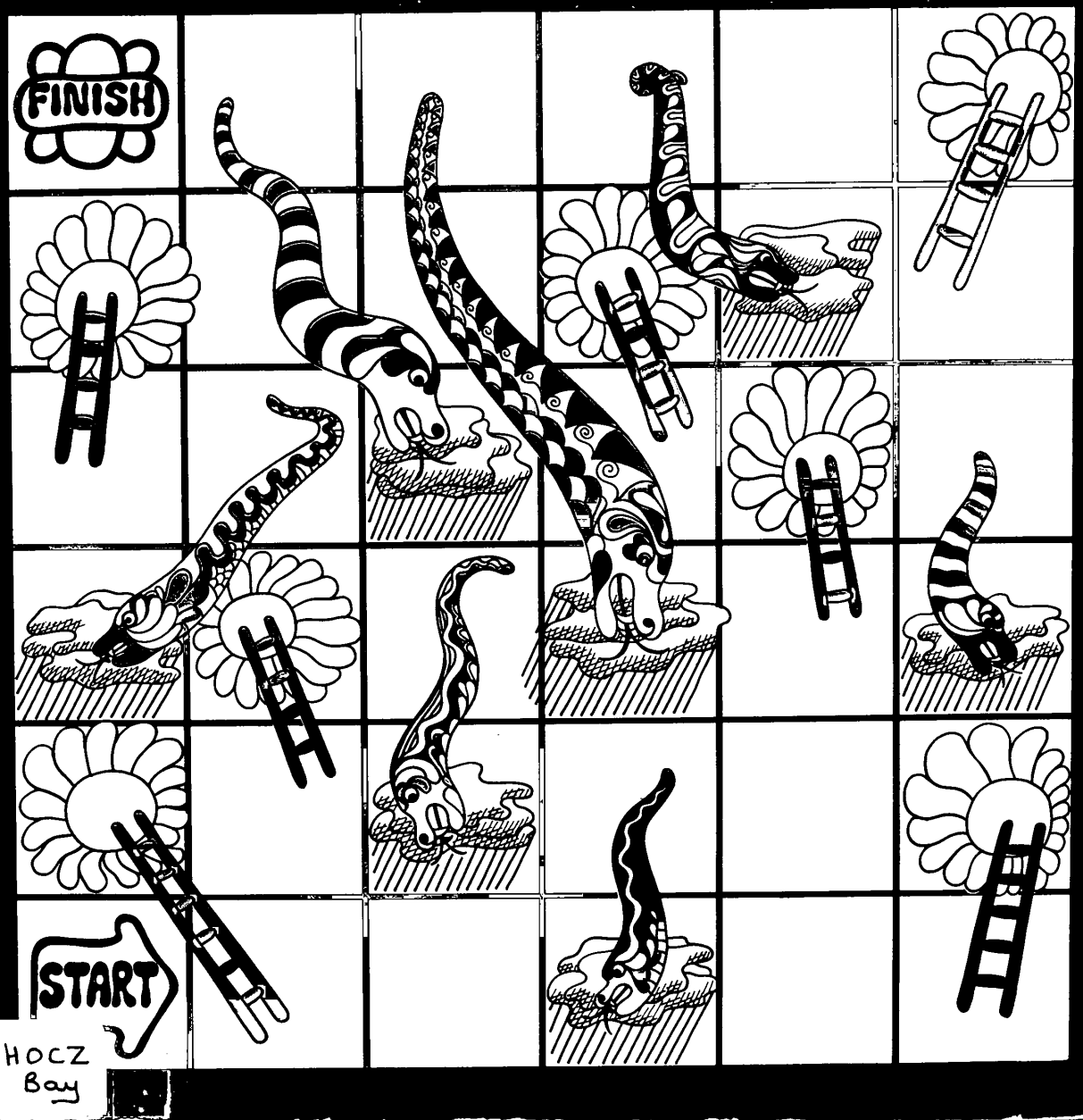
Evaluating New Hospital Buildings

A King's Fund Report



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14 Palace Court London W2
Telephone 01-727 0581

Extract from a letter written by one of the authors after the completion of an evaluation study which was carried out in order to investigate evaluation methods . . .

I made the mistake in evaluation of allowing an unstructured approach. The fault was mine alone, for the Team members were enthusiastic, efficient and knowledgeable and supplied me with almost a surfeit of information. But my own feelings were as those of a child playing a game: something went right and I leaped up a ladder; another thing went awkey and I was slithering down a snake.

This was a fine outlet for one's adrenals, but evaluation must be carried out with forethought and with balanced judgement rather than as an unplanned adventure.

Evaluating New Hospital Buildings

A report containing a review of the major hospital building evaluations so far carried out, an analysis of the methods used and recommendations for a future programme of studies related to the growing complexity of hospital planning and design problems

Ken Baynes ARCA ASIA
Brian Langslow FHA
Courtenay C Wade TD MB ChB DPH

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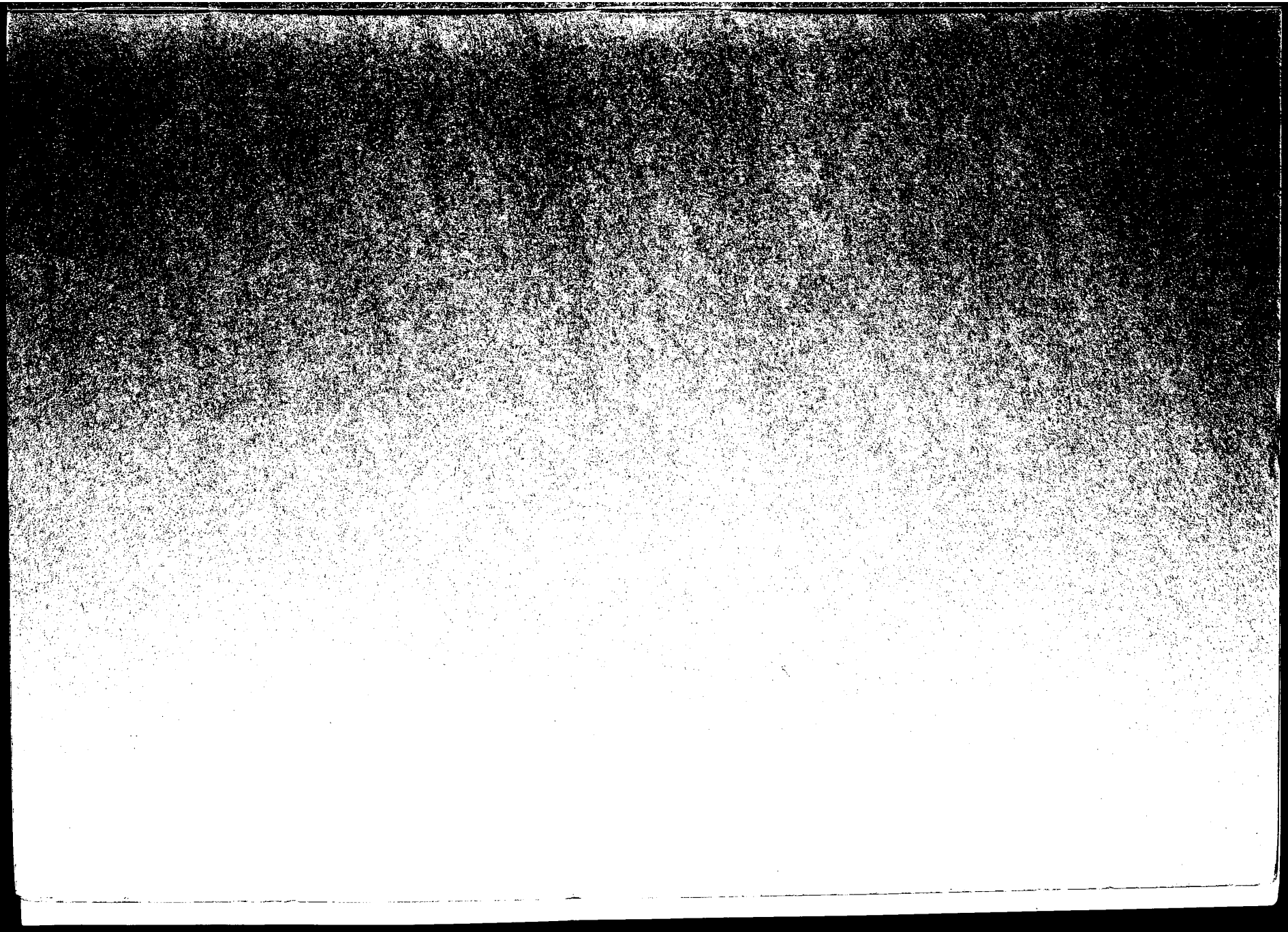


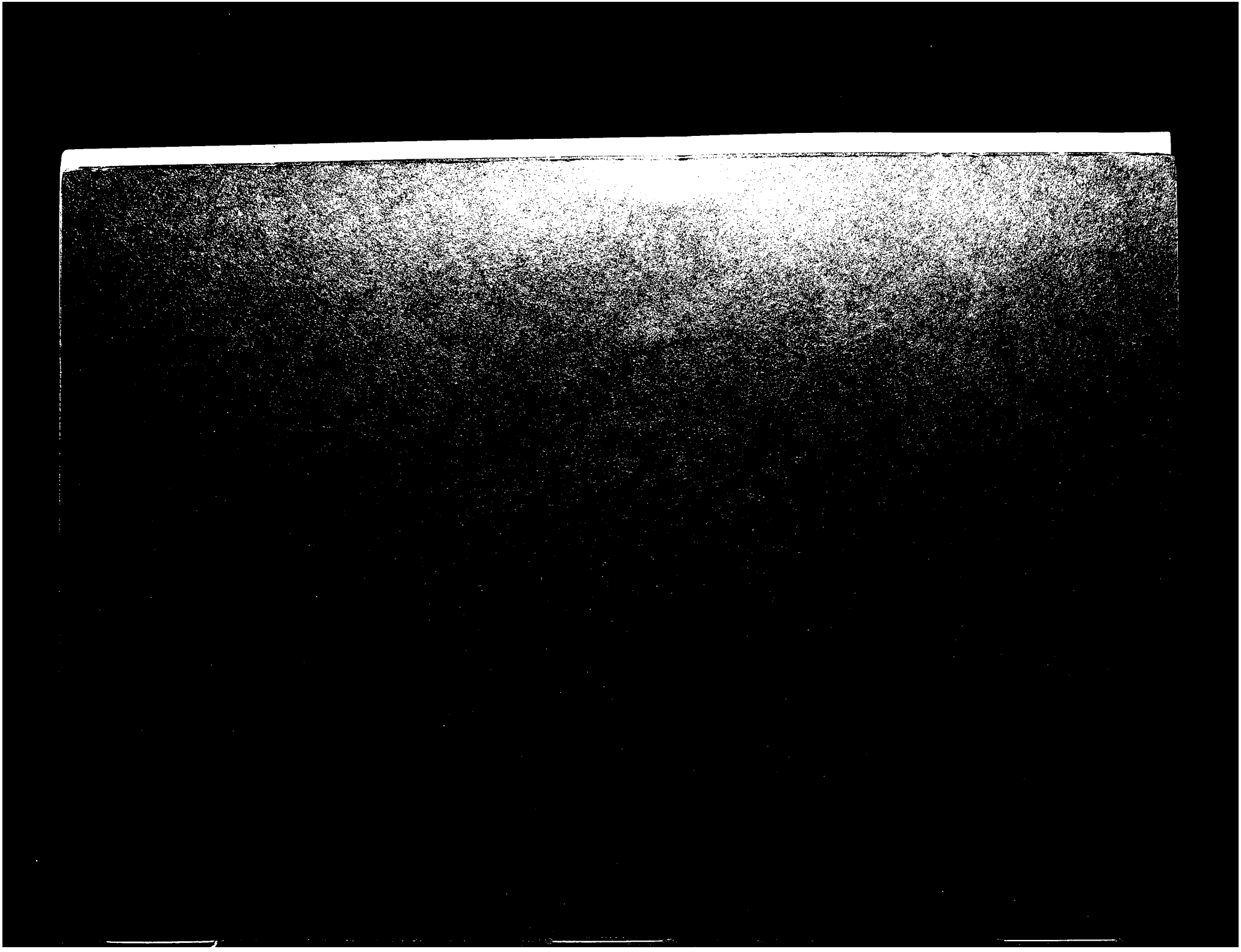
PREFACE

It is of the utmost importance to the hospital service that reliable methods should be devised for evaluating the success or failure of planning and the resulting buildings and facilities. To be widely adopted any such methods need to be practical and administratively manageable. EVALUATING NEW HOSPITAL BUILDINGS is an attempt to set out the groundwork of evaluating and to suggest simple methods and techniques.

In reading the report, I have been greatly impressed by the depth and sophistication of thought which the authors have brought to bear upon their subject, and also by the forthrightness and lucidity with which they have set out the principles, policy and procedures which should be followed. Their admission of the weaknesses they themselves observed in the work done by evaluators in the past (including themselves) shows an intellectual objectivity and degree of professional integrity which is not always shown in this sort of context.

In my opinion this document should join others produced by the King's Fund as a major contribution to the absorbing problem of hospital planning and design.

W G Wilson
Member
King's Fund Hospital Development Committee
November 1969



FOREWORD

A common complaint against architects is that they seldom revisit their buildings once they are completed and, after accounts of these buildings have been published in the architectural periodicals, they prefer not to know any more about them. While this is an exaggeration, it is true that comparatively little effort has been made to find a way to evaluate the performance of buildings in use against standardised yardsticks. It is at first sight surprising that this has not occurred; other complex devices like aeroplane engines are always tested before acceptance and carefully run-in, and their performance is checked against expectations before the design is developed further. However, as this book shows, the problem of evaluating the performance of a building is peculiar in that the criteria for good performance are neither exact, static nor easy to measure, and that measurement involves as many words to describe the goals as to describe the achievement.

Most of the problems of evaluation are identified in this book, including one which maybe makes the performance of hospital buildings peculiarly difficult to evaluate. Because there is little money to spare for conspicuous waste, hospital buildings are held to be very carefully designed around functions, and these functions are now carefully studied and embodied in operational policies before design begins. But many hospital buildings are large and the design and building process takes a long time. While this is happening operational policies and work techniques alter, and this usually results in misfit to a greater or lesser degree between policies and the building envelope. Evaluation after the building has been in operation for a little while will show how the original requirements have changed, but the problem is often to disentangle malfunctioning due to designers' incompetence and that due to the changing functional base.

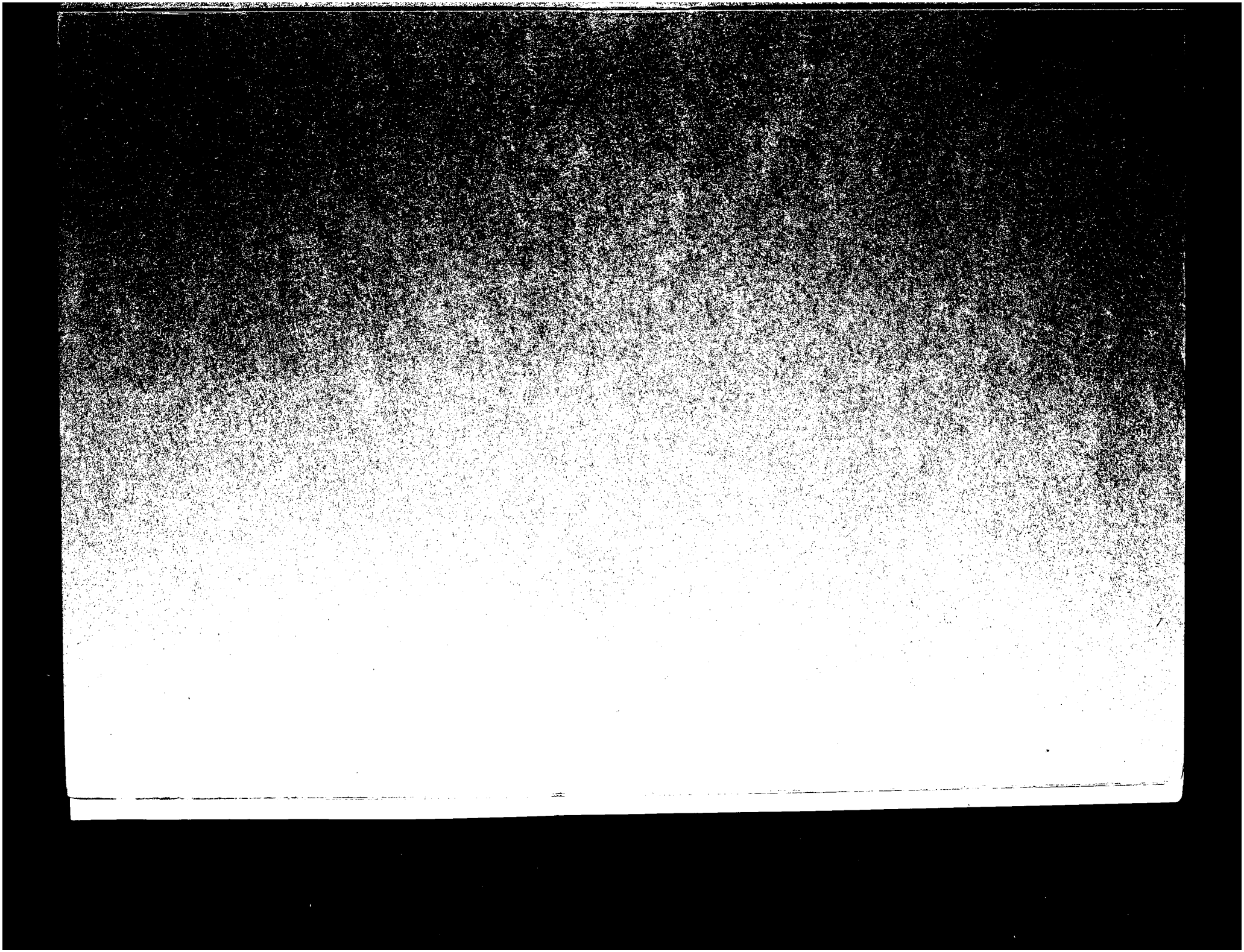
Fortunately well-functioning of an organisation is not totally dependent on a perfect environmental fit; if it were, much of the work in complex organisations would come to a halt. There is a limit to the flexibility of the human spirit and human organisations, and some buildings over-reach that limit.

One of the goals of evaluation therefore is to measure the degree of misfit between work and environment, and to draw conclusions as to the kind of building which should be designed to minimise the friction between developing and changing functions, and static environments. The problem for designers is to design the minimum hard stuff into their buildings, rather than the best fitting hard stuff. The duffle coat analogy still holds: three sizes of coat fit the whole range of sizes of sailors well enough to keep them warm.

I would expect that one day hospitals will be built which are as adaptable to changing work as office buildings and laboratories, and do their job as well as a duffle coat. Evaluation will then be a continuous operation; the performance of the building can be monitored, misfits seen as they occur and modifications to the building will be incorporated as a continuing process throughout the life of the building. Such modifications must be made only when necessary and allowance for whims and fashions will still have to be weighed against the cost of indulging them.

One final point occurs; it is essential, if the results of evaluation procedures are to have a real impact on the planning and design of new hospitals, that the most concise record of results is used. Perhaps this information will one day be coded for data retrieval systems to supplement the discursive methods used in evaluations completed to date.

John Weeks
November 1969

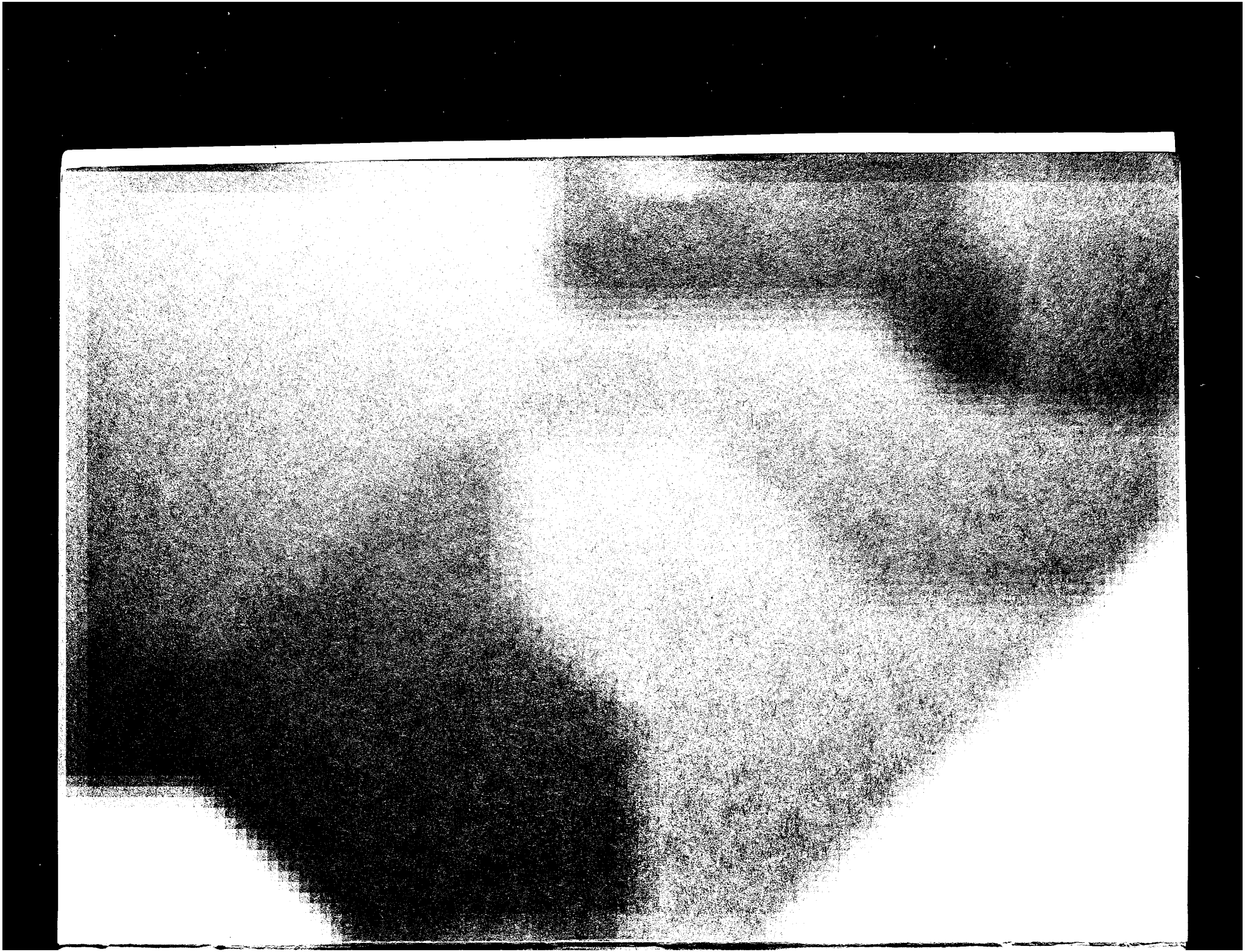


AUTHORS' ACKNOWLEDGEMENTS

To an unusual degree this book is the product of advice and assistance from many different people and institutions. Particular thanks are due to the board of governors and staff of The Royal Marsden Hospital and Addenbrooke's Hospital where we obtained practical experience of evaluation. Also to the staff of the Scottish Hospital Centre, who have shared with us their very considerable practical knowledge and expertise. We have also been able to make extensive use of material developed by the South Western Regional Hospital Board.

Alan Robinson, a sociologist on the staff of Hornsey College of Art, has made a particular contribution to developing the concept of design on which the book is based. Cecily Collier, at the King's Fund, and Kate Baynes have both helped decisively to give the book whatever clarity it has as a piece of communication.

Ken Baynes
Brian Langslow
Courtenay C Wade
November 1969



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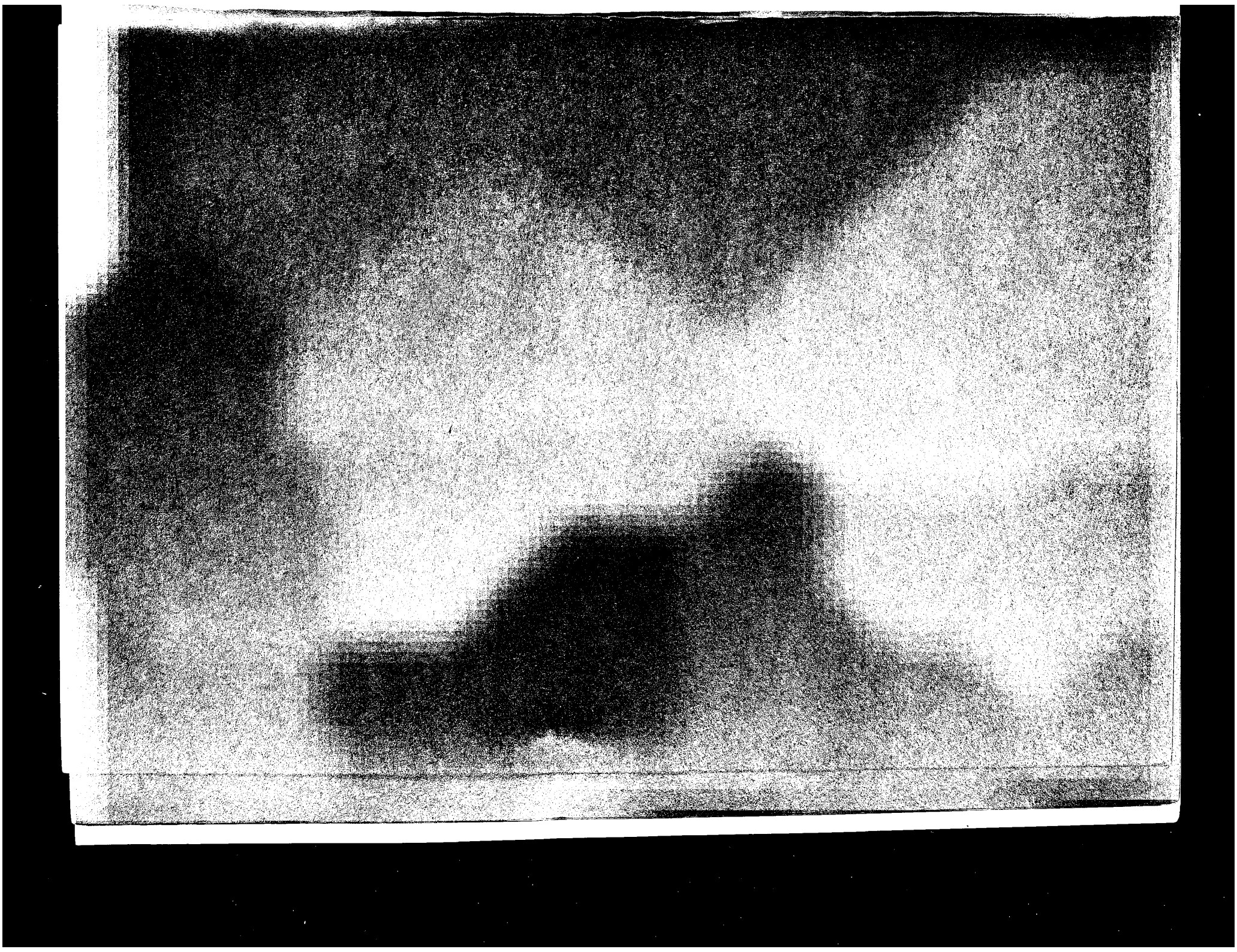

INTRODUCTION

At first sight it seems peculiar that only a relatively small amount of formal work has so far been done on the evaluation of new buildings and equipment in the hospital service. Many people have opinions and suspicions about the way particular pieces of planning are functioning in practice, but few have attempted to test their views objectively, or to record and communicate them.

Appendices A and B of this book describe only thirteen evaluation studies, all of which have been completed or published since 1962. The appendices do not pretend to be completely exhaustive, and the authors know of a number of studies that are at present in preparation, but taken in relation to the immense capital investment represented by hospital buildings and equipment, it is evident that the effort to determine success or failure in planning and design has been small. The Department of Health's own extremely interesting projects (described in Appendix C), which were planned at one time to include a large number of evaluations using a unified method of scoring, had to be restricted because of the pressure of other commitments. Up to now, evaluation certainly has not had a high priority.

Some of the reasons for this are simple enough. Most new buildings constructed since 1945 have been designed as 'one-off' projects rather than as part of a series involving developing planning principles. The demands of immediate problems on planners and administrators have left them with little time for the lengthy task of testing the efficiency of past design solutions. There has not been in existence any agreed methodology for assessing the performance of buildings, and the design process itself has successfully defied objective analysis.

Whatever the reasons for past neglect, the situation is now changing. Managements are becoming increasingly aware that bad design in buildings and equipment is costly in every sense. They are seeking ways to upgrade old facilities to make them work more efficiently; they are looking at wasteful procedures to see if they can be improved by changes in layout and design. At the same time, a tremendous amount of hospital building is going on or is projected and designers of all kinds (architects, structural and electrical engineers, interior and industrial designers, etc) are realising that there is a shortage of information based on practical experience rather than theoretical calculation. In addition, the pressures for standardisation make it all the more urgent to assess success or failure deliberately; otherwise mistakes will be reproduced in hospital after hospital.

It is important to see evaluation against the background of developing planning methods and procedures in the hospital service, because it is here that it takes a natural and clearly defined place. The systematic methods being insisted on by the Department of Health mean that the confusion which frequently surrounded planning decisions in the past, and which made evaluation extremely difficult, should begin to disappear. Now that planning teams must record the principles behind their detailed decisions, it will be easier to trace back the thread of information and argument that led to the adoption of particular forms of planning, design and construction.

It is impossible to underestimate the importance of these developments for the possibility of effective evaluation. In a letter commenting on the King's Fund sponsored evaluation of the new Addenbrooke's Hospital at Cambridge, W G Cannon, the house governor, wrote 'It was expected both by the King's Fund and by ourselves that there would be positive merit in producing the evaluation report quickly. We soon discovered however that lacking as we did a manual on operational policy . . . the time scale was inadequate for the proper briefing of the evaluation team on the rationale that lay behind much of the building . . . The result was that when we saw the draft report and regardless of whether the comments contained were favourable or unfavourable we discovered that a significant proportion had been based on a false premise and we found ourselves in the unenviable position of having to comment in very considerable detail on the report'. In other words, effective evaluation was critically hampered by the inaccessibility of information about the original planning decisions.

What is emerging now is a clear picture of a sequence of interrelated activities which provide a logical framework. There is first a stage of functional analysis, followed by briefing, followed by designing, followed by building, followed by commissioning, followed by operating. Finally there should be a stage of learning from experience and it is here that evaluation completes the circle by influencing future analysis and design.

In this context, EVALUATING NEW HOSPITAL BUILDINGS sets out to do three things. First, to make a case for the importance of systematically evaluating a carefully chosen selection of new hospital buildings and their equipment. Second, to review critically the evaluations that have already been carried out and to describe useful methods and techniques. Third, to suggest a programme of future work.

The main chapters look at the Why, the What, the When, the How and the Future of evaluating new hospital buildings. The appendices report on the two recent evaluations commissioned by the King's Fund; review the main evaluations completed since 1962; report on the Department of Health's now abandoned evaluation scheme; reprint two useful articles, an example of a cost discussion and an evaluation check list; and give a bibliography on methods and techniques.

The present book fits in logically with other aspects of the King's Fund's work on planning information, particularly with the project for the publication of hospital descriptions in uniform style and format. In 1968 the Fund sponsored and published the first of these dealing with Phase One of the Wycombe General Hospital. The aim of that book was to serve as a model for others to follow and so lead to the gradual building up of a library of descriptions providing a valuable source of reference for future planners and designers. However, a description is not the same thing as an evaluation. The Fund rightly sees a hospital description as the logical preliminary to a later evaluation study. The two are complementary.

It is worth making the further point that we are not, in this book, dealing with the kind of highly technical evaluation of building materials and performance properly undertaken by organisations like the Building Research Station. What we are concerned with is the study

of the use and design of the physical environment to provide information that will be of direct use to future planners and designers. This kind of evaluation will reveal problems that can only be solved by technology, but it will do so from the standpoint of the use and efficiency of the building. What we are discussing has more to do with managing, that is, policy, planning and operational principles than it has to do with building science. Basically, it is the quality of decision-making about human problems that is in question, not the quantifiable characteristics of structures or materials.

Throughout, the authors have been keenly aware that they are dealing with a subject which is in the very early stages of development. The comments and criticisms of others are needed and welcomed.

1 WHY TO EVALUATE

The importance of evaluation is central in all areas of design. The problem which it seeks to alleviate is not peculiar to the hospital service but affects the whole of the man-made world. The gaps between need and concept, and between concept and reality, affect all planning and design activity, often with disastrous results. Writing in DESIGN, J Christopher Jones pointed out the huge number of products which seem to create as many problems as they solve. Any consumer has experience of domestic equipment which is inconvenient; any householder moving into a new house knows of seemingly obvious ineptitudes; any intelligent layman must be amazed that it was impossible to foresee and plan for the impact of the motor car on the environment of cities.

The malfunctioning of buildings and products has even produced its own humour in which man is persecuted and intimidated by the possessions he originally created to make life easier. In the hands of James Thurber or Jacques Tati the irony cuts deep, but in the context of the hospital service the joke is not funny.

There is no doubt that all over the country mistakes in hospital design are being perpetuated. For example, nearly all the evaluation studies described in Appendix B reveal the great difficulty of maintaining the desired temperature in modern buildings. Many were too hot, some to the degree where working conditions became almost intolerable. At night, the buildings were often noisy and the lighting too bright or too dark. Time and again the reports show the misuse of carefully designed facilities; sometimes their under-use; sometimes their complete non-use. In only one case was the building and equipment being used in exactly the way predicted by the skilled team which planned and designed it. The lone exception is the recently completed Falkirk ward (see Appendix B) where design assumptions were carefully recorded and the use of the building is as intended.

It is important to realise that the general situation, with its resulting serious inconvenience and waste, is not one which can be resolved simply by 'getting better architects for heaven's sake' or even necessarily by spending more money. It is probably easier to end up with an expensive white elephant than a cheap one. The real problem is in the intrinsic difficulty of successfully predicting the effect of a building on its users and *vice versa*.

Physically, a new hospital is complex and expensive. Its equipment is often highly technical. Even apparently simple planning decisions present enormous problems to the designer. As an example, elaborate studies had to be undertaken by the team involved in planning the new Greenwich District Hospital[1] in order to determine the appropriate corridor widths. It was necessary to predict the traffic flows of people, beds and equipment and to relate these to known information about the traffic capacity of corridors. In addition, tests were necessary with mock-ups, and possible costs had always to be kept in mind. Even more complex problems are posed by areas concerned with the supply of meals and other services; more complex ones still by those where patients are treated and cared for.

In the jigsaw of information which the designer uses as a basis on which to solve these

'The gaps between need and concept, and between concept and reality, affect all planning and design activity, often with disastrous results.'

problems, a vital piece has been neglected. Much effort has gone into developing efficient methods of prediction, but little has gone into finding out how buildings and equipment are actually used and (more important) into how efficient were previous predictions. The situation is one where theory has been built on previous theory without the necessary intervention of experience. Much of the missing experience can only come from studies conducted in the conditions of day-to-day use.

Peter Manning and Sheila Taylor, who worked at the Pilkington Research Unit (Manning is now at the Nova Scotia Technical College, Halifax), state: 'If the creation of the built environment is to be made a more conscious and knowledgeable process (and therefore a more certain and successful one) then it seems necessary that methods of appraising total environments should be developed'. Certainly this view is borne out by the contents of the evaluation reports described in Appendix B. All contain information which could make the design of hospitals 'more conscious and knowledgeable' and therefore 'more certain and successful'. Whatever their shortcomings, they are potentially a valuable contribution to the efficiency and economic operation of the hospital service.

It is today possible to make a number of firm statements about the importance of systematically evaluating new hospital buildings and equipment.

1 At the most direct level, evaluation can be useful to management because it reveals deficiencies in operation that can be remedied fairly easily. All the studies so far published contain clear-cut points of this kind. Often it is a matter of the building or facilities not being used as intended, but sometimes a small error in the design can be simply and cheaply overcome by a change in the method of use.

2 At the next most direct level, evaluation reveals deficiencies in the design that can be remedied fairly easily by small changes to equipment, room layouts, signposting and so on. This information is of immediate use to management because it may be possible to make the necessary modifications quite quickly or, if not, to plan for them over a number of years.

3 Evaluation can reveal where previously accepted design principles are giving trouble in practice, thus directing new thought and experiment to overcome the problems.

4 Evaluation can reveal where accepted design principles are working well, thus releasing expensive design expertise to concentrate on other, unsolved, problems.

5 Evaluation is an essential corrollary of standardisation and the use of those modern building methods that are intended to reduce costs. Here it is worth quoting again from Manning and Taylor: 'In the past, architecture and building have been concerned with one-off jobs, where feedback from completed work has been non-existent and, therefore, of little further value. To-day, however, the pace of development is accelerating and innovation is constant. The industry is being industrialised, and mistakes are being made not once, but many times. So we have to learn rapidly, and apply our knowledge to new construction,

'Much effort has gone into developing efficient methods of prediction, but little has gone into finding out how buildings and equipment are actually used . . .'

especially the development of new systems'.

6 As hospital design is based more and more on sophisticated methods of prediction, so evaluation will become more important, not only to test the resulting buildings, but also as a yardstick against which to measure the effectiveness of the prediction methods. It will be extremely helpful to know which methods can be used with confidence, and which seem to lead to errors. The same argument applies to testing the realism of the methods used to predict and calculate the interrelationship between capital investment and running costs.

7 In the longest term, evaluation should help to reveal certain general principles about the relationship between a hospital building and its users. At the moment such principles are almost completely lacking.

1 HOLROYD W A H *ed*
Hospital Traffic and Supply Problems
London King Edward's Hospital Fund for London 1968

2 WHAT TO EVALUATE

The statements, given at the end of Chapter 1, in support of the importance of evaluation, are of two different kinds. Statements 1 and 2 are about information of immediate use to the management of the building being studied. Statements 3 to 7 are about information of use to the planners and designers of future buildings.

There is nothing exclusive in these two orientations, but it is clear that their existence has led to a great deal of confusion in previous discussions about evaluation studies. Proposals for specific and immediate changes to a particular building have been confused with conclusions about general principles. The lack of any central agency concerned with interpreting evaluation studies has made the situation even more muddled.

In this book we are primarily concerned with evaluations intended to produce information of use to planners and designers. However, management-oriented evaluations are extremely important and their interrelationship with design-oriented evaluations is discussed in Chapters 3 and 4. Many of the techniques described in Chapter 4 are applicable to both kinds of study. There is no doubt that evaluation at the most basic level should be the day-to-day responsibility of management.

In discussing *what* to evaluate, however, there are fundamental differences of interest. First, managers in the completed and functioning building will be mainly concerned with what is not working properly and in suggestions for putting it right. Second, planners and designers looking to the future need to see what is not working properly in the bigger context of the origins and development of the whole project. As well as the details, they will need to probe the fundamental planning principles underlying the design of a building, and they should be interested in what is working well as much as in what is working badly.

We suggest it is more precise to call these second, design-oriented evaluations 'design-in-use studies'. The term has been used consistently by the Scottish Home and Health Department since its first study in 1962. (See Appendix D for a description of the department's work.) Design in use implies the essential relationship between need, design and building: the relationship between theory and practice.

Before looking in detail at what to evaluate, it is worth trying to set the work of evaluating in a general context of standards and ideas about the nature of design activity. A good deal of confusion about design-in-use studies has come from a too narrow interpretation of what design is. It has been suggested, for example, that the brief given to the design team is the appropriate yardstick for evaluating a hospital building. An examination of the relationship between building and brief is certainly a key factor, but this relationship is only a part of the bigger pattern of decisions which determines the quality of the building. The stage which translates need into planning concept and eventually brief is equally if not more important. In other words, national and regional policy and the work of the project team are as much the subject of evaluation as the architect's design.

What to evaluate? Not just the relationship between building and brief, but also the bigger pattern of decisions about any building project, starting at least as far back as the stage of functional analysis.

Although the starting point of a design-in-use study is quite correctly an evaluation of a building's efficiency as a physical environment, it implies more than seeing where concepts have or have not been realised. The evaluator is not only working to discover if the designer achieved what he set out to do, he is also working to discover if he set out to do the right thing. In hospital terms the question is 'why these operational policies' as much as it is 'why this room size'.

A public building is constructed as the result of a complex process. The origins and development of a hospital building project can involve local or national politics, the clash of diverging specialist views, the balance of varying professional skills, factors of siting and weather, the availability and cost of proprietary equipment – pressures and problems of all kinds and decisions at every level. All these affect the 'design' of a building; in fact, many vital design decisions are being made, or are predetermined, long before an architect is even involved.

In a paper[2] given at the International Building Exhibition in 1965, Manning said:

> *Architects believe that when they design they are deliberately and knowledgeably providing a setting for a fuller and richer life. But this is a largely unfounded assumption, for there is nothing in an architect's training which gives him any special insight into human behaviour and certainly nothing telling him how to design so that he will positively mould people's behaviour and attitudes . . .*
>
> *It is probable that the major decisions affecting people's well-being and their environmental standards in general are made not by architects but by administrators, committees and boards who control the purse strings. In a recent project the Pilkington Research Unit visited two mental hospitals, both old buildings, the first designed as a mental hospital in the latter part of the last century, the second adapted to mental hospital use from a workhouse. The environment in one is crude to the extreme; in the other it compares favourably with hospitals built within recent years. The prime reason for the difference in these standards is not varying architectural skills but different hospital administrators' awareness of the problem and the need, and their ability to make financial resources available.*

In addition, Manning and Taylor[3] state:

> *It is almost certainly best* not *to appraise each building as a unique thing (eg, against the architect's brief) but instead as one of a type. This way it can be hoped that it will eventually be possible to categorise and then generalise from the experience of many surveys to produce an answer which is widely applicable. This approach is very different from the architect's normal search for unique situations, but its adoption will be necessary if we are to advance by judgement rather than by luck.*

'The evaluator is not only working to discover if the designer achieved what he set out to do, he is also working to discover if he set out to do the right thing.'

So it is absolutely essential to follow the development of a building project back as far as is relevant to planning and design decisions. This means going beyond the architect's brief, if necessary to the point where social and political pressures and problems moulded the basic requirements and constraints within which the building had to be produced. Any other approach leaves the key planning decisions unexamined and limits the usefulness of evaluation as a study of design in use.

So far, in talking about designs being 'the outcome' of pressures and about the thread of decisions underlying a building project, we have kept the concept of design within a neat and apparently linear framework. In many ways this is an accurate picture and a study should be able to reveal the hierarchy of decisions involved. Design, however, is a dynamic process and it is the designer's job to enlarge the possibilities inherent in any scheme. Everyday experience shows that planning does not proceed in a strictly logical progression but that it feeds its original objectives with its own development. It is important to remember this when conducting a design-in-use study, otherwise there will not be an adequate conceptual framework in which to fit the pattern of decisions involved in the development of the building.

Up to the present time studies have been thought of almost exclusively in terms of 'whole building' evaluations. In other words, one answer to the question 'what to evaluate' has been 'the total environment in a particular building'. While it seems to us that such studies must have a central place in developing design expertise by means of evaluation, it would also be useful to experiment with a completely different kind of study that took an identifiable cycle of activities and examined how it was affected by differing design solutions in a number of buildings.

This approach would have the advantage of producing a relatively large amount of information on the selected cycle and could be a way of making a speedy impact on those areas of design which are known to be particularly susceptible to misjudgement.

There is a further kind of study which is a specialised form of evaluation and which should at least be mentioned here. This is the setting up of experimental environments or equipment in a situation which allows for their realistic use over a reasonably long period of time. At one stage in the development of the specification for the King's Fund bedstead[4], bedsteads embodying the specification were tested by filling a ward with them and observing their effects on patients and staff. The observations led to important modifications to the specification which could hardly have been arrived at on a theoretical basis. As standardisation increases it will be more and more important to make this kind of design-in-use study an integral and unquestioned part of the design process.

Against the broad background set out so far, the next section of this chapter attempts to describe in more specific detail the answers to the question 'what to evaluate'. It does this in relation first to 'whole building' studies, and then makes some suggestions for the content of studies related to identifiable cycles of activity in a number of different buildings.

Whole Building Studies

1 In spite of the notorious unreliability of such information it is important for a design-in-use study to try to arrive at a picture of how the users of a building have responded to it. It is necessary to gather subjective as well as objective views because a response which says 'it works, but I still don't like it' is worth considering carefully. The response of patients is as important as that of the staff. This rather intractable mass of probably self-contradictory data represents the perspective against which other aspects of the evaluation can be made vivid. It is also a pointer to the role that management is playing in making, say, the staff in a mediocre building function efficiently and happily, or the staff in an excellent building function poorly and miserably.

A mistake that has been made in some studies is to treat this kind of 'market research' information as *the* test of a building's success. It can, in fact, only be a part of the bigger picture. The direct voice of the users should, however, always be heard and the cogency of their opinions should be evaluated.

2 Evaluators need to record in outline how the building has functioned since the day it was opened. This will mainly be a matter of interpreting existing statistics and will give the opportunity of evaluating, in the baldest terms, the building's known ability to support (or hinder) the activities of its users.

3 There must be, at the core of any study, objective observations made on the site by independent, skilled observers. These form the basis for evaluating the actual ability of the building to support (or hinder) the activities of its users *at the time of the study*. The following are some of the key subjects for evaluation in this way.

The relationship between the users' activities and the physical layout of the building in general and in detail.

The relationship between the users' activities and the physical conditions (temperature, lighting, etc) provided within the building.

The relationship between the users' activities and the tools (equipment, services, etc) provided within the building.

The relationship between the users' activities and the community outside (transport, communication services, etc) as affected by the layout and siting of the building.

The relationship between the users' activities and the work necessary to keep the building in functioning condition (maintenance, cleaning, etc).

4 In addition to the observations in 3, which allow an evaluation of the building in terms of its ability to house the activities taking place in it, there should also be an objective, on site, evaluation of the building as a made thing. In other words, if the subjects in 3 assess the

building in terms of its ability to support activities there needs to be a balancing evaluation of the building in terms of the separate physical systems which make it up.

For example:

structures;

finishes;

equipment;

electrical and mechanical engineering plant;

roads and car parks;

landscape and environs.

The observations in 3 and 4 are absolutely complementary, but muddling them together has led to confusion in a number of past design-in-use studies. Having a separate analysis of the physical systems in 4 will allow them to be compared with the systems in other buildings of the same type and with the state of knowledge in each of the disciplines involved (architecture; structural, electrical, mechanical and civil engineering; landscape, industrial and interior design). The point here is to locate the physical quality of the particular building being studied in a broader context of known and developing standards.

5 Although cost is an essential yardstick in any study, it has been quietly ignored in most of the studies carried out so far. This is disastrous because many of the key decisions about a building relate to its capital cost assessed against its ability to last over a given period of time. When problems of maintenance and running costs are added, the equation becomes even more complex. Future evaluators will certainly need to gather and assess information on these points and to recognise how they have affected design and how design in its turn has affected them. Techniques for doing this are now becoming available.

All the observations and evaluations so far discussed arise from an assessment of the physical reality of the building being studied; the way it helps or hinders its users' activities; what they think of it; how it compares with other buildings of the same type; how much it costs to construct, operate and maintain. The next stage is to relate the results of these investigations to the decisions taken during the planning and design of the building, so as to reveal as much information as possible of use to future designers. The factors given below seem important.

6 In the past a written brief has not always existed. This highly unsatisfactory state of affairs should now disappear as the defined planning stages laid down by the Department of Health come into use throughout the country. The evaluators need to make a clear statement about how far the building fulfils the brief given to its designers. As a first step they need to see if the activities of the users are being carried out in the way intended at the time when the brief was drawn up. This piece of basic factual information offers the key to evaluating

'The point here is to locate the physical quality of the particular building being studied in a broader context of known and developing standards.'

a number of possibilities as follows.

If the building is not being used according to brief is this because:

the users do not know of the original concept?

the users' needs have changed (which may indicate errors in the brief)?

the users have improved on the original concept (which may indicate errors in the brief)?

the designer did not fulfil the brief (which may indicate errors in the design activity that went on after briefing, or may indicate errors in the brief)?

the designer improved on the brief (and these improvements are being realised in practice)?

If this building is being used according to the brief, this fact still needs relating to the positive and negative observations already made on the site. These questions may be asked:

was the brief itself adequate?

did the designer fulfil the brief adequately?

The evaluation under this heading covers the development of the design from the point when basic requirements were agreed and became the basis for detailed design decisions. In principle, therefore, the brief represents the watershed between planning and design, but it is important to realise that in practice there are factors that prevent this neat division of activities. Planning decisions often have to be fed into the design process when it is under way and we have already observed that design is itself dynamic and can easily feed back new concepts into the original brief. Altogether, evaluators will probably have a difficult task in picking their way through this stage of the design development – the more so because designers are unfortunately not notable for keeping coherent records of their decisions. However, the effort is worth making because it is probably as a result of just this kind of messy situation that so many design errors arise.

7 The next area for evaluation is the whole complex of planning decisions which led up to the formulation of the brief. It is here that the physical conditions observed in the building can begin to be related to the larger concepts which produced them. Exactly which aspects of planning are examined in detail will depend on the results of the evaluation on the site and on the significance for general planning concepts of the building being studied. A selection from the following questions (or others of a similar kind) may be relevant.

Have the projected relationships between capital, and running and maintenance costs been realised in practice?

Have the methods of prediction used by the planners proved reliable and, if not, is it possible to identify the main errors in the techniques used?

Can any deficiencies observed in the building be traced back to inadequacies in the operational

principles on which the design was based?

Does experience with the building being studied have any general significance for local, regional or national policy?

If the building is one of a series, does experience suggest any specific modifications to later buildings in the same series?

If system building methods were used, does experience suggest any general principles about the application of the system to buildings of the type being studied?

Can any general conclusions be drawn about planning hospital buildings, their siting, their relationship to the community or their accessibility to transport and supply services?

8 The final area for evaluation is to do with the related factors of flexibility, extendibility and adaptability. All these are to do with the building's ability to meet future demands and represent different ways of coping with the inevitability of change. It is necessary not only to see if the particular factor involved has been realised in practice, but to see also if it is the right factor to meet likely changes.

The arguments for including an evaluation of these factors related to change seem to us to be thoroughly convincing. In our framework for assessing the significance of changes from the original brief we have already allowed for the idea of *improvements* as well as errors. If design is a dynamic process, so is the management of a hospital or hospital department. It is absolutely certain that the users of any building will want to change and modify it to fit their changing needs, and the design should assist rather than hinder their aspirations.

Here it is worth quoting the studies involved in the planning of the new Greenwich District Hospital. In HOSPITAL TRAFFIC AND SUPPLY PROBLEMS[5] Howard Goodman and J R B Green state:

> *A hospital should act as a centre for the main medical care facilities for the community it serves. This is not a static purpose since the size of the community may change as may its age structure, whilst independently of such population factors the demands on the medical care facilities made by the community may change for epidemiological, sociological or other reasons.*

If a hospital building cannot meet within its planned life those pressures that are reasonably predictable, then it is not a success. Its ability in this respect should, therefore, be evaluated as clearly as possible.

Cycle of Activity Studies

In making a design-in-use study of a single identifiable cycle of activity in a number of different buildings it will generally be necessary to look at all the aspects so far discussed in relation to 'whole building' evaluations. Thus it will be important to know how the users

respond to the provision for the cycle in each hospital; how it has functioned over a period of time; how skilled observers saw it functioning in an on-the-site evaluation; how it is supported by the physical systems of each particular building; and how the different costs compare. It will also be important to know about the relationship between design and brief and the nature of the planning principles and predictions involved in each case. The flexibility, extendibility and adaptability of each building in relation to the particular cycle of activity will also need assessing.

However, a 'cycle of activity' evaluation will naturally tend mainly towards conclusions which might have general significance. It will automatically be more directed towards producing guidance than a 'whole building' study which exists as a complex piece of evidence with varying significance. In terms of *what* to evaluate therefore, a 'cycle of activity' evaluation must concentrate on observations that are capable of producing information about principles rather than details. Or if it does concentrate on details, it should be on details that are thought to be consistently unsatisfactory.

In a letter commenting on the original draft of this book, J K Hunter, then director of the Scottish Hospital Centre and now with the Scottish Home and Health Department, made the following useful suggestions for subjects of 'cycle of activity' evaluations.

Supply and disposal arrangements to wards and departments.

Catering, cooking and service of meals.

Supply, presentation and processing of surgical instruments and other sterile materials.

Education facilities and library services.

The effect of the relationships between rooms and the ease of working in patient-care areas.

Accommodation and facilities for hospital visitors and patients' companions.

Main circulation routes.

Accommodation and facilities for non-resident staff.

There should be a logical progression from the Why to the What of evaluation. It is clear that, in the end, exactly what is evaluated must depend on why it was intended to conduct an evaluation in the first place. What we have tried to set out here is the subject matter that seems to be the logical result of the arguments in favour of evaluation as put forward in Chapter 1.

2 MANNING Peter
Human consequences of building design decisions
The Architects' Journal
vol 142 no 26 29 December 1965
pp 1577–1580

3 MANNING Peter *and* TAYLOR Sheila
Appraisals of the Total Environment
Unpublished paper 1965

4 KING'S FUND
Design of Hospital Bedsteads
London King Edward's Hospital Fund for London 1967

5 HOLROYD W A H *ed*
Hospital Traffic and Supply Problems
London King Edward's Hospital Fund for London 1968

3 WHEN TO EVALUATE

The choice of when to carry out a design-in-use study has to be the result of reconciling two factors that are completely opposed.

These are:

the longer a building has been in use, the more is known about the way the underlying design theories have worked in practice;

but the quicker feedback information can be made available to planners and designers the more likely it is to have a real effect on future buildings.

The second factor presents the more intractable problem. Hospital buildings take a long time to construct and are often completed many years after all the theoretical design decisions have been taken. Sometimes the time-lag is even longer, and key planning decisions have to be made in relation to social and economic forecasts that may look twenty or twenty-five years ahead. It is hardly possible to evaluate a building before it has been in use for at least a year, and it is difficult to make the results of an evaluation available in a form which will help planners and designers in less than nine months. So there is the clear prospect that, even in the most favourable circumstances, feedback will not be available in less than ten years after the theoretical decisions were taken. In ten years design theory itself will have moved on quite considerably.

But even this does not describe the whole problem. There are some aspects of a building – for example, finishes and flexibility in use – that simply cannot be adequately tested by the first year's operation.

For all that, evaluation is not an impossible undertaking. The studies described in Appendices A and B contain enough observations that are directly relevant to unsolved planning and design problems to show that a five year (or longer) gap is not in practice totally disastrous. The general aim should clearly be to evaluate as quickly after commissioning as is compatible with adequate assessment.

In planning a particular evaluation there will also be detailed timing problems related to local conditions. It would clearly be nonsense to evaluate a building only at a time when it was being used very lightly or very heavily. A building's ability to respond to changes in workload may be an important factor to evaluate, and this would mean carrying out observations at carefully chosen dates and times. Aspects of design like heating and lighting are decisively affected by changes in the seasons and, however objective a design-in-use team may be, the experience offered by any building on a hot August afternoon is quite different from the one offered on an icy morning in February.

'. . . the quicker feedback information can be made available to planners and designers the more likely it is to have a real effect on future buildings.'

4 HOW TO EVALUATE

There is no mystique about the methods appropriate to design-in-use studies. Like so many managerial and design techniques, they are the systematisation of activities that most people engage in subjectively every day. Evaluating our personal surroundings for convenience, comfort and pleasure is a process we all rely on – it affects such fundamentals as our choice of house, workplace and entertainment. And, of course, many normal management functions involve evaluations which are on a much more sophisticated level. So there is nothing to be found in this chapter which depends on esoteric knowledge or skill.

Equally, this chapter does not attempt to set out a formula which could be applicable to every case. We would argue that such a formula is impossible to determine and that, in any case, the techniques used in any particular study should be carefully related to the aims of the study, the resources of the evaluators and the nature of the physical environment under examination.

It does, however, seem possible to say that in any design-in-use study there will be five broad sequences of activity which have to take place. These are:

determining the aims of the study;

setting up the necessary practical organisation;

gathering the necessary information;

analysing the information in the context of the study's aims;

and communicating the results.

Certainly it is possible to identify each of these sequences in all the studies in Appendix B. What follows here draws on the experience contained in these studies. The aim is to make some assessment of what has worked well and what has worked badly, and to give a picture of the options that may have to be considered when planning a study.

Determining Aims

Chapter 1 set out a series of statements supporting the importance of evaluation; Chapter 2 tried to show how these statements could be related to subjects for evaluation. Between the two, there is a big range of possibilities, but it is essential to give evaluators a clear aim, or set of aims. The scope selected for any particular study will affect every other detail about it – the team required to carry out the work; the methods they can use; the time it will take them; and the way in which their findings need to be communicated.

At the same time, aims cannot be decided in a vacuum. Practical problems of resources and timing will affect them from the start. One kind of study may be possible if there already exists a group with experience of evaluation; quite another if it is to be the first in a series. There is also the question of relating the aims of a study to design problems that really do require the kind of feedback produced by evaluation. And the most elaborate and well-

Five sequences of activity will have to take place:
determining the aims of the study;
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gathering the necessary information;
analysing the information in the context of the study's aims;
and communicating the results.

intentioned aims will be frustrated if the results of a study are not going to be available until after the relevant design decisions have been made. Such factors are key ones because design-in-use studies are not primarily theoretical. Unless they affect future designs they are a dead letter.

This has not always been clearly seen in the past, but we hope that future studies will be the result of well-formulated aims, and be part of a coherent programme related to solving some of the key problems of hospital planning and design. In deciding the aims for a particular evaluation or group of evaluations, it is suggested that the following questions should be asked and answered.

Is the study or studies going to provide useful information for future planners and designers? If so, exactly what kind of information is it, and are the problems involved of local, regional or national significance?

Is the information likely to be produced worth the expenditure of time and money that will be necessary?

Are there any timing problems? Will the results of the study be ready in time to affect future designs?

Is the study related to any existing design-in-use studies? If so, will this enhance the value of the new study or detract from it? Is it going to cover genuinely new ground or is it only going to repeat something already done elsewhere?

How will the results of the study be communicated to those most likely to be interested in its results?

How far will the experience (or inexperience) of the evaluators affect the results that can be expected and the speed with which they can be produced?

Will the experience of taking part in the study be useful to the evaluators? Will it help them directly in their other managerial or planning activities?

Answering questions of this kind satisfactorily should result in the right team of evaluators studying the right building at the right time. It should also make it possible to give them a clear brief.

Practical Organisation

We have already observed that taking part in a design-in-use study is an excellent introduction to the procedures and problems of planning and design. It seems wrong, therefore, to suggest the setting up of evaluation teams who would concentrate exclusively on this activity, even though it is probably best if, during a study, the people involved can be engaged on it full time. On the other hand, experience of previous studies is an obvious

factor in making an evaluation team more efficient and in reducing the time taken over any particular study. A fairly long-term programme of studies conducted by a group of people with other managerial or planning responsibilities should give the ideal solution. If this main group has also attached to it, for the duration of a single study, individuals who would benefit from the experience, the educational aspect of evaluation will be spread as widely as possible. Members of project teams would clearly benefit from being involved in at least one study.

It has often been suggested that evaluation cannot be carried out by the same people who planned and designed the building being studied. On the face of it this is a reasonable enough idea, and it is easy to see that it may be difficult for a designer to look objectively at the results of his work. But he is also the one individual most likely to benefit from the experience of evaluation. As standardisation increases it will be more and more important to bring designers into direct contact with their designs in use, and it may well be that the kind of designer who cannot be objective about his own work is anyway becoming an anachronism.

There is a fairly consistent pattern in the composition of evaluation teams. On this subject, it is worth quoting from the excellent (but unpublished) report on PROCEDURES FOR EVALUATING NEW BUILDINGS produced by the O & M and Work Study Department of the South Western Regional Hospital Board[6]:

> *The most successful evaluation surveys have been carried out by teams which had a balanced representation of medical, nursing, administrative, architectural and engineering interests. In the case of both the surveys carried out at New Guy's House and at the Vale of Leven Hospital, O & M and work study officers fulfilled the roles of both administrative staff and efficiency specialists. In studies of specialist departments such as x-ray departments, laboratories and laundries etc, it is stressed in a number of reports that acknowledged specialists should be coopted to augment or replace certain members of the nucleus of the evaluation team, ie, for the study of a pathology laboratory, an experienced pathologist could be coopted to the team, either to augment it, or to replace say the nursing officer.*

Later in the same report there is the following:

> *Four factors influence the size of the evaluation team, these being*
> *a) The size of the unit/department/hospital to be assessed.*
> *b) Whether members of the team can devote themselves full time or part time to the work of the evaluation survey.*
> *c) The degree of detail required.*
> *d) The length of time allowed for the study.*
>
> *As a rough guide an evaluation team should consist of at least five persons,*

'Members of project teams would clearly benefit from being involved in at least one study.'

> *plus any specialists who might be coopted for specific departments. If the assignment is a large one, and if the members of the team can only devote part of their time to the survey, then consideration should be given to having two teams of four to six persons . . .*

It is worth emphasising that this is a quotation from a report produced by a regional hospital board. We suggest that it should be possible for any RHB to construct a team of this kind from its existing staff, or from the staff of its hospitals.

The principle of coopting specialists to aid the evaluation team is an important one. Apart from the obvious importance of having, say, a pathologist to assist in the study of a pathology laboratory, it is probably best also to use specialists in work study to conduct this aspect of whatever observations may be necessary on the site. In the two King's Fund studies discussed in Appendix A an industrial psychologist was employed to carry out attitude surveys amongst patients and staff. Specialist advice should always be sought in framing questionnaires and the use of similar market research techniques, otherwise distorted results are almost inevitable. The evaluation team must control the work programme and interpret its results, but this does not mean that it needs to carry out every activity itself.

Discussing the kind of organisation most appropriate for a 'cycle of activity' study, Hunter comments:

> *Each of these topics could be examined by an authoritative team in respect of several hospitals and their report ought to contain more useful and credible feedback than if several teams were given these subjects along with a system of scoring, or worse, if the answers were sought by questionnaire.*

In other words, much the same kind of multi-disciplinary team is required, but the one team should be responsible for studying the chosen 'cycle of activity' in a number of different hospitals.

However much recognition is given to the importance of design-in-use studies it is always going to be difficult to assemble a team and find time to allow its members to carry out the necessary work which may last over a considerable period. The King's Fund evaluation of the Surrey Branch of The Royal Marsden Hospital occupied approximately 144 man-days (divided among the members of the team). This represents a large commitment of resources. We have, therefore, thought it worth while to consider whether useful results might be obtained from less rigorous 'walk-about' surveys conducted by a single individual experienced in making the appropriate observations. Paul Cooper, in his study of the Accident and Casualty Centre at St Peter's Hospital, Chertsey, showed that an individual could carry out a relatively thorough investigation of a small building in the course of a single week, including the gathering and analysis of information and its subsequent communication in the form of a written report.

In the two King's Fund evaluations described in Appendix A, one of the authors (Courtenay Wade) was struck by the similarity between the general impressions he gathered on a preliminary visit, the staff and patient attitudes revealed by the industrial psychologist's study, and the completed analysis as agreed by all the participants. Subsequently he has obtained results from 'walk-about' surveys in the Liverpool area. We would certainly like to see some further investigation of the usefulness of this kind of evaluation; clearly it should at least become part of the normal management routine of a hospital to examine buildings and equipment critically in this way.

The results of such observations, if carefully recorded, would certainly be of the greatest help to a team engaged in a later, more formal, design-in-use study.

It seems an open question as to which organisations should initiate and then finance design-in-use studies. The King's Fund has so far been responsible for three; the Scottish Home and Health Department for four; the Nuffield Foundation for one. Regional hospital boards have been responsible for the remainder with the major part of the work often falling to the work study unit or department. As useful feedback, the King's Fund studies have probably been handicapped because the teams conducting them were selected on an *ad hoc* basis from various authorities, and for the most part neither came from, nor returned to, departments actively engaged in design. The Scottish Home and Health Department's work has not suffered from this defect. This should be a key criterion in the future and it seems to indicate that, in England and Wales at least, regional hospital boards should be the principal initiators of design-in-use studies. In this way personal feedback through the experience of individuals will be added to formal feedback through published results.

Regardless of origins, a study can only be effective if its aims and methods are understood and supported by the staff working in the building to be studied. In this context it is worth quoting again from the report produced by the South Western Regional Hospital Board. Appendix 2 of their report lists the 'essential preliminary steps to the commencement of the survey', many of which are intended to obtain the cooperation of the staff involved and to make sure that they feel they have been treated with courtesy.

> *The board should then advise the group secretary of the intention to carry out an evaluation survey of the unit in question. Sufficient copies of the evaluation team's brief should be sent to him, in order that he might distribute them to the senior members of staff concerned with the unit. At the same time he should be asked to arrange for these officers to be available to meet the team at a mutually acceptable date.*
>
> *The evaluation team should then have informal discussions with the planning (project) team, so that the design of the department, together with any planning decisions etc, may be fully explained . . .*

The team should then make a preliminary visit to the unit and have informal discussions with the hospital secretary, matron and senior medical staff and explain how the study will be undertaken.

Having talked to senior staff, the team should then be introduced to all the departmental heads who might be encountered during the study and afterwards, if possible, should address a meeting of staff working in the department. Great care should be taken to ensure that staff fully appreciate the reasons for the study, and they should be assured that whatever the findings of the evaluation team, there will be no criticism of individuals. Some indication should be given to staff of the types of question they may be asked, so that between the time of the meeting and the commencement of the study, they can clarify their own views on the unit, equipment and their own duties.

Should it be impossible for the team to talk to the staff at a meeting, then either team members should be introduced to each member of staff individually, or else each member of staff should be sent an individually addressed letter of explanation.

An official letter, setting out the aims of the study should also be sent to the appropriate trade unions or professional associations . . .

Finally, just before the actual visit to the unit by the team, any in-patients who might be in the unit should be informed of the impending study, either by the ward sister, or by individual letter. In the case of out-patients, accident and emergency, diagnostic and treatment departments, a large strategically placed notice could inform patients of the survey, and invite their comments.

Earlier in the same report there is this comment.

. . . it is essential that unfavourable comments in the report should not result in recriminations against members of the design team, and this point should be given wide publicity to ensure that it is fully appreciated.

Although all these actions may not be appropriate in a particular study (and other similar ones may be) they are included here to exemplify the basis on which the evaluation team, as an organisation, should conduct its relations with other organisations and individuals. It is only in this kind of climate that worthwhile results can be expected.

Whether a study is conducted by a team or individual, it is absolutely essential that an experienced secretary be available. He or she will be required at all stages of the work – from the initial correspondence through to the work of drafting the final report or other means of communication. We refer here deliberately to 'secretary' rather than 'secretarial help';

a study can be dreadfully hindered by help from a variety of temporary helpers.

Gathering Information

There are two quite distinct phases in gathering information during a study. One is the obtaining of existing information; the other is the creation of new information by means of surveys, collecting opinions, and on-site observation. In many ways the particular studies selected for the second phase will grow naturally out of the material collected during the first phase and it does seem possible to suggest a reasonably clear chronological order. In this section we try to show the interrelationship between the two phases and to make clear the way in which they link with the subjects for evaluation discussed in Chapter 2.

The following are important sources of existing information that may be available.

PLANNING DOCUMENTS These will probably have to be gathered from a variety of sources. An effort should be made to trace the planning decisions back as far as possible so as to show how, say, national economic problems have had a direct effect on the cost limits of a particular building project, or difficulties in purchasing parts of the site have led to phased building. It is important to know the reasons for decisions at regional board level because these will show the intended relationship of the building to other components of the hospital service in the region. Where a building has been planned by a project team, the minutes of their meetings are likely to be the key source of planning information.

POLICY DOCUMENTS These should reveal the intended use of the building. In them it should be possible to identify which operational policies have had a decisive effect on the design. For example, the use of a waitress service for meals; the institution of progressive patient care. Identifying these policies will also allow the evaluators to check how they are being carried out in practice. Once again, the minutes of the project team will be a good source of information.

DESIGN DOCUMENTS The designer's (architect's) brief is an essential piece of information. It will allow the design-in-use team to make a number of important comparisons. Although, as argued in Chapter 2, it is not the *standard* against which an evaluation should be made, it is a central point in the development of a building marking the watershed between planning and design. It is so important that, where it does not exist, an attempt may have to be made to reconstruct it to show the assumptions on which the design was based. This was done successfully by the authors of the description[7] of the new Wycombe General Hospital, though the process took a considerable amount of time. The design process is not linear; it feeds back into the planning of the building, changing the original brief as new possibilities are created. It may be difficult to reconstruct these steps. If they are recorded (as they should be) by the designers or the project team so much the better; otherwise they will have to be discovered by looking at a series of plans tracing revisions to the design and by discussions with the designers. For reference purposes a site plan and detail plan (of at least $\frac{1}{8}$ inch scale) will be needed.

'There are two quite distinct phases in gathering information during a study. One is the obtaining of existing information; the other is the creation of new information by means of surveys, collecting opinions, and on-site observation.'

COST DOCUMENTS It is essential to know the capital cost of the various elements of the building. Running costs will be more difficult to interpret but useful information should be available. It will be interesting to compare these with any predictions of running costs that may have been made at the planning and design stages. Big variations here indicate areas for further observation on the site.

OPERATING DOCUMENTS These provide the basic material for the simplest kind of assessment. They show in bald terms how far the building supports (or hinders) the activities of its users. The following are likely to be of interest:

details of commissioning procedures;

statistical summaries (number of patients treated, meals served, etc);

staffing statistics;

damage reports (revealing design faults or inadequate equipment);

engineering and maintenance reports.

If the managers of the building have themselves carried out any kind of evaluation, or if there have been any work study reports, these will be of the greatest use to the team.

In addition there will be more detailed documents which will reveal day-to-day activities of the users of the building – timetables for out-patient clinics or operating theatres; meal times and menus for catering departments, and so on.

A reasonably large amount of time will be necessary for the team to examine all this information, and this should be done before beginning observations on the site.

The existence of a hospital description will greatly assist the work of the evaluation team at this stage, particularly if it records the operational and planning principles on which the physical design of the building was based, and reproduces the brief given to its designers. It will still be necessary for evaluators to gather together the original documents for reference, but a description should provide immediate access to the most significant points of design and development.

As already mentioned, in the two King's Fund studies described in Appendix A an attitude survey was conducted among staff and patients by an industrial psychologist. This provided information about the views of the users and pointed to aspects of the buildings needing further study on the site. We believe that where specialist advice is available this kind of survey is most valuable and that it should logically take place before the team carries out detailed observations. It can become a bridge between the gathering of existing information and the creation of new information by observation.

'The existence of a hospital description will greatly assist the work of the evaluation team . . . particularly if it records the operational and planning principles on which the physical design of the building was based, and reproduces the brief given to its designers.'

In the Falkirk ward unit study organised by the Scottish Hospital Centre in conjunction with the Scottish Home and Health Department, there are two very successful sections which record the users' views in a way which has not been published elsewhere. These are simply essays by a consultant and the administrative ward sister describing their experience of working in the unit from its inception. In their different ways both are vivid and give a picture, unique in evaluation studies, of the building as a container for a living organisation. The quality and relevance of any information gained in this way will depend on the individuals involved, but it is probably as significant as any apparently more 'scientific' method based on market research techniques. It seems a particularly good way of gathering information where expert advice on the use of questionnaires is not available. It also allows for the revelation of any problems that might be excluded by the framing of a questionnaire.

Observations on the site can be carried out in a number of different ways. The South Western Regional Hospital Board list (among others) the following.

> *Continuous observation of the departmental activities by day and night, for reasonably long periods of time, either at least 12 hours non-stop, or for two or three periods of 4 to 5 hours. This could well be undertaken by O & M and work study personnel.*
>
> *Random sampling techniques – to measure the occupancy of rooms or areas, or the utilisation of equipment ('readings' could be made by any member of the team, although the final analysis and determination of the limits of accuracy may best be undertaken by someone with either mathematical, statistical or work study experience).*
>
> *Mechanical recording devices may be used, depending on the type of and/or the nature of the unit to be assessed – eg:*
>
> *stop cameras;*
> *cine cameras;*
> *tape recorders;*
> *thermometers;*
> *noise meters etc.*
>
> *Interviews with patients and staff.*
>
> *Direct observation and assessment, using experience gained from previous similar assignments.*

Illustrations 1 to 7 show examples of the results of some of these methods drawn from the reports in Appendices A and B.

1 Page showing part of the analysis of the patient questionnaire from the report on the new maternity unit at St Austell. The questions are carefully framed so as to lead the patient from topic to topic, gradually building up a picture of his response to the building. This is a well thought-out questionnaire, but questionnaires can give misleading results unless they are compiled with the help of specialist advice. *(An Evaluation of the New Maternity Unit, St Austell,* South Western Regional Hospital Board.)

2 String diagram recording the results of observing nurse journeys over a period of twenty-four hours. *(The Falkirk Ward,* Scottish Home and Health Department, Crown Copyright.)

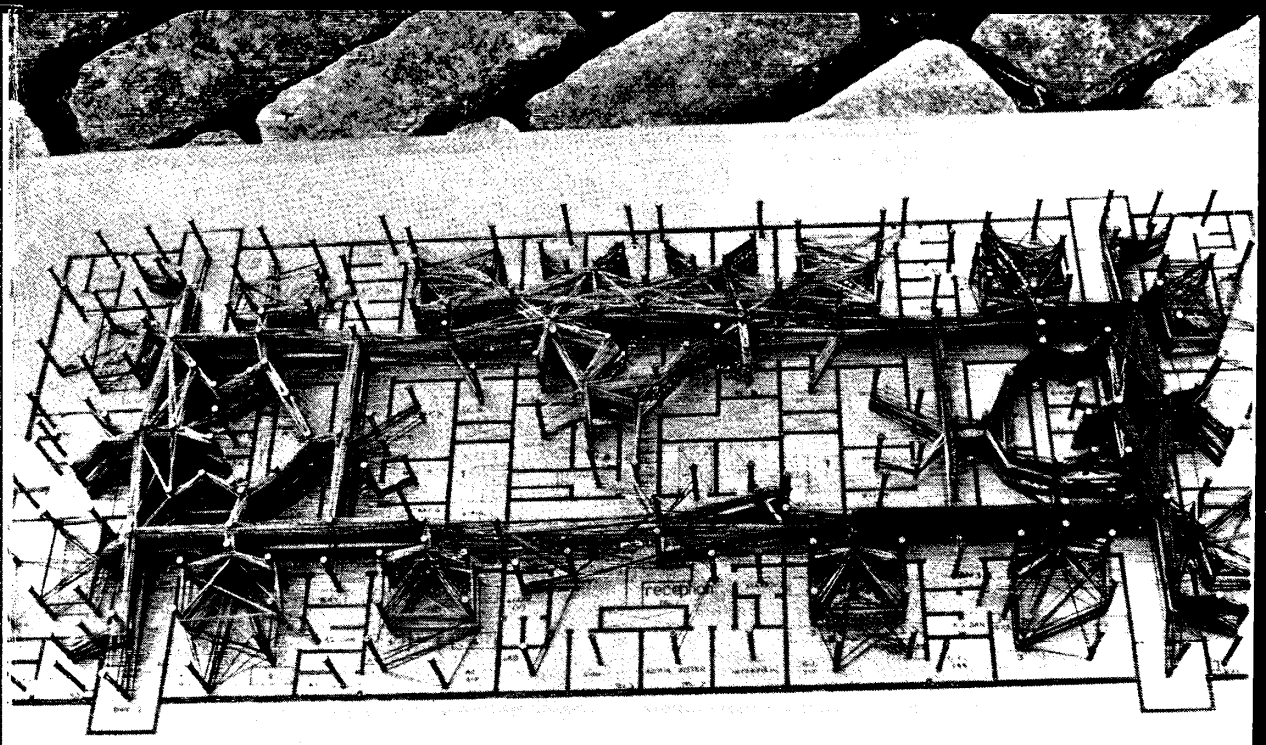
3 Chart based on an 'activity-sampling' investigation showing the usage of equipment in a CSSD. The observations reveal an over provision of equipment. *(Nuffield House, Musgrave Park Hospital, Belfast,* The Nuffield Foundation.)

4 Photograph showing the view into a single room from the nurses' station in the new Falkirk ward. Photography can be used in many ways to record the reality of a building, but is essential for any aspect concerned with vision, signposting or general visual character. *(The Falkirk Ward,* Scottish Home and Health Department, Crown Copyright.)

SOUTH WESTERN REGIONAL HOSPITAL BOARD - HOSPITAL BUILDING EVALUATION

QUESTIONNAIRE FOR PATIENTS

	a.	b.	c.	TOTAL
3.5 Were the undressing facilities provided (a) Very satisfactory (b) Satisfactory (c) Unsatisfactory Comment:-	8	36	19	66
3.6 Was the privacy in giving your personal particulars (a) Very satisfactory (b) Satisfactory (c) Unsatisfactory Comment:-	28	28	3	59
3.7 Was the heating (a) Too hot (b) Just right (c) Too cold Comment:-	22	41		63
3.8 Was the ventilation (a) Too draughty (b) Just right (c) Too stuffy Please indicate month and time of day ..... Comment:-	1	48	15	64
3.9 Did you find the general level of noise (a) Very low (b) Tolerable (c) Too high If (c) what particular noises irritated you most Comment:-	41	20	3	64
3.10 Did you consider the interior decorations to be (a) Very attractive (b) Attractive (c) Unattractive Comment:-	22	43		65
3.11 Were arrangements for light refreshments:- (a) Good (b) Adequate (c) Inadequate Comment:-	19	15	21	55



FALKIRK ROYAL INFIRMARY

2

1

	EQUIPMENT
1	Washing Machine
2	Syringe Sink 1 (plastic)
3	Syringe Sink 2 "
4	Syringe Bench with above sinks.
5	Glove Room Sink
6	Glove Room Wet Bench.
7	Glove Room Dry Bench
8	Glove Drying Machine
9	Glove Powdering Machine
10	Ultrasonic Cleaning Unit
11	Wash-Up Sink No.1
12	" " " " 2
13	" " " " 3
14	" " " " 4
15	Needle Syringe Bench Stn. 1
16	" " " " 2
17	Needle Sharpening Machine
18	Needle Capping Machine
19	H.P. Steam Sterilizer No.1
20	" " " 2
21	Hot Air Sterilizer No.1
22	" " " 2
23	Solution Room
24	Packing Room Station 1
25	" " " 2
26	" " " 3
27	" " " 4
28	" " " 5
29	" " " 6
30	Ward Pack Tables
31	Theatre Pack Tables
32	Linen Room Bench

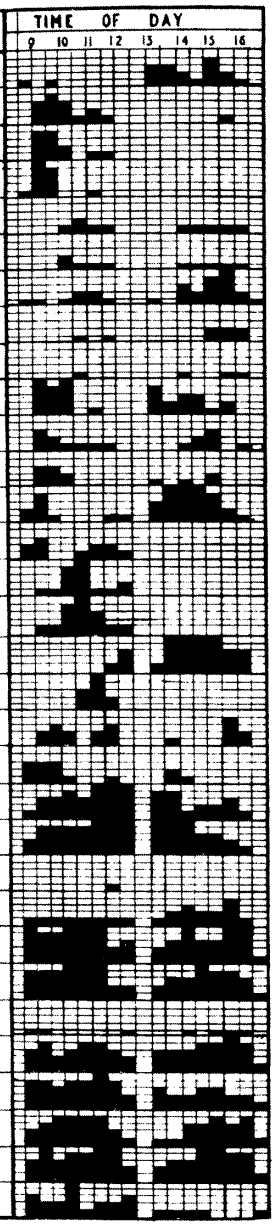


FIG 31 CHART SHOWING USE OF EQUIPMENT

3

4

5 (opposite) Page from the report on the new maternity unit at St Austell. The comments in the right hand column are typical of the kind of assessments and comments that can be made as a result of direct observation by the members of a design-in-use team. *(An Evaluation of the New Maternity Unit, St Austell,* South Western Regional Hospital Board.)

6 and **7** (overleaf) Pages from the report on New Guy's House. These are from two chapters recording the results of a complex series of observations made to determine the reality of savings expected to result from the use of a pneumatic tube communication system. The observations, of obvious planning and design significance, were made by work study specialists. *(An Evaluation of New Guy's House,* King Edward's Hospital Fund for London.)

ISOLATION SUITE.

This suite comprises 2 single bedrooms, a sluice and toilet.

Lobby area, 87 sq. ft.

The toilet is shared between the 2 single rooms and there is no bath or shower.

ROOMS NO. 26 AND 28, SINGLE BEDROOMS

Area: 143 sq. ft.
width 13'8"
depth 10'4".

Layout: as for other single wards.

No separate area for babies to be isolated if necessary.

ROOM NO. 27 - SLUICE.

Area: 83 sq. ft.
width 10'0" (in largest part)
depth 9'0".

Layout/Equipment.

Sterilizer.

Slop-hopper.

Bed pan washer.

Heated bed pan rack.

Wooden mackintosh rail.

Paper towel dispenser (dressing).

Soap dispenser.

Bins, metal.

Urine test facilities.

The arrangement of sink and slop-hopper had not been properly considered. This is not used as polypropylene bed pans are now used.
This appeared to be very cumbersome. (The use of disposable polythene sheets was queried).
No paper towels (hand).

No wash hand basin.

Lobby:

Weighing scales were stored here.

Also, library book rack.

Nurse call indicator light outside door of lobby.

This was used for Clinics.

There were no proper facilities for making this a proper isolation suite: An outside door had been provided as an after thought entering into one of the single rooms. There should have been a separate entrance to the Unit proper (for visitors, disposal etc.)
There were no separate facilities for washing cutlery and other equipment.

G comparison of time taken for errands

		Path lab	Disp	X-ray	Supt and matron's office	Stores	Works	C S S D	Others	Total
New Guy's house	No of errands	30	44	18	29	24	8	27	116	296
	Time spent (mins)	420	543	257	285	418	120	274	804	3,121
	Time per errand (mins)	14	12	14	10	17	15	10	7	11
Hunt's house	No of errands	69	152	37	24	34	13	81	78	488
	Time spent (mins)	595	1,067	298	213	479	166	704	713	4,235
	Time per errand (mins)	9	7	8	9	14	13	9	9	

H calculation of apparent saving of ward staff time

	Mon (mins)	Tue (mins)	Wed (mins)	Thur (mins)	Fri (mins)	Sat (mins)	Sun (mins)	Total (mins)
Actual time spent on errands in Hunt's house	817	867	822	562	693	336	138	4,235
Add: 5% to bring to equivalent number of beds as in New Guy's house	41	43	41	28	35	17	7	212
Sub-total	858	910	863	590	728	353	145	4,447
Add: 2/9ths to compensate for larger distances involved in travelling from New Guy's house	191	202	192	131	162	78	32	988
Calculated time spent on errands in New Guy's house if pneumatic tube had not been installed	1,049	1,112	1,055	721	890	431	177	5,435
Actual time still spent on errands in New Guy's house	619	537	443	403	681	312	128	3,121

Calculated apparent saving on errands attributed to use of pneumatic tube	430	575	612	318	209	119	51	2,314
Daily total	7 hrs 10 mins	9 hrs 35 mins	10 hrs 12 mins	5 hrs 18 mins	3 hrs 29 mins	1 hr 59 mins	51 mins	38 hrs 34 mins say 38½ hrs

J calculation of nursing time absorbed in operating pneumatic tube installation

Time to move to pneumatic tube station, insert contents, dial receiving station, dispatch tube, and return to main part of ward	40 secs
On return of carrier from receiving station time allowance to move to station, check that carrier is empty and return to ward	30 secs
Total time expended per dispatch on every dispatch	70 secs
Extra time expended on dispatches to pathological laboratory only - insertion of specimen in special inner container and packing with plastic foam	10 secs
Total time expended in using pneumatic tube system:	
i) On all carriers sent = $\frac{70 \times 228 \text{ mins}}{60}$	266 mins
ii) Extra time on carriers to pathological laboratory = $\frac{51 \times 10}{60}$	9 mins
	275 mins or 4 hrs 35 mins

K traffic handled by pneumatic tube installation other than that originated by wards

	No of dispatches
Pathological laboratory	
Dispensary (otherwise collected by ward staff or distributed as routine by dispensary porters)	45 pw
X-ray (casualty X-ray reports otherwise distributed by porter)	[illegible] pw
C S S D	nil
Departments (2nd floor)	[illegible] pw
Theatres and recovery ward	say 15 pw
Casualty (mainly swabs otherwise taken by porter)	say 2[illegible] pw
Total	81 pw

NB Little or no realisable saving of staff time resulting from the use of tube shown above.

There are a number of points to be made about the list and the illustrations. First, to reiterate that specialists in work study can be relied upon to make the more technical observations. Second, that the observations made should be related to the aims of the study as a whole; and, third, that the touchstone of direct observation and assessment by members of the team should be their own previous experience either in other evaluations or professionally.

There is no substitute for all members of the evaluation team actually visiting the building, getting its feel, and making direct observations. Only in this way will their later discussions be realistic. But equally there is no need for them to undertake work that would be better done by somebody else. And, of course, not all team members need be engaged in all observations.

This is particularly true of the assessments called for under heading 4 in Chapter 2, which entail the evaluation of the building as a made thing. The examination of structures, finishes, equipment, and electrical and mechanical engineering plant, apart from their effects on the users, should be undertaken by the relevant specialists in the team, or by a specialist brought in for a particular purpose.

Whoever makes the observations, there will be the problem of ensuring that they are in a form which will allow them to be related together at the analysis stage of the evaluation. This problem will be made easier if the study has a logical structure from the start, but activities on the site will need some form of control. One of the main difficulties in the two King's Fund studies was the linking up of the various pieces of information all of which were in different technical 'languages'.

Aides memoire and check lists have been used successfully for this purpose, and the observation of clearly specified activities was to have formed the basis of the series of design-in-use studies planned by the Department of Health (then Ministry of Health). Appendix E contains an analysis of topics for evaluation arranged under key words like 'locale' and 'space'. Appendix F reproduces the check list contained in the South Western Regional Hospital Board report. Some such system is probably essential if chaos is to be avoided.

An interesting possibility, not yet used in any evaluation so far as we know, would be provided by an adaptation of the activity data method sheets put forward by the Ministry of Public Building and Works as a way of recording user requirements in the design process. Illustrations 8 and 9 show two of these sheets as included in ACTIVITY DATA METHOD.[8] The sheets are intended as a basis for predicting design requirements related to known activities, but it would be a simple matter to turn them inside out and to use them instead for recording the conditions resulting from design. An extension to the right hand column would allow team members to include subjective comments which could then be related to the results of objective measurement. The sheets have the merit of being based on activities rather than particular buildings or departments. They would be a good basis for 'cycle of activity' studies carried out in a number of different hospitals as they avoid the difficulty of demanding any artificial scoring system.

8 and **9** Two activity data method sheets from the Ministry of Public Building and Works publication on this method of determining user requirements in design. An adaptation of these sheets would provide an excellent form on which to record observations during a design-in-use study. (Crown Copyright.)

ACTIVITY DATA

activity **SUPERVISING AIRCRAFT SERVICING**

number **5**

description

The N.C.O who supervises aircraft servicing spends some of his working hours doing paper work. He keeps records of work, job cards and safety certificates etc. Personnel discuss work with him. Little change is anticipated in this activity.

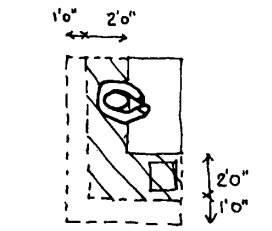
q **people**

N.C.O. (or supervisor)

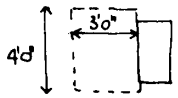
q **things**

desk 5'0"×2'9"×2'4"H
filing cabinet 1'6"×2'0"×4'4"H
stationery cabinet 3'0"×1'6"×6'0"H
pinboard 8'0"×4'0"H

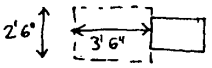
space components



desk with interview space



stationery cabinet



filing cabinet

layout notes

The desk is the centre of the activity; the other components should be arranged conveniently around the desk.

clear height 8 ft.

regulations and notes

AIR CONDITIONS

temp °F.	70	~~55~~	60	55	50		no heat.
temp va.	±1°	±2°	±3°	±4°	±5°		
heat srs.							
humid %	80	70	60	50	40		
humid s.							
sm & fu.							
dust fre.	essent.		~~desirable~~				unnec.
dust srs.							
infection							
hygiene	essent.		desirable				~~unnec.~~

VISUAL CONDITIONS

lum/sq ft	50	~~30~~	20	15	7		
daylight	10	6	~~4~~	3	1·4		unnec.
glare ind.	10	16	~~19~~	22	25	28	
sunlight	excluded		undesir.				~~desirable~~
view out	essent.		~~desirable~~				undesir.
privacy	essent.		desirable				~~undesir.~~
blackout	essent.		~~unnec.~~				
special							

SOUND CONDITIONS

accept.n	15	20	30	~~35~~	40	60	
noises	normal speech						
RT. secs.	~~0·75-1·0~~		0·75-1·5				1·0-1·5
privacy	~~essent.~~		desirable				unnec.

SAFETY CONDITIONS

human	
security	
fire risk	

DIRECT SERVICES

disposal	
h. water	
c. water	
drainage	
gas	
comp a.	
steam	
elect. p.	not outlets (230v 13a AC)
telephn.	not extension
oth. com	intercom (or similar)

DIRECT DEMANDS ON FABRIC

loading	50 lbs/ft²		
spillage			
foot tr.	light - moderate		
wheel tr.			
impacts			
abrasion			
easy cl.	essent.	~~desirable~~	unnec.
vib free	essent.	~~desirable~~	unnec.
vibration			

ACTIVITY DATA

activity: AIRCRAFT SERVICING

number: 7

description

During working hours aircraft are serviced or have defects corrected. Components are removed for servicing or replacement, in some cases the aircraft will be stripped down to its structure. Most work is carried out on or about the aircraft the remainder is covered by other activities. The size of aircraft is likely to increase in future and it is possible that the servicing work will become more complex including work at present done by RAF and civilian manufacturers

q | **people**
technicians

q | **things**
fixed wing aircraft
helicopters
ground servicing equipment
benches
2 - ton overhead crane point from which to suspend aircraft for centre of gravity test (5-tons)

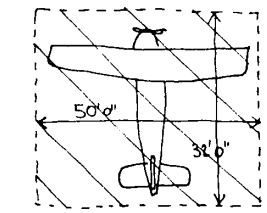
layout notes
The crane should sweep all aircraft bays.
The ground equipment bay should be placed centrally

~~clear height~~ hook height 18 ft.

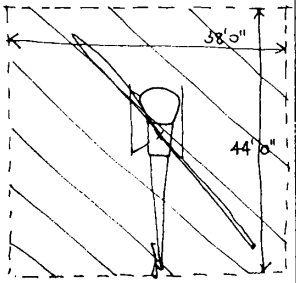
regulations and notes
Electric socket-outlets should be raised 2-3 ft from floor to reduce risk of sparking fuel

D.C. only provided in new building.

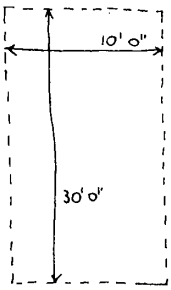
space components



Fixed wing servicing bay



Helicopter servicing bay



Storage bay for ground servicing equipment

AIR CONDITIONS

temp °F.	70	65	~~60~~	55	50		no heat.
temp va.	±1°	±2°	±3°	±4°	±5°		
heat srs.							
humid %	80	70	60	50	40		
humid s.							
sm & fu.							
dust fre.	essent.		~~desirable~~		unnec.		
dust srs.							
infection							
hygiene	essent.		desirable		~~unnec.~~		

VISUAL CONDITIONS

lum/sq ft	50	~~30~~	20	15	7		
daylight	10	~~8~~	4	3	1·4		unnec.
glare ind.	10	16	19	22	~~25~~	28	
sunlight	excluded			~~undesir.~~			desirable
view out	essent.		desirable				~~undesir.~~
privacy	essent.		desirable				~~undesir.~~
blackout	essent.		~~unnec.~~				
special							

SOUND CONDITIONS

accept.n	15	20	30	35	40	~~50~~
noises	electric hand tools, engines of ground equip					
RT. secs	0·75-1·0		~~0·75-1·5~~		1·0-1·5	
privacy	essent.		desirable		~~unnec.~~	

SAFETY CONDITIONS

human	
security	no unauthorised persons permitted
fire risk	fuel in aircraft, see notes

DIRECT SERVICES

disposal	
h. water	
c. water	
drainage	
gas	
comp a.	no 2 outlets (80-100psi) / bay
steam	
elect. p.	no 2 outlets (230 v 13a AC) / bay no1 outlets (28 v DC)
telephn.	
oth. com	

DIRECT DEMANDS ON FABRIC

loading	80 lbs/ft² (aircraft >6,000lbs)
spillage	oils
foot tr.	moderate
wheel tr	tyred - light
impacts	tools and components
abrasion	dragging of jacks, stands etc
easy cl.	essent. ~~desirable~~ unnec.
vib free	essent. ~~desirable~~ unnec.
vibration	

Analysis

Analysing the information gathered seems to have been the major difficulty in a number of studies. In the two King's Fund studies the teams disbanded as soon as they had completed their observations on the site. In other cases delays in publishing the results of the study are said to have resulted from the difficulty of 'agreeing the final draft'.

It is almost certainly a mistake to mix up drafting with analysis. The draft (if the chosen form of communication is to be a written report) is best prepared by an individual, but the analysis must be made by the evaluation team as a whole in meetings set aside specifically for the purpose. This, after all, is the motive for their coming together in the first place.

Here it is easy to see how the mixing up of description with evaluation has led to confusion. Such a large proportion of existing studies is taken up with description that this must sometimes have seemed the major part of the work. There is no reason why a description should not be undertaken by an individual on the basis of collected information, but he cannot, and should not, draw the relatively complex inferences that are the province of a multi-disciplinary team. It is the team that needs to draw together the information and relate it in such a way that it bears on the subject matter of its original brief. The analysis *is* the evaluation.

Communication

In deciding how to communicate the results of their study, a design-in-use team needs to make an analysis similar to that which decided their brief. They need to assess the significance of their findings and the size and nature of the audience that would benefit from hearing of them. The character of the audience will influence the type of presentation; its size will influence the means of production and, in turn, these will influence each other.

This section is written on the assumption that the most usual form of communication will be a written and illustrated report, printed by one or other of a number of processes. However, this does not mean that for particular purposes other methods might not be equally appropriate. A set of slides with a commentary, a film, or even an exhibition could easily be effective. A set of slides might be used where the main significance of a report was for a single organisation. An exhibition might be used where the study had revealed points of significance for public policy that ought to be made known to a general audience. But publishing in some form is likely to be the normal medium for communicating design-in-use studies because, in spite of the existence of more sophisticated information systems, a book remains one of the most convenient and easily stored sources of reference.

It is not possible to say that existing reports make particularly skilled use of the book's potential as a means of communication. Many are discouragingly thick and have a daunting array of complex appendices. Illustrations are not well used and, with a number of exceptions, there are few examples of good, helpful diagrams. Often, reports are no more than a compilation of papers with no attempt to relate them together in more general terms.

'It is the team that needs to draw together the information and relate it in such a way that it bears on the subject matter of its original brief. The analysis *is* the evaluation'.

There is no single solution to these difficulties, but it is possible to suggest principles.

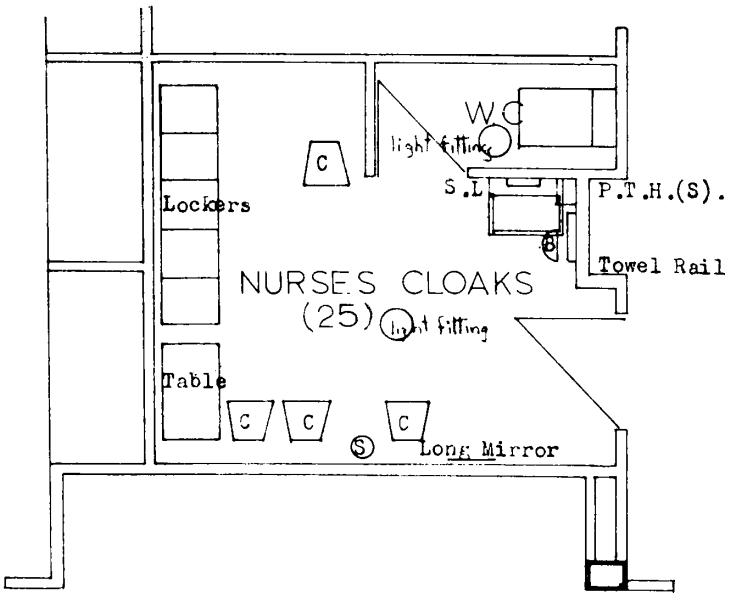
CONTENT The distinction between description and evaluation is the key one. Much of the bulk of existing reports is taken up with material that would be more appropriate to description. Where a description has been published, a later design-in-use report should be thought of as complementary to it; it should not be necessary to repeat the descriptive information. Where a description has not been published it may be worth considering publishing one separately and before a design-in-use report. If the two aspects are to be combined in one volume, they should be carefully distinguished from one another. The present muddle of the two results in a confusion of the description and a blunting of the evaluation.

Once the idea of design in use is separated from the idea of description, the editorial responsibilities of the team can be seen more clearly. They are not mainly presenting neutral 'evidence', but are making a qualitative assessment based on their observations and experience as professional people. The value of their findings is closely related to their ability to draw inferences from their field work. Just as the analysis is the evaluation, so the communication of the analysis is the main publishing task of the team. This suggests that a good deal of the material included in present studies should have been left out or, at least, that its relation to the central theme should have been made clearer. It is certainly unnecessary to publish the results of every observation undertaken; an ideal compromise is probably to be found in publishing a main report with supporting studies available on request.

There is no doubt that in the immediate future design-in-use teams will be hampered by the paucity of good examples on which to model the content of their reports. The level of published argument about planning and design, even in the professional press, is not high and it is rare to find a discussion of design that is anything like the kind of study we have been talking about in this book. Esoteric arguments about style and aesthetics proliferate. Most reports and articles appear when a building is opened and not after it has been in operation for a time. So models are hard to find. However, we reprint in Appendix G an interesting discussion of standards and costs from the latest study published by the Scottish Home and Health Department. While the discussion has weaknesses, acknowledged by its authors, it is one of the few sections on cost in any study, and one which falls in most clearly with what we see as the editorial tone and approach appropriate to future publications.

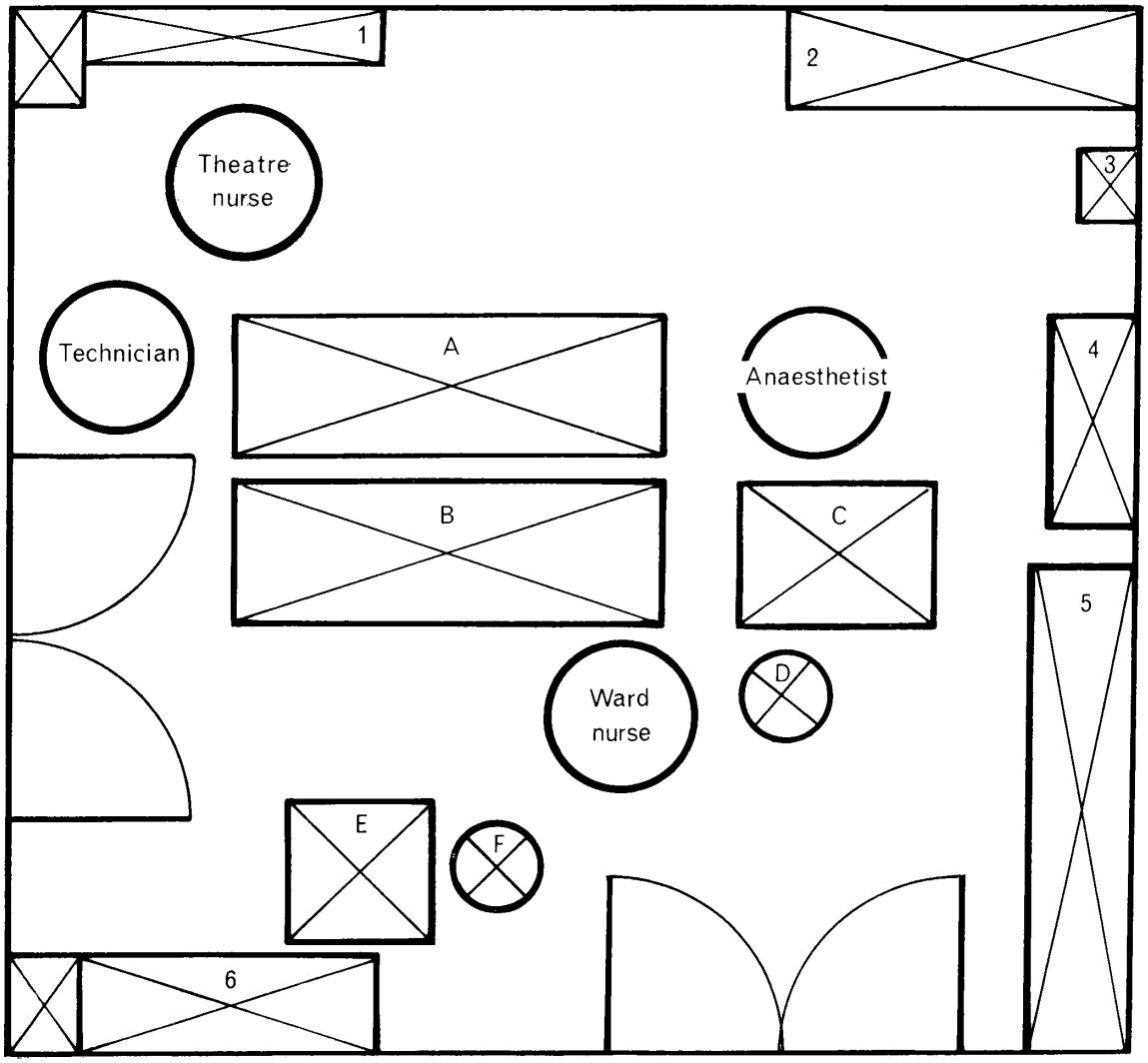
PRESENTATION It is a commonplace that people's experience influences the kind of information which they can absorb most easily, but it is equally a commonplace that reports, books, questionnaires and many other pieces of communication are produced as if this problem did not exist. It is an important factor in making known the results of design-in-use studies because the information produced is intrinsically of interest to people with many different backgrounds. The composition of planning teams gives the clue to the possible difficulties. Nurses and doctors may find plans hard to read; architects may find the planning significance of morbidity statistics hard to interpret – and so on. The key to finding a solution is to use the least specialist means of communication possible for any particular piece of information. Some possible means of presentation are shown in illustrations 10 to 18.

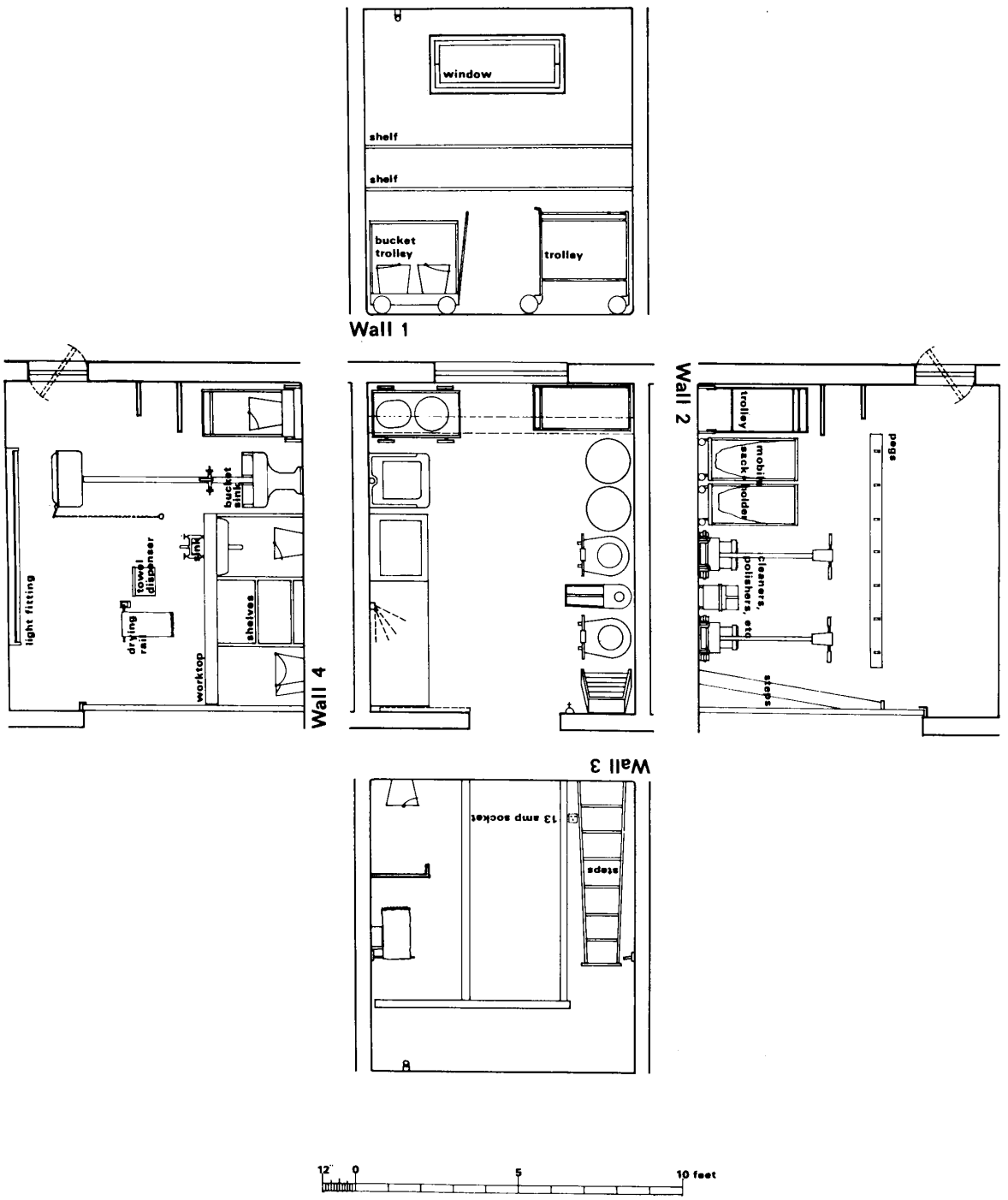
10 11 12 and **13** Plans and drawings showing four clear ways of presenting the physical reality of a room. Whatever methods are used in communicating the results of an evaluation, it will be necessary to select a convention that is understandable to those people, with varying backgrounds, who will be interested in the results of the study. (10 *An Evaluation of the New Maternity Unit, St Austell,* South Western Regional Hospital Board; 11 *An Evaluation of New Guy's House,* King Edward's Hospital Fund for London; 12 *Domestic Service Room, Information Sheet,* Scottish Hospital Centre; 13 *Nuffield House, Musgrave Park Hospital, Belfast,* The Nuffield Foundation.)

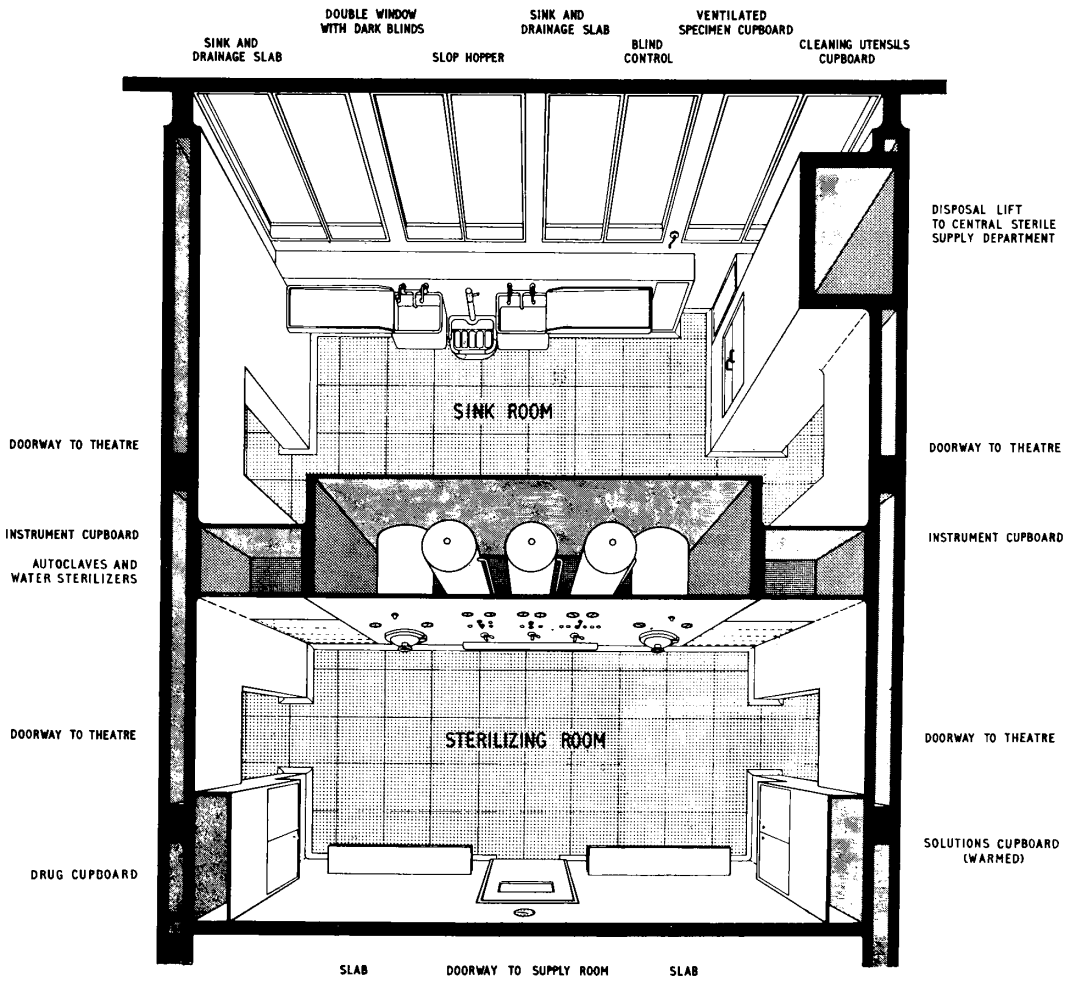

W.C
light fitting
C
S.L
P.T.H.(S).
Lockers
Towel Rail
NURSES CLOAKS
(25)
light fitting
Table
C
C
C
S
Long Mirror

11

1 Drug cupboard
2 Anaesthetist's working shelves
3 Refuse receptacle
4 Sink
5 Cupboard for table parts with work top
6 Shelves for theatre coverings and register
A Patient's trolley
B Operating table
C Anaesthetic trolley
D Suction apparatus with bowl for dirty articles
E Drip and catheterisation trolley
F Drip stand

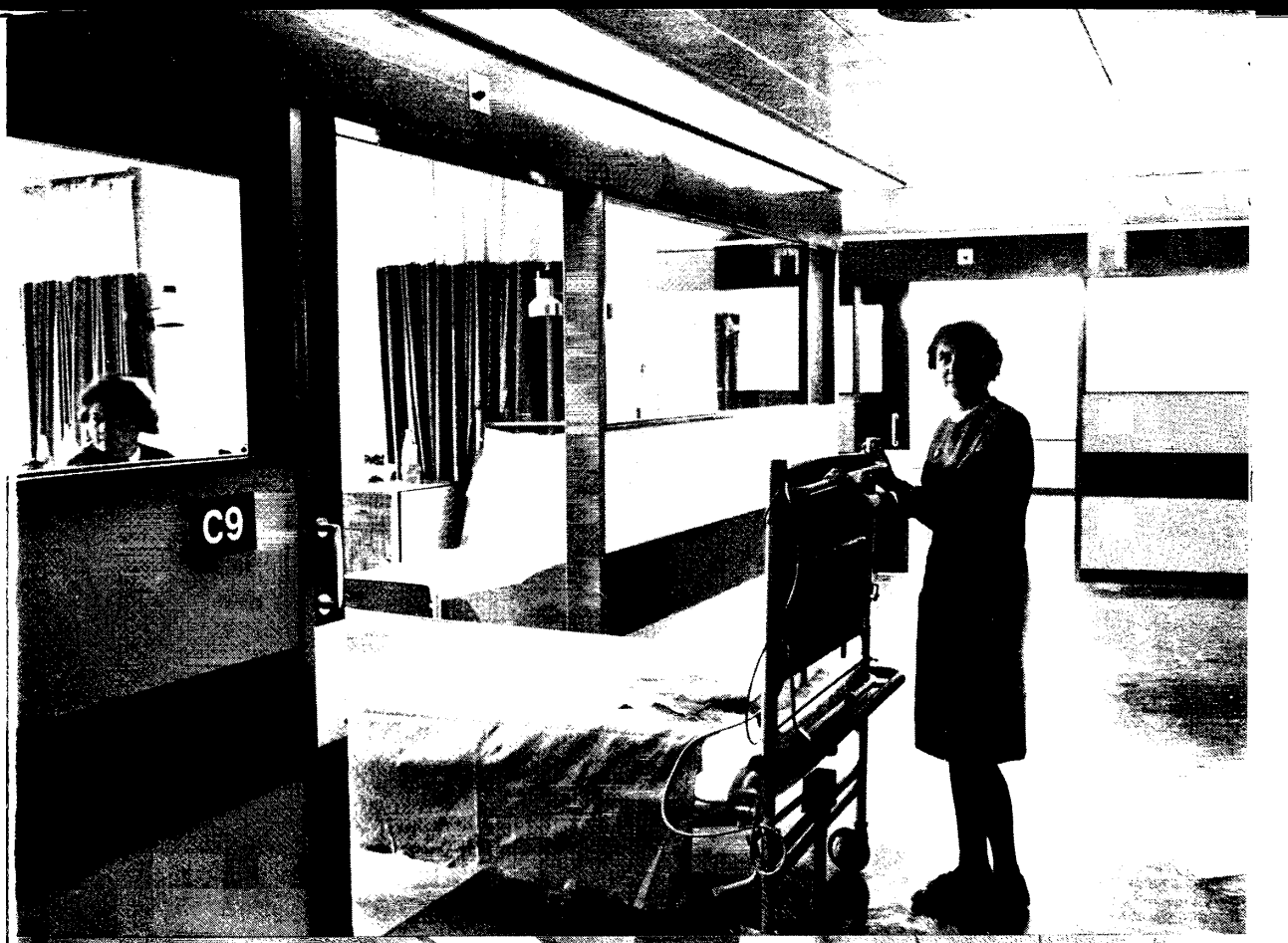



window
shelf
shelf
bucket trolley
trolley
Wall 1
Wall 2
Wall 3
Wall 4
light fitting
bucket sink
sink
towel dispenser
drying rail
shelves
worktop
trolley
mobile sack holder
pegs
cleaners, polishers, etc
steps
13 amp socket
steps
12" 0 5 10 feet


DOUBLE WINDOW WITH DARK BLINDS
SINK AND DRAINAGE SLAB
VENTILATED SPECIMEN CUPBOARD
SINK AND DRAINAGE SLAB
BLIND CONTROL
CLEANING UTENSILS CUPBOARD
SLOP HOPPER
DISPOSAL LIFT TO CENTRAL STERILE SUPPLY DEPARTMENT
SINK ROOM
DOORWAY TO THEATRE
DOORWAY TO THEATRE
INSTRUMENT CUPBOARD
INSTRUMENT CUPBOARD
AUTOCLAVES AND WATER STERILIZERS
STERILIZING ROOM
DOORWAY TO THEATRE
DOORWAY TO THEATRE
SOLUTIONS CUPBOARD (WARMED)
DRUG CUPBOARD
SLAB
DOORWAY TO SUPPLY ROOM
SLAB

14 15 16 and **17** (opposite and overleaf) Part of a series of photographs contained in the report on the new Falkirk ward. The use of photography to convey the reality of a building is probably an essential element in communicating the results of any design-in-use study. (*The Falkirk Ward*, Scottish Home and Health Department, Crown Copyright.)

18 (opposite page 45) Chart showing issues to theatres from a central sterile supply department. It is easy to summarise in words the conclusions that can be drawn from a chart of this kind, but extremely cumbersome to give the detailed information in written form. (*Nuffield House, Musgrave Park Hospital, Belfast*, The Nuffield Foundation.)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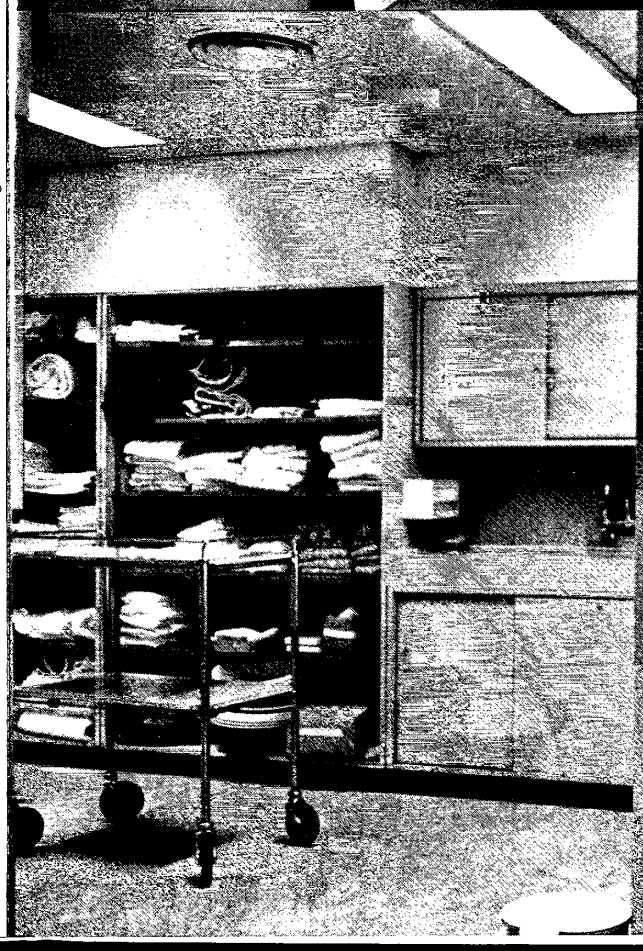
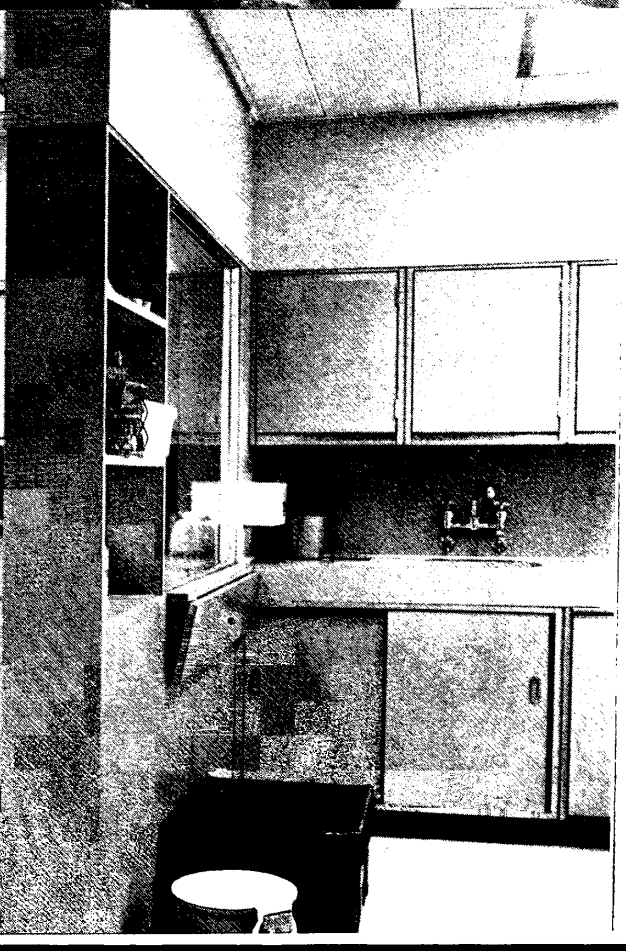
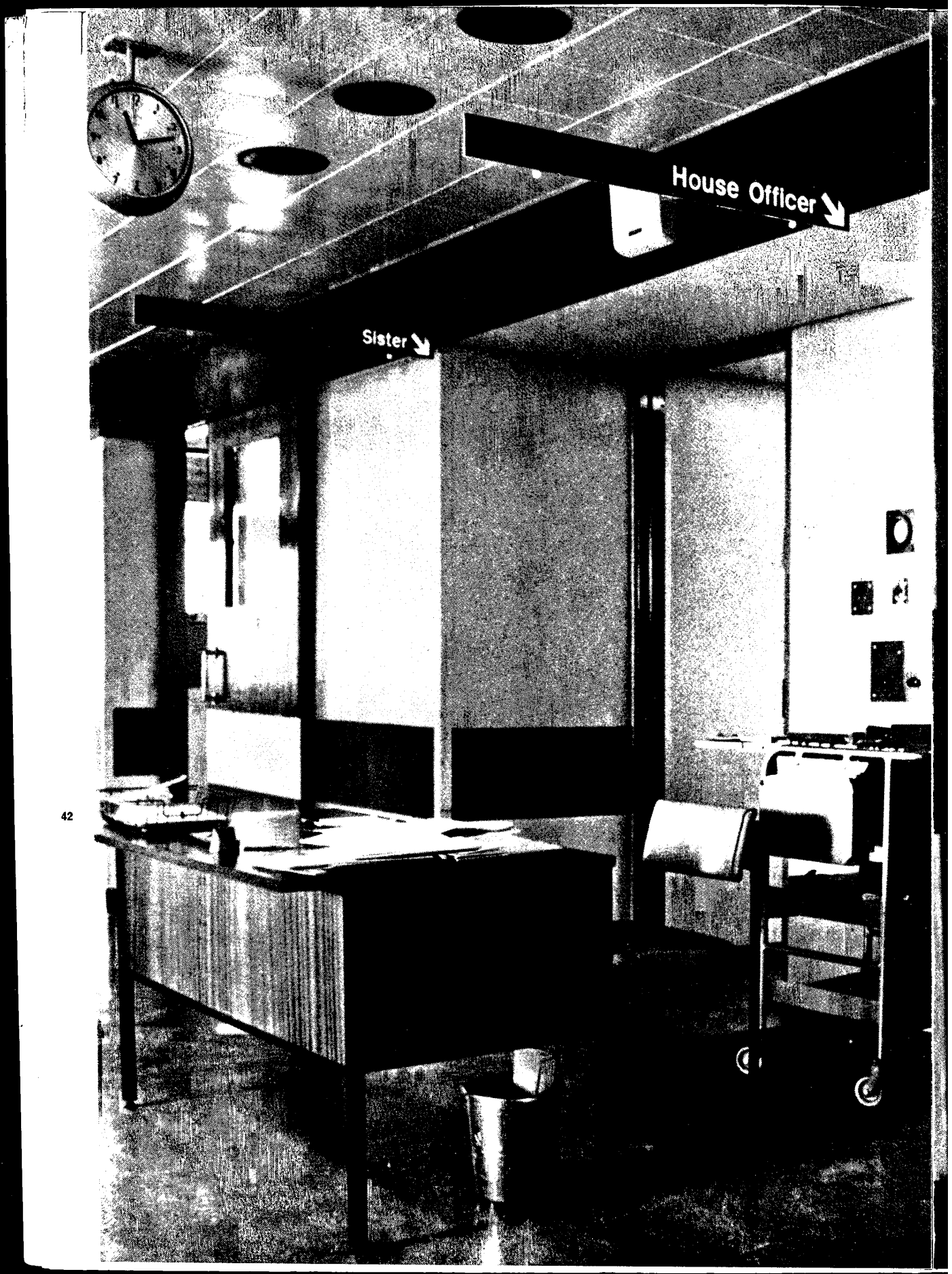
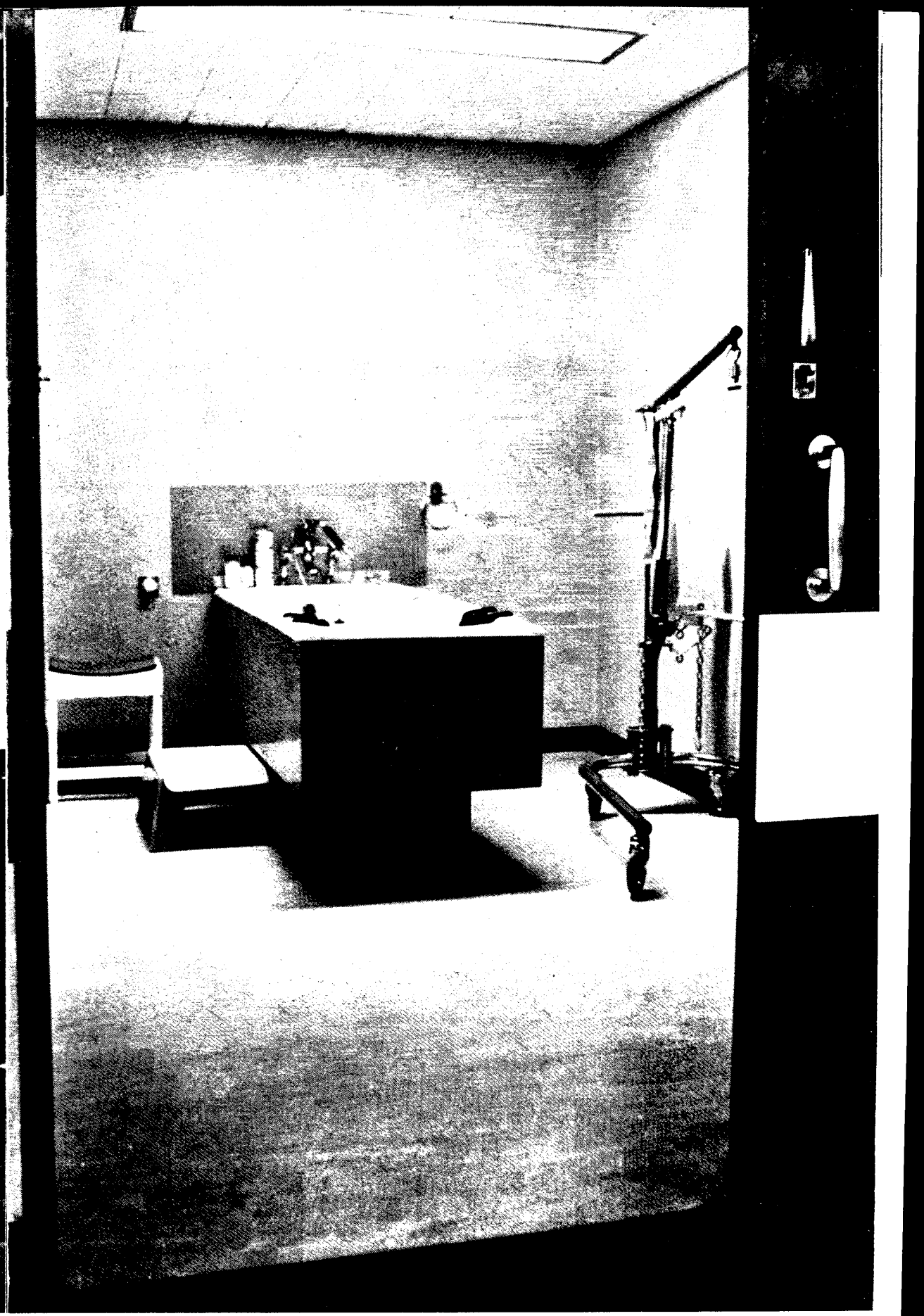





House Officer
Sister



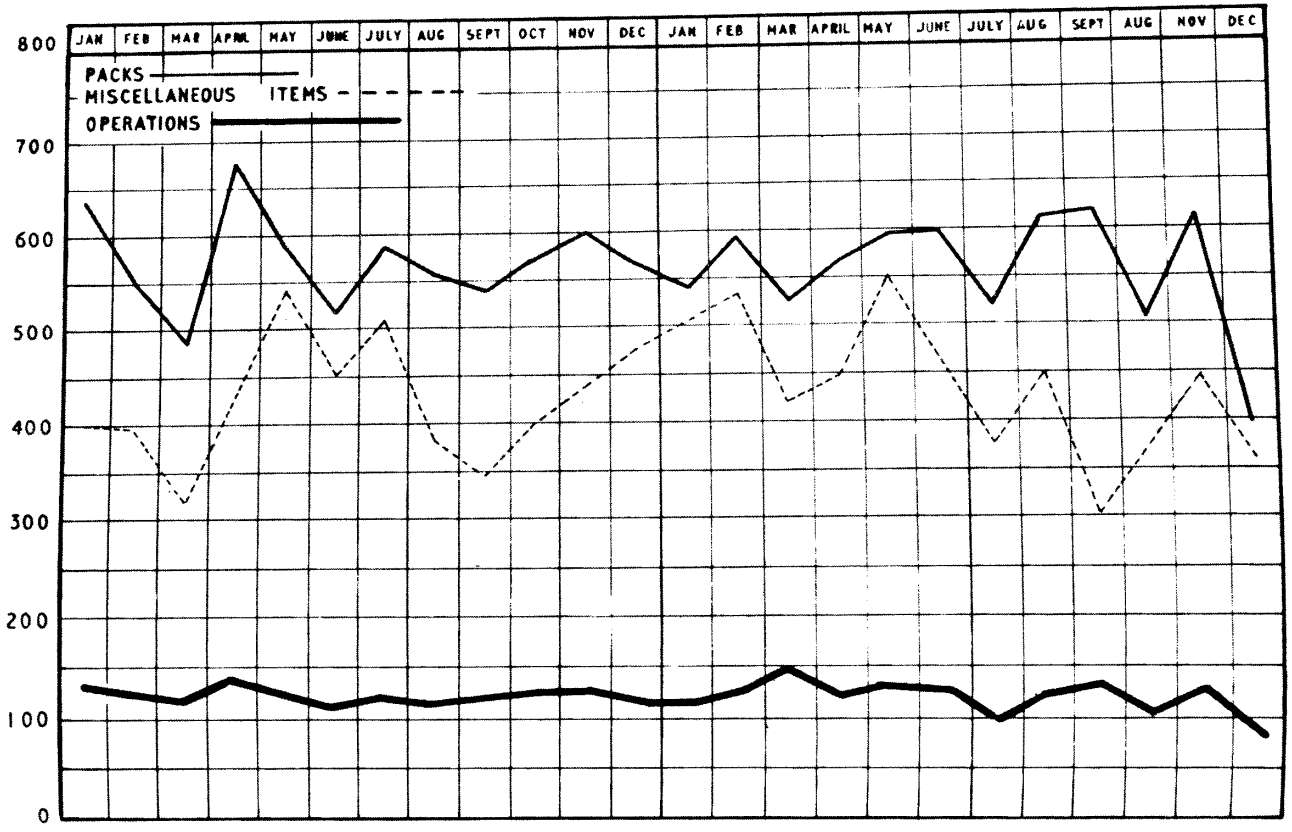


FIG. 26 ISSUES TO THEATRES (GENERAL) FROM CENTRAL STERILE SUPPLY DEPT. 1959-60

It is not the purpose of this book to discuss the design of design-in-use reports except to make clear that they present complicated typographic and layout problems which, taken with the point just made about communication, may well mean that their detailed presentation should be in the hands of a specialist.

PRODUCTION Here it is worth quoting from the Wycombe General Hospital description which has an appendix on production methods.

> *. . . making such decisions (about printing methods) . . . will depend on a variety of factors – for example, what printing facilities are available within the publishing organisation, and what useful links already exist with printers. A fundamental factor is the number of copies of the book that are required. It should be remembered that the* more *copies that can be ordered the cheaper* each *copy will be though the* total *bill will be greater . . .*
>
> *At about 3,000 copies letterpress is an economical printing method, but below 2,500 it begins to be expensive per book because many of the costs involved come from the preparatory work that is necessary regardless of the number of copies which are to be printed. Where less are needed, it is worth considering one of a number of methods using typewritten originals and offset printing. Most of these methods are capable of reproducing plans efficiently, though there will be difficulty with some photographs. It is only when very large numbers are involved. say more than about 15,000 copies, that big-scale offset printing becomes economical.*

Finally, it is worth saying that effective communication is not a passive activity. If the evaluation team and their sponsors consider their findings of really key importance, they will not be doing their job if they simply write a clear, concise report and have it well produced. It is one thing to publish a book, quite another to get it read. Within the publishing organisation it may be possible to short-circuit the problem by means of seminars and discussions with those engaged in planning and design. Outside, it will almost certainly be necessary to attract attention in other ways – for example, by advertisements, press comment, book reviews, and conferences. All these are an integral part of communication in contemporary society, and cannot be ignored by anyone seeking to influence an activity as important as the planning and design of future hospitals.

6 SOUTH WESTERN REGIONAL HOSPITAL BOARD
O & M and Work Study Department
Procedures for Evaluating New Buildings
Bristol South Western Regional Hospital Board 1967
Unpublished

7 GAINSBOROUGH John *and* LINGARD R E
Hospital Description Wycombe General Hospital
Phase One
London King Edward's Hospital Fund for London 1968

8 MINISTRY OF PUBLIC BUILDING AND WORKS
Directorate of Development
Activity Data Method
A method of recording user requirements
London Her Majesty's Stationery Office 1966
(R & D Bulletin)

5 THE FUTURE OF EVALUATION

In spite of the efforts that have gone into them, and with certain notable exceptions, it is doubtful if the design-in-use studies so far published have really had any very direct impact on the planning and design of new hospitals. There are a number of reasons for this and they need to be resolved as quickly as possible. The most important factor is confusion of aims, which has led to a mixing up of the elements of a hospital description, a study of day-to-day operation, and information of use to future planners and designers. A number of the published studies are, as a result, so bulky as to discourage even the most determined reader. The relatively small total number of studies is also a drawback since it means that only a few subjects have been covered and that the framework for realistic comparison between a number of buildings does not yet exist.

There are also the timing difficulties referred to in Chapter 3, which mean that potential feedback contained in a design-in-use study is often related to concepts that have already been outdated by the normal progression of design ideas.

Summing up these difficulties as 'too confusing', 'too cumbersome', 'too few' and 'too late', the solutions to them ought to be 'greater clarity', 'less bulk', 'more' and 'more quickly'. Except for the last, these do in fact seem convincing and possible as a basis for the future. In Chapter 2 we tried to show what should be evaluated, and in Chapter 4 we tried to indicate ways of unscrambling descriptions from evaluations. We also tried to suggest that, though a study may need to be extremely detailed, only what is relevant beyond a local level should be published. So far as 'more' is concerned, however much time design-in-use studies take up, the point should be remembered that participation in them is a valuable educational experience. For members of project teams it is the best possible introduction to the problems of hospital planning and design.

It is the difficulty of 'too late' that is most intractable and that highlights the main weakness of the present situation. The weakness is that there is no coherent programme of design-in-use studies and no central agency concerned to interpret the findings of *groups of studies looked at together*. If there were, the 'too late' problem would be mitigated because 'whole building' and 'cycle of activity' studies could be linked in a discussion of particular design problems and, if necessary, be interpreted in the light of more specific field trials in controlled experimental conditions.

It is significant that it is only from Scotland that there comes a clear statement that design-in-use studies have affected subsequent design. In the Bellshill report there is a reference to the two preceding studies at the Vale of Leven and Kirkcaldy: 'Their contribution to the formulation of principles subsequently embodied in the considerable amount of published guide material amply justified the effort expended'. At the Scottish Home and Health Department the drawing of such useful conclusions is possible because there is a clear and coherent link between evaluation and design that can be supplemented by other experimental work.

What is needed in England and Wales is not a central team of high-powered evaluators who would stump the country carrying out design-in-use studies. Most studies should originate at regional board level and be carried out by teams of people also engaged in other planning, design or managerial tasks. In this way the valuable experience represented by participation in evaluation would be spread as widely as possible, and would have a good chance of making an effective impact on planning.

However, this desirable regional location must be ineffective without the addition of a central body to interpret and encourage. The whole approach outlined in this book depends on the existence of an interpreting agency; without it, the future of hospital design-in-use studies is in jeopardy.

The pattern would be of a team, or teams, of evaluators in each region made up from the existing planning, design and managerial staff. Teaching hospitals could support similar teams by grouping together to cooperate in a series of design-in-use studies. For 'cycle of activity' studies, it might be necessary for a number of regional boards to work together in staffing a team that would be common to all the regions concerned. For the people involved at this level, design in use would be seen as complementary to their other activities. The results of their work would be passed to a central agency which would collect, collate and disseminate results of general interest, coordinate future programmes and give guidance on methodology.

At the start at least this central function could probably be performed by a very small team, possibly even by one man, whose work and staff would grow gradually with the development of design-in-use studies. As the Department of Health already carries out a similar function in relation to O & M and work study, it could well be an appropriate location. However, if the department's other commitments make such an establishment impossible, it would be equally appropriate for the agency to be located in a university. It would then be in contact with other relevant disciplines, and could work closely with the nearest regional hospital board.

An arrangement of this kind should achieve our basic aim, which is that, in a short time, design-in-use studies should become an accepted part of the hospital planning process.

The future of design in use in the hospital service has to be seen in the context of the buildings and equipment likely to be needed over the next fifteen or twenty years, and of the physical and conceptual methods which will be used to produce them. In total this represents an enormous commitment of human and material resources; one that is already being based more and more on systematic and scientific methods. As technology affects building at every point, and as the choices it offers become more complex, so techniques of control and prediction have to become more sophisticated. In the emerging pattern of planning, design in use has a central role. It is the final link that completes the chain which runs from functional analysis to briefing, to designing, to building, to commissioning, to operating and, through to evaluation, back again to functional analysis. Its effect on future planning and design is its essential purpose and justification.

'. . . in a short time, design-in-use studies should become an accepted part of the hospital planning process.'

A KING'S FUND EVALUATION OF TWO HOSPITALS 1966

In 1966 the King's Fund commissioned the evaluation of two hospital buildings: Stage One of the new Addenbrooke's Hospital, Cambridge, opened in 1961; and the Surrey Branch of The Royal Marsden Hospital, opened in 1963.

The objects of the evaluations were to advise the hospitals of items of structure or use which might with advantage be changed and on matters relevant to the building of subsequent stages of the hospitals. It was hoped that the studies would also produce data which would be of use to other planners and designers, and that the experience gained would help in clarifying the possible organisation and content of future design-in-use studies. Work on the studies led directly to the publication of the present book. This appendix gives some specific information about the two evaluations; many of the general points have been embodied in the main chapters. Copies of the reports are available in the library at the King's Fund Hospital Centre.

Each team was led by Courtenay Wade, then the medical planning officer of the Chelsea Postgraduate Medical Centre. Winifred Raphael, an industrial psychologist and research consultant to the King's Fund, was a member of both teams as was Ursula Smith, a nurse, then employed as a work study officer at St George's Hospital, London. A team of hospital administrators and architects and engineers with specialised knowledge of hospitals was recruited for each hospital, and for The Royal Marsden survey a second nurse was enlisted.

Method of Evaluating Stage One of the new Addenbrooke's Hospital

After preliminary meetings with hospital officers, an attitude survey was carried out by the industrial psychologist. The comments of patients and staff interviewed were recorded, analysed and circulated to members of the team. At the same time, the team leader spent two weeks 'getting the feel' of the hospital, talking to patients and staff, watching procedures, observing the comings and goings of patients, staff and others. This period of observation resulted in a report which was circulated to members of the team.

The findings of the industrial psychologist and the team leader showed similarity on almost every item. In other words, the views of the hospital users and the views of the observer were almost identical. The two reports were used to focus attention on those subjects which needed particular study.

The main survey was carried out during a concentrated period of seventeen days by a team consisting of Wade, a nurse, an administrator, several architects and an engineer. The first three members were present for the whole time and the architects and the engineer surveyed the hospital on shorter visits during this time. The full-time services of the United Cambridge Hospitals' work study officers were made available to the evaluation team and four observers were recruited locally for the collection of quantitative information. The total time spent by all these members on the evaluation amounted to approximately 110 man-days.

If, to this figure, were added the preliminary attitude survey and the earlier visit of the team leader, the total amounted to approximately 136 man-days.

It was thought best by the team leader to allow the main evaluation to be an unstructured exercise. After consultation with the other members of the team, the representative of each discipline tackled his or her part of the evaluation in the way thought by that person to be most suitable.

Method of Evaluating the Surrey Branch of The Royal Marsden Hospital

The general method of approach to the task at The Royal Marsden was similar to that used at Cambridge. The industrial psychologist carried out a preliminary attitude survey and the team leader, this time accompanied by an administrator, observed the running of the hospital. Two reports were again prepared and circulated to members of the team. Although these two reports were not so similar as in the case of Addenbrooke's Hospital, they were still in agreement on many items.

The main survey was carried out during a period of twelve days by a team consisting of Wade, two nurses, two administrators, an architect and two engineers; Wade and the two administrators being present throughout the survey. One nurse was present for the first half and the other nurse took over the duties for the second half. The architect and the engineers surveyed the hospital on shorter visits during this time. To the team were added four observers recruited locally for the collection of quantitative information.

The total time spent by all these members on the main survey amounted to approximately 108 man-days. If to this figure there were added the preliminary attitude survey and the earlier visit of the team leader and the administrator, the total amounted to approximately 144 man-days.

As with the Addenbrooke's evaluation, the study was an unstructured exercise.

What Lessons Were Learned?

Firstly, the almost entirely unstructured approach proved to be a mistake. It resulted in a mass of uncoordinated data which was difficult to weld together into a comprehensible report, particularly as the teams disbanded immediately each survey was completed. Communication was therefore minimal during the drafting stages of the reports. The teams reassembled to discuss the first and second drafts of the Addenbrooke's report after it had been prepared by the team leader and, with The Royal Marsden team, there was only one post-survey meeting, at the time of the completion of the first draft.

In their paper, APPRAISALS OF THE TOTAL ENVIRONMENT, Manning and Taylor[9] write, 'It is almost certainly impossible to attempt to build up a post-survey assessment from a mass of data which must necessarily be unrelated and possibly irrelatable. (Though this is possibly

worth attempting)'. It can now be said that the attempt has been made and the experience confirms this dictum.

When Wade was appointed to lead both teams it was hoped to show that a worthwhile evaluation could be carried out in a matter of six months. This proved not to be the case for several reasons.

1 The unstructured method of working has already been mentioned, although the target date might still have been reached had the teams not dispersed on the completion of the visits to the hospitals and had they been retained as a functioning unit during the preparation of the draft reports.

2 The two evaluations were carried out in parallel, so that the team leader, who was also the editor and main writer, divided his attention rather than concentrating on each hospital in turn.

3 There was a time lapse between the hospitals receiving the second draft reports and returning their comments for inclusion in the third drafts.

A timetable of events will show the progress made.

	ADDENBROOKE'S	THE ROYAL MARSDEN
1966		
Preliminary visits started	3 January	4 February
Main visits started	16 February	15 March
First draft ready	30 March	5 May
Second draft ready for comments by the hospitals	24 August	24 July
1967		
Comments received from hospitals	10 January	13 February
Third draft ready and sent to team members for comment	3 March	20 March
Last reply back from team members	29 March	17 May
Third draft amended	4 April	25 May

So, although the surveys were carried out rapidly and a great amount of information was gleaned, the ordering of these data was the main stumbling block in the exercise. A structured method of enquiry, planned before the start of the survey, would have gone a long way to obviate this block and to speed the operation.

9 MANNING Peter *and* TAYLOR Sheila
Appraisals of the Total Environment
Unpublished paper 1965

B REVIEW OF EXISTING DESIGN-IN-USE STUDIES

On the following pages the main content of the principal existing hospital design-in-use studies is summarised. Under each title is a brief discussion of the Aim, Team and Method used; this is followed by notes of the Content of each publication and the way in which it was produced.

THE NUFFIELD FOUNDATION
Division for Architectural Studies
Nuffield House, Musgrave Park Hospital, Belfast
The case history of a new hospital building
London The Nuffield Foundation 1962

Aim To provide information that would prove of practical help to those presently engaged in the commissioning and planning of hospitals; and to encourage the publication of comparable information for other hospitals.

Team The team was assembled by the Nuffield Foundation, Division for Architectural Studies. Its exact composition is not specified in the report.

Method After a period of reviewing existing problems, the team made a selection of the particular aspects which they considered to be the most deserving of study.

Content This report, which was the final stage in a research programme originally sponsored by the Nuffield Provincial Hospitals Trust, includes sections on the ward units; the operating theatre suite; the central sterile supply department; the engineering services and plant; the levels of daylighting and artificial lighting in the ward units; and the results of heating tests in the ward units. The appendices comprise room schedules for a ward unit, operating theatre suite and central sterile supply department; details of the bacteriological tests that were carried out.

Type of publication Offset lithography from typewritten originals. There are halftone and line illustrations.

KING'S FUND
An Evaluation of New Guy's House London King Edward's Hospital Fund for London 1963

Aim To establish as accurately as possible the extent to which the building was fulfilling the intentions of those who planned it and to see if it were meeting the needs of patients and staff as a surgical block; to provide guidance to other authorities who might be planning, so that they could avoid repeating mistakes, or benefit from successful innovations; and to test evaluation methods.

Team The evaluation team consisted of representatives of the King's Fund, the Ministry of Health and 'other persons engaged in hospital work and having an interest in the study' – a total of 35 people. The working party, 18 strong, represented medical, nursing, administrative, architectural, and engineering interests.

Method The first meeting of the evaluation team agreed the main purposes of the evaluation study. They then set up a working party to undertake the detailed studies required to assess the building. An outline programme was prepared on the points to be taken into account. The various departments were visited, staff interviewed and preliminary evaluation reports prepared for discussion and revision. Questionnaires were circulated to 500 patients. Over 300 replies were received; these were analysed by the staff of the King's Fund and a report prepared for the working party. The full working party met on six occasions to discuss the preliminary reports, with representatives of the different grades of medical, nursing and other hospital staff in attendance to answer questions arising from the reports.

Content Sections on evaluation procedure; design and function of the building, the wards, the operating theatres, the central sterile supply department, the engineering services, the lift services, the pneumatic tube communication system; the studies of air movement. There are a large number of appendices, including a summary of replies to questionnaires addressed to patients; a report on a string diagram study based on a 'notional nursing day'; a report on space allocations in wards, operating theatres and CSSD compared with Ministry of Health advice; a diagram showing the use of space in an operating theatre, anaesthetic room scrub-up, clean preparation rooms and dirty clean-up room; a time chart showing the use of theatres during a period of two weeks; a report on the pneumatic tube communication system; a list of the number and training of staff; and a schedule of room sizes and finishes.

Type of publication Offset lithography from typewritten originals. There are halftone and line illustrations.

SCOTTISH HOME AND HEALTH DEPARTMENT
Vale of Leven Hospital
Edinburgh Her Majesty's Stationery Office 1963
(Hospital design-in-use no 1)

Aim To assess how the hospital had been found in practice to serve the purposes for which it was designed, and to draw any conclusions which might have a bearing on the planning and design of other new buildings.

Team The team comprised doctors, nurses and architects, with assistance from work study officers in carrying out a twenty-four hour ward study.

Method A study was made of the official records relating to the planning of the hospital covering the period from 1950 and up to the time of the study; on this basis the team met twice before proceeding to Vale of Leven. Next a form was prepared to assist in obtaining a uniform and complete set of observations during visits to the hospital. The report states that while this served as a useful check list, it did not fulfil its original function. At the time of the first visit to the hospital a general discussion took place with the medical superintendent, the matron and the group secretary. On following visits, the main sections of the hospital were listed and studied systematically. Visits were made by members of the team either singly or in pairs on eleven occasions, two of which were night visits. General findings were discussed as the review proceeded. The team was augmented to undertake a study of the journeys involved in carrying out nursing duties over a twenty-four hour period in a surgical ward. The results were examined using the string diagram technique. The length of time required for this review was directly affected by the fact that none of the members of the team could devote their full-time attention to it. The report notes that the evaluation would have been helped by the existence of a detailed architect's brief.

Content Sections on ward units; the operating theatre suite; laboratory services; the pharmacy; central sterilising; the syringe service; the central supply area; the out-patient and casualty department; the radiology department; the physiotherapy department; the kitchen, dining-room and canteen; the laundry and sewing room; disposal of refuse; the administrative and records office; the stores; the teaching department; the nurses' home; the toilet and cloakroom accommodation; the fabric of the building; the floors; the boilerhouse and mechanical services; visitors; car parking. There are four appendices: a diagram showing the general layout of the hospital; a reproduction of the questionnaire used by the survey group; a ward plan; and the results of noise measurements.

Type of publication Offset lithography from typewritten originals. There are halftone and line illustrations.

NORTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD
Evaluation of the new OPD at Orsett Hospital (Tilbury and South East Essex HMC) by the Regional Work Study Unit
London North East Metropolitan Regional Hospital Board 1965
(Report no 58)

Aim To determine 'to what extent the design of the building and the facilities it provides matched up to the demands made upon them during normal day-to-day operation of the department'.

Team The study was conducted by three members of the work study unit with the assistance of four specially recruited observers and four nursing cadets.

Method The study was conducted in two stages: measurement of the use made of the department over a four-week period in August/September 1964 and a critical appraisal of the layout of the building, its components, fixtures and equipment. Facts were gathered by direct observation by the work study team and by self-recording by the department's own staff. For one month the progress of each patient through the department was recorded on a card by the staff of the department and the work study team. This data was transferred to punch cards and then analysed. Users' opinions were gathered by questioning each consultant and the senior nurses on the layout, equipment and functioning of the department as a whole and of the sections with which they were particularly concerned. In addition, during one week, 170 patients were chosen at random and questioned. The questionnaire used was prepared in consultation with Miss Lisl Klein of the Department of Scientific and Industrial Research.

Content Subjects and areas covered in the report are frequency, size and duration of clinics; the patient movement pattern; the waiting areas; the consulting suites; the treatment and ancillary accommodation; medical records and reception; maintenance and engineering problems; cleaning

problems; and levels of staffing. Appendices include a plan of the department; a reproduction of the patient questionnaire; a schedule of clinics; an analysis of time spent by patients in the department; an analysis of waiting time for appointments; the patient movement pattern; an analysis of the ratio of companions to patients; the layout and distribution of waiting areas and consulting rooms.

Type of publication Duplicated.

COOPER, Paul
St Peter's Hospital, Chertsey, Accident and Casualty Centre. A Trial Evaluation Survey
London The King's Fund Hospital Administrative Staff College 1965 (unpublished).

Aim To see whether a comprehensive evaluation study of a new facility could be undertaken by one individual within a limited period of time and to an acceptable degree of objectivity; and to evaluate the extent to which the demand for the services of the accident and casualty centre had been accurately assessed and the extent to which the planning of the operational policies, the design of the building and the present methods of working met this demand.

Team This was specifically a one-man evaluation and was undertaken by the author.

Method One week was allowed for the conduct of the survey (including the production in draft of the report). The study relied on the collection and analysis of information of four kinds: statistical analysis of past records; statistical information from methodical observations made during the study; observations of day-to-day methods and practice; and the comments and opinion of staff obtained by structured interviews.

Content The report contains information on the needs to be met, the operational policies envisaged and a description of the building and equipment provided. For evaluation purposes, the following are analysed: the work which is being done in relation to the work load envisaged; the way in which the facilities are used including analysis of the pattern of staffing and organisation in relation to the operational policies envisaged; the effectiveness with which the facilities are used. Appendices include: a plan of the hospital; notes for the engineering staff on the running of plant and suggestions for maintenance of engineering equipment; notes for the guidance of the hospital staff on the use of the engineering services and equipment; a schedule of furniture and equipment provided; a reproduction of the individual record forms used for statistical purposes.

Type of publication Duplicated with inserted photographs and plans.

SCOTTISH HOME AND HEALTH DEPARTMENT
Victoria Hospital, Kirkcaldy
Edinburgh Her Majesty's Stationery Office 1965
(Hospital design-in-use no 2)

Aim This evaluation was the second in a series of studies designed to provide information likely to be of value in the planning of other new hospital units.

Team The survey group from the Scottish Home and Health Department and the Scottish Development Department comprised a doctor, a nurse, an architect, an engineer, and an administrator. Assistance in carrying out the studies of nurses' journeys was given by various members of the administrative, nursing, work study and architectural staff.

Method Preliminary discussions were held with officers of the South Eastern Regional Hospital Board, the board of management and senior members of the hospital staff before the review started. The method of study was similar to that employed in the department's first design-in-use study at Vale of Leven Hospital, with the following differences: after the first detailed ward study, certain recommendations with regard to equipment, the use of sterile packs and the keeping of nursing records were accepted and, when implemented, a *second* survey was undertaken; studies of nurses' journeys were made in ward units over a continuous twenty-four hour period; a detailed study of traffic through the radiology department was undertaken.

Content A review of departments and facilities including entrances; a ward unit; out-patient department; operating theatre suite; physiotherapy department; radiodiagnostic department; central sterile supply department; pharmacy; office accommodation; general stores; kitchen and dining-room; doctors' residency; nurses' home; school of nursing; boiler house; mortuary; and disposal arrangements. There are sixteen appendices: hospital morbidity statistics; categories of staff; a plan of a ward; an analysis of the number of nurses on duty in a ward; details of the case load on two wards; a plan of the geriatric assessment unit; a plan of the out-patient department; an analysis of patients seen as casualties and operations on out-patients; a plan of the dermatology unit; a plan of the operating theatre suite; a reproduction of the x-ray survey card; a plan of the radiodiagnostic department; details of a survey carried out in the radiodiagnostic department; an analysis of the office accommodation; plans of the ground, first and second floors.

Type of publication Offset lithography from typewritten originals. There are halftone and line illustrations.

SOUTH WESTERN REGIONAL HOSPITAL BOARD
Study Group
An Evaluation of the New Maternity Unit, St Austell
Bristol South Western Regional Hospital Board 1966

Aim To establish as accurately as possible the extent to which the unit was meeting the needs of patients and staff as a maternity unit and fulfilling the intentions of those who planned it; to provide guidance to others planning similar units who might benefit from the findings of the evaluation team; and to assess any particular items which required correction.

Team The team consisted of medical, nursing, architectural, engineering and work study representatives.

Method A meeting was held with the consultant architect at which the plans and policies of the unit were discussed. Prior to the team's visit to the unit, a meeting was arranged with the deputy group secretary and matron, at which the evaluation procedure was described. Questionnaires were then sent out to the nursing staff and to a sample number of patients (those who were in the unit at that time and a number of past patients). Comments were invited from the medical and midwifery staff who use the unit, the secretary, group engineer, and the catering officer. To assist them, an *aide memoire* was prepared which listed headings under which comments would be welcomed. The replies and comments were collated and summarised. The team visited the unit and spent 2½ days in assessing the unit as a whole, using all the above information to assist them. Each room in the unit was assessed in the following way using the check list: the location of the room was noted, particularly in relation to other rooms and departments; the access was considered; the area was measured and its adequacy/inadequacy noted in relation to the room's functions; the layout of the equipment and furniture was noted and details of functional efficiency, ease of use, maintenance

were checked: the engineer made a particular note of all engineering details – ventilation, heating, lighting, power outlets, telephone, nurse call, etc; adequacy of windows was noted; a special check was made of the finishes in each room.

Content A general description of the unit, a summary of the team's findings, conclusions and recommendations. Appendices include a schedule of accommodation, the operational policies for the unit, room assessments including drawings, an engineering report, a reproduction of the check list used in the evaluation, and an analysis of replies to the questionnaire.

Type of publication Duplicated with inserted illustrations and plans in the form of photocopies.

UNITED SHEFFIELD HOSPITALS
The Children's Hospital Assessment of the New Ward Block Western Bank, Sheffield 10 Sheffield The United Sheffield Hospitals 1966

Aim To provide a description of the new wards; to make a number of specific recommendations where the wards were not functioning correctly, in the hope that they would be of use in future planning of paediatric wards; to comment on those aspects which appeared to be working well.

Team The team comprised ten members directly associated with the hospital and fully aware of its problems, but none of whom was directly involved in the day-to-day work of the wards.

Method The team held two meetings, direct inspection of the wards was carried out and discussions took place with the staff concerned. Information was principally collected by direct contact by individual members of the team. Detailed analysis was restricted to the neo-natal ward and to one of the medical wards, but comments arising from problems on the other two wards were incorporated.

Content A description of the redevelopment plan; a general description of the new wards; an evaluation of the siting of the wards; an evaluation of the layout, the use of space, the privacy and the comfort; an analysis of staffing and an examination of the viability of the size of the unit; an analysis of the provision for medical teaching, other staff, and ease of maintenance; an analysis of engineering services (heating and ventilation); detailed observations on rooms, facilities and equipment; and a summary of conclusions.

Type of publication Duplicated with inserted plan in the form of a photocopy.

MANCHESTER REGIONAL HOSPITAL BOARD
Victoria Hospital Blackpool Evaluation of New Ward Block Manchester Manchester Regional Hospital Board 1966

Aim To establish whether the building was fulfilling the intentions of those who planned it and to provide information to assist in the planning of other new ward blocks.

Team The evaluation was undertaken by the Manchester Regional Hospital Board with the help and cooperation of the officers of the hospital management committee. The team included members of the board's medical, nursing, architectural and engineering departments, together with a work study officer. Coordination of the work of the members of the evaluation team was undertaken by the capital works section of the board. The chairman's foreword notes that there are a number of issues where the evaluation team had been critical but the feature, to judge from the questionnaire, has been acceptable to the patients. He asks whether this is an indication that the planners are seeking to apply too exacting standards.

Method No description of the method used is included in the report.

Content A description of the general layout of the wards; individual room descriptions; analysis of communications, control of infection, mechanical engineering services, electrical engineering services, and the planned maintenance system; and a summary of conclusions. Appendices include: a ward plan; an analysis of patients' replies to questionnaires; patients' statistics; staffing details; analyses of rooms and areas in the wards; central sterile supply, and frequency of room utilisation.

Type of publication Letterpress with halftone illustrations and line plans.

SCOTTISH HOME AND HEALTH DEPARTMENT
Bellshill Maternity Hospital
Edinburgh Her Majesty's Stationery Office 1968
(Hospital design-in-use no 3)

Aim The report states 'With the amount and quality of guide material now available, the need for . . . an exhaustive presentation of design-in-use studies has passed. The Bellshill study has, therefore, been given a much more concise format, highlighting the main lessons to be learned from an active maternity unit in a form which can readily be assimilated, and indicating aspects which can be followed up in greater detail by those with some special interest'.

Team A group from the Scottish Home and Health Department and the Scottish Development Department that included medical, nursing, administrative, architectural and engineering officers.

Method Not described in the report but similar to that used in the other Scottish studies.

Content A description of the historical background to the project; a statistical summary; short sections reviewing the design, the structure, and the engineering features; and planning appraisals of the main departments.

Type of publication Offset lithography from typewritten originals with a halftone illustration.

SCOTTISH HOME AND HEALTH DEPARTMENT
The Falkirk Ward
Edinburgh Her Majesty's Stationery Office 1969
(Hospital design-in-use no 4)

Aim To evaluate the operational features underlying the design of the ward unit, among them: 'the importance of planning for flexibility in use, and its contribution to high bed occupancy; use of single rooms; value of locating patients' clothes lockers within the bed-curtain areas; effect on staff of working in internal rooms; degree to which noise control has been achieved; the influence of the layout on domestic services; the influence of the design on nurse staffing, the centralisation of supplies, the topping-up system of supplies, two forms of heating, a nurse call system and decentralised WC and washing facilities'.

Team The team was multi-professional, consisting of a doctor, an architect, an administrator and a nurse.

Method 'To a considerable extent, the factual and statistical information collected by the ward staff during the initial months of working provide answers to the questions posed. The department was anxious however to secure that the evaluation should be as thorough and authoritative as the time and resources available would permit. They appreciated that the number of workers with the appropriate professional experience in the analysis of ward units was limited, and that such individuals could not be expected to set aside the many other pressing demands on their time to make a detailed and lengthy study of the Falkirk ward unit. They therefore decided to approach the evaluation of the ward in three ways by arranging for: the collection of factual information by the ward staff according to headings devised in consultation with the Scottish Hospital Centre, and the subsequent analysis of this information with cooperation from the Centre: a detailed 24-hour survey of nursing journeys in the ward by an experienced multi-professional group, and the preparation of string diagrams from the information collected; a two-day symposium to which a wide representation of interested individuals would be invited to consider and assess the material collected and to express views on the experiment'.

Content An introduction, a description of the method of evaluation, details of the planning assumptions, photographs of the ward and a description of the architectural and engineering features. There are details of the operational features to be evaluated, operational statistics, a note on the survey undertaken at the ward, users' reactions in the form of articles by a consultant surgeon and the administrative ward sister, a discussion of standards and costs with a cost analysis, a report of views expressed at the symposium held in December 1967, a list of organisations associated with the project and a floor plan.

Type of publication Offset lithography from typewritten originals. There are halftone and line illustrations.

C WORK ON EVALUATION BY THE DEPARTMENT OF HEALTH AND SOCIAL SECURITY The following notes were prepared specially for this report by the Department of Health and Social Security.

1 The department's original intention was to mount a series of design-in-use studies on a national scale, setting up multi-disciplinary teams from regional hospital boards, assisted and guided in their work by members of the department's own team. It was hoped that the results of those studies would provide valuable information on building and engineering design which could be fed back to hospital authorities to assist them in their hospital building programme projects.

2 In order to devise a technique for evaluation the department's multi-disciplinary team of six, augmented by a further eight officers, undertook a study in depth of the medical and surgical wards at Poole Hospital over a period of three days in January 1965. One lesson learned was that the team needed to be smaller to avoid disturbance and distraction to the ward staff. A further study was subsequently carried out in July 1965 at the Queen Elizabeth II Hospital, Welwyn with the main team of six members only.

3 These studies enabled the team to produce a draft HOSPITAL TECHNICAL MEMORANDUM describing a method for conducting design-in-use studies and for reporting the results in a standard form. The memorandum set out the pattern which the report should take.

4 The recommendations in the memorandum were tested in subsequent studies at Luton and Dunstable Hospital. The first visit of the team to the hospital took place in April 1966 for a period of one and a half days, the second in May 1966 for two days. A report was produced (but not published) following the lines recommended in the memorandum.

5 Whilst only wards were studied at Poole, Welwyn and Luton, it was intended that the method should be suitable for the study of any other department. However, the production of the report mentioned in para 4 above proved to be a time-consuming operation, particularly when viewed in the light of the intended national exercise of some forty-five studies a year. Furthermore, because of the length of the reports it was considered doubtful whether information on particular design points could be easily extracted for use nationally, as required.

6 It is now thought that apart from those responsible for either the design, management or use of particular hospitals few gain much of significance from the isolated evaluation of those hospitals; this would suggest that this type of assessment should be commissioned locally. An example of a quick evaluation for the benefit of designers and users is that carried out on the department's development project at Walton Hospital, Liverpool. One-day seminars were held on the out-patient department and the accident department and a third is proposed for the x-ray, pharmacy and CSSD. Representatives of the architects and all users attended, and lists of questions were discussed. These questions were concerned primarily with the functioning of the department but included space

standards, environment and movement of staff and goods. As a result of these seminars several alterations have been made to the running of the departments and some changes in the equipment and fittings.

7 As far as full-scale design-in-use studies are concerned, the department's work will in future be carried out in a manner designed for maximum *national* benefit. There have already been studies, by visits, during the course of the design work on standard departments and accommodation for the mentally ill. More detailed investigations will be necessary for the work on the 'whole hospital' design project. When the new standard departments are in use generally, evaluation results can be incorporated in subsequent versions of their design.

8 In the meanwhile, the department intends to carry out evaluations into the effectiveness of the large new district general hospitals and other major new developments. A study will be mounted, the basic aim of which will be to work out a system for measuring the effectiveness of new buildings and for exploring their running costs. It is hoped that there is already available a considerable amount of information in the regions on this subject and that appropriate regional hospital boards will cooperate with the department in its investigations.

THE EVALUATION OF NEW HOSPITAL BUILDINGS

by J K Hunter,
Principal Medical Officer, Scottish Home and Health Department.
The substance of an article published in **Health Bulletin Vol XXIII No 2 1965**

The attractive features of new accommodation have a particular appeal to those who have worked in old and deficient units. But newness can be deceptive and experienced observers looking at basic functional requirements may elicit important points for future reference when any new design is examined in use. Recent studies of this kind include NUFFIELD HOUSE, MUSGRAVE PARK HOSPITAL, BELFAST; AN EVALUATION OF NEW GUY'S HOUSE; and VALE OF LEVEN HOSPITAL.

It is not easy to make the most of one's own experience. It is even more difficult to learn from that of others as there is the added problem of distinguishing well founded views from preference or prejudice. To many workers the degree by which accommodation is better or worse than conditions previously experienced seems more impressive than an assessment of what might be a more rational arrangement. The same applies to enquiries from patients. In the evaluation of new hospital buildings what is purely personal and subjective has to be recognised and regarded in quite a different light from views based on more precise and reasoned observation.

Sources of Basic Data Hospital planners draw basic data from a variety of sources, and are exposed to influences of which some are more useful than others: some are well informed, some are superficial, some prejudiced. They range from impressions gained by those who pay brief visits to hospital wards and departments, to publications resulting from detailed and systematic research. Between these extremes is the information emerging from routine inspections, conferences, discussion groups and points gathered by means of questionnaires. Recently, there has been considerable activity in collecting and editing current opinions obtained by the circulation of draft notes to hospital boards and committees. Data also results from the 'work studies' of certain activities in existing hospital situations. Individuals, working parties and committees carry out reviews and make reports on particular subjects, and with the commissioning of more new buildings, there is the type of project called a design-in-use study – that is, the systematic evaluation of new accommodation. Information also comes from mock-up and simulation studies, from the development of advanced highly specialised units and research on a long-term basis.

As experience is gained in design-in-use studies they may secure a high place in the scale of values, but it is clearly impossible in terms of time to work out the proposed functional details of a hospital, design and build it, evaluate it, adjust it and proclaim the result, holding back successive projects until all the lessons have been learned. This sequence must be cut into at some point and evaluation – if it is to have any application to the current building programme – must be done on what exists and with such synthetic aids as can be devised such as the standard nursing day in ward units. This means that studies have to be made in facilities already outmoded and in this it is important to distinguish necessary

functions and key activities from methods of working imposed on staff by the particular design. The study should aim to discover in these units, and in a reasonably short time, the good and bad points to be incorporated in, or eliminated from, future projects. In addition, such studies can point to physical and organisational changes which might improve the efficiency of the particular hospital and to further studies in depth which might be done. The data may be useful for reference by other planners, and experience has shown that such studies are most instructive to those who take part in these.

Standards While any evaluation implies judgements against some form of standard, the position in hospital work is complicated by the way in which standards vary. If widely accepted standards existed for the shape, size, fittings and finishes of any particular hospital room, or an optimum way in which each of many activities should be undertaken – even if hospital workers were reasonably consistent in their opinions – evaluation would be greatly simplified. No one will dispute, however, that a vast store of practical experience exists in our hospitals, though much is gained by people with limited opportunity or ability to analyse and express it. In many cases, experience results only in generalisations and a broad division of situations into those that are either liked or disliked. Undue stress may be given to observations during visits to wards and departments although conditions at the times of the visits may not be typical, and the familiar element of work may comprise only part of the complete functional picture.

It is, of course, most important to elicit the users' opinions, but they must be interpreted with caution and planning should never be based on an individual officer's likes or dislikes. Technical developments will continue, acceptable standards will change and it is of the utmost importance to sift the evidence and assess what is important, what needs to be done and the accommodation for that. First principles must be examined and this takes the survey team into the realm of the common things so frequently taken for granted. The complete cycle of operations – supply, treatment or service, and disposal – must be considered and this means looking not only at the individual 'bits', but at their interrelationship. This involves sluice rooms, linen rooms, pantries, the disposal of rubbish, WCs, bathrooms, showers, domestic service rooms, lifts, hatches and hoists, windows, doors, floor coverings, wash-hand basins, curtains, trolleys and cubicles as well as the sizes and shapes of a host of rooms and areas. Indeed, all the common everyday things as they affect or are affected by hospital work by day and by night.

Design-in-use Studies A multi-professional team from the Scottish Home and Health Department and Scottish Development Department has completed two design-in-use studies of new hospitals and begun a third.[10] In addition, survey work has been carried out at sixteen hospitals in relation to a Planning Note on consultative out-patient departments to be published later this year.[11] Four of these out-patient units were new and two recently up-graded. Medical, nursing, administrative and architectural staff have been involved and they had access to engineering advice and to others expert in particular fields as necessary. All the survey workers have some appreciation of work study methods and none was concerned in the planning or running of the hospitals under review. The latter point is

important as the group must be able to approach its task with no inhibitions. It is essential that the members of the team should be conversant with a wide range of hospital practice so that the survey can from the outset be interpretative and not merely another inspection. The team should not be large, say four or five, and an appreciation of work study helps as a common factor in their general approach and method of enquiry. An unknowledgeable team would be merely inquisitive and Pickwickian; it would not obtain the confidence and cooperation of the hospital staff.

Planning of Studies 1 TYPE OF STUDY TO BE UNDERTAKEN These vary and three broad categories might be distinguished. The most usual kind is likely to be one where the accommodation is examined systematically, briefly described, illustrated and conclusions drawn. This may cover a whole hospital or relate to a particular unit or department as a series of hospitals. A second type includes some studies in depth – perhaps the more detailed examination of a particular department, or the improvement of some procedure may be suggested, implemented and resurveyed. This, of course, takes considerably longer. The third type may be mounted on its own or emerge from more general studies; it would relate to some specialised subject requiring examination in more technical detail. The engineering services might be taken as an example of a suitable field for special studies. Questions of heating, ventilation, lighting, lifts, telephones, mechanical aids, etc, can of course be assessed from the point of view of the general user, but a more detailed appraisal of engineering installations would require a team of a different kind.

2 TIMING It is desirable that a new unit should be left to function for at least a year before a study is undertaken.

3 APPROVAL IN PRINCIPLE The relevant boards must be informed of the proposed project and approve it before any action is taken at the hospital itself. It may also in some cases be necessary to obtain clearance from trade union representatives – eg, if any review of domestic services is to be included.

4 PRELIMINARY WORK All relevant planning documents and normal records should be studied and the usual indices of work done. This should become easier when more comprehensive briefs for the architects are available and planning assumptions more clearly stated. It is essential that the objectives of the study are understood and informal meetings at the regional board, board of management and at the hospital itself have proved exceedingly useful. It is at such meetings that the proposed study can be fully explained. Heads of departments, the project architect and the consulting engineers should be promised the opportunity to see the report in draft form.

5 VISITS Apart from major studies such as a 24-hour study in at least one ward unit including a clinical assessment of the work load, and some follow-through studies in out-patient departments, visits to parts of the hospital should preferably be of short duration and repeated on several occasions. It is a mistake to spend long periods in one department questioning the staff; this interrupts routine work. Surveys should not interfere with normal

duties. Hospital staff should be encouraged to express their views on the accommodation they use and given the opportunity to do this. Such views should be recorded and carefully checked.

6 RECORDS It is important to make records at the time of each visit or very shortly thereafter. Detailed measurements should be made where necessary. Although a set of drawings should be available to the team, a tape measure is an essential piece of equipment.

7 SPECIAL STUDIES In ward areas detailed surveys of nurses' journeys are of great value in indicating room usage. To record only activities in the 'bed' areas may omit important data concerning the use and relationships of important ancillary rooms. In out-patient departments the method of choice is to record in detail the progress of patients from arrival at the reception point through the consulting suite and until they leave the department. Such records can be effectively set out in chart form. For studies in ward areas and in large out-patient departments it may be necessary for the team to be supplemented by additional workers. Medical and nursing members of the team are essential for observations in consulting areas.

8 STAFF Hospital staff should not be asked to make detailed records specially for the survey. Experience of this has been unsatisfactory and in any event the staff are fully engaged otherwise.

9 QUESTIONNAIRES AND PRO FORMAS For detailed studies of design and basic functional requirements questionnaires are of a limited value and difficult to interpret. Pro formas are more useful as check-lists than for recording the observations in the wards and departments.

10 SECRETARIAL AND OTHER ASSISTANCE The need for secretarial help in handling papers is important throughout the survey and when the report is being compiled. Access to photography and assistance from a draughtsman are also required.

11 REPORT The report must be easy to read and must avoid irritating cross-references and vague terms. To say that some piece of apparatus is 'larger than required' or that the ventilation is 'inadequate' may give a useful lead for further investigations, but comments such as a room is 'too large' or 'rather too small' or 'should be bigger' mean little. The effectiveness of the report is helped if its presentation allows the main conclusions to be appreciated without being lost in sections of more specialist interest. It is possible that reports should be in two sections, one for the ordinary reader who is unlikely to be interested in detail relative to the particular hospital and the other – a more limited edition – available for those with a more detailed and particular planning interest. It is possible also that the preparation of very detailed charts may be more trouble than they are worth – though they may achieve a more telling picture than a verbal description alone.

TIME TAKEN Early experience can only be an approximate guide when the teams' members have had other duties to perform. This has both advantages and disadvantages. If those with planning experience are divorced from routine work they can easily get too detached: if they are overpressed with other activities, studies become too sporadic. Much also depends on the experience of the observers themselves, and on the clarity of the planning assumptions made when the accommodation in question was designed and commissioned.

It may be estimated roughly that an experienced team of the kind described above with access to good basic data might achieve the following for a medium sized hospital if the group could devote at least two or three days a week to this work.

Preliminary study of records, clearance from boards and explanatory discussions	say 3–4 weeks
Review of wards and departments	say 4–6 weeks
Drafting report, taking photographs and having tracings made	say 4 weeks
Circulation for comments	say 4 weeks
Finalisation of report	say 2 weeks
Printing	say 2–3 months

About 5 months to going to print – say two surveys a year. Smaller surveys would take less time and full-time work would be quicker but, unless answers are required with great urgency, it is useful for those concerned to be involved in other planning activities as their experience may be applied in current planning discussions before reports are completed and published.

10 This article was written in 1965. The position now is that four studies have been completed and one is in preparation. Details of the published studies will be found in Appendix B.

11 SCOTTISH HOME AND HEALTH DEPARTMENT
Organisation and Design of Out-patient Departments
Edinburgh Her Majesty's Stationery Office 1967
(Hospital Planning Note no 6)

PROPOSALS FOR A METHOD OF ASSESSING THE PERFORMANCE OF BUILDINGS

by J Garnham Wright

Extract from a paper given at the University of York Institute of Advanced Architectural Studies in 1965

For an architect, a good brief contains information which is arranged rationally, following a progression from main aims to general detail, where each piece of information is derived from that preceding it. To be useful this follows the sequence by which a designer goes about getting an understanding of the design problem. It can be summarised as six stages.

1 He identifies the owners and the users, to discover the purpose and function and what they use. This is the *content* of the building. For example, 'The building is for an education authority (owner), will be used by 600 pupils aged 11–16 years (users), as a school for craft subjects, in which they are trained to use hand-tools and some machine-tools for woodwork and metal-work.

2 He establishes the physical conditions which are appropriate to these people using this kind of equipment for this purpose. For example, amount of light required on the working plane for children working certain hours at handicraft; the level of air, temperature and humidity for light manual and sedentary work; the fire resistance needed to give 600 pupils time to escape at the onset of fire, etc.

3 He establishes the amount of space needed, internally and externally, and how best it should be arranged. For example, the size of a classroom for pupils and equipment; the relationship between classrooms, sanitary accommodation, group assembly areas, etc.

4 He chooses the appropriate materials, structure and services for that particular building at that time and place, for example, robust structures and finishes, with a heating system allowing quick build-up of temperature, and sensitive to user control.

5 He forecasts the cost resulting from the provision of the chosen amount of space (3), at the technical quality required (4), and, if necessary, seeks with the owners to adjust the provision until the cost falls within acceptable limits.

6 He takes note of the location, so that the design may be fitting to the situation. For example, in the case of the school, the location for the building will be largely predetermined by the needs of the 600 pupils, being related to where they live, but the final choice of site should preferably follow all of the previous considerations.

These six stages can form the basis of a classification of performance used in the method of assessment. The six main categories of performance are thus represented by the keywords: CONTENT; CONDITIONS; SPACE; FABRIC AND MECHANISM; COST; and LOCALE. In each category, at the shallowest level, there is one basic question to be answered in

making an assessment, but an answer based on fully verified scientific facts can be made only after a number of further detailed ancillary questions are answered.

Information for the measurement and evaluation of each category can be arranged on cards. The basic question can be answered by value judgements on the top card, and the number of cards in each set will depend on the depth of the study and the degree of accuracy sought from scientific observations.

The cards will be printed for 'yes' or 'no' answers so far as possible on a boxed pro forma, which can be marked from a mask with windows over the boxes to govern the scoring, after the collection of information.

The basic questions are as follows.

1 Are the users able to carry out their tasks efficiently?

Keyword – CONTENT

A thorough answer means checking by operational research the number of people, their purpose and activities; the amount of gear used, etc.

2 Are the physical conditions suited to the requirements of the users?

Keyword – CONDITIONS

A thorough answer means checking on the external and internal climate; and the impact of the environment inside and outside on human perception. This entails physiological, psychological and sociological studies.

3 Is the space adequate and suitably arranged?

Keyword – SPACE

A thorough answer means checking on sizes and shapes of each room; relationships of rooms; and relationship of internal and external spaces.

4 Is the building safe?

Keyword – FABRIC AND MECHANISM

A thorough answer means checking on the performance of all the components of fabric, structure and services, for the design life of the building.

5 Has the owner been given good value for money?

Keyword – COST

A thorough answer means checking on the cost per unit (per person; per unit area and volume); the balance of cost between the various elements; and the cost of maintenance.

6 Is the building and its use well suited to the situation?

Keyword – LOCALE

A thorough answer means checking on subsoil, topography and the wider characteristics of the environment.

F

DESIGN-IN-USE CHECK LIST
Extract from **Procedures for Evaluating New Buildings,** produced by the South Western Regional Hospital Board 1967.

The check list is intended to be used for evaluations based on the observation of specified factors and relationships.

SHEET ONE: **HOSPITAL SITE**

1 **Location**
1.1 To other hospitals
1.2 To other medical facilities
1.3 To ambulance service
1.4 To patients' catchment area
1.5 To staff catchment area
1.6 To staff amenities—shopping, entertainment, banking and postal services
1.7 Public transport (road, rail, helicopter)
1.8 Main traffic routes
1.9 Direction signs (to hospital)

2 **Entrances and exits to site** (main and service)
2.1 Direction signs (to hospital, units and departments)
2.2 Control of entrances
2.3 Safety of access
2.4 Segregation of vehicles from pedestrians
2.5 Public shelter and other amenities

3 **Area**
3.1 Acreage of site
3.2 Density of buildings (space for further development)

4 **Site lay-out**
4.1 Siting of main buildings (aspect, orientation, etc.)
4.2 Roads
4.3 Paths
4.4 Siting of boiler house and chimney (smoke)
4.5 Examination of communications on the site for—
4.5.1 Patients—walking and stretcher, car parks, lifts
4.5.2 Staff—Lifts
4.5.3 Visitors
4.5.4 Supplies—laundry, sterile goods, and fuel
4.5.5 Disposal (including bodies)—laundry, sterile goods, and sewage

5 **Landscaping**
5.1 Economic use of existing contours
5.2 Blending of building with environment
5.3 Use of shelter belts
5.4 Planting of soft areas
5.5 Treatment of hard areas
5.6 Design for easy maintenance

SHEET TWO: **MAIN HOSPITAL BUILDINGS**

1 **Location**
1.1 To main entrance of site
1.2 To other medical facilities on site
1.3 To administrative buildings
1.4 To engineering services (boiler house)
1.5 To staff residential accommodation
1.6 To staff dining facilities
1.7 To staff teaching facilities
1.8 To staff welfare facilities
1.9 Aspect and orientation

2 **Entrances and exits to main hospital buildings**
2.1 For patients
2.2 For staff
2.3 For visitors
2.4 For supplies
2.5 Disposal
2.6 Reception facilities
2.8 Waiting and parking bays
2.9 Direction signs

3 **Areas**
3.1 Total area
3.2 Area of departments
3.3 Area of communication spaces

4 **Building layout and design**
4.1 Arrangement of departments (directness of association)
4.2 Traffic flow of—
4.2.1 Patients—walking stretcher
4.2.2 Staff
4.2.3 Visitors
4.2.4 Supplies
4.2.5 Disposal
4.3 Flexibility and growth
4.4 Simplicity of plan form
4.5 Compactness
4.6 Character

5 **Engineering services**
Check as for departments Sheet 3 and also
5.1 Check main lines of services for—
5.1.1 Simplicity of planning
5.1.2 Accessibility for maintenance

6 **Fire**
6.1 Access for fire fighting and escape vehicles
6.2 Fire mains
Check also as for departments Sheet 3

SHEET THREE: **HOSPITAL DEPARTMENTS**

1 **Location**
1.2 To other medical and surgical departments
1.3 To other diagnostic departments
1.4 To administrative departments
1.5 To staff facilities
1.6 To supply departments
1.7 To main services
1.8 To mortuary
1.9 To incinerator
1.10 To laundry

2 **Entrances and exits to departments**
2.1 For patients
2.2 For staff
2.3 For visitors
2.4 For supplies (including food)
2.5 For disposal
2.6 Reception facilities
2.8 Waiting and parking bays
2.9 Direction signs

3 **Area**
3.1 Total
3.2 Working area
3.3 Toilets and amenities
3.4 Circulation per cent
3.5 Number of beds (wards only)

4 **Department layout and design**
As for building layout see Sheet 2 but substitute 'rooms' for 'departments' where necessary.

5 **Environment and engineering services**
5.1 Heating
5.2 Lighting
5.3 Power
5.4 Ventilation
5.5 Medical gases and suction
5.6 Clocks
5.7 Call systems (general and emergency)
5.8 Telephone—
5.8.1 external
5.8.2 internal
5.9 Radio and TV
5.10 Water supply (hot and cold) standby electricity, vacuum cleaning, conveyor tube, staff location, vertical transport, etc. (as relevant)

6 **Fire fighting and protection**
6.1 Means of escape
6.2 Smoke protection (smoke stop doors)
6.3 Fire compartments
6.4 Structure and materials
6.5 Fire appliances (portable)
6.6 Hose reels
6.7 Mains (dry run)
6.8 Fire instructions

SHEET FOUR: **ROOMS AND SPACES**

1 **Location**
1.1 Relation to other rooms and spaces

2 **Entrances**
2.1 Number and signposting
2.2 Dimensions
2.3 Vision panel
2.4 Ease of use—furniture, door springs, etc
2.5 Finish and protection
2.6 Security

3 **Area**
3.1 Total (adequate, generous or inadequate)
3.2 Floor working area
3.3 Area of working surfaces

4 **Layout of Equipment and Furniture**
4.1 To suit procedures

5 **Details of—**	**Check each for—**
5.1 Equipment	1 Functional efficiency
5.2 Furniture	2 Accessibility
5.3 Storage	3 Ease of use
5.4 Disposal	4 Finish
	5 Dependability
	6 Maintenance
	7 Appearance
	8 Ease of cleaning

6 **Environment and engineering services**
6.1 Temperature
6.2.1 Ventilation—natural
6.2.2 Ventilation—artificial
6.3.1 Lighting—natural
6.3.2 Lighting—artificial
6.4 Power outlets
6.5 Call system and communication
6.6 Protection from glare
6.7 Noise factor
6.8 Acoustics
6.9 Water supplies, radio and TV, medical gases and suction, vacuum cleaning and conveyor tube, staff location, vertical transport, etc (as relevant)

7 **Windows**
7.1 View
7.2 Aspect
7.3 Use of opening lights
7.4 Ease of cleaning
7.5 Maintenance
7.6 Blinds and curtains

8 **Finishes**
8.1 Floor—
8.1.1 Non-slip
8.1.2 Comfort
8.1.3 Quietness
8.1.4 Ease of cleaning
8.2 Walls
8.3 Ceilings

9 **Soft furnishings**

10 **Interior decorations**
10.1 Appearance
10.2 Maintenance
10.3 Ease of cleaning

STANDARDS AND COSTS

Reprinted from **The Falkirk Ward,** published by Her Majesty's Stationery Office for the Scottish Home and Health Department 1969. This, Section 10 of the study, is reprinted as an example of the kind of cost discussion that has meaning for planners and designers.

10.1 The purpose of this section is limited to looking at the key functional features of the ward unit to assess their cost against the benefits these features provide. These cost estimates are not expressed in total cost terms, with capital and running costs brought to present value; the figures are limited to capital cost only.

10.2 This aspect of the evaluation exercise has not been developed in depth, and the information presented is incomplete and approximate; but some broad costings should help to focus attention on questions which are of importance in planning new hospital wards.

10.3 A key principle in all recent Scottish hospital planning has been that the department have tried to plan up to a standard and down to a cost. It is only since the expansion of the hospital building programme that began about 1960 that the scale of operations has justified the efforts needed to establish planning standards and cost limits; indeed it was only since then that there have been in the United Kingdom a reasonable number of new hospital buildings from which to draw lessons about functional, building and engineering standards, as well as about construction costs.

10.4 **Cost Limits** The Falkirk ward unit is a development project, built to exemplify certain standards; and a theoretical approach might have been to design a ward to ideal standards, then to build it, and so to find out what it costs. This is not, of course, what happened. As the planning work for the ward proceeded, costs were very closely scrutinised, and intentions were modified at various stages to reduce costs. The unit was basically a medical and nursing experiment and not an architectural or an engineering development project; and there was strong pressure to keep down costs.

10.5 Initially, in their planning and cost control operations, the team were working simply under the discipline of trying to keep costs as low as possible, compatible with the achievement of the main functional standards which the ward was to illustrate. In this they had a powerful spur in the form of the cost targets produced by the (then) Ministry of Health. The department is indebted to the ministry for the immense amount of work and original thought that they put into the concept of departmental cost allowances and cost limits; and it was highly gratifying to the Falkirk team when, just as they were about to proceed to the working drawing stage, the results of the Ministry's work on deep-plan wards emerged, and it became clear that the probable costs for the Falkirk ward were closely in line with the ministry's cost target figures for such wards.

10.6 The appendix to this section (*not included*) shows a later cost comparison based on tender prices, and an analysis based on final costs. These calculations reflect the ward costs

for the purposes of cost limit comparisons. At the time the contract was let, the Falkirk ward conformed to a cost limit based on the Building Note for deep-plan wards, but since then, building costs have risen while cost limits have not; and the department would now recognise that it would be extremely difficult, if not impossible, to plan and build a 120-bed ward block to the Falkirk plan within current cost limits, without cutting building standards below acceptable limits. This is not simply an academic question. The cost limits remain the basic cost controls, and in the further application of the Falkirk principles, which are already being applied elsewhere on a large scale, planning teams must keep within cost limits.

10.7 **Area Comparison** It is helpful before turning to the cost of particular features of the ward to look at one or two other general comparisons. One yardstick often used in ward comparisons is that of the area per bed. In this connection it is sometimes difficult to be sure that like is compared with like, but Table 1 shows the net areas per bed of a number of different wards, excluding lifts, stairs, and communication space.

Table 1 Net Areas per Bed for Different Types of Ward

Ward	Number of beds	sq ft per bed
Nightingale	24	200
EMS	28 to 32	174
Vale of Leven	2×25	183
Larkfield	32	246
Welwyn	2×29	228
Eastburn	30	262
Greenwich	72	248
Bristol	60	293
Falkirk	60	302
Gartnavel	72	307
Greenock	72	324
SHHD 6-bed	72	254
Aberdeen Royal Infirmary	58	394

The wards listed represent a wide range of accommodation from an almost complete absence of privacy for patients combined with sub-standard ancillary and sanitary facilities, to more acceptable and forward-looking standards. They typify planning opinion over more than a century of hospital design.

10.8 The precise figures in Table 1 are not important; but it can be seen that the Falkirk ward is near the top of the range. At present the nearest plan to be worked out on Falkirk principles, at lower areas per bed, is a linear version of Falkirk by Messrs Keppie, Henderson and Partners, who were also the project architects for the Falkirk ward. The Gartnavel plan provides 72 beds per floor, and has the equivalent of two or three additional consultants' rooms over the Falkirk plan. Allowing for this, it works out at almost the same area, 307 sq ft per bed. It seems therefore that going up to 72 beds per floor does not reduce the area

materially; and this is not related to a linear design; there is a deep 72-bed plan for Greenock, which brings out an even higher area per bed. It is interesting that at an earlier stage in the planning of the Falkirk ward, when the number of beds was increased from 48 to 60, the increase did result in a lower area per bed. A standard in the middle of the range would be about 250 sq ft per bed. This is the kind of figure the Department of Health are aiming at in their current standard ward exercise.

10.9 A first and very rough estimate can be made of the cost of the extra space at Falkirk over this rather arbitrary standard of 250 sq ft per bed by taking the difference – 52 sq ft per bed – and applying a sq ft rate to it. £6 3s. 10d. is the overall rate appropriate to ward accommodation. This would give about £320 per bed.

10.10 **Engineering Costs** The engineering costs obviously ought to include both capital and running costs; this discussion is restricted to capital costs.

10.11 The engineering remit specifically excluded the provision of cooling in this deep planned ward. This meant that the required environmental conditions had to be achieved by heating and artificial ventilation alone, supplemented by the opening of windows when required. The engineering costs of the ward worked out at 50s per sq ft. The ventilation system at 20s per sq ft, without cooling, can properly be considered a low-cost system, but even this costs as much as £300 per bed. Against this there are some offsetting savings. With the deep plan, the core areas require no heating at all, which possibly saves about £60 per bed. There is some reduction in the amount of expensive outer wall which is difficult to price. Some running costs are increased with an artificial ventilation system and some are reduced.

10.12 A more sophisticated system including cooling, possibly a twin duct system which would permit much better or local control, would probably cost about twice as much as the low cost system installed at Falkirk. The engineering costs of the Falkirk ward have also been affected by the ward layout, which resulted in an appreciable number of long runs of service.

10.13 **Deep versus Linear Plans** Consideration of engineering costs leads to the question of the respective merits of deep versus linear plans. On the basis of experience gained so far, the department are prepared to approve deep ward plans in Scotland only on sites where it is impossible to provide linear plans economically.

10.14 The deep plan at Falkirk is only one way of planning a ward to the principles described in the department's Ward Planning Note. The department's ward planning team are satisfied that the linear Gartnavel plan meets all the essential requirements set out in the planning assumptions, and the engineering context of the ward plan is much reduced compared with Falkirk.

10.15 The following features of the Falkirk ward seem to be the most important functional features carrying identifiable cost implications. Some attempt is made below to explore the cost implications of these features.

10.16 **Four-bed Rooms** The choice of four-bed rooms is one cost factor that can be treated fairly rigorously. The department know from the Falkirk and Gartnavel plans that a ward unit using four-bed rooms in the intermediate care area needs about 302 sq ft per bed; this is on the basis of 72 beds per ward floor, including a 12-bed intensive nursing care area on the Falkirk pattern. Their ward planning group have prepared an alternative linear 72-bed unit based on 6-bed rooms in the intermediate care area which has now been fully worked out. This unit, with eight 6-bed rooms instead of twelve 4-bed rooms in the intermediate care area, a rearrangement of the nurses' working rooms and some other relatively slight modifications, works out at 254 sq ft per bed. By far the greater part of this reduction in area is attributable simply to changing from four beds per room to six.

10.17 When costing four-bed rooms against six-bed rooms in a 72-bed floor, it is possible to put a rough cost on this feature of £300 a bed. This is not a small price, but it is necessary also to consider with care the benefits of choosing four beds as against six beds per room. In 1963 International Hospital Federation ward planning discussions, the department's representative had to defend the choice of four-bed rooms mixed with single-bed rooms against a strong body of international opinion that advocated one and two-bed rooms only, and considered Scottish thinking very backward.

10.18 **Provision of Separate Washing Facilities and WCs for each Bed Room** The alternative to the provision of separate patients' washing facilities, showers, and WCs opening off each bed room in the intermediate care area is the provision of grouped sanitary facilities. The main difference in cost here arises from the additional circulation space needed. Most of this is in the bed areas themselves, but there will be some consequential increase in the ward corridor as well. There will also be some extra plumbing and engineering costs because of longer runs for pipes and ducts to dispersed points. Comparing the Falkirk ward with a 30-bed ward based on grouped plumbing for patients, the cost of this feature may be estimated at about £76 per bed, plus a factor for the engineering and plumbing costs of dispersal. Changing to six-bed rooms in the intermediate care area reduces the cost of this feature considerably, to a matter of only about £36 per bed, again excluding the additional engineering and plumbing costs attributable to dispersal.

10.19 **Rooms versus Bays** The third feature also concerns the multi-bed rooms in the intermediate care area, and is in effect the choice of rooms instead of open bays. At Falkirk the cost of providing partitions and doors to the corridor from these rooms is about £1,400, or £23 per bed. In the department's linear 72-bed plan with six beds per room, the cost is about £14 per bed. The cost of possible alternatives varies, from the cost of full partitioning, omitting only the doors, to almost *nil* in those examples where no partitioning at all is provided to the corridor. The saving might be put at £10 per bed. Some further saving, perhaps of about the same order, may be possible if the omission of doors and widening of the door aperture should permit some narrowing of the ward corridor. The overall cost of this feature might thus be about £20 per bed.

10.20 **Dispersed Day Space** The three features mentioned and one other make up the

main special characteristics of the Falkirk intermediate care multi-bed rooms. The other is the provision of dispersed day space, that is, a certain amount of sitting space in the bed room, found within the total day area to which cost limits have been related. It does not appear that this feature carries any significant extra cost.

10.21 **Separate Nurses' Working Rooms for the Intensive Nursing Care Area** A basic feature of current ward plans, beginning with Falkirk, is the provision of a separate cluster of nurses' working rooms to serve the intensive nursing care area. There are three such groups for 60 beds at Falkirk, and three for 72 beds in later plans. This element can be provided within a 72-bed floor at 250 sq ft per bed, if six-bed rooms are adopted in the intermediate care area. One way to estimate their cost is to think of the alternative of the nurses' cluster serving 30 beds, as in some plans which do not provide for an intensive nursing care area. (One of the nurses' clusters in the intermediate care area at Falkirk will serve 28 beds, when the interchangeable four-bed unit in the intensive nursing care area is in use as part of the main intermediate care area. In a 72-bed ward in this situation there will be 34 beds served from a single cluster.)

10.22 The nurses' cluster with its share of ward circulation costs roughly £5,200. Three for 72 beds thus costs £215 per bed, and one for 30, £172 per bed, a difference of about £43 per bed. This is about one-eighth of the cost of choosing four beds instead of six. It is also about the cost of a week's stay in an acute hospital. This admits the argument that if the care facilitated by the provisions of the independent nurse-working rooms for the intensive nursing care area shortens average stay by 2 per cent it is paid for in little over a year. This calculation could obviously be considerably refined and developed.

10.23 **Summary** Table 2 summarises the cost estimates of the features that have been isolated.

Table 2 Rough Cost Estimates for Individual Planning Features

	£ per bed
Four beds rather than six beds for intermediate care area	300
Separate WC facilities for each room in the intermediate care area	36 to 76 (plus)
Rooms rather than bays	20
Separate nursing cluster for the intensive nursing care area	35 to 45

10.24 It must be stressed that these estimates are very rough, and that more detailed work would be needed to establish more reliable and accurate estimates. The department consider however that they give a reasonably fair picture of the relative costs of four main planning features of the Falkirk ward, and show where the weight of argument should be directed in relation to costs. Cost economies must however be considered in relation to functional effects.

10.25 It is essential to keep in mind the purpose of spending money on good ward planning. It represents an investment over at least half a century; it must meet unexpected changes and it will be in use day and night all the year round. The great majority of nurses work in the wards; in Falkirk itself, for example, three-quarters of the total nursing staff are allocated to the wards, and the ward is the area where the hospital planner can do most to facilitate the work of the nurse. It is also the area where he can do most to make the patient's stay in hospital comfortable and can help to remove unnecessary apprehensions and indignities with which our patients are faced in some of the units which are in use today.

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