symptoms and other health conditions, to be compared and categorised.

5.18 The four Classes used for the formula were those which were serious enough to require medial attention and so likely to be recorded. As they were likely to be recorded, information was available on the number of incidents of each harm.

5.19 For the formula, weightings were given to each of the four Harm Classes to reflect the degree of incapacity. These weightings were based on those that had been developed for other work (Cheyne et al 1997). For this procedure and to avoid too many decimal places in the formula, the original weightings were multiplied by 1,000. Examples of harm in each of the four Classes and of the weightings given are shown in Figure 3.

Figure 3 **The original weightings and examples of the four classes of harm**

Class of Harm		Examples of Harm	Weighting
I	Extreme	Death, permanent paralysis below the neck, malignant lung cancer, regular severe pneumonia, permanent loss of consciousness, and 80% burn injuries.	1,000,000
II	Severe	Chronic confusion, mild strokes, regular severe fever, loss of a hand or foot, serious fractures, very serious burns and loss of consciousness for days.	100,000
III	Serious	Chronic severe stress, mild heart attack, regular and persistent dermatitis, malignant but treatable skin cancer, loss of a finger, fractured skull, severe concussion, serious puncture wounds to head or body, severe burns to hands, serious strain or sprain injuries and regular and severe migraine.	30,000
IV	Moderate	Occasional severe discomfort, chronic or regular skin irritation, benign tumours, occasional mild pneumonia, a broken finger, sprained hip, slight concussion, moderate cuts to face or body, severe bruising to body, 10% burns and regular serious coughs or colds.	1,000

5.20 These weightings provided the second set of figures for the hazard rating formula.

Statistics

5.21 As part of the development of the Rating System, the Department calculated provisional likelihood and harm outcome statistics. The BRE classified HASS (Home Accident Surveillance System) and HADD (Home Accident Death Database) data by hazard, harm outcome and age of victim. The HASS and HAD databases are held by the Department of Trade and Industry. The HASS records people attending Accident and Emergency department due to a home accident. Detailed information about the victim and accident is obtained through an

interview with about 50% of the recorded incidents from a sample of 18 hospitals. HADD data relates to deaths and the latest database available is 1995. This data was used to identify the harm outcome distributions for each hazard.

5.22 English House Condition Survey 1996 (EHCS96) data was used to identify the number of dwellings where the hazard is likely to exist. This was used to as a base for the likelihood of an occurrence. The EHCS96 is English based survey of the housing stock carried out every five years. Over 15,800 households were interviewed and information obtained on occupants, accidents and health of the occupiers. Overall, 1,154 households had accidents severe enough to visit a doctor or casualty department. Information was collected about over 42,000 people and over 50% of these people had one of 27 health conditions. In addition, over 12,000 dwellings were visited by surveyors and received a full survey relating to the provision of a range of amenities, the condition of dwelling and an assessment of fitness. Combining the HASS/HAD and EHCS data allowed calculation of the likelihood of an occurrence for dwellings in England.

5.23 It is clear that the robustness and accuracy of the statistics used in the Rating System are key to the robustness of the final score. The Department will be continuing to develop the statistics used in the system to ensure they are accurate and robust.

The original hazard rating formula

5.24 An example of the original hazard rating formula is shown in Figure 4. For this formula, the weighting for each possible harm outcome is multiplied by the likelihood of its occurrence, and the products summed to given the hazard rating. In this example, the most likely outcome has been judged to be a Class IV harm, a Class III harm has been judged less likely, a Class II even less likely, and a small possibility a Class I harm.

Figure 4 **Example of the original formula for calculation of a hazard rating**

Class of Harm	Weighting (W)	Likelihood (L) – 1 in	W x L
I	1,000,000	500,000	2.00
II	100,000	80,000	1.25
III	30,000	20,000	1.50
IV	1,000	7,000	0.14
		Hazard Rating	**4.89**

THE DEVELOPMENT OF THE RATING PROCEDURE

The first assessment procedure

5.25 The first suggested assessment procedure required the surveyor, on completion of the inspection, to place each hazard on a scale from 1 to 100, the scale being divided into intervals of 5. Zero on the scale represented the point at which the hazard was as low or as safe as it could be, and 100 that it was at its most dangerous.

5.26 From the selected point on the scale, a hazard rating would be generated through the original formula (as shown in Figure 4).

5.27 The Working Group decided that this initial proposal was unsuitable. The relationship between the hazard scale and the rating appeared obscure. The procedure put the surveyor remote from the final rating, and uninvolved with determining the likelihood of each outcome. It

was also felt that this proposal did not make enough use of the expertise of environmental health officers (those who would be likely to make most use of the System).

Revised first stage

5.28 The BRE proposed a second procedure (Option 1). Using the original formula and information from the sources such as the English House Condition Survey, the distribution of hazard ratings through the housing stock were calculated for each potential hazard. For this is was assumed there was a standard distribution of each hazard through the stock. Tables were produced giving a hazard rating for each of 23 groups of the stock, ranging from the worst 0.13% to the best 0.13%.

5.29 The proposal was that the surveyor would give a hazard rating to each hazard, based on an assessment of whereabouts that particular dwelling would be in the housing stock, in the best 44% or the worst 2.5%, for example.

5.30 This second procedure required a knowledge and experience of the distribution of conditions through the UK housing stock. The Working Group considered that this was not necessarily the most appropriate approach for environmental health officers. However, it was considered that the details of the assumed distribution of the hazards ratings could provide useful background information.

Alternative approaches

5.31 Two variations of a different approach were developed by the Department and LRI. The first alternative required the surveyor to assess both the likelihood of an occurrence and the most likely outcome (Option 2). The second required an additional assessment of the likely spread of other possible outcomes from a range of standard spreads (Option 3). The standard spreads assumed a standard distribution of outcomes, from none through small spread to full range.

5.32 Another change introduced for Options 2 and 3 was to include a fifth Class of Harm, Minor. Many housing hazards will result in a Minor outcome. To ignore these occurrences might mean some hazards would be left unrecorded, or surveyors may increase their assessment of the outcome in order to ensure a hazard was recorded.

5.33 For these two alternatives the original formula to generate a hazard rating was amended. For Option 2, the hazard rating would be generated by multiplying only the weighting for the most likely Class of Harm by the likelihood. For Option 3, the rating was generated by multiplying the weightings for each Class of Harm by the likelihood of an occurrence and by a weighting given to the standard spreads. In both cases Class V Harm, Minor, was included, which was given a weighting of 100.

FIRST TRIALS OF THE RATING PROCEDURES

5.34 The three systems for rating hazards were tested at the Field Trials of the survey procedure.

5.35 Initially, it was proposed that each hazard would be rated as it was identified. This would show, where more than one of the same hazard was present, which was the most dangerous. These trials showed clearly that this would be inappropriate and time consuming whichever system was adopted.

5.36 The conclusion from the Field Trials was that the most appropriate rating procedure was Option 3. First, this option involved the surveyor more directly in generating the hazard rating. Second, the knowledge and experience of local environmental health officers was more suited to determining the likelihood of occurrences and the possible outcomes than in judging whereabouts in the housing stock a hazard put a dwelling.

5.37 It was also concluded that an assessment of the likely spread of other outcomes as well as the most likely outcome would allow for a more sophisticated evaluation of the hazard.

5.38 It was this system of rating hazards which was then built into the electronic survey programme for testing through the piloting by local authorities.

OTHER PARAMETERS FOR ASSESSING HAZARDS

5.39 There were several parameters which had to be decided which would affect the consistency of hazard assessment. These included:

a) The "person" in relation to which hazards were to be assessed;

b) The period over which the likelihood of an occurrence was to be judged; and

c) Whether it was the most likely or the most serious outcome which was to be considered.

The person

5.40 Four options for the "person" against whom hazards would be assessed were considered. These were:

a) An average member of the population;

b) An average vulnerable member of the population;

c) Members of the occupying household; and

d) A person vulnerable to the particular hazard.

5.41 It would be inappropriate to assesses hazards in relation to an average member of the population. Those residents who make the most use of dwellings, place the most demands on them, and spend the most time in them may not be average members of the population. They are more likely to be elderly, very young, ill and disabled people. Assessing hazards in relation to an average member of the population could leave the more vulnerable dwelling users exposed to hazards assessed as relatively safe. In addition, the results would give a false impression of the safety of the housing stock.

5.42 As certain people are more vulnerable to some hazards than others, assessing hazards in relation to a standard average vulnerable person would not be appropriate. This would also downgrade some hazards.

5.43 Assessing hazards in relation to the current occupiers could mean that two dwellings in an identical condition would be given different hazard ratings depending on the nature of the occupying household. The System was intended to provide a Rating for the dwelling, but this would be a Rating in relation to the occupants and would mean it would be necessary to reassess

on a change of occupancy. This was not considered a practical approach. However, assessing whether the condition of a dwelling was a danger to the current occupiers would be important in determining the nature and speed of any action to be taken in response to the hazard assessment.

5.44 Judging each hazard in relation to a person most vulnerable to that hazard would result in an assessment of the suitability for use and occupation of dwellings by all the population (other than the registered disabled). If a dwelling was safe for the most vulnerable persons, it would be safe for all. This approach also reflected current guidance on the assessment of Fitness (DOE 1996). This approach that was adopted for the Rating System.

5.45 Those qualifying to register as chronically sick or disabled were excluded from the most vulnerable category. For this group, there should be specialist assessment of their needs and of any adaptations necessary. This was outside and beyond the scope of the Rating System.

Period over which likelihood of occurrence is judged

5.46 As discussed above (at paragraphs 5.08 and 5.09) for some hazards the occurrence may be relatively instantaneous such as a fall. For others, it may be more insidious. To accommodate these differences, the likelihood of an occurrence was to be judged over the following twelve months.

5.47 Guidance on the number of occurrences for each hazards was to be based on the annualised average over a five year period. This would balance out variations such as the effects of a particularly cold winter and a mild winter. Unfortunately, data was not available for a full five year period.. Provisional statistics are available and the Department will be continuing the development of accurate and up-to-date statistics to support the system.

Most likely or most serious outcome

5.48 If the system used most serious outcome that could result from an occurrence, this could skew the results. For many hazards, the most serious outcome could be death and therefore the assessment of a hazard would be limited to the probability that may be very unlikely to occur. Therefore, using the most serious outcome may undermine the public perception of the system by producing high scores when for example death may be extremely unlikely.

5.49 The Working Group decided that the assessment should be of the most likely outcome from an occurrence. As harmful occurrences in dwellings are more likely to result in minor or medium health outcomes, assessing the most likely outcome would give a truer reflection of the effects housing conditions.

5.50 The Working Group also decided, however, that it was important to include an assessment of the spread or range of other possible outcomes (as in Option 3 above). This would provide for a more refined result. It was also more realistic as, for the majority of occurrences, a range of outcomes are possible.

PILOTING THE RATING PROCEDURE

5.51 The electronic survey programme, and the survey and rating procedure were tested by piloting with local authority officers. For these tests, the officers were provided with written instructions on the rating procedure, including the conventions to be adopted.

5.52 The scoring screens built into the electronic survey programme required three judgements to be recorded – the likelihood, the most likely outcome and the spread of other possible outcomes.

5.53 Likelihood was to be recorded on a ten point risk scale, ranging from 1 in 10,000 to 1 in 10. The most likely outcome was to be chosen from a pick list which gave appropriate examples for the hazard from each Class of Harm. The spread was to be chosen from a list of five standard options (see Figure 5).

Figure 5 **The standard spreads of outcomes adopted for the piloting**

Spread	Possible Other Outcomes
None	The only possible outcome is the most likely outcome.
Adjacent One	This is appropriate where the most likely outcome is Extreme (Class I) but there is a possible of a Severe outcome (Class II), or where the most likely outcome is Minor (Class V), but with a possibility of a Moderate outcome (Class VI).
Small Range	There is a possibility that the outcome could be in the Class either side of the most likely outcome.
Wide Range	This is where there are three other possible outcomes as well as the most likely.
Full Range	While one outcome is the most likely, there is a possibility that the outcome could be any of the others.

5.54 An example of the scoring screen used for the third phase of the piloting is shown in Figure 6. This screen shows at the bottom the hazard rating generated from the answers recorded by the surveyor. Tapping the button marked with a "?" next to this score displayed the formula which generated it – see figure 7.

5.55 The documentation supplied to the local authority officers in the piloting included the distribution of the hazard ratings throughout the housing stock as calculated by the BRE. This was supplied to provide the officers with some guide when they had generated their ratings for a hazard.

Figure 6 **Scoring screen used in the local authority piloting**

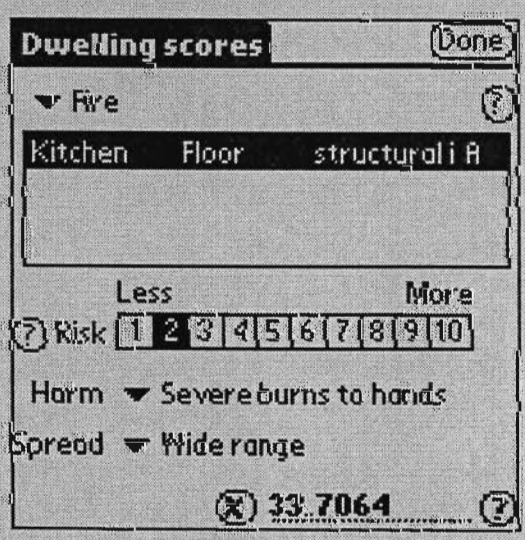
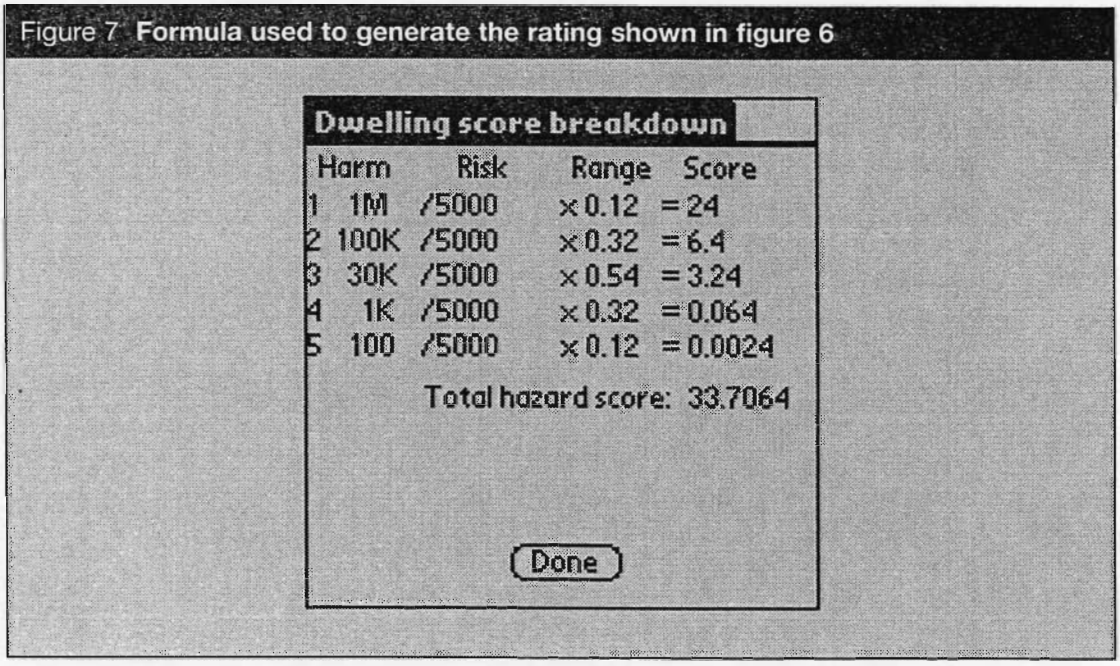


Figure 7 **Formula used to generate the rating shown in figure 6**



Findings from the piloting

5.56 Although officers considered the principle of rating hazards sound, comments from those involved in the first phase reflected the need for further development. The further development between the second and third phases produced more positive responses, but still showed further work was necessary.

5.57 As stated above, the rating procedure developed for the piloting required three answers – the likelihood of an occurrence, the most likely outcome and the range of other possible outcomes. Some officers were concerned that this meant that there were three decisions that were potentially subjective and open to challenge. Other officers felt that this was just breaking down the decision process into logical steps, making the final determination clearer and less vulnerable to challenge.

5.58 Each phase of the piloting used different ways of phrasing and presenting the three issues requiring judgements. For the first phase, the likelihood of an incident occurring was shown as in ratios. This was disliked by the officers and produced the comment that "ratios are meaningless" and the suggestion that "descriptive categories" should be used. Descriptive categories, 'Highly Likely' and 'Likely' for example, were tried for the second phase. However, this approach was not successful. For the third phase a numerical ten-point scale was used (see Figure 6 above).

5.59 The piloting confirmed that the approach adopted for rating hazards, would work. However, it highlighted two areas for further development. The first was to find an acceptable form of presenting the issues to be judged. This form had to be both technical accurate and give environmental health officers confidence in the decisions and final result. The second area was the need for further guidance and training to inform judgements.

5.60 The ten-point numerical scale used for the third phase was liked as a means for entering a response, but it produced its own problem. A shift of one button on the likelihood scale resulted in a large jump in the hazard rating. This could mean that two person surveying the same dwelling may produce widely differing hazard rating, although their judgements had been very close.

RATING WORKSHOP

5.61 There was a lack of a clear findings from the piloting on how to present the issues requiring judgements. Therefore, the Department and LRI agreed to hold a workshop to test a range of rating options. The object was to test a variety of ways to enter data, and different approaches to presenting the issues to be judged.

5.62 For three sample hazards, the Department calculated the average likelihoods and the average spread of outcomes as discussed earlier. These were broken down for a range of different ages, types of properties and for different age groups of the population. This information was made available to provide additional guidance to inform the judgements.

5.63 To provide a wide range of rating options, six scoring screens were built for the hand-held computers. Each screen was designed to provide different methods to enter data as well as different approaches to rating hazards. The data entry methods offered included five and ten point scales, pick lists, direct number entry and a slider (See Figures 8 and 9 for examples).

5.64 Twenty officers took part in the workshop. Working in groups they were given pictures and descriptions of hazards and asked to rate the hazards using the six scoring screens. They were also provided with information on the average likelihoods and spread of outcomes for each of the hazards.

Figure 8 **First scoring screen used in the rating workshop**

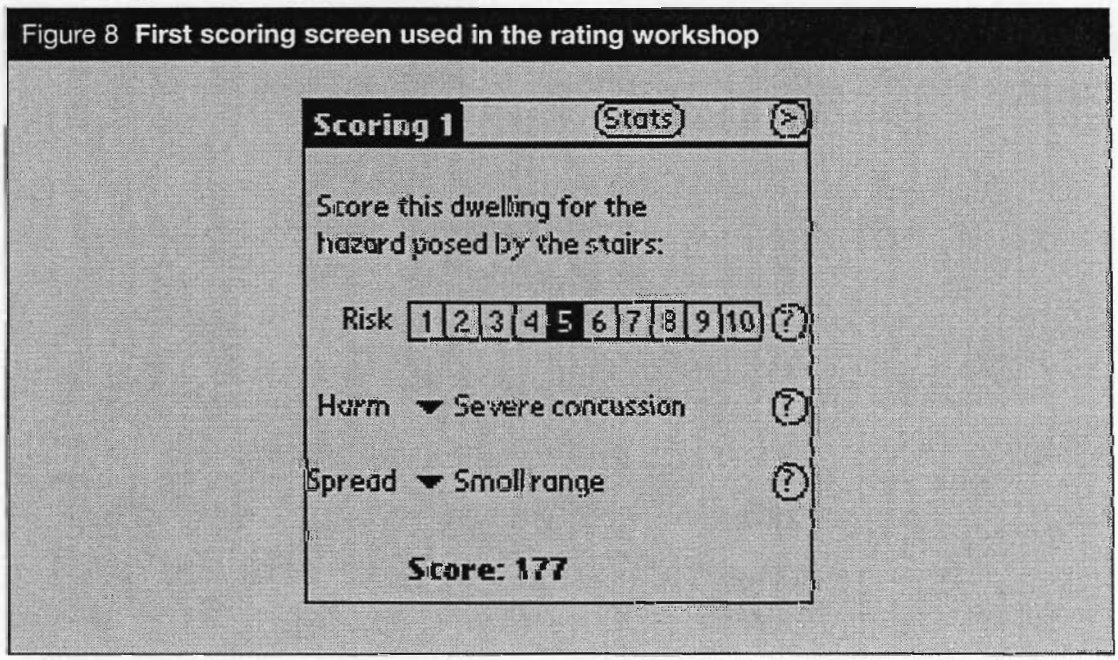
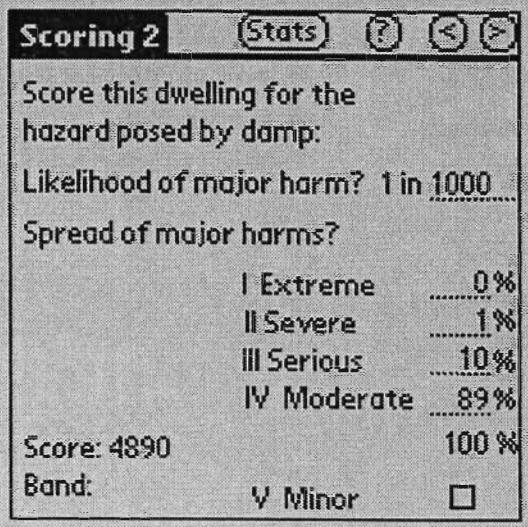


Figure 9 **Second scoring screen used in the rating workshop**



Findings from the workshop

5.65 There were two main preferences for entering data. One was by way of a button scale, the other from a pick list. The longer button scale, as designed for this workshop, was criticised as it gave more options and more possibility of variations in the results between two surveyors. However, a short button scale was seen to mean from bigger jumps in the ratings.

5.66 Officers disliked entering numbers (see Figure 9). There appeared to be two reasons for this. First, that it offered an almost unlimited range, so that it was highly unlikely that two surveyors would reach the same result. Second, a lack of familiarity with the hand-held computers and the means of entering data.

5.67 The information on average likelihoods and spread of outcomes was found useful, providing clear guidance in a form which was appropriate to local authority officers.

THE DEVELOPED SCORING SCREEN AND RATING PROCEDURE

5.68 A revised scoring screen was designed, using the average likelihoods and spread, and based on the findings from the workshop. The likelihood button scale, with sixteen buttons, was longer than previous versions. Although there were more buttons, the figures behind them had been carefully calculated to avoid large jumps in the rating.

5.69 Technical advice had suggested that the use of a range of standard spreads for the outcomes based on a normal distribution was not justified. To replace these, four button scales were shown, one for each of the four main Classes of Harm. Each scale had eleven buttons, these would allow the spread of possible outcomes to be recorded in percentages (to a total of 100%). This would reflect the available information on the distribution of harm outcomes for each hazard.

5.70 As with the likelihood scale, the figures behind the buttons for the spread of harm had been calculated to provide a sensible scale while avoiding wide variations in the results.

5.71 The formula used to calculate the hazard rating used only the first four Classes of Harm. It had been found that including the fifth Class in the formula made an insignificant difference to the hazard score. In addition, as Class V Harms do not require medical attention, there was no information on the numbers of such outcomes.

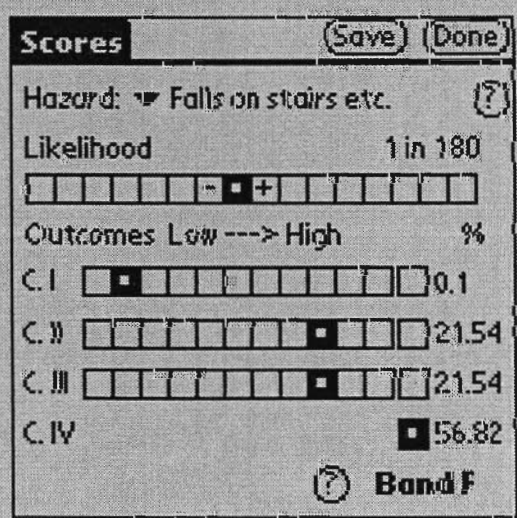
5.72 Percentages were used to show the spread of possible outcomes, so the original weightings given to the Classes of Harm (see Figure 3 earlier) were divided by 100. The finalised formula developed for generating a hazard rating is shown at Figure 10.

Figure 10 **Example of the finalised formula for calculation of a hazard rating**

	Class of Harm Weighting		Likelihood 1 in		Spread of Harm (%)		
I	10,000	÷	100	X	0	=	0
II	1,000	÷	100	X	10	=	100
III	300	÷	100	X	30	=	90
IV	10	÷	100	X	60	=	6
					Hazard Rating	=	**196**

5.73 To provide immediate information to the surveyor, each button scales showed the average likelihoods and the average spread of outcomes for each hazard automatically. The final scoring screen as built is shown in Figure 11.

Figure 11 **Finalised scoring screen**



5.74 The scoring screen was designed to provide instant feedback to the surveyor. If the surveyor picked another button, the screen automatically changed the likelihood or spread and the final rating. Tapping on the "?" button at the foot of the screen would bring up the hazard rating. Also to be shown on the screen would be the Hazard Band (on which see Chapter 6).

CHAPTER 6
Interpretation of the hazard ratings

A SINGLE SCORE OR A RATING FOR EACH HAZARD

6.01 The original aim was to produce a single numerical value or score for a dwelling, by summing the ratings of all the hazards identified. While this was mathematically possible, technical advice suggested that the resulting figure would not give any indication of the severity of the housing conditions.

6.02 Separate ratings for individual hazards could be compared to show which was the most serious hazard and which the least. Adding the ratings together would produce a single score. This would not show how many hazards were present. There would be no indication of whether there was one hazard which posed an imminent threat of a Class I Harm, or many hazards all of which were a threat of Class IV Harms.

6.03 There were 24 categories of hazards and 15 sub-groups in the finalised list (see Figure 2). However, it was found in the Local House Condition Survey trial that in dwellings judged unsatisfactory, surveyors were generally rating one to five hazards and exceptionally ten. This indicated that the results in the form of separate ratings for individual hazards would be manageable and meaningful.

ACCEPTABLE AND UNACCEPTABLE HAZARD RATINGS

6.04 The principles behind the formula used to generate a hazard rating meant that the rating could be related to an Equivalent Annual Risk of Death (see Figure 12). An Equivalent Annual Risk of Death is a term used in risk assessment and management. It is not intended to suggest that death is the outcome from a hazard, but provides a means for comparing widely differing hazards.

6.05 There has been considerable work (mainly through the Health and Safety Executive (HSE)) on what was perceived by the public to be an acceptable and an unacceptable Equivalent Annual Risk of Death. While there are many factors influencing public perception, it would appear that an Equivalent Annual Risk of Death of 1 in 10,000 is considered by the public to be an acceptable risk, while 1 in 1,000 is unacceptable.

6.06 These two risks relate to hazard ratings of 100 and 1,000 respectively. Therefore, it was possible to suggest that a hazard rating of less than 100 should be considered acceptable, while a rating of 1,000 or more should be considered unacceptable.

Figure 12 **Hazard ratings and equivalent annual risk of death**

Hazard Rating	Equivalent Annual Risk of Death
1	1 in 1,000,000
10	1 in 100,000
100	1 in 10,000
1,000	1 in 1,000
2,000	1 in 500
10,000	1 in 100
20,000	1 in 50
1000,000	1 in 10

BANDING

6.07 In order to avoid too emphasis been placed on numbers, hazard ratings could be banded. For general purposes, it would not be necessary to try to differentiate between a hazard rating 250 and one of 275. Banding the ratings would provide a simple and manageable means of comparison.

6.08 A series of ten Bands were proposed, as shown in Figure 13.

Figure 13 **Proposed hazard rating bands**

Band	Hazard Rating
A	5,000 or more
B	2,000 – 4,999
C	1,000 – 1,999
D	500 – 999
E	200 – 499
F	100 – 199
G	50 – 99
H	20 – 49
I	10 – 19
J	9 or less

6.9 Using the information or acceptable and unacceptable risk suggests that ratings in Bands A, B and C are unacceptable. Those in Bands G, H and I are acceptable and Band J is the Ideal. Scores in Bands D, E and F, while not acceptable, are not severe enough to be considered unacceptable.

6.10 The Department is continuing to develop proposals on the relationship of the Bands to enforcement mechanisms.

CHAPTER 7
The Guidance

INTRODUCTION

7.01 A fundamental requirement for the Housing Health and Safety Rating System was detailed technical guidance (DOE 1996). This guidance provides definitions and information on hazards, including the relevant features to take into account in any assessment. Hazard rating of dwellings requires additional stages in the survey over and above the traditional survey methods, such as identifying hazards and rating them. The guidance explains and advises on the extended procedure and on the rating procedure.

7.02 The guidance is directed primarily to those who would be using and applying the System – local authority officers, principally environmental health officers. However, it would also need to be capable of being understood by others, such as landlords and occupiers, who might be affected by the System.

7.03 The guidance is made up of several sections that evolved separately during the development of the System. The sections include:

a) Interpretation and Working Definitions;

b) Responsibility for Faults and Hazards;

c) The Survey Procedure, including identifying faults and hazards;

d) The Scoring Procedure;

e) Interpretation of Hazards Scores; and

f) Profiles of Potential Health and Safety Hazards in Dwellings.

ASPECTS OF THE GUIDANCE

7.04 It was apparent from the outset that any guidance should include clear definitions. It was appreciated that all those who would use or be affected by the System must be able to understand the System and each stage and element of it.

7.05 Where possible, existing definitions were used. Where there was more than one definition currently in use or no appropriate definition existed, then one was drafted.

7.06 A preliminary list of definitions was drawn up as one of the first tasks in the development. This was revised and extended as the System developed. It was particularly influenced by the survey procedure development (see Chapter 4) as the trials and piloting highlighted areas where there was room for confusion or ambiguity.

Responsibility for faults and hazards

7.07 A prime purpose for the System was as a replacement for the current Fitness Standard. As such, the survey procedure and assessment concentrates on those aspects of a dwelling where are the responsibility of the owner (whether as landlord or owner-occupier) or a manager.

7.08 While this assumption was taken for granted by local authority officers, it had to be clarified for others. Drafts of the various sections which would make up the guidance were circulated to members of the Working Group and of the Steering Group. Comments indicated that there was a need for detailed explanation of the division of responsibilities between owner (landlord) and occupier (tenant) for the state and condition of dwellings.

7.09 This issue of responsibility has been the subject of considerable Parliamentary and judicial scrutiny, and a detailed explanation for the purposes of the System was drafted based on this scrutiny (Law Commission 1996).

The survey and the rating procedure

7.10 The System is applicable for both the electronic survey programme and a paper based survey procedure. However, the first drafts of an explanation of the survey procedure concentrated on the use of the electronic survey programme. The structure of the programme and the information to be collected were devised for the piloting. Based on this, guidance containing a description of the survey and hazard scoring procedure was produced. It described the structure of the programme, including how and where information was to be recorded.

7.11 As the piloting of the survey programme progressed, the scoring procedure developed and was revised and refined. These revisions led to amendments of the explanations and guidance to reflect the changes.

7.12 The final revision of the guidance contains an explanation of the procedure to be followed for a paper based survey as well as the structure of the electronic programme. Also included were a series of flow-charts to give a diagrammatic representation of the procedures.

Interpretation of hazard ratings

7.13 For the trials and piloting by local authority officers, no information was provided on interpretation of the hazard ratings generated. This meant that those involved had no comprehension of the implications of a particular rating and were uninfluenced by the results.

7.14 The final guidance includes an explanation of the interpretation of the hazard ratings and the Banding scheme.

Profiles of hazards

7.15 The Guidance also includes profiles of potential housing hazards. These profiles included:

a) A definition the hazard, describing what was included;

b) Details of the potential for harm;

c) Whether any group was particularly vulnerable to the hazard;

d) A description of the 'Ideal' against which conditions would be judged; and

e) Details of relevant features which might increase or reduce the severity of the hazard.

DEVELOPMENT OF THE GUIDANCE

7.16 The guidance for the first phase of the piloting was limited mainly to first drafts of the definitions and the profiles of hazards. It also included an outline of the survey and scoring procedures. This was felt by the officers involved to be limited and not geared to the piloting. In addition, as it was supplied at the briefing, the officers had little time to read it.

7.17 For subsequent phases of the piloting, the guidance was expanded and revised to take account of comments and suggestions. The documentation was also supplied in advance of the briefing for these phases. However, as it became more comprehensive and as the Rating System itself required a radical change of approach, there were still comments that there had been insufficient time to read and absorb the contents.

7.18 Further revisions were made for the final version of the guidance. These took account of the final stages of the development of the rating procedure and also information which had become available during the development. The format and approach remain the same as this had been well received and approved of, particularly by those involved in the piloting and who were part of the main target audience.

7.19 The System has been devised so that the under-lying evidence can be revised and updated as new information emerges. Periodic revisions to the guidance will be necessary to reflect this.

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Raw, G, Cox, SJ et al (forthcoming) *A risk assessment procedure for health and safety in building*, CRC: Watford.

This report details the development of a new Housing Health and Safety Rating System to replace the current Housing Fitness Standard.
The new Rating System evaluates risks to Health and Safety in a range of dwellings, and is capable of ranking dwellings according to the seriousness of the risk posed.

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