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THE EVALUATION OF INFORMATION SYSTEMS IN THE ORGANISATIONAL
CONTEXT OF THE NATIONAL HEALTH SERVICE

VOLUME 2

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Appendix A.

Evaluation Survey Questionnaire.

**EVALUATION OF INFORMATION SYSTEMS IN THE
NATIONAL HEALTH SERVICE**

QUESTIONNAIRE

Health Authority.....

Name of respondent.....

Job title.....

Please add comments or explanations to your answers if you wish, and feel free to continue on additional sheets if necessary.

Please return the questionnaire in the envelope provided.

SECTION 1

This section asks you to give some general information about your Health Authority and its systems.

1.1 How many people work on the development and support of information systems in your Authority? Please provide the number of whole time equivalent staff who carry out this work in each of the following groups:

Computing staff _____

Information officers _____

Others _____

1.2 What are the main operational and information systems in use in each of the following application areas?

Hospital

Community

Finance

Administration

1.3 What systems are currently being planned, developed or acquired in each area?

Hospital

Community

Finance

Administration

1.4 What is the source of the systems used in your Authority? (Please tick the appropriate boxes to indicate the main source of applications and also any other sources.)

	Main source	Other sources
Developed in-house	_____	_____
Developed for your authority by an external organisation	_____	_____
Obtained from another Health Authority	_____	_____
Operated for your authority by another Health Authority (e.g. Region)	_____	_____
Commercially produced packages	_____	_____
Other source..... (please specify)	_____	_____

1.5 What methods of systems analysis and design are used in your authority? (Tick those used and add any others.)

SSADM	_____
Traditional analysis methods	_____
NCC	_____
Quickbuild methodology	_____
Others..... (please specify)	_____
.....	_____
None	_____

1.6 Does your Authority have an Information Strategy? (Tick one.)

Yes	_____
No	_____
Under development	_____

1.7 If your strategy is sufficiently well developed, please answer the following:

Does the strategy contain criteria by which proposals can be assessed?	YES/ NO
Does it lay down procedures for the selection of systems?	YES/ NO
Does it specify procedures for the assessment of completed systems?	YES/ NO

1.8 Which of the following recommendations and procedures for procurement and selection of computer systems are used in your Authority at present, and which are you proposing to use in the future? (Tick all those used.)

	Used now	To be used in future
GATT regulations (where applicable)	_____	_____
NHS Information Management Group Guide to the Preparation of an Operational Requirement	_____	_____
Information Management Group Method for Identifying the Costs and Benefits of Computer Systems used in Health Care	_____	_____
Institute of Purchasing and Supply contract guidance	_____	_____
Other.....	_____	_____
(please specify)		
None	_____	_____

SECTION 2.

The next section asks you to describe the investigations which take place during development and procurement of systems, and evaluation of installed systems. If systems are treated in different ways depending on their size, type, or functional area, it would be helpful if you could photocopy this section and return one set of answers for each type of system.

2.1 This section relates to (delete the option which does not apply):

All systems/ The following system types:

- 1.
- 2.
- 3.
- 4.

2.2 At what points in the development or acquisition of a system are decisions made to proceed with or discontinue a project, and between alternative software packages, proposals or major design options?

2.3 What evaluation procedures or other investigations support these decisions?

2.4 Which of the following direct and indirect costs are taken into account when selecting systems? For each entry in the list below, please tick the appropriate column to indicate whether it would be considered and how it would be assessed. If an item would usually be quantified in non-financial terms, please state what measure would be used, e.g. hours, productivity measures. Please add any additional types of cost which would be included in your assessment.

	Not included	Monetary value	Qualitative assessment	Other measure (please specify)
Initial costs:				
Buildings, site preparation				
Hardware				
Software development (external)				
Consultancy				
Training (external)				
Time spent by systems staff on:				
• development/procurement				
• implementation and training				
Time spent by user staff on:				
• development/ procurement				
• implementation				
• training				
Recurring costs:				
Stationery				
Other consumables (tapes etc.)				
Hardware maintenance				
Communications costs				
Software support (external)				
Time spent by staff on:				
• system operation				
• data collection				
• support				
Indirect costs:				
Risk of system failure				
Disruption caused by changes				
Effects on users' job satisfaction				
Other costs.....				
.....				
.....				
.....				
.....				

2.5 Which of the following types of **benefit** are taken into account (where applicable) when selecting systems? For each entry in the list below, please tick the appropriate column to indicate whether it would be considered and how it would be assessed. If an item would normally be quantified in non-financial terms, please state what measure would be used. Please add any additional types of benefit which would be included in your assessment.

	Not included	Monetary value	Qualitative assessment	Other measure (please specify)
Meeting statutory/central requirements				
Reduced or avoided costs:				
• stationery & other consumables				
• equipment				
Time savings:				
• clinicians				
• managers				
• nursing and paramedical staff				
• laboratory staff				
• clerical staff				
• others				
Availability of staff for additional tasks				
Better management information:				
• new information				
• more timely information				
• more appropriate information				
• more accurate information				
• easier access to information				
Improved service to patients				
Other operational improvements				
Improved decision-making				
Better management control				
Better use of resources				
Ability to respond to change				
Improvements in job satisfaction				
Better security against loss of data				
Greater confidentiality				
Other benefits.....				
.....				
.....				
.....				
.....				

2.6 Which, if any, of the following additional factors would you normally take into account when deciding whether to introduce a new system or deciding between alternative solutions? (Tick any which are considered and add any others.)

- Type of finance required _____
- Other potential uses for available resources _____
- Compliance with your Authority's Information Strategy _____
- Use of preferred hardware _____
- Opinions of reference sites _____
- Availability of software support _____
- Potential for integration with other systems _____
- Usability _____
- Size or reputation of supplier _____
- Others..... _____
- _____
- _____
- _____
- _____

2.7 Which, if any, of the following methods are used in calculating and comparing the values and costs of systems? (Tick any which are used and add any others.)

- Statement of capital and revenue costs _____
- Payback period _____
- Net Present Value _____
- Internal Rate of Return _____
- Equivalent Annual Cost _____
- Other methods..... _____
- _____
- None of these _____

2.8 What measures, if any, are taken to ensure and/or confirm that actual costs are as predicted and that the expected benefits are achieved?

2.9 Does any formal review of a system take place once it has been implemented? (Tick one.)

Yes _____

No _____

For some systems _____

If a review is carried out for some systems, what determines whether a system will be reviewed?

How long after implementation does a review take place?

2.10 What aspects of a system are included in post-implementation reviews? Please tick all those that apply, and add any others.

- Costs _____
- Realisation of financial benefits _____
- Realisation of other benefits _____
- Hardware reliability _____
- Software reliability _____
- Computer system performance _____
- Amount of use made of the system and/or the information provided _____
- Effects of information produced by the system _____
- Users' opinions of the system _____
- Users' job satisfaction _____
- Effects on service to patients _____
- Effects on operation of the department / Unit / HA _____
- Security and privacy _____
- Computer system operation _____
- User department's procedures _____
- Ergonomic factors _____
- Satisfaction of pre-defined system objectives _____
- Others..... _____
- _____
- _____
- _____
- _____
- Not applicable _____

2.11 Does any other review of any aspect of an operational system normally take place in addition to (or in place of) the post-implementation review described above? If so, what aspects of systems are investigated? (Either those in the list above, or others.) When and how frequently does this occur?

2.12 Have you ever had occasion to carry out additional investigations of any system which were not part of your normal procedures as described in questions 2.10 and 2.11? If so, what investigation was carried out, and what made it necessary? (If applicable, please describe more than one occasion.)

2.13 What liaison takes place between the users of systems and the staff who support them, and what is the purpose of this?

2.14 Please describe any review or assessment which has taken place of the development, procurement, or implementation of a system in your Authority.

SECTION 3.

This section asks for your opinions about the evaluation procedures in use in your organisation.

3.1 With reference to the categories of costs and benefits given in questions 2.4 and 2.5, do you think that decisions about the initiation of projects or selection between solutions would be improved in your organisation if any additional types of cost or benefit were taken into consideration? If so, please list these, and say whether you would assess them in terms of monetary value, some other measurement, or qualitatively.

3.2 Please give your opinion of the methods used in your Authority for making and supporting decisions about the selection of projects and decisions between alternative solutions. How effective are they in ensuring that your Authority has systems which meet its needs and make the best possible use of resources? Tick one of the following, and explain your answer if you wish.

Very effective	_____
Moderately effective	_____
Not very effective	_____
Not at all effective	_____
Counter-productive	_____

3.3 Would you like to see any additions or changes to the procedures which support these decisions, or should any additional factors be taken into account? If so, what would these be?

3.4 If any type of post-implementation evaluation is carried out in your Authority, in what ways is it useful or beneficial?

3.5 Is there any additional type of post-implementation evaluation or investigation which you think would be useful in your Authority, and what would the purpose of this be?

3.6 How effective is post-implementation evaluation in ensuring that systems meet the needs of the Authority? Tick one of the following, and explain your answer if you wish.

- Very effective _____
- Moderately effective _____
- Not very effective _____
- Not at all effective _____
- Counter-productive _____

3.7 If you have suggested possible changes to your procedures in this section, what difficulties might prevent these from taking place?

3.8 What aspects of the investigations and evaluation procedures which you have described are most likely to cause difficulties, and what problems have been experienced?

3.9 Thank you for taking part in this survey. If any points in the answers you have given are of particular interest or require clarification, would you be willing to discuss your answers in a telephone conversation?

YES / NO.

Telephone number:.....

Appendix B.

Further analysis of survey results.

B1. Further results.

This section presents further details of the results of the survey of health authorities and gives a fuller account of areas which were presented in summary form in Chapter 2. Section B2 contains extracts from some of the narrative responses, as these illustrate the range of situations encountered.

The survey began by enquiring about the number of staff involved in providing or supporting information systems. Not all of these are primarily IT personnel: some are information officers, managers or users who are responsible for supporting their

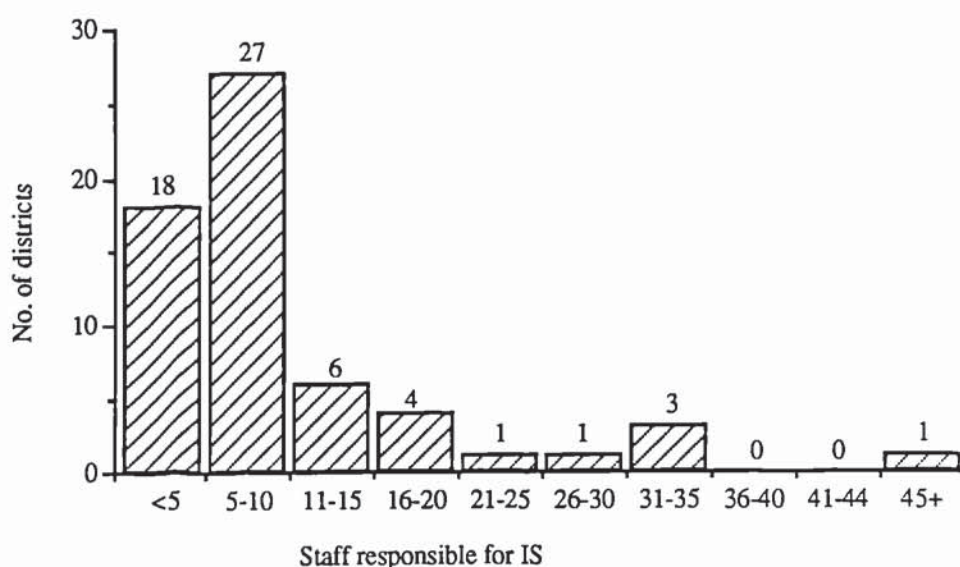


Figure B1. Staff responsible for information systems.

own systems. Figures B1 and B2 show the total number of such staff and those who are primarily computer staff. These figures refer to district health authorities. The four regions each employed between 50 and 150 IS staff. It will be noted that though all the districts had at least some people with responsibility for information systems, many of them had few such staff and some authorities had no computing staff at all. A few districts had quite large IS establishments. However, all but one of these were large London authorities.

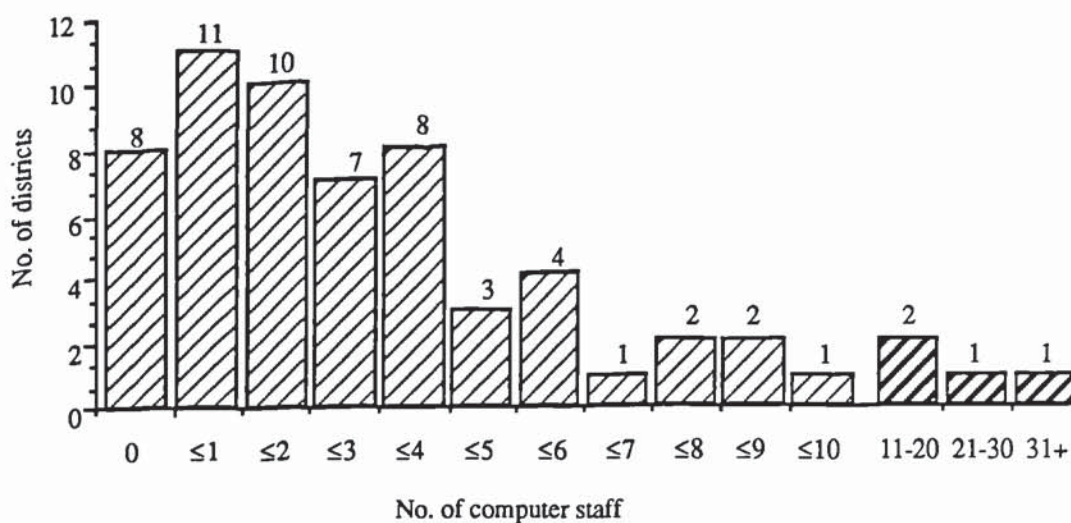


Figure B2. Number of computer staff.

Table B1 shows the most common application areas at the time of the survey. Hospital systems were mainly patient administration (PAS) systems and stand-alone departmental applications. Departmental systems can include laboratories, pharmacy systems which can include stock control, Maternity, Theatres, Radiology etc. In addition to these, there were a few other applications, including nurse management, catering and clinical audit.

Application	No. of authorities	%
PAS	64	97.0
Departmental systems	57	86.4
Community	65	98.5
Manpower/personnel	47	71.2
Supplies	30	45.5
Financial applications	64	97.0
Works management	28	42.4

(66 responses)

Table B1. Main application areas.

In the community field, the most common types of application are Child Health systems - these have an operational component as they assist in the management of vaccination programmes, child surveillance and school medical examinations - and systems relating to paramedical staff and community nurses, which are usually aimed at collecting Körner data and other management information, with few operational functions. Comcare, the

community health system which is described in Chapter 4, is in this category. As paramedical staff can work in the community and in hospitals, the classification of these systems is difficult, and the categories given by respondents have been followed. There were also a few recall systems for breast and cytology screening, though the breast screening programme (see Chapter 6) was in its infancy and a similar survey conducted now would find more such systems.

The main financial applications were payroll and the standard ledgers; there were also budgeting systems and systems for specific functions such as travel claims, leased cars etc. In addition to systems which produced Körner data for individual areas, some authorities had management information systems at district or regional level. There were also a number of systems to collect various statistics, such as deaths, cancer registration and hospital activity analysis. Less common applications included ambulance scheduling, performance indicators, geographical information systems and modelling packages. A number of respondents mentioned the use of personal computers for word processing, spreadsheets etc.

Only two authorities had no further developments in progress or under consideration; most were undertaking more than one project. The applications to be developed were mainly similar to or extensions of the types of system described above: further modules of PAS and departmental systems, more advanced ledger packages, and new community systems or the inclusion of further staff groups were all common. New features were the appearance of resource management and case mix systems, and more advanced hospital applications such as order communications and nursing applications or even complete integration of hospital systems. (The survey took place shortly after the launch of the national Hospital Information Support Systems (HISS) project, of which the pilot project described in Chapter 3 was part.) An expansion in management information systems was also planned, including a small number of decision support systems, executive information systems and district-wide indices of patients. An increase in the use of personal computers and electronic mail was expected in a number of districts.

Question 1.4 asked about the sources of application software. Respondents were requested to indicate the main source and also any others. Unfortunately, many did not answer in the expected way, not distinguishing between the main source and less important sources, or indicating more than one main source. A few respondents did not answer this question. It is possible that there was some confusion between the second and third options. The figures in Table B2 therefore show only the numbers indicating that a source is used. Note that the sample includes four RHA's: all had commercially

produced packages and software developed in-house, two had commissioned software from external developers and three had obtained systems from other authorities.

Source	No. of authorities	%
Developed in-house	36	59.0
Developed by an external organisation	29	47.5
Obtained from another HA	36	59.0
Operated by another HA (e.g. Region)	50	82.0
Commercially produced packages	54	88.5

61 responses.

Table B2. Sources of software.

Of those who did specify a single main source, the largest group indicated that commercially produced software was the main source, with software provided and operated by other authorities (i.e. regions) in second place. Table B3 shows these responses.

Source	No. of authorities	%
Developed in-house*	1	3.8
Developed by an external organisation	1	3.8
Obtained from another HA	6	23.0
Operated by another HA (e.g. Region)	8	31.0
Commercially produced packages*	10	38.0

* Includes 1 RHA

26 responses.

Table B3. Main sources of software.

The survey asked which development methodologies were in use (see Table B4.) Many authorities were using two or more of these, but a high proportion used none as development is not their responsibility. Quickbuild is ICL's proprietary methodology, recommended for use with its 4th generation development tools. The NCC approach was distinguished from traditional analysis methods in the questionnaire as the NCC design documentation is used in some authorities, but NCC and traditional approaches are counted as one below. This is still the most common approach.

Methodology	No. of authorities	%
SSADM	14	21.2
Traditional / NCC methods	26	39.4
Quickbuild	5	7.6
Other	5	7.6
None	31	47.0

66 responses.

Table B4. Development methodologies.

The methods specified by those in the "other" category were prototyping (2), SASDM (1), the project management method PROMPT (1), and an "unstructured cost-benefit type approach" (1). A number of other respondents indicated elsewhere in the questionnaire that PROMPT was in use.

The final question in the first section asked which of the available guidance on procurement was in use. Regrettably, the responses to this did not give a true picture as the researcher was not aware of the existence of the publication which is probably most commonly used (NHS Information Management Group, 1987a) until after the questionnaire had been issued. However, it was interesting to note that about half the respondents (36, 54.5%) already used or were proposing to use the (then very recently issued) guidance on investment appraisal produced by the NHS Information Management Group (NHS Information Management Group, 1988b), and 53 (80.3%) had used or expected to use the IMG guidance on the production of operational requirements (NHS Information Management Group, 1988a). This could reflect increasing interest in procurement and investment decisions on the part of districts. 30 (45.4%) used the sample contracts produced by the Institute of Purchasing and Supply (1979).

Questions 2.2 and 2.3 ask about the decisions which are taken during development and procurement projects and the investigations which support them. Most authorities were concerned with software purchase rather than development.

Final approval for projects might be the responsibility of individual managers, a committee with oversight of computing in the district, the District Management Board, or the District Health Authority itself, and this could depend on the cost of the project. A number of districts accepted systems selected for them by their RHA, apparently with little involvement on their part, and some authorities said that they had no formal

procedures. In one region, decisions to undertake regional development projects were made by a vote of the general managers of each district.

Procurement procedures could involve open tenders (often obligatory for large projects) or the requesting of tenders from selected suppliers. A number of different types of activity were mentioned in support of the procedures. These show the varying degrees of formality and the variety of approaches to planning, financial assessment, and assessment of the proposed systems. They included the following:

Comparison of possible projects with information strategy

Feasibility studies

Assessment of requirements

Market surveys to identify likely software

Investment appraisal following the IMG guide

Other cost-benefit analysis - often very informal

Assessment of costs only

Production of operational requirement (OR)

Comparison of proposals with OR

Comparison of systems with other statement of requirements

Use of agreed evaluation criteria

Tender evaluation.

Taking up references

Site visits

Demonstrations by suppliers

Technical investigations

Sizing studies

Evaluation of staff skills

Investigation of supplier companies

Examination of terms of contract

Pilot trials within the DHA.

There were also a number of methods of ensuring or confirming that cost and benefit targets were met; it was not always clear whether both costs and benefits were included. A number of respondents stated that no such measures were taken or that the RHA was responsible.

The answers to question 2.9 showed that most authorities carried out post-implementation review on some but not all of their systems. These respondents were asked what factors would be considered when deciding whether or not to carry out a review. The categories of response are listed below. Many of the 33 respondents gave more than one factor. Three authorities which gave factors actually answered “Yes” to the question of whether they reviewed systems, and one answered “No” but indicated that reviews would be carried out if requested by the RHA.

Cost	10
Existence of problems	7
Size / scope of system	5
Importance of system / service implications	4
Availability of staff time to perform review	4
User interest	4
Changed requirements	2
Regional pilot schemes reviewed	2
Determined by Region	2
Source of funding for system	2
Further phase of development considered	2
Complexity of system	1
Benefits marginal	1
Benefits hard to obtain	1
In-house developments	1
Microcomputer systems	1
Projects managed under PROMPT	1
Managerial responsibility for system	1
Degree of innovation	1
Subjective element in decision	1
Expediency	1

33 responses.

Table B5. Criteria for undertaking post-implementation reviews.

The cost, size, importance and complexity of systems are related issues. Fourteen authorities listed one or more of these factors.

The time at which reviews took place varied considerably, from one month after implementation to up to 18 months, though both these extremes were exceptional. Most of the 44 respondents who answered this question gave a range of times or indicated that the timing would vary, but an interval of 6 - 12 months before the first review seemed the most likely. A small proportion (7 sites) would sometimes or always carry out the first review less than six months after implementation; only two of those who specified a time would leave it longer than 12 months, though 12 months was the most popular fixed period (9 sites). A few (6) sites would review a system at intervals rather than only once.

The questionnaire asked which topics would be included in a post-implementation review. Users' opinions and the reliability and performance of the system appeared to be the most common subjects, though of the subjects suggested, only ergonomic factors would be included by fewer than half the respondents.

	No. of authorities	%
Costs	38	76
Realisation of financial benefits	33	66
Realisation of other benefits	41	82
Hardware reliability	44	88
Software reliability	45	90
Computer system performance	45	90
Amount of use of system / information	40	80
Effects of information	28	56
Users' opinions	46	92
Users' job satisfaction	25	50
Effects on service to patients	28	56
Effects on operation of department/ Unit/ HA	34	68
Security and privacy	27	54
Computer system operation	29	58
User department's procedures	26	52
Ergonomic factors	12	24
Satisfaction of system objectives	32	64
Other	5	10

50 responses.

Table B6. Subject of post-implementation reviews.

The other aspects suggested by respondents were:

Data protection registration status and subject access requests

System capacity and increased needs

Availability of better and more cost effective solutions

Quality of implementation

Quality of training - initial and refresher

Availability of system

Timescales

Any other problems.

Questions 2.11 and 2.12 were both concerned with post-implementation evaluation other than the post-implementation review. Question 2.11 asked whether other types of evaluation were normally practised, whereas question 2.12 requested examples of evaluation which had been carried out in addition to the normal procedures. There was some overlap between answers to the two questions, and other types of evaluation were also mentioned in the responses to question 2.14, which was intended to elicit examples of process evaluation. The answers to these questions are therefore discussed together.

The types of evaluation or investigation which seemed to be part of respondents' usual practice were financial audits, monitoring of reliability as part of support procedures, informal review meetings held at intervals between users and implementers, a regular review of communications, annual data protection compliance audits, customer satisfaction questionnaires, informal reviews when implementation of a system at other sites is considered, monitoring of expenditure and audits of security and related issues. Of these, only financial audits and reliability monitoring were mentioned by more than one site. Investigations which appeared more ad hoc in nature included investigations related to the introduction of district policies, a benefits study involving a number of districts, reviews needed for development of an information strategy, and a review of current communications.

A number of authorities reported that investigations had been carried out in response to problems. The difficulties which prompted these included poor performance, poor accuracy, high costs, lack of benefits, problems with working practices, unsatisfactory information, and a district rejecting a regionally-imposed system which was considered unsuitable. Note that the existence of problems was also one of the factors included in decisions to conduct post-implementation reviews.

Question 2.14 was expected to produce descriptions of evaluations of the process of development, procurement or implementation. However, many of those who gave responses did not interpret it in this way. A maximum of seven of the 35 answers given described process evaluations, though there were also some negative responses. One site gave the implementation process as a subject for post-implementation review, but described a different type of evaluation in answer to this question. It appears that the question should have been worded differently. Despite this, it is apparent that at least some process evaluation takes place (cf. Blackler & Brown, 1988).

The liaison between users and support staff is relevant to evaluation as it could provide the vehicle for conducting monitoring or initiating and perhaps overseeing reviews. It was thought possible that user groups would be responsible for these activities. The survey found that contact between users and support staff was common during system operation and for resolving problems. This was often ad hoc and informal, but a few authorities had more formalised procedures for seeking support: a hot line or help desk, or a nominated individual through whom all communication was passed. Three respondents said that there were no separate IT staff, and a few relied entirely on Regional staff or suppliers for support. In addition, some systems have user groups - assuming that they have been mentioned where they exist, 23 of the 59 authorities had these. Other types of group existed in a few authorities: an "information group", working groups formed to oversee an implementation, steering groups with managerial responsibility for one or more systems, and a meeting of the system managers of more than one system to discuss common factors.

Suggesting / controlling enhancements	12
Problem solving	8
Monitoring / review	7
Sharing experiences	4
Communication	4
Training	1
Ensuring effective use of resources	1
Ensuring a broad sense of ownership	1

20 responses.

Table B7. Purpose of user groups.

Twenty respondents gave the purposes served by user groups in their authorities. Many of these cited more than one function for the groups. The purposes stated were mainly practical functions, but a few respondents mentioned more general objectives. Monitoring and review of systems were user group functions in fewer than half these sites.

The third section of the questionnaire was largely concerned with managers' opinions of their own evaluation procedures. In considering the responses it must be remembered that a number of respondents left some or all of the questions in this section blank, so that a missing response may, but does not necessarily, indicate that the question does not apply, no problems exist etc.

Respondents were asked to rate the effectiveness of their procedures for project/system selection (question 3.2) and for post-implementation evaluation (question 3.6) on a 5-point scale. Most were fairly satisfied with both.

	No. of authorities	%
Counter-Productive/ Not at all effective*	1	1.7
Not very effective	15	26.3
Fairly effective	35	61.4
Very effective	6	10.5

57 responses.

*One respondent indicated a position between the first two categories.

Table B8. Opinions of procedures for project and system selection.

Opinions of the effectiveness of post-implementation evaluation were more difficult to analyse as a number of respondents who had said that no post-implementation evaluation was carried out had given responses, some finding their procedures fairly effective. These could represent evaluation other than post-implementation reviews. In order to ensure that all responses were comparable, these have been removed. The remaining responses were as shown in Table B9.

	No. of authorities	%
Counter-productive	0	0.0
Not at all effective	3	7.3
Not very effective	7	17.1
Fairly effective	28	68.3
Very effective	3	7.3

41 responses

Table B9. Opinions of procedures for post-implementation evaluation.

Question 3.1 asked whether respondents felt that any types of cost or benefit which were not considered in the selection of projects or systems ought to be taken into account. Although 20 responses were received, only five of these respondents suggested factors which they would like to add to their own assessments. Of these, two suggestions were not in the original list: these were opportunity cost and the possibility of income generation from software.

Guidance of an information strategy needed	7
Better assessments of costs and/or benefits	7
Include additional costs/benefits (from 3.1)	5
More structured/formal procedures (other than CBA)	5
More resources needed for evaluation	5
More user involvement	4
Region/District issues	4
Better operational requirements	2
Consideration of standards	1
Consideration of quality of training/support	1
Closer evaluation of alternatives against OR	1
Better advice on drawing up OR and MOS	1
Standards and penalty clauses in contracts	1
Greater acceptance of change	1
Dept. of Health's priorities not same as district's	1
More resources available for systems purchase.	1

Table B10. Improvements to system selection.

Other improvements to the procedures used were also suggested by respondents to question 3.1, and question 3.3 specifically requested other changes which would be considered useful. These two sets of answers have been considered together, making a total of 31 responses. The main categories of response are listed in Table B10. It seems that a number of these respondents felt that their procedures for assessing costs and benefits were not sufficiently formal, and that the assessment of benefits was an area of difficulty. The need for systems to be selected within a strategic framework was widely felt. Conflicts between districts and regions were indicated by one RHA and three districts. A few respondents felt that no changes were required, and it will be seen that some of the responses are concerned with the environment in which systems are acquired.

Nine respondents suggested desirable improvements to their post-implementation evaluation procedures (question 3.5). These were mainly concerned with additions to the topics covered, though two respondents wanted reviews to be held on a regular rather than an ad hoc basis, one favoured more reporting of problems by end-users, one was concerned to link evaluation with contract compliance and another saw potential for improving evaluation through the use of PROMPT.

If changes to evaluation procedures were considered desirable, what prevented authorities from introducing them? Question 3.7 dealt with this issue, showing, predictably, that lack of resources was the major restraining factor (see Table B11). The resources needed included user staff, IT staff and the necessary skills as well as money. One respondent mentioned that the inability to recruit and retain staff contributed to the lack of staff resources.

Resources	10
Attitudes / motivation	4
Policy changes	3
Staff changes	1

16 responses.

Table B11. Factors preventing changes to evaluation procedures.

Current procedures for post-implementation evaluation had also encountered problems (question 3.8). All but one of the respondents who mentioned difficulties in cost-benefit analysis stated that the measurement of benefits was a problem area: the sixth response also probably included benefits, as the problem stated was “quantification”.

Difficulties in cost benefit analysis	6
Lack of staff with the right skills	4
Lack of resources for IT generally	4
Lack of hardware policy	2
Meeting users' timescales	1
Reviews raise users' expectations	1
Meeting central requirements	1
User staff turnover	1
Training	1
Users' motivation to change	1
Systems not chosen by district	1
Reluctance of departments to admit to spare capacity	1
Lack of funds to implement any changes to systems	1

21 responses.

Table B12. Problems in current evaluation procedures.

B2. Extracts from the responses.

The summaries above indicate the opinions of the respondents and the problems encountered. However, the responses themselves give a richer understanding, though it must be borne in mind that each refers to a specific situation and that they are in most cases the views of IS managers rather than of end users. A selection of the responses to section 3 of the survey is printed below. They have been selected to represent the range of opinions rather than the number of respondents expressing similar views.

B2.1. Changes to procedures for project and system selection.

“There has not been a coherent and comprehensive policy/strategy on IT implementation in the health authority. Systems have been implemented in isolation thus lacking a common standard as also connectivity amongst them. Therefore connectivity and common framework should be included in the criteria. ... Greater involvement of users would be useful - particularly at the initial stages of planning and implementation. Quality of training and support should be given more importance.”

“The required benefits are now clearly set out in our Information Strategy. However all investment so far pre-dates the Strategy. We now have a strategic framework within which to assess the costs and the monetary and non-monetary benefits.”

“A formal methodology of assessing cost benefits against efficiency benefits would be very useful.”

“Very difficult to measure “improvement in patient care” which must be the overriding reason to introduce IT systems.”

“I do not necessarily consider that the quality of decisions made in the past regarding the selection of systems identified in section 2 would have been improved with the provision of additional financial and benefit information. However, I do consider that where possible the full cost implications of solutions proposed should have been determined prior to a project’s acceptance in order to provide better project control and financial planning. ... The management of IT function within the District has recently been subject to review.”

“Estimations of time spent by staff on implementation / getting used to the system normally are greatly underestimated. False expectations by senior managers that you can implement a system overnight and get immediate results. ... Procedures for systems purchase have for the most part met what was specified. Dissatisfaction with systems has arisen because of lack of clarity in what the system was meant to achieve. There are two separate source of this frustrations. 1. Districts purchasing regional and national systems which don’t meet local needs. 2. Lack of clarity about what the strategic objectives of the district are and how the system purchase is contributing to that.”

“Procedures no substitute for judgement - have little time for formal processes. Extent of requests for modifications / enhancements good indicator of effectiveness of choices made.”

“Need to introduce an integrated strategy. Previously no formal procedures for computer procurement and individuals have done their own thing. With the establishment of an information department I hope this will change. I would also like to introduce structured methodologies i.e. PROMPT or SSADM.”

“Possibly if a more structured cost-benefit analysis could be performed - but these are often inconclusive. ... No additions and changes but more qualified staff to carry out procedures would be useful.”

“Use of Operational Requirements - time and resources given to produce them properly in conjunction with users. Closer evaluation of alternatives compared with OR.”

“I feel greater advice could be offered to districts on preparing the detail within operational requirements (ORs) and memorandums of specifications (MOSs).”

“The main improvement would be to formalise benefits analysis and use them for more systems implementations. ... Improved benefits analysis and post implementation reviews.”

“A more rigid cost/benefit analysis which would be standard across all systems may be beneficial. Not all benefits can be quantified in terms of money and these need to be given a higher priority.”

“A more formalised approach to the issue of specifying and costing computer systems, so that a standard method could be used for all purchases. This method should be clear, concise and simple to follow, giving a “corporate” feel to the process and ensuring all the right considerations are made. Greater emphasis on the user’s opinions of the system.”

“Time and money to be made available for proper systems evaluation.”

“Formalisation of topics to be addressed against set standards (operational) with set review times and penalty clauses within the suppliers contracts. ... Although the informal system works well for individual systems, more control over system needs to be considered if O.S.I. and networking are to become a reality.”

“I would prefer a broader sweep of factors - realisation that innovation, competitive edge, being able to do things not done before in the Authority or changes in the ways things are done to be considered more positively.”

“The process needs to be more structured within a strategic framework.”

“A more formal procedure might help. Hindsight has shown most decisions to be soundly based. ... Improved cost appraisals. Better clarification of benefits. Justification for local solutions when central solutions would be more cost effective.” (RHA.)

“It is obvious that the selection methods used to date are inadequate. The additional points to note are especially the qualitative ones as there are not normally significant savings purely on a cost basis any more. ... More recognition of the time involved within a project for comprehensive assessment and post implementation evaluation is required.

A need for urgency competing against other work pressures leads to short cuts being taken. These would necessitate reasonable staffing levels and achievable timescales.”

“Devolution of such decisions to District level by Region.”

“Problems are not procedural but financial, e.g. a system which completely fulfils user requirements is normally too expensive.”

B2.2. Benefits of post-implementation review.

“Helps to ensure that we improve our planning and implementation procedures. Also ensures that any shortcomings are not repeated.”

“Being ad hoc its usefulness is also ad hoc.”

“To establish local issues and steps required to resolve them. To identify whether benefits are being achieved and corrective actions required to realise them. To ensure support arrangements are operating effectively.” (RHA.)

“Confirmation of decisions made. Independent assessment of customer satisfaction.” (RHA.)

“Gives a better starting point for making future decisions.”

“The fact that it is known it will be carried out gives a greater rigour to the selection process.”

“Very useful to review the usefulness of a system, both operationally and in the production of useful information for staff and management. Also to review the effects of an operational system on staff, including the running of a department. For possible extension to other sites a review is particularly important, even if just the hardware or software is being considered.”

“Post-implementation evaluations are useful to make decisions on future enhancements/upgrades to the system, as also if necessary, decision to replace an existing system.”

“Usually it gives confidence to the users that the system is good - and that procedures etc. can be improved. It shows them how to make better use of the system.”

“All systems would be better if implemented with hindsight. The post-implementation review gives us that hindsight to use in future implementations.”

B2.3. Reasons for not changing evaluation procedures.

“Managerial will to take a global view of the situation, rather than meet the needs of just one specialty or unit.”

“Mainly the availability of staff with the appropriate expertise and time.”

“The constantly changing technological (and political) environment. Körner/ Griffiths/ White Paper all required investment in technology without reference to a strategy for overall development”

“Staffing levels. Attitudes by certain Health Authority professionals in not recognising the contribution which can be made by I.T. professionals.”

“Resources! £, recruitment and retention of staff. (A huge problem which can prevent us putting even basic theory into practice.)”

B2.4. Problems with current evaluation procedures.

“Quite often the development and implementation of systems are required to support central requirements. Cost benefits are difficult to realise and measure for the individual user, and it is impossible to quantify better management by better information.”

“It is often difficult to quantify benefits achieved and to weigh qualitative benefits against costs.”

“Many of the skills required by the process are thinly available within the District, which makes the District reliant to a substantial degree, upon support from outside agencies. Further those systems that do not attract this support, (due to their small installation costs, or limited impact) tend to be assessed by inexperienced, in house staff, who cannot spend as much time as is necessary on this aspect of purchase. This has an effect on the end result, in terms of evaluation of systems.”

“If effective evaluation was undertaken that suggested improvement in systems [it] would certainly involve expenditure. The availability of capital and revenue rather than resistance to change would be the main controlling factor.”

“Assessing increased workload capacities tends to cause the most problems as people tend to be very protective about their own departments and any spare staff capacity, but having said that most departments are understaffed.”

Appendix C.

Comments on HISS study: letter from Darlington HA.

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Appendix D.
Planning Aid.

Post-Implementation Review of Health Information Systems Planning Aid.

1. Possible reasons for post-implementation evaluation.

Control of the system - confirming/ monitoring that objectives/ requirements in a variety of areas have been met.

Investigation of known problems and identification or prediction of others.

Input to long and short term planning for the system and organisation.

Identification of possible improvements.

Identification of opportunities to derive further benefits from the system.

Less tangible benefits of evaluation are also possible, for example:

Improved knowledge of the system/the organisation/ systems in general,

Learning how to improve the implementation process,

Improved communication, especially between users and support staff,

Other effects such as improved confidence in the system, greater acceptance.

(Some of these may be side-effects rather than objectives of the evaluation.)

2. Possible areas for evaluation.

Objectives/requirements.

Satisfaction of pre-defined system objectives/ requirements, conformance to specification.

Continued satisfaction and relevance of these.

Costs.

Realisation of financial benefits - savings.

Realisation of other benefits.

Usage/usefulness.

Amount of use made of the system & information produced (especially where optional).

Satisfaction of information needs of users of all types.

Information produced - use, accuracy, relevance, timeliness, presentation.

Effects of having/ using information produced by the system on the quality of service provided, operation of the service.

User related.

Ergonomic factors.

Job content, patterns of work - especially clerical & field staff.

Training/understanding of system.

Users' job satisfaction.

Other social factors - attitudes, acceptance of system, effect on skills, career prospects, turnover, etc.

System impacts.

Impact on service to patients - e.g. patient care, more time available to patients, contact between patients and system, take-up of services.

Effects on external bodies & relationships with these.

Impact on efficiency of the service, e.g. time saved, better planning of visits.

Effects on operation of the department/ Unit/ HA.

Effect on links between departments, communication.

Organisational concerns.

User department's procedures, work flow, schedules.
Time spent on data collection/system use.
Staffing - levels, relief arrangements.
Data input methods - whether appropriate, resources needed.
Computer system operation.
Ease of use - software, equipment.

Technical & Support.

Hardware reliability.
Software reliability.
Computer system performance.
Security and privacy.
Supporting services, facilities & supplies.
The implementation process, e.g. methods used, training, installation & handover.

It may also be necessary to concentrate on certain functional areas. Special attention may be given to parts of the system which are critical to its success, known problem areas or suspected "weak links".

N.B. This list is not exhaustive. The areas overlap to some extent, *as would their* investigation. Where examples are given of impacts on staff or others affected by the system, they are intended to indicate the type of factor which might be studied if applicable; it is not suggested that the specified effect actually exists.

Appendix E.

Comcare cost-benefit checklist.

COMCARE Costs and Benefits.

In order to help us to investigate the costs, benefits and other impacts of Comcare in your area, it would be very useful if you could complete this simple checklist. Your answers will be used as a basis for further discussions which will try to define the costs, benefits and other impacts in greater detail.

Please return the completed checklist to Malcolm Stone by Friday, 30th March.

Name

Position

Section A lists a number of specific things which it is hoped that Comcare/ Comcost will help you to do. Section B is a list of various types of benefit which are often claimed for health information systems. It is not suggested that the system provides all of these, but we need to know which are applicable. For each suggested benefit or type of benefit, please tick in the first column if the system is providing this benefit in your area of responsibility at present, and in the second column if the benefit is not currently provided but you expect it to be achieved in the future.

A. Use of Information	Present	Expected
Does the system:		
• Provide the information for your Körner return?	_____	_____
• help with business planning for your service?	_____	_____
• help you with SWOT analysis?	_____	_____
• help you to calculate costs for contracts?	_____	_____
• help with work scheduling and staff allocation?	_____	_____
B. Benefits of Health Information Systems	Present	Expected
Meeting statutory/central requirements (other than Körner)	_____	_____
Where a previous manual or computerised system has been replaced:		
• previous system no longer needed	_____	_____
• better security against loss of data	_____	_____
• greater confidentiality	_____	_____
Better management information:		
• information not previously available	_____	_____
• more timely information	_____	_____
• information closer to your requirements	_____	_____
• more accurate information	_____	_____
• information more readily accessible	_____	_____
Useful information provided to your staff	_____	_____

Results of better information:

- Improved decision-making _____
- Better control of your service _____
- Better use of resources _____
- Improved ability to respond to change _____
- Improved service to patients _____
- Any other improvements in working practices
(which staff group?)..... _____

Time savings, for

- managers _____
- nursing or paramedical staff _____
- clerical staff _____
- others (which staff group?)..... _____

Improvements in job satisfaction _____

Please list any other benefits _____
..... _____
..... _____
..... _____
..... _____

C. Costs and other impacts:

Section C asks about the costs and other impacts of the system. Most of the questions ask you to answer YES or NO. This section is concerned with indirect costs and impacts as well as direct costs. Many of these do not have an obvious financial value but can nevertheless have an effect on the service.

Do you and/or your professional staff spend time on:

- data input (Psions) YES / NO
- data collection (manual) YES / NO
- checking and correcting errors YES / NO
- any other system tasks YES / NO

Do you and/or your professional staff spend more time spent on these activities than in any previous manual or computer-based system?

YES / NO / NO PREVIOUS SYSTEM

Does your service have clerical support? YES / NO

If so, do your clerical staff spend time on:

- data input (Psions) YES / NO
- data collection (manual) YES / NO
- checking and correcting errors YES / NO
- any other system tasks YES / NO

Do clerical staff spend more time spent on these activities than in any previous manual or computer-based system?

YES / NO / NO PREVIOUS SYSTEM

Did the introduction of the system cause significant disruption to you and/or your staff?

YES / NO

Has any disruption been caused by any subsequent changes to the system?

YES / NO

Have you noticed any reduction in the morale, motivation or job satisfaction of your staff as a result of their using the system?

YES / NO

If so, has this presented any problems for you as their manager?

YES / NO

Have you ever found that reports printed by the system contained incorrect information?

YES / NO

If so, did this cause any problems or additional work?

YES / NO

Has the time at which system reports arrived ever caused any problems or additional work?

YES / NO

Are you aware of any problems associated with the usability of the system?

YES / NO

Please list any other indirect costs or undesirable impacts of the system.

Thank you for completing this checklist.

Appendix F.
Comcare Report.

A Study of the Costs and Benefits of Comcare

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3rd June 1991.

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1. Introduction.

1.1. Scope and contents of this report.

This report describes a study of the costs and benefits of the Comcare information system in the Community Unit and paramedical services of Darlington Health Authority. The work was carried out as part of a collaborative research project between the Authority and the Department of Computer Science and Applied Mathematics at Aston University. Thirteen staff groups were using the system at the time of the study: it has since been extended to three more.

This introductory section outlines the background to the study. It describes the preliminary planning exercise and the approach used in the main study. The costs, current benefits and expected future benefits for all users of the system are summarised in the following section. Section 3 gives more detail for each staff group. Questions relating to the method of assessing costs and benefits are discussed in Section 4 and conclusions are presented in Section 5. Appendices to the report contain the detailed costing figures for the Community Unit (Appendix 1) and results of the timing and attitude surveys (Appendices 2 and 3). A copy of the survey questionnaire is included as Appendix 4.

1.2. Background to the study.

Comcare was developed by Alternative Systems Limited and is now supported by ICL. It was one of a number of similar systems which were developed to meet the requirements of the Körner report [1] for Community Health. This prescribed a minimum set of data which all authorities should collect and required annual returns to be made to the Department of Health. Comcare also produces a number of reports which are intended for use by local management and end users. The system was chosen by most districts in Northern Region. Staff record their activities using either forms of hand-held computers (Psion Organisers).

When this study commenced in November 1989, the system at Darlington was in a state of change. Implementation had begun early in 1988 but some groups of intended users were still not using the system. The purpose of the system has changed during its life and continues to do so. Its original purpose was to provide the data required for the Körner returns, but this has been extended to include other local needs for management information and resource management. At the time of this study, the Authority was beginning to consider the effects of the reforms introduced by the White Paper "Working

for Patients” [2], and their implications for the provision of information [3,4]. These included the need to be able to calculate the cost of services in preparation for the internal market and a revised minimum data set which authorities would be expected to collect with the aid of a computer system. These needs were expected to be fulfilled at Darlington by the use of Comcare.

When responsibility for the system was passed from the District IT Services team to the Community Unit, a review was carried out. This highlighted some important objectives. The most pressing of these was to clear an increasing backlog of data awaiting input which was causing the system reports to be several months out of date. This was being remedied through the provision of additional temporary data entry staff and an accelerated programme of implementing Psion Organisers. It was known that the system was not popular with the majority of users and it was thought that their low opinion of it had led to a loss of motivation to provide accurate data. To make the system more useful to managers and staff and thus to increase their commitment to it was therefore another necessary objective. Throughout the review period, new reports were being introduced. The standard reports from the system were inflexible and bulky, but extract software had been written by the Regional Computer Unit to enable data to be transferred to a PC, where it could be analysed and presented using database/spreadsheet and graphics packages. Costing reports were also being developed.

The possibility of carrying out an evaluation of the system as part of a research project was seen as an opportunity to build upon and extend the work which was already in progress.

1.3. Initial study.

The first task was an initial study which tried to structure the issues identified above in a way that made it possible to look at the relationships and interaction between them. Interviews with a representative selection of user managers and members of the Comcare team were carried out.

Figure 1 portrays the interaction of variables and shows planned and current interventions at the end of this phase of the study. It can be seen that a number of the relevant factors related to the initial planning and implementation of the system. There had also been some technical problems. The two central problem areas concerned the data input backlog and questions of motivation. Reports had been received up to five months after the period to which they related. However, this problem was being remedied and some improvement had already been seen. The backlog had been caused by poor initial

estimates of the resources needed for data entry in the Community Unit, coupled with problems with entering data experienced by the users and some technical difficulties.

The problems affecting motivation appeared to be more complex. It was thought that a 'vicious circle' was in operation whereby the lack of motivation of staff affected the quality of their input. This in turn affected the quality and thus the usefulness of the outputs, which in turn reduced morale and the motivation to make good use of the system. The root cause of the problem appeared to be the time required for data entry, which had to be taken from patient care, but implementation problems and training which gave only a limited understanding of the purpose of the system appeared to be contributory factors. It appeared that the system was very unpopular in most departments. Comparisons were made with other systems, as data was still collected by manual means in some departments and in two areas, Comcare had replaced a successful pilot system.

The purpose of the initial phase of the study was to identify evaluation work which could make a contribution to the development of the system. Aspects of the problem situation were identified and ideas for possible corrective action generated. The study described in this paper was one of a number of activities which were planned or re-emphasised as a result of this initial investigation. Others included a continuation of the process of identifying information needs by the Critical Success Factor method and work on finding more appropriate input methods.

1.4. The cost-benefit study.

The cost-benefit study aimed to identify tangible and intangible effects of the system. Its objectives were to provide a more concrete basis for planning the future of the system and to explore further the issues affecting motivation. It was decided that the study would take place during the summer of 1990 so that the new reporting software would be in use. It was expected that there would be some demonstrable benefits by this stage.

The study was introduced at a seminar to which service managers were invited. Its main components were an assessment of direct financial costs, attempts to quantify and cost the time spent on data capture, a user survey which explored attitudes to the system and the effects on staff as individuals, and discussion of the benefits and the less quantifiable costs of the system with the managers of individual services and more senior managers. Interviews with managers took place in April - July 1990. The user survey was circulated at the beginning of August 1990.

The qualitative assessments made in this report are based on information given in interviews with 16 managers, including the managers of the thirteen groups of staff using Comcare at the time of the investigation. Direct costing figures were provided by the Community Unit, District IT Services and the Finance department. All system users were asked to participate in a survey which investigated the time spent on data input and the users' attitudes to the system and its effect on their working life. An acceptable response rate was achieved.

The study formed part of a research project which is investigating methods for the evaluation of information systems in the NHS. It was expected to contribute to the research objectives by allowing issues related to the evaluation of costs and benefits to be explored and any particular requirements or constraints imposed by the NHS context to be considered.

1.5. Summary.

The main findings of the study were as follows:

- Many of the initial problems with the system had been overcome, but a number of difficulties remained.
- Little use had been made of information provided by the system.
- Managers expected greater benefits in the future.
- The major cost of the system was that of staff time.
- Opinions of the value of the system were mixed.
- Many staff received no individual benefit from the system.
- The system had little effect on job satisfaction.
- This or a similar system will be necessary in the new NHS management environment.

2. Overall findings.

2.1. Direct costs.

Direct expenditure (on equipment, works, software, maintenance etc.) is summarised in Table 1. Fuller details are given in Appendix 1.

Initial expenditure on works and equipment and recurrent expenditure on software and support have been derived from records held in the Community Unit and the District Information and Computing Unit. It proved difficult to assemble this information as it does not appear possible either to identify all purchases which relate to a particular project, or to relate payments to a supplier to the relevant purchases, without a prohibitive degree of effort. Details of purchases have therefore mainly been taken from the requisition forms (D408s). It required a considerable effort to relate these to actual purchases as prices were often unknown at the time of the requisition, queries about discounts were outstanding, requisitions had been cancelled and a few items existed for which no documentation could be found. The purchase of Psion Organisers with associated software and services proved the most difficult area to untangle and the figures produced may not be entirely accurate. Costs are stated inclusive of VAT where appropriate.

The actual cost of Comcare staff was provided by the Finance Department, as were establishment figures and average costs for user staff. The initial effort required for the implementation on the part of the Information and Computing Unit had not been recorded as no internal charging arrangement existed for their services.

Capital charges are applicable from the financial year 1990-1991 onwards.

Communications costs include the cost of telephone calls made by the Comcare team: these were logged for a period and an annual figure extrapolated. Calls made by user staff are not included.

Expenditure on replacements for Psion Organisers is expected from 1992-3. However, the transfer of paramedical staff in the Acute Unit to the new Hospital Information Support System (HISS) for data collection may affect the demand for Psions. No plans exist to replace the DRS 300 or associated equipment. If a 7 year life were postulated, the machine would require replacement in 1994-5; a ten year lifespan would expire in 1997-8. The possibility exists that Comcare will have been superseded before the useful life of the hardware ends. An increase in maintenance charges as the equipment ages and failures of older equipment are also possible.

	£	£	£	£
	1987-88	1988-89	1989-90	1990-91
DRS installation	25,527	2,955		
Personal computers			26,977	7,048
Psions and associated purchases	6,754	14,594	17,159	10,394
Works	5,500		5,500	
Hardware support	671	2,905	2,905	2,905
Software support	750	1,575	2,748	3,805
Staff - Community Unit	2,912	26,194	53,045	42,583
Staff - users	2,097	127,842	167,916	186,577
Staff - clerical		2,000	2,255	2,524
Training	2,099	9,035	1,942	4,780
Communications	84	412	412	412
Miscellaneous	260	1,090	1,418	1,807
Capital charges				692
Total annual cost	46,654	188,603	282,277	263,538
Total cumulative cost	46,654	235,257	517,534	781,072

Table 1. Summary of Quantifiable Costs.

2.2. User staff time requirements and costs.

The user survey included a section about the amount of time spent by professional staff on system use. This was expected to be the major recurrent cost and was also thought to be one of the main factors affecting motivation. In theory, this time is recorded in the system: in practice, however, the working patterns of some staff groups make this difficult and managers suspected that the data held in the system was unreliable. Table 2 summarises the time spent by staff in each group and the cost of this. The total time spent is shown as an average number of minutes per person per week and as whole time equivalent (w.t.e.) staff for the department as a whole: this should enable a view to be taken on the practical effects of this time commitment and is particularly meaningful where services are over-stretched or being obliged to contract. However, it should be noted that many staff take administrative work home or complete their input after normal working hours. In some departments, part of the time spent would previously have been used for other methods of data collection. In other cases, manual systems are still in use (see Section 3). The method by which these figures were calculated is described in Appendix 2.

It was originally expected that information about the time spent on input would be available from the system for most staff groups. However, this was not the case as the recording of timings for "other" (non-contact) activities was found to be either incomplete or not done at all in most groups. In particular, managers reported that Psion users who entered data during or immediately after each appointment did not record the time taken, as this was only a few seconds in each case. The use of the Psion's timing facility to record the time spent on patient contacts was limited. Some staff were unaware of this facility. It cannot be used to time non-patient related activities: the suggested approach is to total the time sent on each activity during the day. Any future enhancement to this facility which would allow times to be recorded more precisely and flexibly would increase accuracy and perhaps reduce effort.

The questionnaire was designed to allow users to record *all* work related to Comcare, i.e. error correction, checking of input, retrieval of data from other sources and problem solving could all be included in addition to actual data entry.

The time required for system use includes error correction, including correction of case loads where appropriate. Checking outputs and other tasks associated with the system are also included. The survey was issued shortly after a change took place in the way errors are handled. As errors are no longer corrected at Archer Street, and staff receive regular error reports which at the time of the survey many had not yet seen, more time

	Average time/ week (mins.)	Minimum (full-time)	Maximum (full-time)	Establishment (in w.t.e.)	Total time (as w.t.e.)	Cost ¹
Audiology	93	50	154	6.0	0.2	2,870
Chiropody ²	227	141	290	10.4	1.0	16,842
Clinical Specialist Nurses ³	55	32	74	3.0	0.1	1,223
Dietetics ⁴	148	174	175	3.8	0.2	4,012
District Nurse/Midwives	128	33	293	11.0	0.6	10,509
District Nurses	133	78	200 ⁵	41.7	2.5	41,396
Health Visitors	237	134	345	23.9	2.5	42,278
Mental Handicap Nurses	108	89	144	7.9	0.4	6,368
Occupational Therapy	131	15	310	32.2	1.9	21,590
Physiotherapy	111	55	268	23.7	1.2	16,091
Psychiatric Nurses	119	44	208	14.0	0.7	12,742
Psychology ⁴	64	15 ⁶	75	4.9	0.1	3,226
Speech Therapy	107	48	285	9.0	0.4	7,430

Total Annual Cost (1990-91): 186,579

Notes.

1. Derived from standard salary + on-costs for each staff group.
2. This figure could be rather high. See section 3.3.
3. Timings are derived from the system rather than the survey and may be low.
4. Average times for the larger staff groups were calculated from full-time respondents only. For Dietetics and Psychology an average using whole time equivalents was calculated as there were insufficient full-time respondents.
5. One much higher value was omitted from the calculations as it appeared not to be comparable.
6. Part-time. Only one full-time respondent.

Table 2: Time required for system use.

may now be needed for correction of input errors. However, the solution of the problem affecting case loads should remove a considerable amount of fruitless work from the affected staff groups, and error correction should only be a small part of the workload.

Psion users occasionally suffer from machine and software problems which require the machine to be switched off: this can disrupt work as the machine may need to be left for up to twenty minutes.

The figures in Table 2 represent the time spent on the system and the cost of that amount of time. The reader should appreciate that they *do not* show the difference in cost between Comcare and any previous system which has been replaced. Furthermore, they do not necessarily represent an amount of time which would be freed if the system were not to be used, or additional money which has been spent. For example, some data entry is done in the time allowed for appointments of fixed length. Furthermore, any other system capable of meeting increasingly complex requirements for information would certainly require more time than the very simple systems which were in use before Comcare, some of which still persist. In practice, some of this work is done after hours and is thus unpaid. The financial measure thus shows the scale of the effort required, whereas the actual impact of the system is a combination of expenditure, personal cost to staff and time taken from other activities.

2.3. Unquantifiable costs.

All staff groups had experienced a degree of disruption when the system was introduced. Whilst some disturbance would be expected, this was severe in many cases. The initial task of registering patients caused a peak in the workload. Changes to coding systems, input methods and the data items to be collected had caused further problems, although the severity of these again varied between groups. A number of managers had noticed that the morale of their staff was affected: in most cases this had been most severe immediately after implementation and was now improving. A small number of managers described severe problems, and in some cases individuals had reacted very strongly to the introduction of the system. This situation increases the pressure on managers, who are in a particularly difficult situation if they cannot point out any real benefit to the staff.

The effects of these problems can be seen in terms of costs, such as additional time requirements, and reduced benefits, i.e. the loss of useful information because of errors and misunderstandings, late input, poor accuracy, and inconsistent coding. Most significantly, some departments described reductions in the amount of clinical work done

which were considered unacceptable. Attempts have been made to reduce the time requirement to a tolerable level through changes in input method, coding or the data items collected. In some cases better data control at Archer Street would have enabled problems to be detected earlier, and some staff would have benefited from more training.

Inaccurate case load lists had been a severe problem causing considerable extra work. The main cause was found to be a software error which has now been rectified by the supplier: in one department problems with Psion use had caused errors and these have now also been remedied.

The most important possible cost to staff as individuals would be a diminution in their job satisfaction. This could be caused by a number of factors, such as the need to spend time on uninteresting tasks, frustration at a reduction in the time spent on activities which are considered more important, increased stress, or anxiety about the use of technology. This was investigated as part of the user survey, which is discussed more fully in section 2.5.

2.4. Benefits from the system.

The study aimed to assess the functional and qualitative benefits of the system. Measurement in financial terms was not expected to be practicable, as the expected benefits were largely those of improved management information. Assigning a monetary value to these presents severe difficulties. Some managers identified time savings in obtaining regular information: such savings by staff were more than outweighed by the time spent on collecting data for Comcare. Managers spent time on supporting the system, solving problems, defining information requirements and liaising with the Comcare team. This had been a large commitment at first, but except in departments which still had severe difficulties with the system was now considered small: less than half a day per month seemed normal. In some departments time was also spent in disseminating information and discussing it with staff; this should be seen as part of the management process. Displaced costs in the use of information (as where a manager can reduce the time spent on planning or decision making because the system can produce exactly relevant information for the task) were not found to be significant. There were a small number of cases where staff or managers had previously spent time on collecting, collating or interpreting data. This could be regarded a benefit to be offset against the time requirements for Comcare, but only rough estimates of the time involved were available.

Effects on the quality of decisions made and other aspects of management, or specific consequences of having certain information at a particular time, would be difficult to identify and value, though some examples were identified.

In most departments, Comcare replaced or co-existed with other methods of collecting information which were capable of providing counts of patients and treatments given, and some simple analyses of patients according to categories relevant to the service: age, type of referral etc. For these departments, the improved information resulting from the introduction of Comcare consisted mainly of activity timings and better analyses of the work done. Where timings or activity coding were seriously inaccurate, there was little if any advantage over manual methods which could produce the basic information with little effort.

Comcare was thought to be more flexible than previous systems and to give better access to information now that the extract facility gave the opportunity to produce ad hoc reports. The recently introduced graphical outputs were generally approved and considered easy to use. The time at which regular reports arrived had improved once the data entry backlog had been overcome, and was now considered acceptable by most managers, although at time of the interviews, the monthly reports had been delayed by the production of the information needed for Körner.

Current uses of the information and those expected in the future were identified in conjunction with service managers. A number of specific ways in which it was expected that information would be used were discussed. These were:

- *Providing information for the annual Körner returns.* This was the original purpose of the system. For the first time, all but one department had derived the previous year's return from the system, although in one case extrapolation from data for part of the year had been necessary.
- *Business Planning.* All but two of the thirteen service managers expected that information from Comcare would be useful for planning the development of their services. Managers were beginning to make use of the information or to become aware of its potential. Most of the practical uses of information described by managers seemed to relate to the short and medium term, rather than to long range planning which requires a broader range of information and the ability to predict trends.

- *SWOT analysis.* An analysis of strengths, weaknesses, opportunities and threats had recently been carried out in many departments. Although most managers expected that the system would in future be able to assist with this type of exercise, it had not been widely used on this occasion.
- *Allocation of staff and workloads.* Only three departments had used system-produced information for this purpose as yet, though all but two service managers expected to do so in the future. One department (Occupational Therapy) had undertaken a fairly extensive reorganisation with the aid of the system. This had introduced a greater degree of specialisation. The manager of one of the smaller departments was able to use other sources of information and saw no need for Comcare in the future.
- *Costing of services, especially in relation to contracting.* Reports on the costs of each service were being developed at the time of the review, so this was in general an expected rather than an actual use. Although the service which acted as pilot for the costing reports (Chiropody) was not yet completely satisfied with them, it had been possible to decide the most cost-effective way of carrying out a particular type of minor surgery on the basis of the information. This type of information was seen as essential for contracting.

Other uses of the information were discussed and specific examples identified, in order to show where possible the types of benefit which could be expected and whether the information had actually been usable and useful. A small number of managers had made no practical use of the information other than Körner. Most could cite a few occasions in which the information had contributed to decisions but fewer were making extensive or regular use of it. Often, information from other sources was also used, or the Comcare information served to confirm the decision which had been made, though there had been a few unexpected discoveries.

Some examples of the decisions made and other uses were:

- A decision that a vacancy could be filled by someone of a lower grade.
- To predict the increased number of referrals to dietetics which would result from the appointment of an additional paediatrician.
- To show the effects of removing a post from the establishment (2 cases).
- That a specialist in a particular aspect of Mental Handicap nursing should be appointed.
- That the proposed appointment of foot care assistants to carry out basic foot care would not be effective as this type of work was rarely the only treatment given in an appointment.
- Student research projects (two cases).

Managers in all but one department were expecting the system to be of considerable use in planning and managing their services, though some felt that their need for information was more limited. Almost all expected that the information would allow them to make better decisions, make better use of resources, and detect and respond to changes in demand. Better use of resources was expected to allow patients to be offered a better range of services. About half the service managers felt that they were prevented from making fuller use of the system by inaccuracy, inconsistent use of codes by staff, coding structures which despite revision did not adequately reflect the patterns of work, and/or the need to record additional items of information specific to their services. The more senior managers who were interviewed also saw the need for additional types of information.

The way in which information is disseminated to staff varies between disciplines, but most see their own printouts (showing numbers and types of activity and the time spent) and the summary for the department. The user survey showed that opinions of the feedback given to individuals varied even within departments.

Attitudes to the confidentiality and security of data varied. Some managers felt that confidentiality had been lessened as personal data was now recorded on a computer. The Psychology department, which has a particular need for confidentiality, had gone to some trouble to conceal the identities of both patients and staff. Some managers clearly distrusted the computer as a means of safeguarding information: a system error which had caused frequent problems with case loads had given them cause for concern. Others felt that their data was now more secure by virtue of being held centrally and regularly copied.

Only the Mental Handicap and Child Care teams had statutory information requirements other than Körner: the system was not relevant to these.

2.5. Opinions of system users.

Responses to the user survey are summarised in Table 3. Full results are given in Appendix 3. The questions were 7-point Likert-type scales. These consist of sentences expressing opinions about the system, with which respondents are asked to show the extent of their agreement or disagreement.

The responses show that opinions about several significant items were mixed. Staff were in general aware of a need for the system, though fewer than half agreed that it gave

actual benefits to themselves or improved the service that their departments could give. The two departments whose staff held the most consistently unfavourable opinions of the system had received very little benefit from it and had experienced considerable problems in the past because of the time taken for data entry, including an impact on the number of patients seen. Attitudes were more varied in the other staff groups.

Part of the questionnaire investigated aspects of the work which were potentially relevant to the job satisfaction of staff. These were identified on the basis of the model of job satisfaction proposed by Mumford [5]. They included the use and acquisition of skills, interest in the data collection task, the sense that data collection is a worthwhile activity, and the potential for the use of this information to seem threatening. Few staff indicated that the system had more than a slight effect on their overall job satisfaction. This is reassuring as data collection is a minor part of their work. The use of Psion Organisers had caused initial apprehension, but most seemed to have overcome this.

Most staff preferred the method of input (Psion or forms) which they were using.

There was almost complete agreement about some items. These were Q3, "I try hard to ensure that the data I submit to Comcare is accurate"; Q11, "Providing good information is a responsible task", with which only one person disagreed; and Q22, "Taking the job as a whole, I get a lot of satisfaction from my work". These views are perhaps not surprising. Whilst few disagreed with Q20, "This type of information will be essential once the White Paper comes into force", or agreed with Q2, "I resent others knowing how I spend my time", or Q4, "I appreciate the variety which data collection adds to my job", a significant proportion neither agreed nor disagreed these items.

In order to gain a better understanding of the views expressed, correlation coefficients were calculated for combinations of responses to the 26 survey questions and items which reflected the amount of effort made. A correlation table is included in Appendix 3.

The associations suggested by this analysis were more or less as expected, with moderate correlations between many of the items. A few points are of interest. Attention was given to the relationship between two items which summarised the two main purposes of the survey and other items which might be contributory factors. One of these was question 5, "On balance, I think the system is worth the effort we put into it." The item most strongly associated with this was question 1, "Comcare gives me useful feedback about my work". This emphasises the importance of ensuring that individuals receive information from the system. Other strong associations were with questions:

7 ("We need Comcare to collect our Körner data"),

8 ("I appreciate the variety which data collection adds to my job"),

9 (“Information from the system helps my department or team to give a better service”),
 16 (“Using Comcare has enabled me to develop new skills”),
 17 (“Information from Comcare helps me to plan my work”),
 18 (“The information we provide is necessary if our service is to be well managed”),
 25 (“Being able to use my Psion gives me a sense of achievement”); and a more moderate association with
 13 (“Comcare has given me a better sense of what my job comprises”).

There were strong inverse associations, where agreement with one statement is associated with disagreement with the other, with:

6 (“Data collection prevents me from spending my time more usefully”),
 15 (“Recording my activities adds stress to my job”) and a more moderate association with
 19 (“I enjoy my job less because of Comcare”).

Question 19 was taken to be a summary item for the job satisfaction aspects of the survey. The strongest associations were those with questions 6 and 15, and the negative association with question 5. There were more moderate associations with question 4 (“I do not find data collection interesting”) and inversely with question 7 (Körner).

Other strong correlations were between questions 6 and 15 (use of time & increased stress); 9 and 18 ; 1 and 17; and 13 and 17. The amount of time spent each week and the other numeric items did not appear to correlate strongly with any of the survey questions. This and other exploratory analysis of the survey data, including a simple factor analysis, demonstrated the importance to staff of carrying out activities which are seen as worthwhile.

There was little variation in the responses to Q3, (“I try hard to ensure that the data I submit to Comcare is accurate”), and the correlations between this and other items gave only moderate support to the suggestion that poor motivation will have a detrimental effect on accuracy. There were moderate positive correlations with Q7 (Körner) and Q14 (“I use my professional knowledge in recording my activities”), and moderate inverse correlations with Q6 (“Data collection prevents me from spending my time more usefully”) and Q19 (“I enjoy my job less because of Comcare”). These were all statistically less significant than the correlations described above. The nature of this item was such that it was perhaps unreasonable to expect staff to disagree with it.

	Strongly Disagree No. (%)	Disagree No. (%)	Slightly Disagree No. (%)	Neither Agree nor Disagree No. (%)	Slightly Agree No. (%)	Agree No. (%)	Strongly Agree No. (%)
1. Comcare provides me with useful feedback about my work	17 (16.7)	28 (27.4)	6 (5.9)	7 (6.9)	21 (20.6)	23 (22.5)	0 (0.0)
2. I resent others knowing how I spend my time	14 (13.7)	43 (42.2)	7 (6.9)	31 (30.4)	2 (2.0)	4 (3.9)	1 (1.0)
3. I try hard to ensure that the data I submit to Comcare is accurate	0 (0.0)	1 (1.0)	4 (3.9)	4 (3.9)	8 (7.8)	61 (59.8)	24 (23.5)
4. I do not find data collection interesting	4 (3.9)	16 (15.7)	9 (8.8)	14 (13.7)	13 (12.7)	29 (28.4)	17 (16.7)
5. On balance, I think the system is worth the effort we put into it	9 (8.9)	28 (27.7)	11 (10.9)	13 (12.9)	9 (8.9)	29 (28.7)	2 (2.0)
6. Data collection prevents me from spending my time more usefully	2 (2.0)	22 (21.6)	5 (4.9)	10 (9.8)	19 (18.6)	31 (30.4)	13 (12.7)
7. We need Comcare to collect our Körner data	4 (4.0)	11 (10.9)	8 (7.9)	23 (22.8)	16 (15.8)	38 (37.6)	1 (1.0)
8. I appreciate the variety which data collection adds to my job	21 (20.6)	40 (39.2)	11 (10.8)	19 (18.6)	5 (4.9)	4 (3.9)	2 (2.0)
9. Information from the system helps my department or team to give a better service	11 (10.8)	25 (24.5)	3 (2.9)	20 (19.6)	16 (15.7)	24 (23.5)	3 (2.9)
10. I am afraid that the information might be used against the interests of my department or service	4 (4.0)	20 (19.8)	4 (4.0)	30 (29.7)	18 (17.8)	21 (20.8)	4 (4.0)
11. Providing good information is a responsible task	0 (0.0)	1 (1.0)	0 (0.0)	6 (5.9)	5 (4.9)	71 (69.6)	19 (18.6)
12. We do not receive enough support for our use of the system	4 (3.9)	27 (26.5)	7 (6.9)	27 (26.5)	15 (14.7)	17 (16.7)	5 (4.9)
13. Comcare has given me a better sense of what my job comprises	10 (9.8)	40 (39.2)	11 (10.8)	12 (11.8)	17 (16.7)	11 (10.8)	1 (1.0)

Table 3. User survey responses (all staff groups).

	Strongly Disagree No. (%)	Disagree No. (%)	Slightly Disagree No. (%)	Neither Agree nor Disagree No. (%)	Slightly Agree No. (%)	Agree No. (%)	Strongly Agree No. (%)
14. I use my professional knowledge in recording my activities	5 (4.9)	14 (13.9)	4 (4.0)	22 (21.8)	17 (16.8)	36 (35.6)	3 (3.0)
15. Recording my activities adds stress to my job	5 (4.9)	17 (16.7)	6 (5.9)	16 (15.7)	19 (18.6)	32 (31.4)	7 (6.9)
16. Using Comcare has enabled me to develop new skills	17 (16.7)	33 (32.3)	8 (7.8)	12 (11.8)	20 (19.6)	12 (11.8)	0 (0.0)
17. Information from Comcare helps me to plan my work	17 (16.7)	47 (46.1)	6 (5.9)	13 (12.7)	11 (10.8)	8 (7.8)	0 (0.0)
18. The information we provide is necessary if our service is to be well managed	3 (3.0)	14 (13.9)	2 (2.0)	20 (19.8)	22 (21.8)	34 (33.7)	6 (5.9)
19. I enjoy my job less because of Comcare	5 (4.9)	20 (19.6)	5 (4.9)	36 (35.3)	17 (16.7)	15 (14.7)	4 (3.9)
20. This type of information will be essential once the White Paper comes into force	0 (0.0)	1 (1.0)	1 (1.0)	25 (24.5)	12 (11.8)	57 (55.9)	4 (3.9)
21. I would rather use a Psion than forms	5 (4.9)	8 (7.8)	3 (2.9)	19 (18.6)	8 (7.8)	33 (32.3)	26 (25.5)
22. Taking the job as a whole, I get a lot of satisfaction from my work	0 (0.0)	3 (3.0)	0 (0.0)	1 (1.0)	12 (11.9)	57 (56.4)	28 (27.7)
24. I was initially apprehensive about using a Psion	2 (2.7)	11 (14.8)	1 (1.3)	7 (9.5)	18 (24.3)	28 (37.8)	7 (9.5)
25. Being able to use my Psion gives me a sense of achievement	10 (13.7)	10 (13.7)	2 (2.7)	15 (20.5)	16 (21.9)	18 (24.7)	2 (2.7)
26. I feel confident about using my Psion	0 (0.0)	4 (5.5)	1 (1.4)	9 (12.3)	11 (15.1)	37 (50.7)	11 (15.1)
23. How important is Comcare in determining how happy you are in your job?	Not a factor No. (%)	A very small factor No. (%)	A small factor No. (%)	A fairly important factor No. (%)	An important factor No. (%)	A very important factor No. (%)	The most important factor No. (%)
	58 (57.4)	15 (14.8)	16 (15.8)	7 (6.9)	5 (4.9)	0 (0.0)	0 (0.0)

2.6. General comments.

Time spent by user staff is the greatest recurrent cost of the system. This and accuracy are now the two major concerns, although the effect on staff morale and the resulting difficulties for managers are still a significant factor for some groups.

The effects of the time requirement on patient care are mitigated by the sense of responsibility to patients which exists in all staff groups, and leads them to take administrative work home, work late etc. This dependence of the system on the goodwill of staff is clearly not desirable.

Most managers seemed well aware of the attitude of their staff to the system: one or two were proved slightly optimistic by the user survey. Nevertheless, where managers were convinced of the value of the information, more actual use of it and therefore benefit from it was noted (there is likely to be an element of reinforcement here!) and staff are likely to become aware of this in the long term.

The opinions of departmental managers of the extent to which this information will be needed in the future varied, whereas the more senior managers were agreed that it will be essential. Managers need to be aware of the effects of the internal market on their services and their information requirements.

The user survey showed that staff in general were satisfied with their own input methods. Survey respondents made favourable comments on the support given by the Comcare team.

A number of staff groups had attempted to reduce the effort involved in data entry. Agreed methods included the adoption of more limited data sets for registering patients, the use of redesigned activity sheets, containing data for a week, and simplified coding systems. In some departments, less formal measures were taken and the types of data recorded varied between individuals. The professional association of one staff group had advised against the recording of activity timings. Such measures limit the negative effects of the system, but also restrict the information which can be derived from it and so affect its usefulness. Where accuracy is compromised, e.g. by guessing activity timings or where activity details have to be recorded for unregistered patients, problems may only be deferred.

3. Details of individual services.

3.1. Introduction.

The accounts of individual services in this section are mainly based on two sources of information: interviews with the service managers, and the user survey. For each service, factors about the service which are relevant to what follows are summarised, then current and expected uses of the information are described along with any problems experienced and other types of cost and benefit. Where appropriate, comparison is made with previous information provision. Important points from the user attitude survey are noted, but the reader is referred to the full results which are given in Appendix 3.

3.2. Audiology.

The Audiology department is small, consisting of six staff. It has been possible to manage this number of people and allocate work without the need for information of this type. A manual system is still in use. This records the number of patients seen, but does not identify them and does not record the time spent on activities. On one occasion, timing information from Comcare was used for a research project, but in general, the information has not been needed and its use is not expected in the future for any purpose, including costing. The department holds open repair clinics, to which patients come in without appointment. These clients are not registered on Comcare.

The department has no permanent clerical support, although YTS trainees are sometimes appointed for a 4-month period and are given patient registrations as one of their tasks. The system needs little support from the service manager: one meeting per month is the average.

Data entry was extremely time consuming at first, requiring about three quarters of an hour each day. It was necessary to increase the time allocated to each patient by five minutes, with the result that each member of staff could see two fewer patients in a day. This situation was unsatisfactory and stressful. A redesigned registration form was introduced which required only a minimal amount of data to be entered for each patient. This allowed a considerable reduction in the time taken to register patients. Activities are recorded using Psions. It is necessary to 'force' the Psion to accept activities for patients whose registrations have not yet been entered by the staff at Archer Street.

Körner information was requested for the first time in the year 1989-90, and the data was provided by Comcare. There are in fact no specific Körner requirements for Audiology. No SWOT analysis had been required at the time of the study.

The system was still unpopular with the staff, who were receiving no useful feedback from it. Survey respondents felt that their time could be better spent. Some thought that the system was necessary for service management or Körner, but none received any current benefit themselves or felt that the information helped them to give a better service. Effects on job satisfaction were negative but limited.

It seems that the Comcare system is providing little if any benefit to this service, and none is expected by the department. There is a need to pinpoint (and perhaps raise awareness of) the intended future uses of the information collected in order to justify the continued use of the system.

3.3. Chiropody.

Körner data for 1989-90 could not be produced from Comcare because the transfers of patients who were admitted to the Acute unit had not been recorded. This made the information inaccurate. The problem was due to a misunderstanding and should not occur again.

By the time of this study, there had been some use of the information. One application was to show that the idea of employing less qualified staff to carry out basic foot care was not cost-effective, as few appointments consist solely of this type of treatment. Chiropody acted as the pilot department for the costing reports. Although these were not yet completely satisfactory, it had been possible to decide the most cost-effective way of carrying out nail surgery on the basis of the information. Ad hoc reports from the system had been used in a research project.

The allocation of work between staff is not an issue as chiropodists do not have individual case loads. However, it is possible to show the distribution of work between locations, which is expected to be of use in the future. The system was expected to enable management to identify trends in the workload, such as changes in the source of referral. In order to measure the quality of the service, there is a need for an output measure. However, this is difficult for Chiropody where much of the treatment is on-going. It was expected that items sold to patients in the course of treatment would be recorded and that this would allow a better service to be given by meeting the demand for specific items.

The average time spent on system use which was calculated from the user survey was one of the highest at 227 minutes. However, as survey respondents recorded up to 100 contacts in a week, this figure is not unlikely. As respondents all recorded activities at the

time of each contact, it appears that most of this time falls within the time allowed for appointments. One possible factor affecting the calculations is that not all staff carry out registrations: it is possible that a disproportionate number were done by the survey respondents, but further investigation would be needed for an adjustment to be made, and the difference made would probably not be large.

The system was expected to reduce the time spent by service managers in obtaining information and to make the information available more quickly. Data was thought to be accurate and staff appear from the user survey to spend time on checking data and error correction. At the time of the interview, a manual system of data collection was still used to record some types of activity.

Staff found reports in graphical format more helpful than the original lists. Some difficulties in the use of the system were mentioned. These were caused by a lack of information and of documentation such as user manuals. It was felt that training had covered the mechanics of using the system but had given little idea of its capabilities.

In responding to the user survey, most respondents stated that they did not receive useful feedback about their work (Q1), but all agreed that the information was necessary for the good management of the service. Other questions relating to the value of the system received mixed responses: the system seems to be considered necessary but not personally beneficial. Four of the six respondents experienced stress as a result of recording their activities, but there was no concern about the way information would be used. The effect on job satisfaction does not seem to have been great. The three Psion users who returned questionnaires had overcome their initial apprehension about using the machines.

3.4. Clinical Specialist Nurses.

No responses to the user survey were received from this small group of staff. The information in this section is thus derived entirely from an interview with their manager, the Out-patients Co-ordinator. It has not been possible to ascertain the opinions of the staff themselves about the system. There are three specialist nurses, all full-time, specialising in the areas of stoma care, breast care and pain relief. The work is mainly located in the Out-patients Department but some patients are seen in the community.

At the time of the interview, information from the system had been used only once. This was to support a specific decision, although an element of SWOT analysis was involved in the decision process. The regular reports were supplemented by an ad hoc information

request. The system is not used to provide Körner data, which is collected for these staff by Medical Records.

There was no previous information system in the department for these staff: this system was thus considered an improvement. However, information was collected for some time before any output was received.

It was expected that now that the information had begun to be used, its use would continue. The system should be able to show individual workloads and the amount of work done, and provide the necessary information to decide on staffing requirements and to calculate costs.

The average weekly time requirement per person was 55 minutes. It should be noted that as each of these staff has a different rôle, the average figure may not be particularly meaningful: individual timings were 57 minutes, 32 minutes and 74 minutes. Little error correction is required.

The time spent on the system was extracted from data recorded in the system. It may therefore be underestimated. This was necessary as none of this staff group completed the user survey. System reports are circulated to the staff.

The system required very little support from the Outpatients Co-ordinator. It was felt that now that the information was being used, some effort on defining information requirements would be worthwhile.

Data collection was done manually at the end of each day. This effort was resented at first and staff were unhappy at the prospect of their work being monitored, but there have been no serious problems in this area. There was some doubt over the accuracy of the activity timings recorded in the system as some figures seem rather high.

3.5. Dietetics.

The manager and staff of this department have a very positive attitude to the system, which is regarded as one of the strengths of the service. This view is supported by the considerable use which has been made of the information provided.

All the staff are Psion users. "Other" activities are recorded for only two months in the year and are not included in the results of the timing survey.

The system replaced a previous manual system in which counts of patients seen were recorded in a book. Some manual statistics, relating only to outpatients, are kept as a

cross-check. Information about the meals ordered can be obtained from the catering system.

Data for the Körner return was provided by the system. Comcare information was not of great use in the SWOT exercise, but changes in the coding structure have made the necessary information available so that it could be used in any further analysis. Specific uses for the information prior to this study included predicting the impact on the service of the appointment of an additional consultant paediatrician and a decision to change the way that non-attenders are followed up. Several ad hoc reports had been requested and provided: these requests were expected to continue. The ability to answer specific queries in this way was seen as more important than the regular printouts, and quarterly output would be preferred to the current monthly reports.

The system had provided information which was not previously available, concerning the mix of cases and the source of referrals. The ability to see which doctors tend to refer patients to the service was helpful in planning and in the allocation of staff. It was possible to see how much work is generated by medical, surgical and paediatric consultants. Information about the way time has been spent was considered useful.

Staff see the printouts of their own activities and the totals for the department. They are all thought to be interested in the information, and this also provides a way for them to check the data which they had submitted. The manager's account of the attitude of the staff to the system was supported by their very positive responses to the user survey, which mentioned time spent examining the information received and showed that the information was considered useful. Most staff felt that the system was worth the effort made and found data collection interesting, although half expressed slight agreement with the opinion that their time could be spent more usefully. The information was thought to help the department to give a better service. Some staff, however, found that recording their activities caused stress.

It was expected that the system would be of assistance in costing the service and in making service agreements. A new coding structure had made it possible to indicate the complexity of treatment and to differentiate between professional work and other kinds of task. The intensity and complexity of the work done will be important in making service agreements. It will be possible to include volumes of work and the average time taken for various types of treatment in the agreements, and to predict how much work will be possible. Costing of the service was under consideration at the time of the study. This service was considered simple to cost. The main cost is that of staff, which the system should be able to provide; equipment costs are low. Overheads must also be included.

There are some travel costs as a few home visits are made each week: Comcare would be able to help to calculate these if mileage were recorded.

There is a need to measure outcomes: the use of the discharge code for this is envisaged. If this can be achieved, it is expected that it will be possible to improve the effectiveness of the service. The ability to adapt to the pattern of referrals should improve the use of resources. This and any improvements in effectiveness would improve the service given to patients.

3.6. District Nursing - Darlington.

District nurses form the largest part of the Adult Care Team in Darlington.

Although a number of potential uses for the information produced by the system have been identified, there had been little actual use at the time of the study. This was partly due to problems with the system and the accuracy of input data. Körner information was produced but its accuracy was questioned: checking against manual records was necessary.

For the District Nursing Service, it is possible to look at breakdowns of the case load. Case load lists would be useful to staff if they were accurate. However, a software problem had caused the case loads held in the system to be highly inaccurate and it was frequently necessary to return the lists with corrections. Patients were often placed in the wrong case load, so it was necessary to find the correct practice in order to make the corrections. The district nurses contacted each other in order to do this. The printout was found unhelpful for this purpose as it shows the GP code but does not give the name. Inaccurate case loads also affected the use of the information for staff allocation. It should be noted that this error caused an increased time requirement which is reflected in the responses to the user survey. This problem was corrected in the latest release of the system.

The overall picture of service activity given by the system was thought to be fairly accurate, but not completely so. One problem was the time taken for discharged patients to be removed from the case load. It was not yet possible to identify trends in activity as the new printouts had not been available for long enough. It was expected that the availability of ad hoc reports would make information more readily available. So far, however, these had not been in the form which was expected.

A number of uses for the information were expected to be possible in the future:

- Costing for contracts, once the relevant costs could be incorporated. Factors to be considered included the choice of a standard salary, as staff tend to be above the mid-point on average: it would also be necessary to incorporate overtime and weekend work, for which staff are paid at enhanced rates.
- Allowing sisters to identify trends in the composition of their case loads, in such factors as age and type of treatment given: this would show any changes in the type of work done.
- Enabling each sister to plan the work of her group of staff and to arrange leave.
- Better information could encourage staff to think about their own working practices.
- Decisions concerning the performance of individuals.
- Decisions concerning the required mix of staff, i.e. the skills and grades needed at each practice. This will give a better use of resources and thus indirectly benefit the patients.
- Determining the direction of the service.

Comcare is seen as only one of the available and necessary sources of information for this service. For example, demographic information will also be needed. Information from all sources will allow trends to be identified. If changes are imposed on the service, the information provided by the system should help in monitoring their effects. It will show *what the service does, and so help in raising its profile.*

Difficulties with the system were time-consuming, but it was expected to reduce the effort required for the manager to obtain information.

Most survey respondents felt that they received useful information from the system and thought the effort made was worthwhile. Some were concerned about the way the information might be used and felt stress as a result of recording their activities. The information was seen as necessary in the White Paper environment and for Körner.

3.7. District Nursing/Midwifery - Teesdale.

This group of nursing staff forms part of a multi-disciplinary team working in Teesdale. The team also includes health visitors, a physiotherapist and an occupational therapist. The District Nurse/ Midwives have used Comcare since October 1988 and now all use Psions. When the interview relating to this group took place, staff had recently begun to record the time spent on their activities and travel. Each member of staff sees the report of her activities. Staff are thought to discuss their information with each other and are asked for comments on the accuracy of the information.

Interestingly, none of the respondents to the user survey found data collection uninteresting, though half were undecided. Most thought the effort made on the system was worthwhile, though the perceived benefits were to the service as a whole rather than to their own work. A majority were afraid that information might be used against their service, but none resented others knowing how they used their time. Most felt that they received sufficient support. Psions were popular and staff felt confident about using them. The effects on job satisfaction were if anything positive: only one of the seven respondents enjoyed her job less because of the system, though two did not express an opinion, and a majority of staff reported factors which are known to contribute to job satisfaction, such as a sense of achievement gained through using the Psion, use of professional skills, and development of new skills (presumably related to computers and data handling). Some appreciated the variety added to their task set. Opinions were divided about increased stress caused by the recording of activities and the contribution of the information to a "sense of what my job comprises".

The service manager recalled that there had been considerable resentment of the system when it was introduced. The user survey results suggest that this has been overcome. Training was given but does not appear to have been entirely effective. The time requirements for data collection have reduced now that staff are used to the system. Staff tend to record their activities at the end of the day.

The system replaced a previous manual system of data collection which provided similar information to Comcare, with the exception that timings were not recorded. The manual system was considerably less time-consuming, requiring about an hour each month for each person to record the number of initial and subsequent visits with counts by age and type of treatment. Information from Comcare is easier to read than that from the manual system: the new types of output are also preferred to the original listings. It is easier to detect inaccuracies in Comcare data than it was with the manual system, however, the data is in fact thought to be less accurate. Comcare gives the team's manager better access to information.

Körner data has been provided by the system. It was expected that in the future information from the system would be used in decision-making, including decisions about allocation of workloads, and in calculating the costs of activities. There were some potential problems: inaccuracy, especially where staff are covering the workload of absent colleagues; the time at which reports arrive; and the inability to record more than one activity for a visit which may in fact include several, making visits appear unnecessarily long.

3.8. Health Visiting.

Health visitors operate in Darlington and Teesdale. Körner data is provided by Comcare, but these staff also use the Child Health system, which is used to meet other central information requirements. There is some duplication of the data recorded in the two systems.

Staff in both Darlington and Teesdale are shown their individual printouts. At the time of the interviews there were thought to be problems with the accuracy of the reports, due to inaccurate and inconsistent input. At the time of the user survey, three months later, most survey respondents thought that they were receiving useful feedback from the system.

Comcare replaced a manual system in which the number of patients seen for each type of activity were recorded for each day and returned monthly. Comcare gives additional information: activity timings and a better breakdown of non-clinical activities. It is expected to give a better picture of the amount of work done. Data from the manual system was obtained more quickly, i.e. within a week of the end of the month, whereas Comcare monthly reports take several weeks to produce. Some ad hoc reports have been requested and Comcare is expected to give better access to information than the manual system. However, the Child Health system provides much of the management information required by this service.

The time required for use of the system, as calculated from the user survey, appears high but agrees with the managers' estimates. It is higher than the time needed by other community nursing groups, although survey respondents in this group had fewer contacts than district nurses or nurse/midwives. The suggested reason for this was the complexity of the visits: health visitors tend to carry out several activities on each visit, including advice and support which have to be recorded separately for Körner but are in fact given with almost every other type of care. There is also a tendency for unscheduled calls on neighbours to be requested if the health visitor is seen in the vicinity! This can result in activities which the health visitor was not expecting to carry out and which cannot be coded at the time. About half the survey respondents recorded their activities after each visit: the four of these who stated a time required between one and five minutes to record each contact. This gave a mean time of 3.5 minutes per contact, which is slightly higher than the average for all users of 2.88 minutes. Clerical staff enter some of the registrations and amendments.

However, another very significant factor appeared to be the time spent on correcting case loads. Health visitors recorded significantly more time spent in this way than any other

staff group. This was known to have been a major difficulty, although other types of error correction are not considered a problem. Although some respondents did not spend time on this activity, those who did (the majority) recorded times of up to 7.5 hours each month, with half the respondents spending over two hours each month. This activity should be far less time-consuming in future as the error which caused most of the problems has been corrected. To allow for this, a further calculation was made after adjusting the time spent on case load correction to no more than 20 minutes per month for those who had specified a time. This would reflect the likelihood of a few genuine errors or changes occurring. The adjusted average of 182 minutes per week is likely to be a more realistic estimate for future years.

Inaccuracy, inconsistent use of codes and the need to make changes in the coding system have limited the usefulness of the data. Information was thought to be less accurate than that produced by staff in the annual reports based on their own records. The use of system produced information in the annual staff allocation decisions needed the problem with case loads to be corrected. The 5 minute periods in which time is recorded are too long to record accurately unsuccessful visits and travelling, or data entry after a visit. Survey respondents all claimed to record their contact times, but some omissions and inaccuracies were suspected. A revision of the coding structure was expected. Use of the second treatment code to record child protection data was expected to allow more accurate explanation and prediction of workloads. SWOT analysis would require information about the source of referrals, which the system could provide, and about outcomes, which would not be available from Comcare. It is known that not all staff record the time spent on Comcare input.

Once sufficient accuracy has been obtained, the system is expected to be used in the allocation of work and deciding the size of case loads, monitoring trends and responding to changes in the patterns of work, identifying areas where the service needs to develop. This should allow better use of resources. Individual staff produce an annual report: this takes several days and the time taken to produce the statistics is expected to be considerably reduced once case loads are correct and information from the system can be used. A smaller statistical exercise is sometimes required during the year and Comcare could also help with this. The work of clerical staff on the production of annual reports could also be reduced.

Some disruption was caused by the introduction of the system, but this was not considered excessive. Subsequent changes in coding also caused difficulties. The worst effect on morale was caused by the constant inaccuracy of case load lists. The manager of the Child Health Team spends up to two hours each week in meetings and giving

support for the system, though there is less need for support now that almost all health visitors are using Psions.

The user attitude survey revealed that most staff preferred using Psions and that in most cases, initial apprehension about their use had given way to confidence. Opinions about the worth of the system were divided and two thirds of the 12 respondents thought that their time could be spent more usefully. The system was seen as necessary for Körner and in the White Paper environment and most felt that the information was necessary for good management. Evidence from the survey about the effect on job satisfaction was inconclusive. This staff group had the highest proportion of respondents who stated that Comcare affected how happy they were in their jobs (Q23), although the difference between this group and others was small. Slightly over half agreed that they enjoyed their jobs less because of the system and a similar proportion felt that recording their activities caused stress. A proportion felt a need for more support.

3.9. Mental Handicap Nursing.

Mental handicap nurses are part of the multi-disciplinary Mental Handicap Team: all staff groups in the team use Comcare except the social workers, who are managed by the local authority. Both methods of data capture are in use. There was no previous manual or computerised information system: Comcare has thus given much improved information to the service manager. Regular information requirements had been discussed and ad hoc reports were available. The new style of report could be used with much less effort than the original listings.

At the time of the study, little use had been made by management of the information provided. An extension of the coding system was being planned to allow each case to be given a weighting. This would allow the information to be used in allocating work and for more effective planning. The system was expected to give better control over the service and to improve the use of resources.

Staff had access to the monthly printouts and discussed them with their manager. It was thought that more effective use of time was resulting from this and the discussions had also allowed problems with the use of codes to be resolved.

There was little disruption when the system was introduced, although some time was needed for training. Some subsequent effort was necessary to remedy inconsistencies in the use of codes and to improve the accuracy of the recorded activity timings. However, there do not appear to have been any severe problems in this staff group. Discussions between the team manager and the Comcare team occur monthly, on average, and require

from 1 hour to a half day. Liaison with the support personnel has been helpful. The team manager spends from 2 hours to a half day per month discussing the reports with the staff.

The system was expected to reduce the time needed to answer information requests. If information is needed about years before the system was introduced, it has to be extracted from diaries or other records and may involve several hours' work. Such requests do not occur regularly but on occasion there may be several in the same month. As more years' work is recorded on the system, the need for such exercises should be reduced.

All six staff responded to the user survey. The Psion users appeared to be happy about using their machines. Opinions about most other points were mixed. Those staff who expressed an opinion saw the system as necessary for Körner and in the White Paper environment, but views about the contribution to the work of individuals and the department were split.

3.10. Occupational Therapy.

Occupational therapists work in all three Units. The manager of those in the Acute Unit was interviewed as she provides support for Comcare to all occupational therapists.

Staff in the Acute Unit have Psions, those in other Units use forms. A weekly sheet for recording activities is in use at Aycliffe. The time spent on system use according to the user survey (131 minutes per week) seems comparable with the manager's estimate of 20 minutes per person per day for recording activities only. Little time is spent on error correction. The recording of activities as health care packages was expected to reduce the time needed for data input.

The introduction of the system caused some initial disturbance and adverse reactions from individuals (as did the reorganisation of the department which was linked to the use of the system). However, the training helped to overcome these problems.

Before Comcare, the only information recorded consisted of registers of patients who were due to attend. These were ticked to show who attended but were not thought to be kept particularly accurately. Information from Comcare is considered more accurate and more accessible. Activities can be timed more precisely.

It was felt that benefits had already been received from the improved information. It had been possible to identify activities which are not being carried out and to decide whether they should be undertaken. It was also possible to show where additional skills were needed and to assess the level of staffing needed to cover the work done in different

areas. There had been limited use of the system in the SWOT analysis. The system had been used in reorganising the Occupational Therapy department in the Acute Unit so that staff specialised in a more defined area. Staff had been redeployed to areas which were better suited to their skills and hours of work. An ability to detect and respond to changes in workload had been demonstrated by the response to seasonal variations in the Orthopaedic workload.

Training in the Acute Unit is provided by the manager who also assists if staff are having difficulties with the system. This does not require a large time commitment. New staff are given further help and instruction by their colleagues.

It was thought that staff in the Acute Unit found the information interesting and that motivation had increased as a result of the feedback provided. However, most staff who responded to the user survey felt that data collection was not the most useful way of spending their time and did not use the information produced in planning their own work. Opinions were mixed about the provision of useful feedback and whether the effort put into the system was worthwhile. All the staff who indicated that they did not receive useful feedback were from the Mental Handicap Unit, though these were not the whole of this group. Most respondents did not find data collection interesting.

3.11. Physiotherapy.

Physiotherapists work in all three units. At the time of this study, those working in the Community were beginning to transfer from the paper system to the use of Psions and a pilot of Psion use in the Acute Unit was being arranged.

The Physiotherapy Department in the Acute Unit has a particular problem in that the system seems unsuited to their methods of working. A physiotherapist can supervise several patients at once, so that in a given period, all may be receiving different treatments for the full length of time. The system is not capable of reflecting this for individual patients, but useful information is lost if such treatments are recorded as group sessions, in which patients are not identified. Physiotherapists in this department also have large workloads and work under high pressure; there are waiting lists and it is not possible to offer treatment to all those who would benefit. Any time spent on paperwork is likely to be resented under these circumstances and can be clearly seen to reduce the number of patients treated in a day. Staff frequently completed their data collection in their own time. In fact, this staff group is not amongst those with the highest time requirement: the situation is aggravated by the situation of this particular department. It was clear that the system was extremely unpopular with staff and that there were severe problems with motivation and with the accuracy of data. Data is frequently submitted late.

Data recorded in the system gave an average time spent per person per week of 76.5 minutes, based on an establishment of 23.7 w.t.e. However, this figure did not correspond with the impressions of the managers of the service, who thought that a much greater time was spent. It also did not take into account differences in working practices between units: Comcare was thought to be less suited to the working practices and pressures of staff working in the Acute Unit. The timing survey gave the more realistic result of 111 minutes: this was still lower than the managers' impressions.

It was hoped that analysis of the survey results would allow differentiation between physiotherapists working in different units. However, a number of respondents did not identify the unit in which they worked and all those who did so were from the Acute Unit. Using only those responses which were identified as belonging to the Acute Unit, a lower average time (99 minutes) was obtained. This was unexpected. However, it is possible that the department in the Acute Unit has now streamlined its data collection, by the use of weekly activity/registration forms and perhaps also the failure to record treatment codes, to the point where the time requirement is now greatly reduced as staff are recording only a minimum set of data. The large number of patients seen and the considerable pressure under which they operate appear to be major factors contributing to their problems with the system.

Furthermore, in this department the system was producing no information which was considered sufficiently reliable to be used without provisos as to its accuracy and comparison with manually collected figures. There had therefore been very little benefit from the system. Körner data had not been in the required form as the coding system did not reflect all the possible locations of treatment. Information had been used in a review of the waiting list for physiotherapy as part of the clinical review process for one specialty. Use in the SWOT analysis and planning has been in general terms only as precise figures could not be used.

The manual collection of statistics continues in all three Units. These figures are compared with data from Comcare. There are serious discrepancies between the two sets of figures in the Acute Unit. Comcare will be able to produce better breakdowns of the figures than the manual system and ad hoc reports are now available within 1-2 days. Staff can have information on their own workloads but most did not find this relevant.

The introduction of the system caused severe disturbance. The need to register all the existing patients caused considerable extra work as it was necessary to retrieve the case notes for each person. These registrations continued to be a problem for ward based staff. In addition, the original daily activity sheets required the data items which identify

a patient to be entered every time a treatment was given. Duplication of these details has been reduced by the use of a weekly sheet in the Acute Unit. The new form also includes registration details. There are still some minor problems with the design.

In the Community and Mental Handicap units, working patterns are different and case loads are smaller and more stable. The information is more accurate and there have been no usability problems with the system. The system was of more use in SWOT analysis in these units. A review which was carried out in the Community Unit used data from the system, which was found to give more information than the manual statistics.

The time needed for error correction was thought to be diminishing at the time of the study. However, one reason for this was that discharge codes, which were a frequent source of errors when they were entered too early and further treatment then took place, were no longer being typed into the system by the Comcare data entry staff. Another reason was the introduction of weekly activity sheets containing registration details, which prevent activities from being submitted to the system before the patient has been registered.

The only clerical support is in Outpatients, where the receptionists handle registrations. A communications link to Archer Street allows these to be entered directly. However, the availability of this link is irregular. If it is not available, additional work can occur as a registration form is completed and then the information is entered at the terminal. A more reliable arrangement is needed if this link is to be satisfactory.

The need to calculate the costs of the service will require accurate information and changes in the information requirement are expected. The time taken for patient related activities is not recorded, although some timings for other activities are recorded. The Physiotherapists' professional association has advised against the recording of activity timings. Some staff are not recording treatment codes. Where patients are treated together and a group session is recorded, it is not possible to show what treatment an individual has received. This information is sometimes needed. The time spent on non-patient activities is recorded. This has been useful in controlling demands on staff time.

The user survey showed that few physiotherapists perceived any benefit at all from the system. They were concerned that the information collected might be used against the interests of their department and felt that recording their activities caused increased stress. A few thought that the information was necessary if their service was to be well managed, but most did not express a view on this question. The majority saw the information as necessary in the White Paper environment. A majority enjoyed their jobs less because of the system. A few written comments were received: these also showed that strong

feelings existed, although the writers would have appreciated an information system which matched their requirements more closely.

The situation in the Acute Unit appeared particularly difficult. The attempted solution of the problems by the progressive reduction of the data collected, whether officially sanctioned or de facto, is illusory as the scope for use of the information is also reduced and no reason or motivation to provide accurate data will be possible. At the time of the review, the system had little potential advantage over the manually collected data, and no actual advantage as the information produced was inaccurate. The proposed introduction of Psion Organisers, if it proves feasible, could be of use: physiotherapists at the Richardson Hospital, admittedly working in different circumstances, have found them more efficient and accurate. However, failing a substantial improvement as a result of this, management will have to decide whether the information requirements of the department in the period before the introduction of HISS justify additional investment, perhaps including the provision of clerical support, or whether it would be possible to rely on the manually collected statistics during this interim period.

3.12. Psychiatric Nursing.

The Community Psychiatric Nursing service is organised in two areas: Darlington and the surrounding villages; and Barnard Castle and Teesdale. Each of the 14 nurses has on average 3-4 referrals each week and sees 4-5 patients each day. The duration of visits is normally between 45 minutes and 1 hour 15 minutes. Data entry is split between Psions and the paper system. Registrations are time consuming because it is necessary to code the data and to locate the postcode in a directory.

There was some disruption when the system was introduced. This was mainly because time was needed to become accustomed to it, and some time was spent on setting up, and later revising, the coding system. Although there were some complaints, these were not serious. The system has now been accepted by the staff.

At first, the treatment codes were defined very broadly, but a considerable effort was made to provide a revised coding scheme which allowed a more precise definition. This could be used to show the areas in which staff were proficient and their training needs. However, the more precise codes were not used because coding treatments became too time-consuming. The coding scheme was changed again and is now more general.

Use has been made of the information provided by the system and a number of other potential uses have been identified, although not all of these are thought likely to be

needed. Körner data has been produced. A SWOT analysis was not required for this service. Case load lists are provided for staff.

Information from Comcare has been used in decisions about workloads and staffing. When the team in Teesdale was established, information about the travelling done and the sources of referrals in Barnard Castle and Teesdale was used in deciding how to divide the service there into sectors. When a team co-ordinator was seconded to another HA, the system provided information which was used to show which member of staff could be transferred to cover the workload. When a member of staff left, information about her case load was used with information from other sources to show that a replacement on a lower grade could be appointed. It is expected that the system will continue to be used as necessary for this type of decision, though it should be noted that mileage is no longer recorded.

Information from the system would be useful in service development and in improving cost-effectiveness, but no changes are planned. The system can provide an analysis of costs, but costings are not needed at present.

Before Comcare, data was collected manually from individual diaries, and forms were completed on a weekly or monthly basis. The routine data collection took at least two hours of staff time each month, and collating the data provided by staff required at least an hour. Any additional requirements took more time. Nevertheless, the time requirement for Comcare is significantly higher.

The information provided by the manual system consisted of numbers of new referrals from GPs and consultants, discharges, visits, aborted visits and injections. Comcare provides information which was not previously available. It can show the sources of work, which GPs use the service, the amount of time spent and the distance travelled. Case loads can be shown and analysed geographically or according to age or sex.

Information is obtained fairly readily, but in the past there were difficulties in obtaining the precise information which was required. The time at which reports arrive is considered acceptable.

The accuracy of the information produced depends on the accuracy of the input. It is suspected that there may be some inaccuracy in timings as staff try to make their times add up to 7.5 hours and that staff may use only those codes which they can remember. Case load lists were inaccurate in the past. This was because discharges were recorded incorrectly in the Psions and the discharges were not reflected in the lists. This problem has now been resolved.

Comcare is expected to give some improvement in the ability to detect changes in the numbers of referrals for various diagnoses and age groups. It can show the amount of demand for particular types of care and could help in decisions between providing care in group sessions or on an individual basis.

The system can show the time until the first contact with the patient, which would allow quality assurance as it is standard practice to act on a referral within 2 days. The activities recorded can also show whether staff are having the necessary contact with other disciplines and making use of resources such as voluntary organisations. Although it would be possible to monitor what staff are doing and the regularity of visits, it is considered unlikely that this will be required.

The recording of mileage has been discontinued. This was duplicating the information in the weekly and monthly mileage forms. Comcare can print monthly travel claims but they cannot be made available in time to be included in the next month's payments. There is no equivalent of the weekly form. Staff also complete monthly timesheets which contain similar information to the system reports.

Little management support or liaison with the Comcare team is required. It is now only necessary to ensure that the data has been submitted and to ask staff about the small number of errors which are reported. The problem with case loads caused some extra work for the co-ordinators.

Whilst most staff prefer the use of Psions, and these are considered more efficient for staff whose workload is mainly clinical, a few have a strong preference for the paper system. There have been no real usability problems although an error will occasionally cause the machine to hang. One person had difficulties because of a faulty machine.

Data is considered more secure against loss under Comcare. There is a need to ensure confidentiality, which was not an issue with the manual system as patients were not identified.

Eleven staff returned the questionnaire. Most staff did not find the system useful to themselves or helpful in providing a better service. Comments suggested a lack of confidence in the data and a feeling that the system is not relevant to their needs. Opinions were divided as to its necessity for service management and for Körner. However, the information was thought to be necessary in the White Paper environment. A majority said that they could spend their time more usefully. Most thought that the information might be used against the interests of their department. A small majority felt

that more support was needed. Most respondents preferred to use Psions and most Psion users were confident about the use of their machines. None found data collection interesting. More than half experienced increased stress and enjoyed their jobs less because of the system.

3.13. Psychology.

At the time of the study, Psychology had recently begun to use the system again and only one set of reports had so far been received. A previous implementation had failed because of an unacceptable encroachment into clinical time. The service manager recalled that each person had been spending 1/2 day per week on data entry, of which registrations had been the most time consuming part. This would certainly be excessive for a service with a low number of contacts each week. One survey respondent described his/her time commitment during the former implementation: this amounted to a little over an hour each week. Although Psions had been used in the original implementation, data was now collected on forms as this had been found less time-consuming. The re-introduction of the service had caused no practical disruption.

The time requirement was still considered high. The time calculated from the user survey, 64 minutes per person per week, is actually one of the lowest. However, this is only for the recording of activities, as the departmental secretaries now register clients, and the work of these staff involves long appointments so that there are a relatively low number of individual contacts. The figure may not be entirely representative as only two survey respondents gave timings for their current use of the system. The department was over-stretched and had a long waiting list: it was hoped that more staff would be appointed.

Comcare replaced a manual system of data collection. This was based on personal diaries and a central diary kept by the secretaries. Twice each year the number of people seen was counted: this took 1 or 2 days each time. Data is now more readily accessible and it is thought that better and more timely information will be available in future.

As information had only been received for one month at the time of the study, its use so far had been limited. However, the first report was helpful in that it showed that much more of one type of work was done than had been realised. The information required for Körner was available, although no better than that provided by the clerical system. SWOT analysis had not been done for Psychology.

It was expected that the information would be of use to staff as it shows what work they are doing. Other benefits were expected if the right type of information could be

produced. It was important to understand the pattern of referrals: clear identification of individual referring agents was thought necessary. This was expected to be helpful in business planning and improving working practices. It was hoped that the information could be used in promoting the service. The pressure of work was thought to give the department little scope for responding to change.

At the time of the study discussions with the District Computer Unit were taking place about the possibility of setting up a computer system within the department to record clinical information, which psychologists would find more relevant to their needs than the type of data collected by Comcare.

The reports so far received were the standard listings rather than the newer summary reports. There had been some problems with accuracy, including inconsistent use of codes by staff and another error, which did not appear to have originated within the department, whereby activities from another department were attributed to Psychology.

It was thought that data was less secure as it was now held centrally and was no longer under the control of the department. Patient data in Psychology is of an extremely sensitive nature. Measures were being taken to preserve confidentiality: aliases were used for staff and patients and in some cases contacts were being entered as group sessions with one participant so that the patient would not be identifiable. (It should be noted that this practice is not advisable as it will prevent the treatment given to individuals from being identified and restrict the use of the information in costing and planning.)

The three survey respondents felt that they did not receive enough support for their use of the system. Two respondents agreed that useful feedback was provided, however, none had used the information in planning their work. All saw the information as necessary for service management. They did not wish to use Psions. One respondent enjoyed his/her job less because of the system; the other two disagreed with this suggestion.

3.14. Speech Therapy.

The introduction of the system caused a high degree of disruption with a consequent effect on morale. The disturbance was partly due to the manager's post being vacant. Uncertainty continued for several months as changes in the method of input took place. At one point it was discovered that no data had been collected for some time: the backlog of data input at Archer Street had prevented this from being noticed. Data collection was resumed and a management decision was taken that all staff would use Psions. Initial problems with support and training have been overcome. An additional training session was helpful. Data is now submitted on time.

The delay between submitting data and receiving output was very long at one stage. This made it necessary to ask staff for additional information. At the time of the study, reports were received more quickly and the quality of the information was also considered better, though information requirements were not fully met. The new type of summary and graphical output had not yet been received but was expected to make the information more accessible. Incorrect information had not been a serious problem.

The coding system had been streamlined by the introduction of health care packages corresponding directly to the patient category. However, this did not give sufficient detail and it was intended that more information about the category of the patient would be collected.

Staff had been involved in the process of defining health care packages. Morale was thought to have improved as a result of the simplified input method, but the user survey suggests that they were still not convinced of the value of the information. (They were not shown outputs from the system at the time of the study, though this was intended for the future.)

At the time of the study, all speech therapists used Psions to record information for Comcare. Their use had been found better than the paper system. "Other" activities were not recorded. Staff entered data at the end of each session, or daily, or at the end of the week, depending on the individual. There were an average of 23 registrations per month. Most of these were done by the secretary at the same time as she compiled the patient's file. This was done manually as there was not a Psion available. A few survey respondents also mentioned entering one or two registrations. It was expected that the secretary would eventually be provided with a Psion to reduce the time spent on entering registrations. However, it seems unlikely that a Psion would make a worthwhile difference. (One of the survey responses appeared to come from the secretary: if so, the process of registering patients required a total of 10-15 minutes per week.)

A Dell PC had been purchased with the intention of creating a database of additional information to be used for management and research. Data was to be collected manually for this system. The database was to include information such as the waiting time between referral and attendance at an assessment clinic, before the first therapy session and between the end of therapy and the review session. This would suggest a danger of duplication in the information requirements for the two systems.

The use of Psions and the simplified activity codes had reduced the time taken for data input. There were few input errors. However, there had been occasional problems with

the Psions. Machines would sound their alarms while inactive; fail to allow the user to pass the program's password entry stage; or display an unhelpful error message and cease to operate further. It had been difficult to find out how to overcome these problems.

Körner figures for 1989-90 were obtained by scaling up the figures for the last 3 months of the financial year, as data for part of the year had not been collected. A complete set of information should be available for future returns.

Information from the system had been used for business planning and SWOT analysis, in conjunction with other information. At this point, the information used in decision-making had been used to provide confirmation rather than for new analysis. It contributed to a decision that certain categories of patients would not be treated in this District. The information was used to show that the existing impressions of the amount of work done in these areas were correct. Either Comcare output or the supplementary information collected because of the time taken to receive output from Comcare was used in a decision that cases would not be prioritised according to age.

In the area of work allocation, there had been a move towards working with groups rather than individual patients. Information from Comcare was used to confirm that this was needed. However, a significant change in the pattern of work was expected in the future: speech therapists would concentrate on assessment of patients, diagnosis and planning programmes of care. Care programmes would be carried out by parents, carers or speech therapy assistants.

The system was expected to show trends in the number and type of contacts. Initial discussions about the provision of costing reports had taken place.

The system needed little on-going support from the service manager: this involved checking the information received for errors and attendance at occasional meetings. Improved reports and graphs were expected to give time savings in the handling of information.

Eight responses to the user survey were received. Most of the respondents did not feel that they received useful feedback and did not use the information in planning their work. They felt that the system was not worth the effort made and did not contribute to giving a better service, and thought that their time could be better spent. Opinions as to whether the system was necessary for Körner were divided. Respondents did not find data collection interesting. Over half experienced some additional stress as a result of

recording their activities and most did not find that it required the use of their professional knowledge.

3.15. Other requirements for management information.

Senior managers require summary information giving an overview of each service rather than detailed listings. The regular information required in the Community Unit was being defined at the time of the study, but ad hoc reports had been found useful.

Introduction of the internal market will bring a need for information which can be used in predicting the cost of services and in monitoring the fulfilment of contracts. This will involve information about the volume and cost of the services provided. If the actual demand for services differs from the contracted level, it must be possible to detect this difference. There will also be a need to monitor the quality of the service given as this will be defined in contracts: this will include such factors as waiting times for treatment and the amount of follow-up care. A minimum data set has been defined.

There is a need for outcomes to be measured and recorded. These will be needed to find the best way of carrying out types of care where there is a choice and as part of the medical audit process. However, in some areas there are no clear indicators of success, e.g. child surveillance, or some aspects of the care of elderly patients which continue throughout the patient's lifetime.

Future developments in the district will bring more sophisticated information systems to the Acute Unit: there is a need for the information systems in Community to fit alongside these. Paramedical staff working in the Acute Unit are intended to use the HISS system to record their activities, even if data is then extracted transfer to Comcare. However, despite early assurances from the HISS team that nobody would be required to use both systems for input, there is still concern that this will be the case. Disciplines where staff work both with Acute patients and in the community feel particularly at risk.

Suggested new areas of need included geographic information systems and the ability to modelling the effects of changes before they occur. There will also be a greater need for communication between different bodies, notably service providers, purchasing authorities and referring agents.

More sophisticated facilities will be needed if more data is to be collected: in the long term the system will need to be replaced by something which will allow better integration with other systems, sharing of information to reduce data collection, and much improved

collection and retrieval facilities for practitioners. The information staff would be well advised to maintain familiarity with emerging technologies and systems.

4. Assessing Costs and Benefits.

4.1. Research Questions.

This section discusses the ‘research’ aspects of the study. The cost-benefit study and the preliminary planning exercise are part of a research project which is investigating the evaluation of information systems of the NHS. The project asks a number of questions about the study. Some of these are specifically concerned with this cost-benefit investigation, others are more general and could be applied to other types of post-implementation evaluation. The project has adopted some underlying assumptions about evaluation: the application of these to the study is considered in section 4.13.

Questions specific to the cost benefit study.

- What costs and benefits, and to whom, should be included? (Section 4.2.)
- Can evaluation techniques make a helpful contribution in this situation? (Section 4.3.)
- What approach is most appropriate here? (Section 4.4.)
- Are the chosen techniques practicable and did they give good results? (Section 4.5.)
- What degree of effort is involved? (Section 4.6.)
- What preparatory work would have been helpful, had an evaluation been expected before the system was implemented? (Section 4.7.)

General questions.

- Do any features of the NHS environment affect the techniques used or the results obtained? (Section 4.8.)
- Does the nature of the system impose any specific evaluation requirements or constraints? (Section 4.9.)
- What are appropriate ways of measuring the impacts of this type of system? (Section 4.10.)
- How can positive and negative impacts (benefits and costs) be weighed and compared? (Section 4.11.)
- Is there any need or scope for a “benefits realisation” type approach when introducing this type of system? (Section 4.12.)
- Do the experiences gained in the study raise any further questions or areas for investigation? (Section 4.14.)

Underlying assumptions.

- That evaluation is useful in developing better systems.
- That evaluation should include a broad range of factors, including social and organisational factors, rather than concentrating on financial and technical areas.
- That the opinions and interests of all concerned parties should be represented.
- That different situations will require different approaches.
- That the impacts of an information system will require to be measured in varying ways and will not all be directly comparable.
- That post-implementation evaluation should be considered before the system is introduced.
- That evaluation should be seen as a normal part of the life of an installed system.

4.2. Which costs and benefits should be included?

The assumption was made that better information is not itself a benefit: the information must give some actual advantage in terms either of beneficial results from its use in practice or of improved organisational capabilities such as the ability to detect and respond to change.

The study adopted a broad view of costs and benefits and attempted to see where the impact of the system was actually felt. A simple framework for this was to look for effects on:

- The organisation,
- Patients, actual or potential,
- Staff as individuals,
- External bodies.

Impacts on the organisation would be felt at various levels: District, Unit, department, or by individuals in the performance of their work. They would include financial costs, changes in the capabilities of the organisation, disruption to normal work etc. Examination of the costs and benefits within the district revealed that the staff who are responsible for data collection receive very little benefit from the system in their individual work, but appear to be aware of the need for such information in service management. The intention that patients should ultimately benefit from the system because of the improved resource usage which it would enable was clearly stated but, in the short term, there has been some negative impact on the amount of care which can be provided. This reduction proved difficult to quantify as in most departments the pattern of work is variable. Factors affecting job satisfaction were investigated as part of the user survey.

The only relevant external body was the Department of Health, which receives Körner returns.

An alternative approach would be to include only those costs and benefits felt by the organisation. This requires the interests of the organisation to be implicitly or explicitly defined. One approach would be to consider the effects of the system on the organisation's fulfilment of its objectives. The impacts to be included would then depend on the objectives: for example, job satisfaction effects would be included if the organisation had an objective relating to the well-being of staff.

The inclusion of indirect effects of a system in an evaluation needs careful thought. What, for example, if reduced job satisfaction makes a department less willing to be flexible, or if, as in the case of one department using Comcare, unrelated information gathering exercises are prevented by the pressure of data collection for the system? It is necessary to include only effects which are principally caused by the system and, if a comparison is to be made, to avoid double-counting, i.e. the inclusion of the same cost or benefit in more than one form. If the approach of identifying the costs and benefits to the various interested parties is adopted, effects on different groups will be regarded as separate. This study has concentrated on the identification of costs and benefits rather than their comparison, and some indirect effects have been noted in the body of the report.

4.3. Usefulness of the study.

The contribution of the study to further planning and development of the system will need to be assessed retrospectively as a conclusion cannot be reached until the results of the study have been disseminated and used. Feedback will be requested at a later stage. However, it is possible at present to note that the initial planning exercise allowed an independent view to be taken of a problematic situation and enabled clarification of the issues involved. The cost-benefit study itself was directly relevant to the strategy which had been adopted for the development of the system.

The study was undertaken in order to provide information for planning the future of the system and greater understanding of the issues involved. It is the detailed information which has been gathered which is likely to be of most use in considering changes, rather than any summative conclusion about the value of the system.

An evaluation exercise can serve purposes beyond the strict definition of the study. In this case, practical suggestions from end users were gathered during the user survey and

have been passed (anonymously) to the Information Team for consideration and action. These show points which need to be addressed. The survey has answered some specific questions: it has demonstrated that the need for the system was appreciated, and has shown where costs or benefits to individuals need attention within staff groups.

4.4. Choice of approach.

The type of evaluation was selected by means of a planning exercise. This involved interviews with a number of managers. They were asked to identify the aspects of the system which presented problems, areas where they saw deficiencies or risks and those aspects which were considered most important if the system was to aid their work. They were also asked for suggestions about the type of evaluation which would be useful. The cost-benefit approach was selected because it provided a framework within which many of these concerns could be explored. Note that the evaluation study was not the only activity suggested by the preliminary study: another was an analysis of the methods of input in various departments, to be carried out by the Comcare team.

Eventually, comparison with other studies will be needed to explore further the assumption that different situations will require different approaches to post-implementation evaluation and to consider the method of identifying these requirements. From this study we can consider whether other approaches would have been practicable and relevant. The initial study suggested a number of other activities which could help in the development of the system: work on identifying the most appropriate input methods for each department; continuation of the planned work on Critical Success Factors and information requirements; and clarification of the effects of the proposed HISS implementation. The decision to adopt a cost-benefit framework must be seen in the context of these other activities, which were to be undertaken by the Comcare team. Other evaluation approaches which might have been relevant included:

- Investigation of the extent to which system objectives were satisfied. The lack of clearly defined objectives would have made this difficult. The purpose of the system had changed since its introduction. An objective definition exercise would have been required.
- A deeper investigation of the factors affecting motivation. This was an important area, but not sufficiently broad.
- Analysis of the extent to which the system meets current and future information requirements. These requirements needed definition rather than evaluation: this was already about to be undertaken by the information team.

- A review aimed at ensuring satisfactory operation of the system and identifying current problems, i.e. the type of post-implementation review sometimes carried out on new systems. An earlier investigation of the system covered this type of area and led to extensive problem-solving activity (see section 1.2).

4.5. Practical considerations.

The study demonstrated a number of practical points. This was entirely a post-implementation exercise: there was therefore no comparative data about previous methods of data collection. Financial practices did not facilitate the gathering of accurate information. For example, tracing the expenditure on equipment proved difficult as linking requisitions and payments would have required considerable effort. It has not been the Unit's practice to assign overheads such as heating and building maintenance costs between departments. The District IT Unit did not record its effort on individual projects.

It was necessary to ask managers to recall events which had taken place up to two years previously. This might have caused omissions. It is thought that most actual uses of the information in departments have been identified, but this would not have been practicable if more departments had made significant use of the information at that time. Under these circumstances, a log of information requests would have been helpful. An earlier review would have been better placed to investigate the immediate effects of the implementation and to compare the impacts of this system with the previous situation.

The study was carried out by an external researcher. This may have aided communication: the managers interviewed were very open, even when their opinions of the system were not favourable. A high degree of co-operation was received. However, this raises the question of who should carry out such a study. In some cases an internal interviewer may be better placed: the research project included another post-implementation study which was hindered by the external position of the researcher. A Unit will not always have a suitable external person available, and the alternative of paid consultancy is not cheap. A degree of trust is needed if the subject matter is considered at all sensitive or criticism may be given: the interviewer must be seen as non-threatening and without a personal interest. Most information concerning individual departments has been disseminated only in this report and to the manager of the service concerned.

The timing questionnaire was a complex document and some respondents appear to have found it difficult to understand or complete. Some questionnaires were not usable because of missing or obviously incorrect answers. For example, one respondent had

apparently recorded the time taken for all record-keeping activities. This degree of complexity was thought necessary because it was the intention to identify differences consequent on the method of working: in practice, no statistically significant differences were found.

The attitude survey was much simpler to complete, though, despite a pilot trial, a small number of questions seem not to have been interpreted in the expected way and should have been phrased differently. A more thorough pilot study would have been preferable. Interviews with a sample of end-users would have allowed the issue of motivation to be explored more fully.

4.6. Effort.

Any evaluation study will require a degree of effort. This study included

- Interviews with 15 managers lasting on average one hour each,
- Preparation for these interviews by completing a checklist,
- A pilot trial of the questionnaire involving four people for about an hour,
- Completion of the questionnaire by 108 staff, requiring about 20 minutes each,
- Retrieval of information by the finance department and members of the Comcare team,
- Support from the Information Manager,
- Time spent by the researcher on preparation, interviewing, analysis of survey results, report writing etc.

Section 4.14 describes other activities which would have been useful. These would have involved additional effort.

4.7. What preparatory work would have been helpful?

In order to show the difference in time requirements between Comcare and superseded clerical or computerised systems, it would have been necessary for the time spent on these to be recorded before the introduction of Comcare. Information about the number of cases seen would be useful for comparison in those departments which suspect that their clinical workload has been reduced. Not all departments collected this information prior to Comcare.

A better understanding of the likely impact of the system before implementation would have aided its smooth introduction.

4.8. Effects of the NHS environment.

The changes in the purposes for which the system is intended to be used have been noted (Section 1.2). The initial reason for installing Comcare was to fulfil the external mandate to produce the Körner returns. The subsequent changes of direction, i.e. the emphasis on resource management and more recently on costing, are largely the result of changes in NHS management rather than the product of local initiatives.

The NHS has been subject to constant change in recent years. Some managers reported that their staff felt insecure and were more likely to regard the information system as a threat because of this. The study took place in the year before the introduction of the internal market, so that a significant change was expected. In addition, pressure to reduce services by cutting staff and closing wards was being felt in this Authority for the first time. There were fears that the quality of the service would be disregarded in the pressure to increase the number of patients treated. There was also a concern that information could be misinterpreted by higher management, though a belief that the work of a department could only be fully understood by a member of that profession also contributed to this. These factors lay behind the inclusion of two items in the user survey: "I resent other people knowing how I spend my time" and "I am afraid that the information may be used against the interests of my department or service." The survey also incorporated an item on the need for the system in the White Paper environment, in order to see whether the implications of this were appreciated.

Because of the pressure under which NHS staff work, the amount of time which was contributed to the study by staff and managers needed to be kept as small as possible. Efforts were made to ensure that this was the case. One purpose of the pilot trial of the survey was to discover how much time respondents would need to spend on it, and managers were asked how long their checklist took to complete. However, the difficulties in arranging meetings with senior staff which have been experienced in other studies were not a problem here and managers were willing for their staff to take part in the survey.

Staff are highly motivated with regard to their clinical work, and derive considerable satisfaction from their jobs. This needs to be considered when assessing the effects of an information system on their working lives or motivation. As using the information system is a small part of their work, the survey was attempting to identify effects which were also likely to be small unless severe difficulties had been experienced. In addition, many staff are willing to make an additional effort to ensure that record keeping tasks are completed and their clinical work unaffected. A better assessment of the actual effect of

the time requirements of the system would have needed to ascertain the amount of paid overtime, entitlement to time off in lieu, work done without pay and any actual increase in staffing. Increased pressure of work would need to be explored more fully and more detail of the reductions in clinical work and their effects would be required.

The NHS is not a profit-making organisation. Not only is its output not quantifiable in financial terms, but there is no single measure of the activity or productivity of a unit or authority. Activities of many kinds are carried out. Although all are aimed, directly or indirectly, at promoting and improving health, some activities have no clearly defined outcome measure. The relative priorities of various activities can be a matter for debate; there is also the question of service quality. There is no simple way to relate effort or resource consumption to the amount of care delivered or the improvement of health attained. This lack of a measure of overall achievement or productivity renders difficult any approach to evaluation which considers the effects of a system on the performance of the organisation.

NHS affairs frequently have ethical and/or political implications. The strong feelings and general interest which are aroused make it especially important that studies of this type are carefully treated and explained. Table 2, which contains figures representing the cost of staff time, could be particularly sensitive as the figures do not represent direct expenditure and could easily be misunderstood. The potential for adverse publicity should not be overlooked.

The tendency for district health authorities to adopt, freely or otherwise, the systems suggested by their RHAs is now reducing as more districts develop their own information services. This system was selected after a regional assessment but without local investigations and there seems to have been little consideration of the extent to which it would meet local requirements. The availability of regional support appears to have been an important factor in the decision. There was therefore no defined set of objectives or expected benefits against which to assess the system.

4.9. Evaluation requirements specific to the system.

There are a wide variety of working patterns within the 13 staff groups. The timing questionnaire had to be able to capture this variation. This necessitated a complex document. As the survey respondents were all professional staff engaged in clinical work, it was not considered likely that there would be significant differences in values or in the ability to complete the questionnaire. Items included phrases such as “my

department or team” in order to be applicable to staff working in various service structures.

The main purpose of Comcare is to provide information for managers. This type of benefit is difficult to quantify and not susceptible to measurement. Interviews with the managers concerned were chosen as the method of investigation. The staff who collect data for the system were known to receive little benefit from it and it was felt that these benefits could be investigated as part of the questionnaire. Had more use been made of the information by staff, interviews with representative individuals would have been necessary. These could have been useful in any case to allow the question of motivation to be explored more fully. Systems with benefits at the operational level are only now becoming available in community health, perhaps as a result of the lack of emphasis given to this area in comparison with acute care. Practical benefits at the operational level were therefore not relevant to this study.

Discussion of the effects of a system on the organisation should not be taken to imply that these impacts are simple. The organisation also affects the system: this is illustrated by Figure 1, the diagram produced after the initial planning exercise. The cost-benefit study found that organisational factors contributed to the extent to which benefits were being achieved. For example:

- The structure of some teams affected the distribution of information to individuals.
- The existence of clerical systems for gathering similar information reduced the advantage of having Comcare without reducing its cost.
- Mileage claims could not be produced from the system because of schedules operating in another part of the Authority.

Factors of this type need to be considered when implementing a system.

4.10. Measuring impacts.

Section 2.2 discussed the meaning of the figures given for the time requirements of the system amongst user staff and the financial valuation of this. The financial valuation and to some extent the timings are not direct measurements of the actual impact: they represent impacts which cannot be measured by translating them to a quantitative scale which can be used in comparisons. Where this is done, there is a need to avoid double-counting: if the alternative measure is included in any final assessment, the original impacts should be omitted. It has not been possible to clarify how much of this figure represents each of the actual impacts (expenditure, time taken from other activities, unpaid work by staff etc.)

but this would increase the usefulness of the study as a basis for understanding the system, planning and problem-solving.

The costs of the system have been included in the financial analysis, with the exception of items noted in Appendix 1 and the initial disruption to departments when the system was introduced. The benefits which had been experienced to date as well as the expected future benefits were predominantly not quantifiable. There may be some (small) time saving for managers in information retrieval which could be offset against the other time commitments. There may also be some identifiable cost savings as a result of decisions made on the basis of system-provided information, though the question of how much of this saving should be attributed to the information system is debatable.

Attempts to cost-justify systems in terms of the savings made through use of the information are sometimes made in the field of resource management, which is one of the uses of this system. However, this raises a number of questions. There are usually other factors which affect a decision and its results. There may be many regular or ad hoc decisions to consider and their outcomes can be difficult to determine. The benefit in a specific case may be an increase in confidence in the decision taken, or a reduction in the effort required to find information. In this study, some managers were able to point to decisions where information had been used. In some cases, they felt that different conclusions would have been reached without this information. Often, however, the system provided only part of the necessary data. Separation of the information system from the management process which it supports is thus difficult. It could be argued that the process can be considered in terms of justification, but that a more relevant question about the computerised information system is whether it is the most cost-effective way of providing the necessary information.

The justification of a resource management system will depend on the extent to which changes in resource usage need to be made. It may be the case that there is an initial peak in actual savings as any slack in the organisation is removed: subsequent tuning will take place in response to changes in need. Could a system then cease to be justifiable? An answer in financial terms would require the future value of the system (i.e. future savings) to be predictable. This was not considered feasible in the Comcare study, which adopted a more qualitative approach to benefits.

Most benefits from Comcare, including those expected in the future, are concerned with improvements in the organisation's capabilities. These include the ability to calculate accurately the staff cost of providing each package of care; the ability to provide the required mix of skills in each situation; the ability to predict the effects of proposed

changes to departments; and the ability to detect changes in the demand for services and to respond to them, including the ability to predict that demand for a service is likely to exceed the contracted level. Managers discussed “control” in general terms: better information is seen as helpful in increasing their ability to be aware of what is happening in their departments. Some of these benefits are related to the avoidance of risk.

4.11. How can benefits and costs be compared?

There is a need to consider the nature of the assessments which can be made as a result of this study. The natural question to ask would be of the type “Do the benefits outweigh the costs.” If the assessment is to be of practical significance, the judgement must apply to the future situation rather than to the current state, i.e. “Is it worth keeping?” rather than “Is it worth having now?” Knowledge of the current situation must be modified by future expectations and any likely changes or relevant trends must be understood.

A further complication arises if there is any compulsion to have the system or to carry out its functions. This can be the result of externally imposed information requirements such as Körner but a similar situation arises if the organisation considers that its survival depends on the information produced. The ability to bid successfully for contracts and to fulfil them will be essential if departments are to continue to operate in the new environment. Minimum data sets for contract monitoring, held in a computer system, will be obligatory and it is expected that Comcare will be able to meet this requirement. There is thus a strong compulsion to have this or a similar system: comparisons between methods of meeting the Authority’s needs are now more relevant than decisions about whether the information should be collected. This change has become part of managers’ thinking within the Authority only during the period when the cost-benefit study was in progress.

This study has not attempted to produce an assessment of the value of the system, although it has confirmed the initial suspicion that, up to the time of the study, costs were high and benefits small. The costs and the benefits have been expressed in terms appropriate to each. Costs have been reduced to a financial scale, on the assumption that they could be overcome by using more resources. However, benefits have been presented in a descriptive way: this was discussed in the previous section. They are therefore not directly comparable on the same scale and a subjective comparison must be made. Some systems could also have significant unquantifiable costs, for example, diminutions in job satisfaction, or benefits which were quantifiable in some way. It is therefore necessary to consider how these differences can be overcome.

Cost-benefit analysis normally attempts to make all impacts comparable by translating them to a financial scale, using surrogate measures where direct ones are not appropriate. For example, job satisfaction might be represented by any change in the cost of staff turnover; the value of a particular piece of information by the estimated value of some avoided risk. However, in some cases there will be no appropriate surrogate. It must be emphasised that despite the apparent objectivity of a financial valuation, subjective judgements are involved. The choice of measures is open to debate and the method has either to quantify factors which are essentially not quantifiable, or to omit them from its assessment.

A financial scale does not seem suitable for expressing all the impacts of a system. Other approaches to evaluation exist which do not use a cost-benefit framework. Another possibility would be to measure the effects of the system in terms which are more generally applicable. For example, utility analysis asks decision-makers to express their opinions of the extent to which the system satisfies its objectives (or contributes to those of the organisation) and the importance of these objectives. This makes it possible to deal with unquantifiable factors. There are a number of variants of this approach, some of which allow a consensus to be derived from many views. Computerised support tools can be used. The approach is aimed at producing an assessment rather than at increasing understanding of the system and its place within the organisation. It can be used when comparing proposed systems, or even, if the organisation's objectives are used, comparing information systems with other uses of resources, as well as in post-implementation evaluation.

An alternative to the comparison or combination of different factors would be to find a single measurement which would reflect all the effects of an information system on an organisation. An approach suitable for post-implementation evaluation would be to assume that the system will affect the productivity or output of the organisation and to measure the change in this. This type of approach has been used in the commercial sector, but its application in the NHS presents difficulties. The problem of finding a suitable indicator was discussed in section 4.9, and the effects of other organisational or environmental changes could be reflected. Such a method would provide a summative assessment rather than the detailed understanding required by this study.

The purposes of the current exercise were to provide information for use in planning for the future development of the system and to increase understanding of the factors involved, especially those relating to motivation. These in fact suggest a need for two types of information: an overall assessment for use in resource allocation and the detailed

information needed to plan for future development, solve problems and increase understanding. The study has produced a considerable amount of detailed information but has not overcome the difficulties of comparison which prevent an overall assessment in financial terms from being made. However, the need to have a system with similar capabilities makes the detailed findings, and perhaps comparisons with other possible methods of providing management information, more relevant than valuations of a single system.

4.12. The “benefits realisation” approach.

A benefits realisation programme is a detailed implementation plan which aims to ensure that benefits are actually achieved by planning how this is to be done and monitoring the benefits received. Benefits realisation techniques have hitherto been associated with the introduction of hospital information systems. These have a large operational element and there is a strong emphasis on the redeployment of staff time. However, the basic principle that the achievement of benefits needs to be managed and monitored could be applied to any type of system.

In this case, the original expected benefits do not appear to have been clearly defined, except for the production of Körner returns, and the purpose of the system has changed. *Monitoring the achievement of benefits* would be more difficult in a situation where the expectations of the system have changed, as intended uses of information may no longer be required, or new requirements may have arisen. The realisation plan would then need to be reviewed in the light of these changed requirements. This does not invalidate the approach, but the structure would need to be flexible.

Despite its current popularity as a distinct topic, benefits realisation is concerned with ensuring that objectives are achieved. Objectives can also include characteristics for the information system and supporting service, such as flexibility and responsiveness. The control of costs, such as the cost of staff time, is an important factor in the success of a system such as this, and *monitoring of these, together with the achievement of other operational, social and organisational objectives*, could be included in the programme. The overall effect would be to build review into the implementation process.

4.13. Assumptions about evaluation.

This section notes the ways in which each of the assumptions listed in section 4.1 is applicable to or illustrated by the cost-benefit study.

- *That evaluation is useful in developing better systems.* Section 4.3 notes that the usefulness of the study needs to be considered retrospectively. The study has attempted to provide information which can be used in planning the future of the system and to elucidate some of its problems. Some suggestions for action have been made.
- *That evaluation should include a broad range of factors,* including social and organisational factors, rather than concentrating on financial and technical areas. Motivation and people's perceptions of their work were found to be important here. The views in departments of their need for information were important in understanding the actual and expected benefits. A purely financial analysis would have revealed little of the reasons for the current situation.
- *That the opinions and interests of all concerned parties should be represented.* The study gave the majority of users the opportunity to contribute their views. The single category of staff which was not represented was the clerical staff involved in data input. These staff were only identified during the course of the study. A member of the support staff was included in the preliminary study.
- *That different situations will require different approaches.* This will require comparison with other work. Section 1.3 describes the method of identifying the approach to this study. It would be of interest to identify the factors which determine the choice of approach. The planning study considered problem areas, risk areas, and those aspects of the system most important to its success. Other determining factors might include the stage in the life of the system, its cost or importance, and organisational factors (sections 4.8 & 4.9) including the pressures of change. Appropriate techniques to support the approach must also be selected. See also section 4.4.
- *That the impacts of an information system will require to be measured in varying ways and will not all be directly comparable.* The study has found a variety of impacts which have been described or measured in various ways. Costs relating to staff time have been represented on a financial scale even where they did not involve direct expenditure. The current benefits are largely unquantifiable. A direct comparison of costs and benefits with the aim of producing an assessment of the current "value" of

the system has not been made. Such a comparison would be largely subjective. It was considered that the current situation was not the most important issue.

- *That post-implementation evaluation should be considered before the system is introduced.* This was not done for this system. It is clear that if comparison is to be made with the situation before implementation, the prior situation must be measured or recorded. Section 4.7 notes preliminary work which would have been helpful in this case. However, when a system has been in operation for some time, changes in the environment or in requirements may have occurred which mean that comparison with the pre-implementation situation is no longer relevant. It may also be difficult to separate the effects of the system from those of other organisational changes.
- *That evaluation should be seen as a normal part of the life of an installed system.* This would make it more likely that evaluation would be planned in advance rather than arising in response to problems. Better preparation would then be possible and regular monitoring, such as that suggested in section 5.2, might be more acceptable. This is partly a question of attitude. It is clearly only the correct policy if evaluation is shown or believed to be beneficial. There is a need to distinguish between planned reviews and ad hoc investigations. The current study is the second ad hoc investigation of the system: the first (see section 1.2) investigated the practical problems of the system, which were then very severe, and led to the formulation of a strategy for its future development.

4.14. Further questions and areas for investigation.

This section notes further investigations which could have been carried out as part of this study, then mentions some wider questions raised by the work, which could be addressed by further research in this area.

A more extensive trial of the questionnaire would have been helpful, as some problems did not cause difficulty to the pilot group. A more accurate assessment of the use made of information from the system could have been achieved if a log of information requests had been available. The question of motivation and accuracy could have been explored further in interviews with individual staff. A more detailed investigation of the impact of the system on patient care would have been useful. This would ideally have involved some preliminary work. However, had more time been devoted to the interviews with managers, more emphasis could have been placed on this area.

Although a number of managers were consulted in the planning study, the decision to adopt a cost-benefit approach was taken by the researcher and the information manager on the basis of the researcher's analysis of the areas of interest and concern to the managers. Greater participation in this decision could have been advantageous both in targeting the study and in promoting ownership of it. Methods of gaining consensus could be explored in further studies.

The question of motivation and its effect on accuracy is of interest. Almost all survey respondents agreed with the statement that they try to ensure that data is accurate, but problems with accuracy remain. Whilst it was perhaps unrealistic to expect much variation in the responses to this item, there is scope for further work here. In particular, an attempt to relate actual accuracy to motivation within departments could have been illuminating, and it would also have been interesting to discuss this question with end users as well as managers. The study was not able to investigate what degree of accuracy users perceive as necessary, or whether this is affected by their motivation, but these are relevant questions. It would also be of interest to relate motivation and perceptions of threat from the system to the ways in which information has been used in an individual's department. For example, does it make any difference if the system is used in reducing the establishment?

The cost-benefit approach adopted by this study provided a framework for understanding the effects of the system and a structure to which the necessary investigations could be pinned. The approach appears compatible with thinking in NHS management at present. Information systems are one way among many of using resources, and decisions between investments of very different types will be needed.

It would be worth considering whether this approach has any effect on the ability to bring out information and considerations which are relevant to planning the future of the system. The survey allowed free comments, but the interviews of necessity concentrated on the effects of the system. If significant bias were introduced to the investigation by constraining participants to a particular way of thinking, the approach would be less appropriate for an assessment which aims to increase understanding.

5. Conclusions.

5.1. General conclusions.

The initial phase of this study revealed a complex situation with many interconnected problems. By the conclusion of the survey, attempts to remedy these problems were beginning to produce results and the scale of many of them had been reduced. The initial practical difficulties in operating the system were largely the result of poor planning. By the time of the study, more realistic assessment of the scale of resources needed to support the system had been made and adequate levels of data entry staff had been provided. The time requirement in future years can be expected to fall below the levels calculated in this study, as the process of refining input methods continues and problems requiring error correction are overcome. The use of additional software, including the costing reports, was allowing the real information requirements of managers to be addressed, though a considerable amount of work remained to be done in this area. Additional Psion Organisers and other measures were being used to reduce the scale of the data entry task. Initial resistance to the system had been reduced in many departments, though considerable hostility remained in some services.

The initial planning phase of the study was felt to have been very worthwhile, as it allowed an independent view to be taken of a problematic situation and enabled clarification of the issues involved. The cost-benefit study itself was directly relevant to the strategy which had been adopted for the development of the system and its structure provided a framework for further assessment and planning. Feedback from users and their managers, including practical suggestions gathered during the user survey, has been passed (anonymously) to the Comcare team. These comments show issues which still need to be addressed.

The interviews with managers showed that confidence in the system has increased as problems have been solved and as the facilities available have improved. It appeared that the implementation strategy was having an effect and good foundations were being laid for the extension of the system to other groups of staff. However, a number of problems remain and the commitment of user staff will be needed if these are to be overcome.

The user survey showed the importance of the system being of practical use to the staff who collect data if they are to consider it worthwhile. More recent Community Health projects attempt to derive management information from data which is useful for clinical purposes. This approach aims to avoid the situation, found with Comcare and other similar systems, where those who make most of the effort see little or no benefit.

Managers were in most cases optimistic about the future usefulness of the system, although one department predicted little need for the information and another, whose patterns of working were difficult to record, still had considerable problems with the use of the system and showed little sign that any benefit from it was likely. However, there had been little use of the information so far in many departments. In some cases, doubts over accuracy and inappropriate coding structures still needed to be resolved.

The system has had the support of senior managers with a vision for its usefulness, but there was a period when neither the system and its supporting facilities, nor the intended users of the information at departmental level, were yet in a position to realise the potential benefits. The availability of accurate, timely information is not of itself a benefit unless it can be used for some beneficial purpose. Work on critical success factors which had previously been carried out by the Comcare team had suggested that many departments lacked clearly defined objectives: it was therefore *not surprising that in many cases the availability of information for ad hoc applications seemed to have been found more relevant than the receipt of regular reports*, as there was a need to identify the critical factors and to decide how they should be monitored. The monthly reports were, however, able to give managers a general awareness of the work of their departments, which is not without value. Managers had now had the opportunity to discuss their information requirements and most now saw the potential uses of the information. Most were also aware of the possible implications of the introduction of the internal market, which at the time was nearly a year in the future.

The high cost of the system and the limited use made of the information at the time of the study must cast doubt over the viability of the system. However, it should be noted that the system provides information which is considered necessary if departments are to operate in the new management environment. Minimum data sets for contract monitoring, held in a computer system, will be obligatory and it is expected that Comcare will be able to meet this requirement. There is always likely to be a cost in meeting information requirements which are imposed by external bodies or by the environment in which an organisation operates, although this cost may be offset if the information can provide other benefits or reduced if the data is taken from systems which exist for other purposes (e.g. clinical systems). Whilst Körner data could be collected with much less effort, management information of the type provided is always likely to require a fairly substantial system.

It has been important that management has been prepared to invest resources in providing good information. Although at the time of this study there had been little practical benefit,

use of the data was becoming established. However, other types of information, particularly information about the outcomes of treatment and the geographical distribution of demand, will be important to management in the future. This system will need to operate alongside other developments in the District. Providing information to meet the requirements of managers in a changing environment will be a continuing process: a system of this type will never be "complete".

Paramedical staff in the Acute Unit will eventually become users of the HISS system. With this implementation about to commence, a short term change of direction would be inappropriate. In the longer term, current developments in community systems can be expected to offer more substantial advantages over Comcare and replacement of the system in order to provide better facilities for professional staff will need to be considered. Compatibility with HISS will be essential.

Finally, there is a need to be aware of the cost of information. It is hoped that this study will have gone some way towards meeting that need.

5.2. Recommendations.

This section contains suggestions about aspects of system use where further investigation would be useful in an attempt to maximise the benefits from the system.

It is suggested that the time spent on the system by professional staff should be monitored periodically, as this is the most significant cost of the system. If the recording of the time spent on the system could be done to an acceptable degree of accuracy, at least for a short period, the system itself could be used to provide the necessary data.

As part of the continuing process of adapting the system to meet the needs of managers and staff, it will be advantageous to review the information provision from time to time, in discussion with service managers, in order to ensure that the information can be used as intended and is providing the expected benefits.

The difficulty experienced in identifying direct expenditure on equipment etc. gave cause for concern: the manager of an information system needs to be able to call on information of this type if budget compliance is to be ensured. The support provided by the District Information and Computing Unit had not been recorded and could therefore not be costed: however, this unit is planning to introduce a project control system which will be able to provide relevant information about future developments.

User survey responses suggested that not all Psion users were able, or felt able, to make the best use of their machines. Follow-up or refresher training, which could be optional, might be advantageous in reducing errors. As there seems to be considerable variation in the time taken to record contacts, time savings could also result.

The various problems with Psion Organisers which cause the machines to hang, sound alarms etc. appear to be borne with fortitude by most users. However, the situation is not satisfactory: time is wasted and annoyance caused. Software errors appear to be responsible for at least one of the common faults. Further efforts should be made to seek solutions from the supplier of the machines .

In some departments, staff were not receiving any feedback from the system as no information was passed to them. This situation is likely to be demoralising: the user survey showed a strong connection between the receipt of information useful to the individual and opinions of the value of the system. It is recommended that providing useful information to all system users should be made an objective. The resolution of the procedural problem which prevents the production of mileage claims from the system would also give a practical benefit to individual staff.

Multi-disciplinary teams operate in Teesdale and in Mental Handicap. However, output for staff in these teams is sent to the manager of each type of staff, so that the manager of a multi-disciplinary team does not have access to information about the workload of all the staff for whom s/he has responsibility. This seems to occur because of a general feeling that only a manager of the same profession can interpret the figures, but it would seem reasonable that the team manager should also have access to the information. This would also facilitate feedback to the individuals concerned, some of whom commented about this matter when completing the user survey. It is suggested that an agreement to share this information should be reached as the benefit to staff is reduced.

Clarification of the effects of the HISS implementation on the paramedical departments should be obtained, as there is concern about the possible need to operate two systems, especially in departments where individuals may work both in the Acute Unit and in the community.

6. Acknowledgements.

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7. References.

- [1] NHS/DHSS Steering Group on Health Services Information. Chairman E. Körner (1984). *A report on the collection and use of information about services for and in the community in the National Health Service. Fifth Report to the Secretary of State.* London: H.M.S.O.
- [2] Department of Health (1989), *Working for Patients*, London: H.M.S.O.
- [3] Department of Health / Information Management Group (1990), *Working for Patients. Framework for Information Systems: Overview* . London: H.M.S.O.
- [4] Department of Health / Information Management Group (1990), *Working for Patients. Framework for Information Systems: Information*. London: H.M.S.O. This paper also has a number of separate annexes which give details of the information requirements.
- [5] Mumford E. (1972), "Job Satisfaction: A Method of Analysis", *Personnel Review* 1(3), pp. 48-57.

Appendix 1. Financial and other direct costs.

This appendix contains further details of the costs which were summarised in Figure 1. All amounts have been rounded to the nearest pound. A summary of the purchases of Psion Organisers and associated software and services is given in order to explain the cost figures.

The costs stated reflect the situation at the time when the information-gathering phase of the study took place. Costs are given from the financial year 1987-88 until 1990-91. Omissions, where known, are noted in the tables which follow. The rate of VAT in this period was 15%.

The following costs could not be estimated:

- Development effort and support supplied by the District Information and Computing Unit. The initial effort was not recorded. support amounts to no more than 1 day per month.
- Managers' time requirements.
- Community Unit overheads: it has not been customary to allocate these to individual projects.
- Time requirements of Community Midwives, School Nurses, CMO's and Health Education, as these groups did not begin to use the system until after the user survey had taken place.
- Time and training requirements of Psychology and School Nurses in their earlier implementations of the system, and of other short-lived implementations: Family Planning Nurses, Continence Advisor and Home Care Assistants.

Summary of Psion purchases

	1987-88	1988-89	1989-90	1990-91
Psion Organisers	32	66	100	47
Software purchased	32	66		47
System test / warranty		25		47
Support & annual s/w licences		75	65	110

These figures are derived from the requisitions for Psions and associated purchases. It can be seen that there is not a direct correspondence between the number of Psions and the software and licences purchased. Data Innovation's current product structure requires that in addition to the purchase of the Care II software, a system test and warranty package must be purchased for each machine. An annual charge per user is then payable for the continuing software licence and support.

DRS installation	£	£	£	£
	1987-88	1988-89	1989-90	1990-91
DRS 351, 20mb processor, 45 mb disk	7,579			
Second disk drive		2,570		
Streamer tape (S1)	1,665			
A2 processor	367			
SM3 submodule	225			
4 ICL workstations (303)	3,024			
Linewriter LW400 & accessories	6,952			
Microline 193+ printer	665			
Gandalf modems	1,200			
COBOL runtime system	60			
CSTEM (communications software)	275			
C-DOS operating system	185			
<i>Total excluding VAT</i>	<i>22,197</i>	<i>2,570</i>		
<i>Total including VAT</i>	<i>25,527</i>	<i>2,955</i>		

Personal computers

Dell PC's & printers		11,458	5,729
Software		12,000	400
<i>Total excluding VAT</i>		<i>23,458</i>	<i>6,129</i>
<i>Total including VAT</i>		<i>26,977</i>	<i>7,048</i>

Initial cost of Psions, software, installation & accessories

	1987-88	1988-89	1989-90	1990-91
Psions, datapaks etc.	5,623	7,745	14,258	9,039
Eraser		295		
Communicating Files Processor		4,650		
Installation and test of link to DRS	250			
<i>Total excluding VAT</i>	<i>5,873</i>	<i>12,690</i>	<i>14,921</i>	<i>9,039</i>
Total including VAT	6,754	14,594	17,159	10,394

Note: the replacement of Psion Organisers is expected. Projected cost: £1300 for 1991-1992; £2450 in subsequent years.

Works

Initial works	5,500			
Air conditioning			5,500	
Total Works	5,500		5,500	

Hardware support

DRS	545	2,400	2,400	2,400
C.F.P.	95	380	380	380
Eraser	31	125	125	125
Total Hardware Support	671	2,905	2,905	2,905

Includes VAT. Figures in italics are budgeted costs based on 1989-90 estimates, others are actual costs.

Software support

	1987-88	1988-89	1989-90	1990-91
RHA @ £25 per hour ¹			200	200
National User Group ¹	750	1,000	1,000	1,000
ASL basic telephone support			800	
ICL support				1,000
Data Innovation support ²		500	650	1,265
<i>Total software support</i>	<i>750</i>	<i>1,500</i>	<i>2,650</i>	<i>3,465</i>
+ VAT where applicable	750	1,575	2,748	3,805

¹Includes VAT

²£10/Psion/year. The figure for 1988-89 appears to be a minimum charge; 1990-91 is the amount paid but does not correspond with the number of Psions purchased.

Staff - Community Unit

Information manager ¹		4,489.25	9,464	10,193
IS support officer (Pro rata)			5,000	2,500
GAA (0.5 w.t.e.)			4,936	5,482
HCO (from Jan. 88)	1,636	8,130	8,666	8,714
Data entry clerks ²	1,276	13,575	23,045	6,980
Scale 3 system support ³			1,934	8,714
Total Staff - Community Unit	2,912	26,194	53,045	42,583

¹ 0.5 w.t.e. from October 1988.

² 1 w.t.e. from January 1988, 3 w.t.e. from January 1989, 2 w.t.e. from January 1990, 1 w.t.e. from April 1990. Plus 3 students for 6 weeks each in 89-90.

³ From January 1990.

Staff - users

	1987-88	1988-89	1989-90	1990-91
Audiology		986	2,658	2,870
Chiropody	1,630	14,706	15,354	16,842
Clinical Specialist Nurses		452	1,122	1,223
Dietetics		3,065	3,658	4,012
District Nurse/Midwives		3,495	9,643	10,509
District Nurses		27,531	37,985	41,396
Health Visitors		29,149	38,794	42,278
Mental Handicap Nurses		2,353	5,843	6,368
Occupational Therapy		15,695	19,679	21,590
Physiotherapy		14,042	14,666	16,091
Psychiatric Nurses	467	11,213	11,635	12,742
Psychology				3,226
Speech Therapy		5,155	6,879	7,430
Total Staff - Users	2,097	127,842	167,916	186,577

School Nurses, Community Midwives and Community Medical Officers began to use the system during the year 1990-91, after the user survey took place. Cost estimates for these groups are therefore not available. An earlier attempt at implementing the system in the Clinical Psychology Department, which failed because of an exceptionally high time requirement, has also not been included.

Clerical staff

Clerical staff - all departments	2,000	2,255	2,524
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The total clerical effort by staff outside the Comcare team amounts to 13 hours per week.

Training	1987-88	1988-89	1989-90	1990-91
Audiology		247	46	50
Chiropody	560		63	138
Clinical Specialist Nurses		193		
Dietetics		302	63	
District Nurse/Midwives		514	66	72
District Nurses		3,209	399	434
Health Visitors		1,733	332	796
Mental Handicap Nurses		385		434
Occupational Therapy		1,472	317	447
Physiotherapy	743	259	108	919
Psychiatric Nurses	796	65	271	
Psychology				299
Speech Therapy		656	277	299
School Nurses				
Community Midwives				651
CMO's				241
Total training	2,099	9,035	1,942	4,780

This table shows the cost of user staff time spent on training. The daily cost of a member of staff is calculated as the standard annual cost / 232. Initial training consisted of a half day per person. Staff who use Psion Organisers were given a further half day of training. Training of new staff is also included: in some cases this is given by colleagues rather than by the Comcare team. Two people are then involved, but it has not been possible to take account of this in the above table. The figures were obtained by counting user registration forms. They represent an estimate of 1 day per registration for departments which use Psions and 1/2 day per user for departments which use only forms. All Psion training for Physiotherapy took place in 1990-91: an estimated 25 staff have been trained. Some other departments also use both methods of input, but it has not been possible to differentiate between individual users: there will therefore be an over-estimate for these departments. A few unidentifiable forms were omitted, and training for non-current implementations is not included.

Communications

	1987-88	1988-89	1989-90	1990-91
Physiotherapy Link Line ¹	14	342	342	342
Telephone (community unit) ²	70	70	70	70
Total Communications	84	412	412	412

¹ From budget for 1989-90.

² Estimated from telephone log. Does not include calls made by user staff.

Miscellaneous

Batteries			400	725
Printing (forms)	100	640	414	500
Ribbons	50	100	100	100
Printer paper		150	150	150
Photocopying	50	50	50	50
Other stationery	60	100	100	100
Diskettes			120	120
Stream tapes		50	50	50
Cleaning equipment ¹			34	12
Total Miscellaneous costs	260	1,090	1,418	1,807

¹ 89-90 actual, 90-91 assumes 1 set screen cleaner per annum.

These are estimates for 87-88, budget costs as at October 1989 for other years.

Capital charges

Capital charges, applicable from 1991-2				692
Total annual cost	46,654	188,603	282,277	263,538
Total cumulative cost	46,654	235,257	517,534	781,072

Appendix 2. Time requirements and system use.

Appendix 2.1. Method of calculation.

A number of assumptions were made in the calculations:

- 3 months = 13 weeks (in converting monthly effort to weekly average).
- 1 whole time equivalent (w.t.e.) = 37 hours 30 minutes per week.
- A standard cost for staff in each group was used. This represented salary and on-costs.
- Staffing was at the establishment level as at October 1990.
- Three groups (Audiology, Speech Therapy and Psychologists) had not received their 1990-91 pay award: an 8% increase was assumed.

Staff costs and establishments were supplied by the finance department.

The questionnaire asked respondents to state the time spent on the system for various types of activity. Data capture was divided into that done at the time of the activity and that done at other times. That done at the time of the activity was calculated from the time taken to record one contact, group session, registration or other activity, and the average number of these in a week. Respondents were asked to state an average figure for each of these; however, where a range was given, the mid-point was taken. The time taken for data collection at other times, for error correction and for any other activities were recorded separately and staff were asked to specify what other activities were carried out.

In a small number of cases where the additional activities specified by respondents appeared not to relate to Comcare, the relevant time was omitted. One response where the respondent appeared to have included the time needed for all record-keeping activities, giving a total time of nearly two days per week, was omitted completely, as were a number of others with significant omissions, for example where no volumes or timings were given for all or part of the data capture. If the time for a single activity which seemed likely to require little time was omitted, e.g. correction of input errors, the response was retained.

There is a slight possibility that some of the respondents who recorded times of 5 or 10 minutes per activity did so because the system itself requires time to be recorded in units of 5 minutes. If so, this will have caused the average times for those staff groups to be raised. However, only a few respondents could be affected and there is no evidence that this misunderstanding in fact took place.

Averages for individual staff groups were calculated from the responses of full-time staff only where possible as the questionnaire may not have collected the precise w.t.e. for

part-time staff. An average using w.t.e. was calculated for Dietetics and Psychology: these are small departments with a number of part-time staff.

Appendix 2.2. Comparison with other methods of timing.

Most staff groups, in theory at least, record the time spent on data entry as one of their non-contact activities. Those groups which actually do so were identified and the time recorded was extracted from the system. Where possible, data from two months was used. An average time per person per week was calculated. These were compared with the times recorded by survey respondents in these staff groups. It was noted that times from the system are in general considerably lower than those calculated from the survey. A number of causes could contribute to this:

- Any under-recording of time in the system.
- Over-estimation of time when completing the questionnaire (especially in relation to the time taken to record one contact at the time of contact, as the calculations would be very sensitive to errors here).
- Any fault in the assumptions underlying the calculations.
- Sample bias if those who spent more time on the system were most likely to return the questionnaire. (There is no evidence of this: there seems to be a good spread of times within staff groups).

As a number of managers of those staff groups where the system was not sampled suspected under-recording, it is quite possible that this was a problem with other groups. The staff groups most susceptible to error in the survey are those where many staff record the time spent as they go along, i.e. the community nursing disciplines. These were known not to record the time taken for data capture, so the comparison has not been made. A small number stated quite a high time per patient, e.g. 5 minutes. Managers' estimates of the time spent in these groups were generally close to those derived from the survey.

Appendix 2.3. Data entry methods.

	Respondents (A)	Psion users (B)	Timing contacts		Record contacts at time		Use of Timer
			All	Psions	All	Psions	
Audiology	4	4	4	4	3	3	0
Chiropody	6	3	6	3	6	3	3
Dieticians	6	6	5	5	6	6	2
District Nurses	12	12	12	12	5	4	4
DNMW	6	6	6	6	1	1	1
Health Visitors	13	10	13	10	6	5	3
CMHN	6	3	6	3	5	2	2
OT	14	8	13	8	8	5	2
Physiotherapy	14	1	0	0	5	1	0
CPN	11	9	11	9	4	4	0
Psychology	3	0	3	0	2	0	0
Speech Therapy	8	7	6	6	3	3	0
Total	103	72	85	67	55	39	17
		(70% of A)	(82% of A)	(93% of B)	(53% of A)	(74% of B)	(23% of B)

The above table summarises information related to the data entry practices of survey respondents. It can be seen that the majority of respondents were Psion users. The survey asked whether respondents recorded the duration of patient contacts. Most did, the main exception being the Physiotherapy department. It is thought preferable that staff should record their contacts as they go along rather than at the end of the day or week. The proportions doing this were lower, although as would be expected, the practice was more common amongst Psion users. The table shows those recording all or some contacts at the time of the contact. The Psion Organiser has a facility which can be used to time contacts: the identifier is entered at the beginning of the appointment and activity codes at the end. This cannot be used for non-patient related activities. However, few staff were using this facility and some were unaware of it. There may be difficulties with its use where a visit comprises several activities.

Most staff claimed to prefer the method of input (Psion or forms) which they were using. However, it seemed worthwhile to examine any differences in the time spent on data capture by the two groups (a very small number use both) and between those who enter data as they go along and those who enter it in a block. This investigation was rendered

difficult by the large number of factors involved, the variation in the responses and the resultant difficulty in extracting a suitable sample for analysis. As the total time required for input is dependent on a number of factors and is also the result of a complex calculation, it was decided that the effects of the input method would be studied by analysis of variance in the time taken to record one contact, which is in the range of 30 seconds - 10 minutes. This is given by survey respondents who enter at least some of their data at the time of the contact, and gave a fairly small sample of about 40 respondents. No significant difference was found between the two methods of input (Psion or forms), or between staff groups, though the sample is too small for the analysis by staff group to give good results. Attention was then given to the total weekly time requirement. Examination of the variables relating to the method of input, Psion/forms and whether done at the time of contact or at another time, showed no significant effect on the average time required for system use per week. The staff group also showed no significant effect.

The method of input and the time at which it is done are only two of a number of factors affecting the total time required for system use. It was clear that the volume of data entered would also be a significant factor, as would the time taken to record each contact, as this now seemed to be unrelated to the input method. It appeared that the time taken to record each activity or registration accounted for more of the variation in time requirements than the number of contacts or registrations. The staff group with the highest average times spent considerably more time than any other group on the correction of case loads.

The fact that the input device appeared to have little effect should not necessarily be taken to mean that it is not worthwhile implementing Psion Organisers. The "forms" category includes several different methods of input. The sample was small and not fully representative. Furthermore, the same input method will not be ideal for all staff groups because of differences in working patterns, and considerable effort has now been made to find the best method of input for each staff group. If this result is suggestive of anything at all, it is that these efforts have been successful. User opinions would support this conclusion.

It has not been possible to explore any differences in accuracy between the various methods and times of input, but opinions offered by interviewees and survey respondents suggested that Psions were more error prone and that data entered at the time was more accurate than that entered later. As the time spent on error correction is detailed in the questionnaire, this was considered as a surrogate measure of the accuracy of some types

of input, but the relevance of this was obscured by the system fault which required extensive correction of case load lists and by the correction of errors by Comcare staff.

Appendix 2.4. Standard costs for each staff group.

The cost for each staff group in each year has been calculated on the basis of the standard cost per person (salary at mid-point + on-costs) and, for the first year of use, the implementation date. These are given in the following tables.

Staff Group	1988-89	1989-90	1990-91
Audiology	9543	10716	11574
Chiropody	14016	14633	16052
Clinical Specialist Nurses	14892	15410	16794
Dieticians	14016	14633	16052
District Nurses	14892	15410	16794
District Nurse Midwives	14892	15410	16794
Health Visitors	14892	15410	16794
Community Mental Handicap Nurses	14892	15410	16794
Occupational Therapy	10046	10497	11516
Physiotherapy	12010	12544	13762
Community Psychiatric Nurses	15143	15714	17209
Psychologists and Counsellors			23149
Speech Therapy	15213	16073	17359

Standard Annual Cost per Person.

Audiology	31/10/88
Chiropody	22/2/88
Clinical Specialist Nurses	31/10/88
Dieticians	16/5/88
District Nurses	27/6/88
District Nurse Midwives	15/11/88
Health Visitors	20/6/88
Community Mental Handicap Nurses	31/10/88
Occupational Therapy	6/6/88
Physiotherapy	28/3/88
Community Psychiatric Nurses	14/3/88
Psychologists and Counsellors	1/4/90
Speech Therapy	16/5/88

Implementation Dates.

Appendix 3. Results of user attitude survey.**Appendix 3.1. Conduct of the survey.**

A preliminary trial was held. Two District Nurses and two Physiotherapists were asked to complete the questionnaire and timed as they did so to ensure that the scale of the exercise was reasonable. The likely time requirement appeared to be 20 minutes. After this, the pilot groups were asked to point out any questions which had caused difficulty. A number of points where the wording of questions might have been problematic were also discussed. A few minor changes were made as a result of this trial.

The questionnaire was circulated to all professional staff who used the system through their departmental managers. 108 responses were received of which 5 could not be used because the respondents had not identified their staff group, and one appeared to have been given to a departmental secretary. This was considered a reasonable response rate (50.2%). The survey was carried out during the holiday period and the response rate may have been affected by the recent circulation of another questionnaire, which in fact delayed the issuing of this survey to some staff groups. The responses were anonymous and care has been taken to feed back the summary of responses for each staff group only to that group.

Appendix 3.2. Survey response.

Table of respondents by staff groups.

Staff Group	No. of Usable Responses	No. of Individual Staff
Audiology	4	6
Chiropody	6	13
Clinical Specialist Nurses	0	3
Dieticians	6	6
District Nurses	12	38
District Nurse/Midwives	7	11
Health Visitors	12	28
Community Mental Handicap Nurses	6	6
Occupational Therapy	14	29
Physiotherapy	14	36
Community Psychiatric Nurses	11	13
Psychology	3	6
Speech Therapy	7	8
Total	103	203

Appendix 3.3. Full results of attitude survey by staff group.

1. Comcare provides me with useful feedback about my work.

Staff Group	Strongly Disagree		Disagree		Slightly Disagree		Neither Agree nor Disagree		Slightly Agree		Agree		Strongly Agree		Total Respondents
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
AU	0	0.00	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4
CH	2	33.33	1	16.67	1	16.67	1	16.67	0	0.00	1	16.67	0	0.00	6
DI	0	0.00	0	0.00	0	0.00	1	16.67	1	16.67	4	66.67	0	0.00	6
DM	0	0.00	2	28.57	0	0.00	1	14.29	2	28.57	2	28.57	0	0.00	7
DN	1	8.33	2	16.67	0	0.00	0	0.00	5	41.67	4	33.33	0	0.00	12
HV	1	8.33	1	8.33	1	8.33	2	16.67	2	16.67	5	41.67	0	0.00	12
MH	2	33.33	0	0.00	1	16.67	0	0.00	1	16.67	2	33.33	0	0.00	6
OT	2	14.29	3	21.43	1	7.14	0	0.00	5	35.71	3	21.43	0	0.00	14
PH	4	28.57	9	64.29	0	0.00	1	7.14	0	0.00	0	0.00	0	0.00	14
PN	3	27.27	3	27.27	1	9.09	1	9.09	3	27.27	0	0.00	0	0.00	11
PS	0	0.00	1	33.33	0	0.00	0	0.00	1	33.33	1	33.33	0	0.00	3
SP	2	28.57	2	28.57	1	14.29	0	0.00	1	14.29	1	14.29	0	0.00	7
All Staff	17	16.67	28	27.45	6	5.88	7	6.86	21	20.59	23	22.55	0	0.00	102

2. I resent others knowing how I spend my time.

Staff Group	Strongly Disagree		Disagree		Slightly Disagree		Neither Agree nor Disagree		Slightly Agree		Agree		Strongly Agree		Total Respondents
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
AU	0	0.00	1	25.00	0	0.00	3	75.00	0	0.00	0	0.00	0	0.00	4
CH	0	0.00	5	83.33	0	0.00	1	16.67	0	0.00	0	0.00	0	0.00	6
DI	2	33.33	3	50.00	0	0.00	1	16.67	0	0.00	0	0.00	0	0.00	6
DM	2	28.57	4	57.14	0	0.00	1	14.29	0	0.00	0	0.00	0	0.00	7
DN	2	16.67	4	33.33	0	0.00	4	33.33	1	8.33	1	8.33	0	0.00	12
HV	2	16.67	6	50.00	2	16.67	2	16.67	0	0.00	0	0.00	0	0.00	12
MH	0	0.00	5	83.33	1	16.67	0	0.00	0	0.00	0	0.00	0	0.00	6
OT	1	7.14	3	21.43	2	14.29	6	42.86	0	0.00	1	7.14	1	7.14	14
PH	3	21.43	3	21.43	2	14.29	6	42.86	0	0.00	0	0.00	0	0.00	14
PN	1	9.09	5	45.45	0	0.00	4	36.36	1	9.09	0	0.00	0	0.00	11
PS	1	33.33	1	33.33	0	0.00	1	33.33	0	0.00	0	0.00	0	0.00	3
SP	0	0.00	3	42.86	0	0.00	2	28.57	0	0.00	2	28.57	0	0.00	7
All Staff	14	13.73	43	42.16	7	6.86	31	30.39	2	1.96	4	3.92	1	0.98	102

3. I try hard to ensure that the data I submit to Comcare is accurate.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	0 0.00	0 0.00	2 50.00	0 0.00	2 50.00	0 0.00	4
CH	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3 50.00	3 50.00	6
DI	0 0.00	0 0.00	0 0.00	0 0.00	1 16.67	4 66.67	1 16.67	6
DM	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	5 71.43	2 28.57	7
DN	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	9 75.00	3 25.00	12
HV	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	8 66.67	4 33.33	12
MH	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	5 83.33	1 16.67	6
OT	0 0.00	0 0.00	1 7.14	0 0.00	3 21.43	9 64.29	1 7.14	14
PH	0 0.00	0 0.00	2 14.29	0 0.00	4 28.57	4 28.57	4 28.57	14
PN	0 0.00	0 0.00	1 9.09	0 0.00	0 0.00	6 54.55	4 36.36	11
PS	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3 100.00	0 0.00	3
SP	0 0.00	1 14.29	0 0.00	2 28.57	0 0.00	3 42.86	1 14.29	7
All Staff	0 0.00	1 0.98	4 3.92	4 3.92	8 7.84	61 59.80	24 23.53	102

4. I do not find data collection interesting.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	1 25.00	0 0.00	0 0.00	0 0.00	0 0.00	3 75.00	0 0.00	4
CH	1 16.67	0 0.00	1 16.67	0 0.00	2 33.33	0 0.00	2 33.33	6
DI	0 0.00	1 16.67	0 0.00	0 0.00	2 33.33	3 50.00	0 0.00	6
DM	0 0.00	4 57.14	0 0.00	3 42.86	0 0.00	0 0.00	0 0.00	7
DN	1 8.33	1 8.33	2 16.67	2 16.67	0 0.00	3 25.00	3 25.00	12
HV	0 0.00	4 33.33	1 8.33	1 8.33	0 0.00	5 41.67	1 8.33	12
MH	0 0.00	2 33.33	1 16.67	2 33.33	1 16.67	0 0.00	0 0.00	6
OT	0 0.00	1 7.14	2 14.29	2 14.29	3 21.43	5 35.71	1 7.14	14
PH	0 0.00	0 0.00	0 0.00	1 7.14	4 28.57	4 28.57	5 35.71	14
PN	0 0.00	2 18.18	2 18.18	1 9.09	1 9.09	1 9.09	4 36.36	11
PS	1 33.33	1 33.33	0 0.00	1 33.33	0 0.00	0 0.00	0 0.00	3
SP	0 0.00	0 0.00	0 0.00	1 14.29	0 0.00	5 71.43	1 14.29	7
All Staff	4 3.92	16 15.69	9 8.82	14 13.73	13 12.75	29 28.43	17 16.67	102

5. On balance, I think the system is worth the effort we put into it.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	2 50.00	1 25.00	1 25.00	0 0.00	0 0.00	0 0.00	4
CH	0 0.00	2 33.33	1 16.67	3 50.00	0 0.00	0 0.00	0 0.00	6
DI	0 0.00	0 0.00	1 16.67	1 16.67	0 0.00	4 66.67	0 0.00	6
DM	0 0.00	2 28.57	0 0.00	1 14.29	0 0.00	2 28.57	2 28.57	7
DN	0 0.00	0 0.00	0 0.00	1 9.09	3 27.27	7 63.64	0 0.00	11
HV	1 8.33	2 16.67	2 16.67	1 8.33	2 16.67	4 33.33	0 0.00	12
MH	0 0.00	2 33.33	1 16.67	0 0.00	1 16.67	2 33.33	0 0.00	6
OT	1 7.14	4 28.57	1 7.14	1 7.14	2 14.29	5 35.71	0 0.00	14
PH	1 7.14	9 64.29	2 14.29	1 7.14	0 0.00	1 7.14	0 0.00	14
PN	4 36.36	3 27.27	1 9.09	1 9.09	0 0.00	2 18.18	0 0.00	11
PS	0 0.00	1 33.33	0 0.00	1 33.33	0 0.00	1 33.33	0 0.00	3
SP	2 28.57	1 14.29	1 14.29	1 14.29	1 14.29	1 14.29	0 0.00	7
All Staff	9 8.91	28 27.72	11 10.89	13 12.87	9 8.91	29 28.71	2 1.98	101

6. Data collection prevents me from spending my time more usefully.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	0 0.00	0 0.00	0 0.00	1 25.00	2 50.00	1 25.00	4
CH	0 0.00	2 33.33	0 0.00	1 16.67	1 16.67	2 33.33	0 0.00	6
DI	0 0.00	2 33.33	0 0.00	1 16.67	3 50.00	0 0.00	0 0.00	6
DM	1 14.29	3 42.86	1 14.29	0 0.00	0 0.00	2 28.57	0 0.00	7
DN	0 0.00	4 33.33	2 16.67	2 16.67	1 8.33	3 25.00	0 0.00	12
HV	0 0.00	3 25.00	0 0.00	1 8.33	3 25.00	3 25.00	2 16.67	12
MH	0 0.00	1 16.67	0 0.00	2 33.33	1 16.67	2 33.33	0 0.00	6
OT	0 0.00	3 21.43	0 0.00	0 0.00	1 7.14	7 50.00	3 21.43	14
PH	0 0.00	0 0.00	0 0.00	2 14.29	3 21.43	5 35.71	4 28.57	14
PN	1 9.09	1 9.09	1 9.09	1 9.09	2 18.18	4 36.36	1 9.09	11
PS	0 0.00	2 66.67	0 0.00	0 0.00	1 33.33	0 0.00	0 0.00	3
SP	0 0.00	1 14.29	1 14.29	0 0.00	2 28.57	1 14.29	2 28.57	7
All Staff	2 1.96	22 21.57	5 4.90	10 9.80	19 18.63	31 30.39	13 12.75	102

7. We need Concare to collect our Körner data.

Staff Group	Strongly Disagree		Disagree		Slightly Disagree		Neither Agree nor Disagree		Slightly Agree		Agree		Strongly Agree		Total Respondents
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
AU	0	0.00	0	0.00	0	0.00	2	50.00	0	0.00	2	50.00	0	0.00	4
CH	0	0.00	0	0.00	0	0.00	2	33.33	2	33.33	2	33.33	0	0.00	6
DI	0	0.00	0	0.00	1	16.67	0	0.00	2	33.33	2	33.33	1	16.67	6
DM	0	0.00	0	0.00	0	0.00	2	28.57	0	0.00	5	71.43	0	0.00	7
DN	0	0.00	0	0.00	0	0.00	4	33.33	2	16.67	6	50.00	0	0.00	12
HV	0	0.00	0	0.00	1	8.33	1	8.33	1	8.33	9	75.00	0	0.00	12
MH	0	0.00	0	0.00	0	0.00	2	33.33	1	16.67	3	50.00	0	0.00	6
OT	0	0.00	2	14.29	1	7.14	4	28.57	2	14.29	5	35.71	0	0.00	14
PH	1	7.69	5	38.46	4	30.77	1	7.69	2	15.38	0	0.00	0	0.00	13
PN	2	18.18	1	9.09	1	9.09	2	18.18	3	27.27	2	18.18	0	0.00	11
PS	0	0.00	1	33.33	0	0.00	1	33.33	0	0.00	1	33.33	0	0.00	3
SP	1	14.29	2	28.57	0	0.00	2	28.57	1	14.29	1	14.29	0	0.00	7
All Staff	4	3.96	11	10.89	8	7.92	23	22.77	16	15.84	38	37.62	1	0.99	101

8. I appreciate the variety which data collection adds to my job.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	3 75.00	1 25.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	4
CH	1 16.67	4 66.67	1 16.67	0 0.00	0 0.00	0 0.00	0 0.00	6
DI	0 0.00	3 50.00	2 33.33	1 16.67	0 0.00	0 0.00	0 0.00	6
DM	0 0.00	1 14.29	0 0.00	3 42.86	1 14.29	2 28.57	0 0.00	7
DN	2 16.67	1 8.33	3 25.00	6 50.00	0 0.00	0 0.00	0 0.00	12
HV	2 16.67	4 33.33	2 16.67	2 16.67	1 8.33	1 8.33	0 0.00	12
MH	0 0.00	2 33.33	1 16.67	1 16.67	1 16.67	1 16.67	0 0.00	6
OT	3 21.43	6 42.86	0 0.00	4 28.57	0 0.00	0 0.00	1 7.14	14
PH	3 21.43	9 64.29	0 0.00	2 14.29	0 0.00	0 0.00	0 0.00	14
PN	3 27.27	3 27.27	2 18.18	0 0.00	2 18.18	0 0.00	1 9.09	11
PS	0 0.00	3 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3
SP	4 57.14	3 42.86	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	7
All Staff	21 20.59	40 39.22	11 10.78	19 18.63	5 4.90	4 3.92	2 1.96	102

9. Information from the system helps my department or team to give a better service.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	3 75.00	1 25.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	4
CH	0 0.00	2 33.33	0 0.00	0 0.00	3 50.00	1 16.67	0 0.00	6
DI	0 0.00	0 0.00	0 0.00	0 0.00	3 50.00	3 50.00	0 0.00	6
DM	0 0.00	1 14.29	0 0.00	2 28.57	2 28.57	1 14.29	1 14.29	7
DN	1 8.33	3 25.00	0 0.00	3 25.00	1 8.33	3 25.00	1 8.33	12
HV	2 16.67	0 0.00	0 0.00	5 41.67	0 0.00	5 41.67	0 0.00	12
MH	0 0.00	1 16.67	1 16.67	2 33.33	0 0.00	2 33.33	0 0.00	6
OT	0 0.00	5 35.71	0 0.00	3 21.43	1 7.14	5 35.71	0 0.00	14
PH	1 7.14	6 42.86	2 14.29	1 7.14	3 21.43	0 0.00	1 7.14	14
PN	3 27.27	2 18.18	0 0.00	1 9.09	3 27.27	2 18.18	0 0.00	11
PS	0 0.00	1 33.33	0 0.00	1 33.33	0 0.00	1 33.33	0 0.00	3
SP	1 14.29	3 42.86	0 0.00	2 28.57	0 0.00	1 14.29	0 0.00	7
All Staff	11 10.78	25 24.51	3 2.94	20 19.61	16 15.69	24 23.53	3 2.94	102

10. I am afraid that the information might be used against the interests of my department or service.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	1 25.00	0 0.00	3 75.00	0 0.00	0 0.00	0 0.00	4
CH	1 16.67	3 50.00	0 0.00	2 33.33	0 0.00	0 0.00	0 0.00	6
DI	1 16.67	0 0.00	0 0.00	4 66.67	1 16.67	0 0.00	0 0.00	6
DM	0 0.00	2 28.57	0 0.00	0 0.00	2 28.57	3 42.86	0 0.00	7
DN	2 16.67	1 8.33	0 0.00	4 33.33	3 25.00	2 16.67	0 0.00	12
HV	0 0.00	4 33.33	2 16.67	4 33.33	1 8.33	0 0.00	1 8.33	12
MH	0 0.00	3 50.00	0 0.00	0 0.00	0 0.00	3 50.00	0 0.00	6
OT	0 0.00	1 7.14	1 7.14	5 35.71	3 21.43	3 21.43	1 7.14	14
PH	0 0.00	0 0.00	0 0.00	3 23.08	2 15.38	7 53.85	1 7.69	13
PN	0 0.00	1 9.09	1 9.09	1 9.09	5 45.45	2 18.18	1 9.09	11
PS	0 0.00	0 0.00	0 0.00	3 100.00	0 0.00	0 0.00	0 0.00	3
SP	0 0.00	4 57.14	0 0.00	1 14.29	1 14.29	1 14.29	0 0.00	7
All Staff	4 3.96	20 19.80	4 3.96	30 29.70	18 17.82	21 20.79	4 3.96	101

11. Providing good information is a responsible task.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	0 0.00	0 0.00	2 50.00	1 25.00	1 25.00	0 0.00	4
CH	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	4 66.67	2 33.33	6
DI	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3 50.00	3 50.00	6
DM	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	6 85.71	1 14.29	7
DN	0 0.00	0 0.00	0 0.00	2 16.67	0 0.00	8 66.67	2 16.67	12
HV	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	10 83.33	2 16.67	12
MH	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	6 100.00	0 0.00	6
OT	0 0.00	0 0.00	0 0.00	1 7.14	0 0.00	11 78.57	2 14.29	14
PH	0 0.00	0 0.00	0 0.00	1 7.14	1 7.14	10 71.43	2 14.29	14
PN	0 0.00	1 9.09	0 0.00	0 0.00	1 9.09	5 45.45	4 36.36	11
PS	0 0.00	0 0.00	0 0.00	0 0.00	1 33.33	2 66.67	0 0.00	3
SP	0 0.00	0 0.00	0 0.00	0 0.00	1 14.29	5 71.43	1 14.29	7
All Staff	0 0.00	1 0.98	0 0.00	6 5.88	5 4.90	71 69.61	19 18.63	102

12. We do not receive enough support for our use of the system.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	0 0.00	0 0.00	2 50.00	2 50.00	0 0.00	0 0.00	4
CH	0 0.00	2 33.33	0 0.00	2 33.33	1 16.67	0 0.00	1 16.67	6
DI	0 0.00	1 16.67	1 16.67	2 33.33	1 16.67	0 0.00	1 16.67	6
DM	2 28.57	4 57.14	0 0.00	0 0.00	0 0.00	1 14.29	0 0.00	7
DN	1 8.33	2 16.67	2 16.67	3 25.00	2 16.67	2 16.67	0 0.00	12
HV	0 0.00	4 33.33	0 0.00	3 25.00	1 8.33	3 25.00	1 8.33	12
MH	1 16.67	2 33.33	0 0.00	1 16.67	1 16.67	1 16.67	0 0.00	6
OT	0 0.00	3 21.43	2 14.29	4 28.57	1 7.14	3 21.43	1 7.14	14
PH	0 0.00	4 28.57	0 0.00	5 35.71	2 14.29	2 14.29	1 7.14	14
PN	0 0.00	2 18.18	1 9.09	3 27.27	3 27.27	2 18.18	0 0.00	11
PS	0 0.00	0 0.00	0 0.00	0 0.00	1 33.33	2 66.67	0 0.00	3
SP	0 0.00	3 42.86	1 14.29	2 28.57	0 0.00	1 14.29	0 0.00	7
All Staff	4 3.92	27 26.47	7 6.86	27 26.47	15 14.71	17 16.67	5 4.90	102

13. Comcare has given me a better sense of what my job comprises.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	2 50.00	2 50.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	4
CH	0 0.00	4 66.67	1 16.67	0 0.00	1 16.67	0 0.00	0 0.00	6
DI	0 0.00	0 0.00	1 16.67	2 33.33	1 16.67	2 33.33	0 0.00	6
DM	0 0.00	3 42.86	0 0.00	1 14.29	1 14.29	2 28.57	0 0.00	7
DN	0 0.00	4 33.33	1 8.33	3 25.00	2 16.67	2 16.67	0 0.00	12
HV	0 0.00	4 33.33	2 16.67	1 8.33	2 16.67	3 25.00	0 0.00	12
MH	0 0.00	3 50.00	0 0.00	1 16.67	2 33.33	0 0.00	0 0.00	6
OT	0 0.00	6 42.86	1 7.14	2 14.29	2 14.29	2 14.29	1 7.14	14
PH	2 14.29	6 42.86	2 14.29	2 14.29	2 14.29	0 0.00	0 0.00	14
PN	1 9.09	4 36.36	2 18.18	0 0.00	4 36.36	0 0.00	0 0.00	11
PS	1 33.33	2 66.67	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3
SP	4 57.14	2 28.57	1 14.29	0 0.00	0 0.00	0 0.00	0 0.00	7
All Staff	10 9.80	40 39.22	11 10.78	12 11.76	17 16.67	11 10.78	1 0.98	102

14. I use my professional knowledge in recording my activities

Staff Group	Strongly Disagree		Disagree		Slightly Disagree		Neither Agree nor Disagree		Slightly Agree		Agree		Strongly Agree		Total Respondents
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
AU	0	0.00	1	25.00	0	0.00	3	75.00	0	0.00	0	0.00	0	0.00	4
CH	1	16.67	1	16.67	0	0.00	1	16.67	2	33.33	1	16.67	0	0.00	6
DI	0	0.00	1	16.67	0	0.00	0	0.00	1	16.67	4	66.67	0	0.00	6
DM	0	0.00	0	0.00	0	0.00	2	28.57	0	0.00	4	57.14	1	14.29	7
DN	1	8.33	2	16.67	0	0.00	2	16.67	2	16.67	5	41.67	0	0.00	12
HV	0	0.00	1	8.33	0	0.00	2	16.67	2	16.67	7	58.33	0	0.00	12
MH	0	0.00	0	0.00	0	0.00	1	16.67	3	50.00	2	33.33	0	0.00	6
OT	1	7.69	0	0.00	2	15.38	3	23.08	2	15.38	5	38.46	0	0.00	13
PH	1	7.14	5	35.71	0	0.00	5	35.71	1	7.14	2	14.29	0	0.00	14
PN	0	0.00	0	0.00	0	0.00	1	9.09	3	27.27	5	45.45	2	18.18	11
PS	0	0.00	0	0.00	1	33.33	1	33.33	0	0.00	1	33.33	0	0.00	3
SP	1	14.29	3	42.86	1	14.29	1	14.29	1	14.29	0	0.00	0	0.00	7
All Staff	5	4.95	14	13.86	4	3.96	22	21.78	17	16.83	36	35.64	3	2.97	101

15. Recording my activities adds stress to my job.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	0 0.00	0 0.00	3 75.00	0 0.00	1 25.00	0 0.00	4
CH	2 33.33	0 0.00	0 0.00	0 0.00	1 16.67	3 50.00	0 0.00	6
DI	0 0.00	1 16.67	1 16.67	1 16.67	3 50.00	0 0.00	0 0.00	6
DM	1 14.29	2 28.57	0 0.00	1 14.29	1 14.29	2 28.57	0 0.00	7
DN	1 8.33	0 0.00	1 8.33	5 41.67	1 8.33	4 33.33	0 0.00	12
HV	0 0.00	5 41.67	0 0.00	0 0.00	2 16.67	3 25.00	2 16.67	12
MH	0 0.00	2 33.33	0 0.00	2 33.33	0 0.00	2 33.33	0 0.00	6
OT	0 0.00	3 21.43	0 0.00	3 21.43	4 28.57	3 21.43	1 7.14	14
PH	0 0.00	1 7.14	0 0.00	1 7.14	3 21.43	7 50.00	2 14.29	14
PN	1 9.09	2 18.18	1 9.09	0 0.00	3 27.27	4 36.36	0 0.00	11
PS	0 0.00	0 0.00	2 66.67	0 0.00	0 0.00	1 33.33	0 0.00	3
SP	0 0.00	1 14.29	1 14.29	0 0.00	1 14.29	2 28.57	2 28.57	7
All Staff	5 4.90	17 16.67	6 5.88	16 15.69	19 18.63	32 31.37	7 6.86	102

16. Using Comcare has enabled me to develop new skills.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	1 25.00	1 25.00	0 0.00	2 50.00	0 0.00	0 0.00	0 0.00	4
CH	2 33.33	1 16.67	1 16.67	0 0.00	2 33.33	0 0.00	0 0.00	6
DI	0 0.00	1 16.67	0 0.00	1 16.67	4 66.67	0 0.00	0 0.00	6
DM	0 0.00	2 28.57	0 0.00	0 0.00	3 42.86	2 28.57	0 0.00	7
DN	1 8.33	2 16.67	1 8.33	2 16.67	1 8.33	5 41.67	0 0.00	12
HV	1 8.33	4 33.33	0 0.00	1 8.33	4 33.33	2 16.67	0 0.00	12
MH	0 0.00	2 33.33	1 16.67	0 0.00	2 33.33	1 16.67	0 0.00	6
OT	3 21.43	6 42.86	1 7.14	2 14.29	1 7.14	1 7.14	0 0.00	14
PH	3 21.43	5 35.71	1 7.14	4 28.57	1 7.14	0 0.00	0 0.00	14
PN	2 18.18	5 45.45	2 18.18	0 0.00	1 9.09	1 9.09	0 0.00	11
PS	1 33.33	2 66.67	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3
SP	3 42.86	2 28.57	1 14.29	0 0.00	1 14.29	0 0.00	0 0.00	7
All Staff	17 16.67	33 32.35	8 7.84	12 11.76	20 19.61	12 11.76	0 0.00	102

17. Information from Comcare helps me to plan my work.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	4 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	4
CH	2 33.33	3 50.00	1 16.67	0 0.00	0 0.00	0 0.00	0 0.00	6
DI	0 0.00	0 0.00	0 0.00	3 50.00	1 16.67	2 33.33	0 0.00	6
DM	1 14.29	2 28.57	1 14.29	1 14.29	2 28.57	0 0.00	0 0.00	7
DN	1 8.33	4 33.33	1 8.33	4 33.33	2 16.67	0 0.00	0 0.00	12
HV	2 16.67	5 41.67	1 8.33	2 16.67	0 0.00	2 16.67	0 0.00	12
MH	0 0.00	2 33.33	0 0.00	0 0.00	3 50.00	1 16.67	0 0.00	6
OT	3 21.43	8 57.14	1 7.14	1 7.14	0 0.00	1 7.14	0 0.00	14
PH	2 14.29	10 71.43	0 0.00	2 14.29	0 0.00	0 0.00	0 0.00	14
PN	4 36.36	2 18.18	1 9.09	0 0.00	3 27.27	1 9.09	0 0.00	11
PS	0 0.00	3 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3
SP	2 28.57	4 57.14	0 0.00	0 0.00	0 0.00	1 14.29	0 0.00	7
All Staff	17 16.67	47 46.08	6 5.88	13 12.75	11 10.78	8 7.84	0 0.00	102

18. The information we provide is necessary if our service is to be well managed.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	1 25.00	0 0.00	1 25.00	2 50.00	0 0.00	0 0.00	4
CH	0 0.00	0 0.00	0 0.00	0 0.00	1 16.67	5 83.33	0 0.00	6
DI	0 0.00	0 0.00	0 0.00	0 0.00	1 16.67	3 50.00	2 33.33	6
DM	0 0.00	0 0.00	0 0.00	1 14.29	1 14.29	5 71.43	0 0.00	7
DN	0 0.00	2 16.67	0 0.00	4 33.33	1 8.33	4 33.33	1 8.33	12
HV	1 8.33	1 8.33	0 0.00	2 16.67	4 33.33	4 33.33	0 0.00	12
MH	0 0.00	2 33.33	0 0.00	0 0.00	1 16.67	2 33.33	1 16.67	6
OT	0 0.00	1 7.69	2 15.38	3 23.08	3 23.08	3 23.08	1 7.69	13
PH	0 0.00	1 7.14	0 0.00	8 57.14	2 14.29	2 14.29	1 7.14	14
PN	1 9.09	5 45.45	0 0.00	0 0.00	3 27.27	2 18.18	0 0.00	11
PS	0 0.00	0 0.00	0 0.00	0 0.00	1 33.33	2 66.67	0 0.00	3
SP	1 14.29	1 14.29	0 0.00	1 14.29	2 28.57	2 28.57	0 0.00	7
All Staff	3 2.97	14 13.86	2 1.98	20 19.80	22 21.78	34 33.66	6 5.94	101

19. I enjoy my job less because of Comcare.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	0 0.00	0 0.00	2 50.00	1 25.00	1 25.00	0 0.00	4
CH	0 0.00	2 33.33	1 16.67	1 16.67	1 16.67	1 16.67	0 0.00	6
DI	0 0.00	0 0.00	0 0.00	5 83.33	0 0.00	1 16.67	0 0.00	6
DM	1 14.29	3 42.86	0 0.00	2 28.57	0 0.00	0 0.00	1 14.29	7
DN	1 8.33	2 16.67	0 0.00	6 50.00	1 8.33	2 16.67	0 0.00	12
HV	1 8.33	3 25.00	0 0.00	1 8.33	4 33.33	2 16.67	1 8.33	12
MH	0 0.00	1 16.67	1 16.67	4 66.67	0 0.00	0 0.00	0 0.00	6
OT	1 7.14	4 28.57	1 7.14	5 35.71	0 0.00	1 7.14	2 14.29	14
PH	0 0.00	0 0.00	1 7.14	4 28.57	5 35.71	4 28.57	0 0.00	14
PN	0 0.00	2 18.18	0 0.00	4 36.36	4 36.36	1 9.09	0 0.00	11
PS	1 33.33	1 33.33	0 0.00	0 0.00	0 0.00	1 33.33	0 0.00	3
SP	0 0.00	2 28.57	1 14.29	2 28.57	1 14.29	1 14.29	0 0.00	7
All Staff	5 4.90	20 19.61	5 4.90	36 35.29	17 16.67	15 14.71	4 3.92	102

20. This type of information will be essential once the White Paper comes into force.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	0 0.00	0 0.00	3 75.00	1 25.00	0 0.00	0 0.00	4
CH	0 0.00	0 0.00	0 0.00	2 33.33	1 16.67	3 50.00	0 0.00	6
DI	0 0.00	0 0.00	0 0.00	0 0.00	1 16.67	3 50.00	2 33.33	6
DM	0 0.00	0 0.00	0 0.00	1 14.29	0 0.00	6 85.71	0 0.00	7
DN	0 0.00	0 0.00	0 0.00	2 18.18	0 0.00	7 63.64	2 18.18	11
HV	0 0.00	1 8.33	0 0.00	0 0.00	0 0.00	11 91.67	0 0.00	12
MH	0 0.00	0 0.00	0 0.00	3 50.00	1 16.67	2 33.33	0 0.00	6
OT	0 0.00	0 0.00	1 7.69	3 23.08	1 7.69	8 61.54	0 0.00	13
PH	0 0.00	0 0.00	0 0.00	4 28.57	2 14.29	8 57.14	0 0.00	14
PN	0 0.00	0 0.00	0 0.00	4 36.36	3 27.27	4 36.36	0 0.00	11
PS	0 0.00	0 0.00	0 0.00	1 33.33	0 0.00	2 66.67	0 0.00	3
SP	0 0.00	0 0.00	0 0.00	2 28.57	2 28.57	3 42.86	0 0.00	7
All Staff	0 0.00	1 0.98	1 0.98	25 24.51	12 11.76	57 55.88	4 3.92	102

21. I would rather use a Psion than forms.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	0 0.00	0 0.00	1 25.00	0 0.00	3 75.00	0 0.00	4
CH	0 0.00	2 33.33	0 0.00	2 33.33	1 16.67	1 16.67	0 0.00	6
DI	0 0.00	1 16.67	0 0.00	0 0.00	1 16.67	1 16.67	3 50.00	6
DM	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2 28.57	5 71.43	7
DN	0 0.00	0 0.00	0 0.00	0 0.00	1 8.33	5 41.67	6 50.00	12
HV	0 0.00	0 0.00	1 8.33	1 8.33	1 8.33	7 58.33	2 16.67	12
MH	0 0.00	0 0.00	0 0.00	2 33.33	1 16.67	1 16.67	2 33.33	6
DF	0 0.00	1 7.14	0 0.00	6 42.86	0 0.00	5 35.71	2 14.29	14
PH	1 7.69	3 23.08	1 7.69	6 46.15	1 7.69	1 7.69	0 0.00	13
PN	3 27.27	0 0.00	0 0.00	1 9.09	2 18.18	3 27.27	2 18.18	11
PS	1 33.33	1 33.33	1 33.33	0 0.00	0 0.00	0 0.00	0 0.00	3
SP	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3 42.86	4 57.14	7
All Staff	5 4.95	8 7.92	3 2.97	19 18.81	8 7.92	33 32.67	26 25.74	101

22. Taking the job as a whole, I get a lot of satisfaction from my work.

Staff Group	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree	Total Respondents
	No. %	No. %	No. %	No. %	No. %	No. %	No. %	
AU	0 0.00	0 0.00	0 0.00	0 0.00	2 66.67	1 33.33	0 0.00	3
CH	0 0.00	1 16.67	0 0.00	0 0.00	1 16.67	1 16.67	3 50.00	6
DI	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2 33.33	4 66.67	6
DM	0 0.00	0 0.00	0 0.00	0 0.00	1 14.29	3 42.86	3 42.86	7
DN	0 0.00	1 8.33	0 0.00	0 0.00	3 25.00	4 33.33	4 33.33	12
HV	0 0.00	1 8.33	0 0.00	0 0.00	1 8.33	10 83.33	0 0.00	12
MH	0 0.00	0 0.00	0 0.00	0 0.00	1 16.67	1 16.67	4 66.67	6
OT	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	11 78.57	3 21.43	14
PH	0 0.00	0 0.00	0 0.00	1 7.14	1 7.14	9 64.29	3 21.43	14
PN	0 0.00	0 0.00	0 0.00	0 0.00	2 18.18	6 54.55	3 27.27	11
PS	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3 100.00	0 0.00	3
SP	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	6 85.71	1 14.29	7
All Staff	0 0.00	3 2.97	0 0.00	1 0.99	12 11.88	57 56.44	28 27.72	101

23. How important is Comcare in determining how happy you are in your job?

Staff Group	Not a factor No. %	A very small factor No. %	A small factor No. %	A fairly important factor No. %	An important factor No. %	A very important factor No. %	The most important factor No. %	Total Respondents
AU	4 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	4
CH	3 50.00	2 33.33	1 16.67	0 0.00	0 0.00	0 0.00	0 0.00	6
DI	3 50.00	1 16.67	2 33.33	0 0.00	0 0.00	0 0.00	0 0.00	6
DM	4 57.14	1 14.29	0 0.00	2 28.57	0 0.00	0 0.00	0 0.00	7
DN	6 50.00	0 0.00	3 25.00	3 25.00	0 0.00	0 0.00	0 0.00	12
HV	5 41.67	3 25.00	2 16.67	1 8.33	1 8.33	0 0.00	0 0.00	12
MH	3 50.00	0 0.00	2 33.33	1 16.67	0 0.00	0 0.00	0 0.00	6
OT	10 71.43	1 7.14	1 7.14	0 0.00	2 14.29	0 0.00	0 0.00	14
PH	8 57.14	2 14.29	3 21.43	0 0.00	1 7.14	0 0.00	0 0.00	14
PN	8 72.73	1 9.09	1 9.09	0 0.00	1 9.09	0 0.00	0 0.00	11
PS	1 50.00	1 50.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2
SP	3 42.86	3 42.86	1 14.29	0 0.00	0 0.00	0 0.00	0 0.00	7
All Staff	58 57.43	15 14.85	16 15.84	7 6.93	5 4.95	0 0.00	0 0.00	101

24. I was initially apprehensive about using a Psion.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	1 25.00	0 0.00	1 25.00	0 0.00	1 25.00	1 25.00	0 0.00	4
CH	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3 100.00	0 0.00	3
DI	0 0.00	0 0.00	0 0.00	0 0.00	2 33.33	4 66.67	0 0.00	6
DM	0 0.00	1 14.29	0 0.00	0 0.00	3 42.86	2 28.57	1 14.29	7
DN	0 0.00	1 8.33	0 0.00	2 16.67	0 0.00	5 41.67	4 33.33	12
HV	0 0.00	2 18.18	0 0.00	0 0.00	4 36.36	5 45.45	0 0.00	11
MH	0 0.00	0 0.00	0 0.00	0 0.00	1 25.00	3 75.00	0 0.00	4
OT	0 0.00	3 37.50	0 0.00	2 25.00	1 12.50	1 12.50	1 12.50	8
PH	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	1
PN	0 0.00	4 40.00	0 0.00	1 10.00	3 30.00	2 20.00	0 0.00	10
PS	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
SP	1 14.29	0 0.00	0 0.00	1 14.29	3 42.86	1 14.29	1 14.29	7
All Staff	2 2.70	11 14.86	1 1.35	7 9.46	18 24.32	28 37.84	7 9.46	74

25. Being able to use my Psion gives me a sense of achievement.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	1 25.00	2 50.00	0 0.00	1 25.00	0 0.00	0 0.00	0 0.00	4
CH	1 33.33	1 33.33	0 0.00	0 0.00	1 33.33	0 0.00	0 0.00	3
DI	0 0.00	2 33.33	0 0.00	2 33.33	1 16.67	1 16.67	0 0.00	6
DM	0 0.00	0 0.00	0 0.00	2 28.57	1 14.29	4 57.14	0 0.00	7
DN	1 8.33	0 0.00	0 0.00	3 25.00	3 25.00	3 25.00	2 16.67	12
HV	1 9.09	1 9.09	0 0.00	1 9.09	4 36.36	4 36.36	0 0.00	11
MH	0 0.00	0 0.00	0 0.00	0 0.00	1 25.00	3 75.00	0 0.00	4
OT	0 0.00	1 12.50	1 12.50	3 37.50	2 25.00	1 12.50	0 0.00	8
PN	2 20.00	2 20.00	1 10.00	2 20.00	2 20.00	1 10.00	0 0.00	10
PS	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
SP	4 57.14	0 0.00	0 0.00	1 14.29	1 14.29	1 14.29	0 0.00	7
All Staff	10 13.70	10 13.70	2 2.74	15 20.55	16 21.92	18 24.66	2 2.74	73

26. I feel confident about using my Psion.

Staff Group	Strongly Disagree No. %	Disagree No. %	Slightly Disagree No. %	Neither Agree nor Disagree No. %	Slightly Agree No. %	Agree No. %	Strongly Agree No. %	Total Respondents
AU	0 0.00	0 0.00	0 0.00	2 50.00	0 0.00	2 50.00	0 0.00	4
CH	0 0.00	0 0.00	0 0.00	0 0.00	1 33.33	1 33.33	1 33.33	3
DI	0 0.00	0 0.00	0 0.00	1 16.67	1 16.67	3 50.00	1 16.67	6
DM	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	4 57.14	3 42.86	7
DN	0 0.00	1 8.33	0 0.00	3 25.00	2 16.67	4 33.33	2 16.67	12
HV	0 0.00	0 0.00	1 9.09	2 18.18	1 9.09	6 54.55	1 9.09	11
MH	0 0.00	0 0.00	0 0.00	0 0.00	2 50.00	2 50.00	0 0.00	4
OT	0 0.00	1 12.50	0 0.00	1 12.50	1 12.50	4 50.00	1 12.50	8
PN	0 0.00	2 20.00	0 0.00	0 0.00	1 10.00	5 50.00	2 20.00	10
PS	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	1
SP	0 0.00	0 0.00	0 0.00	0 0.00	2 28.57	5 71.43	0 0.00	7
All Staff	0 0.00	4 5.48	1 1.37	9 12.33	11 15.07	37 50.68	11 15.07	73

Appendix 3.4. Correlation analysis.Pearson Correlation Matrix.

A value of zero would represent no relationship, 1 would represent total correspondence, i.e. identical values. A negative coefficient represents an inverse relationship. Statistical significance is represented by asterisks: * represents significance at .01 level, ** at .001 level. These figures give the probability that a similar coefficient would be obtained from random data, therefore a smaller decimal represents a greater probability that there is a genuine relationship.

The quantitative items are the weekly numbers of contacts, registrations, group sessions and “other” activities; the time taken to record one contact and one registration (specified only by respondents who enter data at the time of the activities); and the total time requirement. Correlations involving these items, especially the time for one contact and one registration, are based on a lower number of cases.

Correlations:	Q1	Q2	Q3	Q4	Q5
Q1	1.0000	-0.1693	0.2284	-0.3050*	0.6744**
Q2	-0.1693	1.0000	-0.2395	0.2273	-0.1506
Q3	0.2284	-0.2395	1.0000	-0.1437	0.2078
Q4	-0.3050*	0.2273	-0.1437	1.0000	-0.3446**
Q5	0.6744**	-0.1506	0.2078	-0.3446**	1.0000
Q6	-0.4008**	0.1201	-0.3144*	0.2910*	-0.5429**
Q7	0.5555**	-0.2071	0.3009*	-0.2984*	0.5213**
Q8	0.3362**	-0.2344	0.1177	-0.5144**	0.5150**
Q9	0.5473**	-0.2330	0.2776*	-0.2288	0.5740**
Q10	-0.2438	0.3883**	-0.0925	0.1593	-0.2439
Q11	0.0597	-0.2236	0.1486	-0.0987	-0.0096
Q12	-0.1858	0.0801	0.0138	0.0294	-0.1772
Q13	0.3462**	-0.0870	0.2492	-0.1724	0.4254**
Q14	0.2338	-0.1548	0.3009*	-0.3094*	0.2230
Q15	-0.3089*	0.1661	-0.2649*	0.3017*	-0.4755**
Q16	0.4066**	-0.2080	0.1494	-0.2791*	0.4797**
Q17	0.4989**	-0.0915	0.0926	-0.3175*	0.4953**
Q18	0.4200**	-0.1707	0.1835	-0.3246**	0.3986**
Q19	-0.3684**	0.1166	-0.2965*	0.3066*	-0.4915**
Q20	0.3548**	-0.1558	0.1668	-0.1439	0.3118*
Q21	0.2808*	0.0370	0.0462	-0.1553	0.3674**
Q22	0.0597	0.0029	0.0119	-0.0582	0.0927
Q23	0.1456	-0.0265	-0.0002	-0.0897	0.0800
Q24	0.2110	-0.1211	0.2401	0.0892	0.1876
Q25	0.4306**	-0.0477	0.1869	-0.1654	0.5253**
Q26	0.0207	-0.0130	0.1960	-0.1985	0.1065
Contacts	-0.1429	-0.1891	0.2035	0.0567	0.0161
Registrations	-0.1251	-0.0130	-0.0042	0.0432	-0.1372
Group sessions	-0.1324	0.1937	-0.1421	-0.0191	-0.0760
"Other" activities	0.1181	-0.1450	0.1864	-0.2909*	0.1454
One registration	-0.0961	-0.2529	0.1890	-0.3240	0.2314
One contact	-0.2958	0.0796	0.0555	-0.0517	-0.3261
Time per week	0.0258	-0.0557	0.0483	-0.1561	-0.0489

Correlations:	Q6	Q7	Q8	Q9	Q10
Q1	-0.4008**	0.5555**	0.3362**	0.5473**	-0.2438
Q2	0.1201	-0.2071	-0.2344	-0.2330	0.3883**
Q3	-0.3144*	0.3009*	0.1177	0.2776*	-0.0925
Q4	0.2910*	-0.2984*	-0.5144**	-0.2288	0.1593
Q5	-0.5429**	0.5213**	0.5150**	0.5740**	-0.2439
Q6	1.0000	-0.3332**	-0.2968*	-0.3490**	0.3477**
Q7	-0.3332**	1.0000	0.2497	0.4647**	-0.3946**
Q8	-0.2968*	0.2497	1.0000	0.3833**	-0.0111
Q9	-0.3490**	0.4647**	0.3833**	1.0000	-0.2409
Q10	0.3477**	-0.3946**	-0.0111	-0.2409	1.0000
Q11	-0.1290	-0.0612	0.0367	0.1408	0.0494
Q12	0.1709	-0.1892	-0.0562	-0.1567	0.0811
Q13	-0.3241**	0.3224*	0.4120**	0.4063**	-0.0260
Q14	-0.2515	0.2345	0.4103**	0.2159	0.0045
Q15	0.5445**	-0.3297**	-0.2588*	-0.3161*	0.3110*
Q16	-0.4298**	0.4397**	0.4373**	0.3677**	-0.2093
Q17	-0.3739**	0.3582**	0.4655**	0.4218**	-0.1445
Q18	-0.3042*	0.4453**	0.1807	0.4976**	-0.3528**
Q19	0.4652**	-0.3394**	-0.1916	-0.2860*	0.1813
Q20	-0.2250	0.3044*	0.0855	0.3397**	-0.1414
Q21	-0.3055*	0.3361**	0.3270**	0.1157	-0.2965*
Q22	-0.1578	0.0754	0.0468	0.2763*	0.0385
Q23	-0.0756	0.0445	0.1504	0.2199	0.1141
Q24	0.0309	0.2854	0.0970	0.2473	0.0374
Q25	-0.4534**	0.4975**	0.3351*	0.4818**	-0.1773
Q26	-0.2079	0.2605	0.2491	0.1025	0.0030
Contacts	0.0671	-0.1522	0.0290	0.0091	0.0746
Registrations	0.1956	-0.0331	-0.0640	0.1275	-0.0296
Group sessions	0.1792	0.0627	-0.1089	-0.2101	0.1465
"Other" activities"	-0.1791	0.1443	0.2919*	0.1832	0.0175
One registration	-0.3463	0.2689	0.1591	-0.2662	-0.2052
One contact	0.2154	0.0061	-0.0834	-0.0466	0.1712
Time per week	0.1831	0.0348	0.0945	-0.0567	0.0362

Correlations:	Q11	Q12	Q13	Q14	Q15
Q1	0.0597	-0.1858	0.3462**	0.2338	-0.3089*
Q2	-0.2236	0.0801	-0.0870	-0.1548	0.1661
Q3	0.1486	0.0138	0.2492	0.3009*	-0.2649*
Q4	-0.0987	0.0294	-0.1724	-0.3094*	0.3017*
Q5	-0.0096	-0.1772	0.4254**	0.2230	-0.4755**
Q6	-0.1290	0.1709	-0.3241**	-0.2515	0.5445**
Q7	-0.0612	-0.1892	0.3224*	0.2345	-0.3297**
Q8	0.0367	-0.0562	0.4120**	0.4103**	-0.2588*
Q9	0.1408	-0.1567	0.4063**	0.2159	-0.3161*
Q10	0.0494	0.0811	-0.0260	0.0045	0.3110*
Q11	1.0000	-0.0763	0.1176	0.1989	0.0283
Q12	-0.0763	1.0000	0.0074	0.0205	0.0560
Q13	0.1176	0.0074	1.0000	0.3590**	-0.2301
Q14	0.1989	0.0205	0.3590**	1.0000	-0.2325
Q15	0.0283	0.0560	-0.2301	-0.2325	1.0000
Q16	0.0030	-0.1780	0.4321**	0.3020*	-0.2926*
Q17	0.1016	-0.1044	0.5233**	0.3714**	-0.3049*
Q18	0.1057	-0.0734	0.2341	0.0794	-0.2781*
Q19	-0.0884	0.2727*	-0.1241	-0.1919	0.5450**
Q20	0.1221	-0.1276	0.2665*	0.0485	-0.1625
Q21	0.0081	-0.0861	0.2251	0.1372	-0.2517
Q22	0.0788	-0.2177	0.0994	0.0126	-0.1550
Q23	0.3189*	-0.0071	0.3195*	0.2093	0.1241
Q24	0.0367	-0.0333	0.1763	-0.0232	0.1152
Q25	0.0545	-0.2735	0.4810**	0.2760	-0.3772*
Q26	0.2054	-0.0655	0.1872	0.0414	-0.2125
Contacts	0.0822	0.0093	0.0061	-0.1254	0.1010
Registrations	-0.1412	0.2570	-0.0211	-0.0484	0.1664
Group sessions	-0.0013	0.0578	0.0539	0.0743	-0.0529
"Other" activities	0.1269	-0.0291	0.1449	0.1685	-0.0507
One registration	0.0948	-0.2599	-0.0638	0.3487	-0.0392
One contact	0.0441	-0.0979	0.0537	0.0562	0.2030
Time per week	0.0948	0.2320	0.3118*	0.0991	0.1284

Correlations:	Q16	Q17	Q18	Q19	Q20
Q1	0.4066**	0.4989**	0.4200**	-0.3684**	0.3548**
Q2	-0.2080	-0.0915	-0.1707	0.1166	-0.1558
Q3	0.1494	0.0926	0.1835	-0.2965*	0.1668
Q4	-0.2791*	-0.3175*	-0.3246**	0.3066*	-0.1439
Q5	0.4797**	0.4953**	0.3986**	-0.4915**	0.3118*
Q6	-0.4298**	-0.3739**	-0.3042*	0.4652**	-0.2250
Q7	0.4397**	0.3582**	0.4453**	-0.3394**	0.3044*
Q8	0.4373**	0.4655**	0.1807	-0.1916	0.0855
Q9	0.3677**	0.4218**	0.4976**	-0.2860*	0.3397**
Q10	-0.2093	-0.1445	-0.3528**	0.1813	-0.1414
Q11	0.0030	0.1016	0.1057	-0.0884	0.1221
Q12	-0.1780	-0.1044	-0.0734	0.2727*	-0.1276
Q13	0.4321**	0.5233**	0.2341	-0.1241	0.2665*
Q14	0.3020*	0.3714**	0.0794	-0.1919	0.0485
Q15	-0.2926*	-0.3049*	-0.2781*	0.5450**	-0.1625
Q16	1.0000	0.4674**	0.2344	-0.2376	0.2930*
Q17	0.4674**	1.0000	0.3946**	-0.1958	0.1239
Q18	0.2344	0.3946**	1.0000	-0.1799	0.4468**
Q19	-0.2376	-0.1958	-0.1799	1.0000	-0.1169
Q20	0.2930*	0.1239	0.4468**	-0.1169	1.0000
Q21	0.3234**	0.2821*	0.0502	-0.2085	0.1239
Q22	0.0766	0.1311	0.1626	-0.2340	0.2131
Q23	0.1649	0.2647*	0.2220	0.0892	0.0906
Q24	0.2452	0.1215	0.1787	0.0477	0.1690
Q25	0.5916**	0.3772*	0.4592**	-0.3440*	0.4510**
Q26	0.1663	0.1207	0.1898	-0.2844	0.2516
Contacts	0.0837	-0.1455	0.0784	-0.0836	0.1462
Registrations	-0.0693	-0.0132	0.1212	0.1559	-0.0509
Group sessions	0.0281	-0.0287	-0.1325	0.0537	-0.2564
"Other" activities	0.1935	0.0580	0.1469	0.1057	0.1058
One registration	0.2071	0.1568	-0.2572	-0.3109	-0.1652
One contact	-0.2183	-0.1025	-0.3731*	0.0907	-0.2969
Time per week	0.0586	0.0848	0.0383	0.1748	0.0108

Correlations:	Q21	Q22	Q23	Q24	Q25
Q1	0.2808*	0.0597	0.1456	0.2110	0.4306**
Q2	0.0370	0.0029	-0.0265	-0.1211	-0.0477
Q3	0.0462	0.0119	-0.0002	0.2401	0.1869
Q4	-0.1553	-0.0582	-0.0897	0.0892	-0.1654
Q5	0.3674**	0.0927	0.0800	0.1876	0.5253**
Q6	-0.3055*	-0.1578	-0.0756	0.0309	-0.4534**
Q7	0.3361**	0.0754	0.0445	0.2854	0.4975**
Q8	0.3270**	0.0468	0.1504	0.0970	0.3351*
Q9	0.1157	0.2763*	0.2199	0.2473	0.4818**
Q10	-0.2965*	0.0385	0.1141	0.0374	-0.1773
Q11	0.0081	0.0788	0.3189*	0.0367	0.0545
Q12	-0.0861	-0.2177	-0.0071	-0.0333	-0.2735
Q13	0.2251	0.0994	0.3195*	0.1763	0.4810**
Q14	0.1372	0.0126	0.2093	-0.0232	0.2760
Q15	-0.2517	-0.1550	0.1241	0.1152	-0.3772*
Q16	0.3234**	0.0766	0.1649	0.2452	0.5916**
Q17	0.2821*	0.1311	0.2647*	0.1215	0.3772*
Q18	0.0502	0.1626	0.2220	0.1787	0.4592**
Q19	-0.2085	-0.2340	0.0892	0.0477	-0.3440*
Q20	0.1239	0.2131	0.0906	0.1690	0.4510**
Q21	1.0000	0.0867	-0.1026	0.0623	0.3365*
Q22	0.0867	1.0000	-0.0326	0.0997	0.1612
Q23	-0.1026	-0.0326	1.0000	0.1141	0.2211
Q24	0.0623	0.0997	0.1141	1.0000	0.3280*
Q25	0.3365*	0.1612	0.2211	0.3280*	1.0000
Q26	0.4145**	0.1966	-0.0744	-0.0308	0.2024
Contacts	-0.1923	-0.0062	0.0759	0.1659	0.0836
Registrations	-0.101	-0.1354	0.0524	0.0421	-0.2552
Group sessions	0.1443	-0.0982	0.0796	-0.0468	0.0400
"Other" activities	0.0317	-0.1000	0.1025	-0.0084	0.1772
One registration	0.3305	-0.2303	0.0406	-0.3244	0.3106
One contact	0.0205	0.0490	-0.0440	-0.4850*	-0.0356
Time per week	0.0442	-0.1212	0.1967	0.0834	-0.0298

Correlations: activities	Q26	Contacts	Registrations	Group sessions	"Other"
Q1	0.0207	-0.1429	-0.1251	-0.1324	0.1181
Q2	-0.0130	-0.1891	-0.0130	0.1937	-0.1450
Q3	0.1960	0.2035	-0.0042	-0.1421	0.1864
Q4	-0.1985	0.0567	0.0432	-0.0191	-0.2909*
Q5	0.1065	0.0161	-0.1372	-0.0760	0.1454
Q6	-0.2079	0.0671	0.1956	0.1792	-0.1791
Q7	0.2605	-0.1522	-0.0331	0.0627	0.1443
Q8	0.2491	0.0290	-0.0640	-0.1089	0.2919*
Q9	0.1025	0.0091	0.1275	-0.2101	0.1832
Q10	0.003	0.0746	-0.0296	0.1465	0.0175
Q11	0.2054	0.0822	-0.1412	-0.0013	0.1269
Q12	-0.0655	0.0093	0.2570	0.0578	-0.0291
Q13	0.1872	0.0061	-0.0211	0.0539	0.1449
Q14	0.0414	-0.1254	-0.0484	0.0743	0.1685
Q15	-0.2125	0.1010	0.1664	-0.0529	-0.0507
Q16	0.1663	0.0837	-0.0693	0.0281	0.1935
Q17	0.1207	-0.1455	-0.0132	-0.0287	0.0580
Q18	0.1898	0.0784	0.1212	-0.1325	0.1469
Q19	-0.2844	-0.0836	0.1559	0.0537	0.1057
Q20	0.2516	0.1462	-0.0509	-0.2564	0.1058
Q21	0.4145**	-0.1923	-0.1010	0.1443	0.0317
Q22	0.1966	-0.0062	-0.1354	-0.0982	-0.1000
Q23	-0.0744	0.0759	0.0524	0.0796	0.1025
Q24	-0.0308	0.1659	0.0421	-0.0468	-0.0084
Q25	0.2024	0.0836	-0.2552	0.0400	0.1772
Q26	1.0000	0.1686	0.0370	0.0417	0.0942
Contacts	0.1686	1.0000	0.1795	-0.0898	0.1725
Registrations	0.0370	0.1795	1.0000	-0.0059	-0.0633
Group sessions	0.0417	-0.0898	-0.0059	1.0000	0.0203
"Other" activities	0.0942	0.1725	-0.0633	0.0203	1.0000
One registration	0.1076	0.0740	-0.3524	0.3994	0.2051
One contact	0.1304	-0.2249	-0.2051	0.2300	-0.0278
Time per week	0.0460	0.2142	0.0041	0.1403	-0.0330

Correlations:	One registration	One contact	Time per week
Q1	-0.0961	-0.2958	0.0258
Q2	-0.2529	0.0796	-0.0557
Q3	0.1890	0.0555	0.0483
Q4	-0.3240	-0.0517	-0.1561
Q5	0.2314	-0.3261	-0.0489
Q6	-0.3463	0.2154	0.1831
Q7	0.2689	0.0061	0.0348
Q8	0.1591	-0.0834	0.0945
Q9	-0.2662	-0.0466	-0.0567
Q10	-0.2052	0.1712	0.0362
Q11	0.0948	0.0441	0.0948
Q12	-0.2599	-0.0979	0.2320
Q13	-0.0638	0.0537	0.3118*
Q14	0.3487	0.0562	0.0991
Q15	-0.0392	0.2030	0.1284
Q16	0.2071	-0.2183	0.0586
Q17	0.1568	-0.1025	0.0848
Q18	-0.2572	-0.3731*	0.0383
Q19	-0.3109	0.0907	0.1748
Q20	-0.1652	-0.2969	0.0108
Q21	0.3305	0.0205	0.0442
Q22	-0.2303	0.0490	-0.1212
Q23	0.0406	-0.0440	0.1967
Q24	-0.3244	-0.4850*	0.0834
Q25	0.3106	-0.0356	-0.0298
Q26	0.1076	0.1304	0.0460
Contacts	0.0740	-0.2249	0.2142
Registrations	-0.3524	-0.2051	0.0041
Group sessions	0.3994	0.2300	0.1403
"Other" activities	0.2051	-0.0278	-0.0330
One registration	1.0000	0.4987	0.0161
One contact	0.4987	1.0000	0.3497
Time per week	0.0161	0.3497	1.0000

Minimum pairwise N of cases: 19 2-tailed Significance * - .01 ** - .001

Appendix 4. User survey questionnaire.**COMCARE USER SURVEY**

We would be grateful if you would help our current evaluation of the costs and benefits of Comcare by completing this questionnaire.

Please note that the questionnaire is anonymous. Results will be summarised as a whole and by department/service.

Which Unit do you work in? (Please tick.)

- Acute
- Community
- Mental Handicap

Which staff group? (Please tick.)

- Audiology
- Chiropody
- Clinical Specialist Nurses
- Dietetics
- District Nursing
- District Nursing/Midwifery
- Health Visiting
- Mental Handicap Nursing
- Occupational Therapy
- Physiotherapy
- Psychiatric Nursing
- Psychology
- Speech Therapy

Please return the completed questionnaire to Malcolm Stone at Archer Street by Monday 6th August.

Time Commitment

The first part of the questionnaire is designed to find out how users of Comcare go about the task of recording data for the system, and how much time is spent.

1. Which method of input do you use? (Please tick one.)

Psion

Forms

2. Do you record the **time** spent on patient-related activities? YES / NO

3. If you record other activities, do you record the **time** spent ? YES / NO / N/A

4. How many days are there in your normal working week?

Number of days:

The following questions refer to an average week. Please give a single average figure rather than a range. If your workload varies too much for this to be possible, please use your last full week as an example.

5. In an **average week**:

How many individual patient contacts do you record on Comcare?

How many patient registrations do you record?

(If someone else, e.g. clerical staff, registers your patients, enter "None".)

How many group sessions do you record?

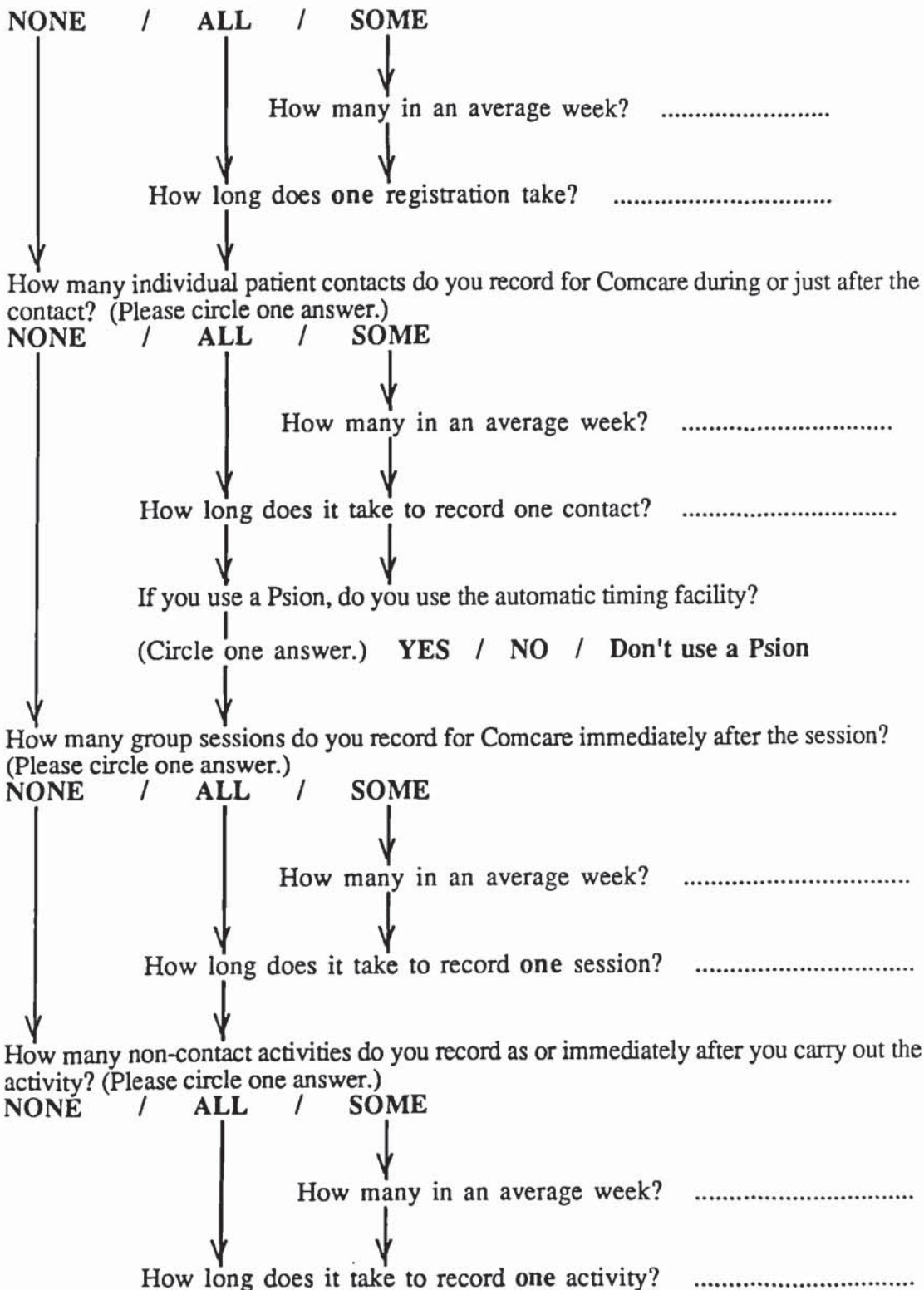
(Enter the number of sessions)

How many non-contact ("other") activities do you record?

(Enter the number of activity entries recorded.)

6. Some users enter data as they carry out each activity; others enter all the data for a morning, day, week etc. at the same time. This question asks how much of your data you enter **as you go along**, and how long it takes. The question has several parts: please follow the arrows next to your answer and complete the questions indicated.

How many registrations do you do at the time of contact with the patient? (Please circle one answer.)



7. This question asks about any other time spent recording data for Comcare.

How many times in an average week do you do Comcare input **other than times recorded in question 6?** (Please tick one answer and follow any arrows.)

More than once each day ----> How often?.....

Once each day

Once each week

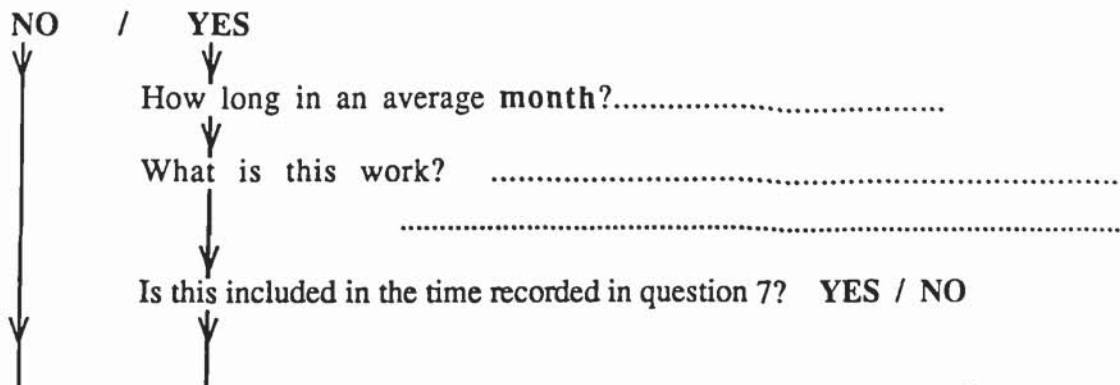
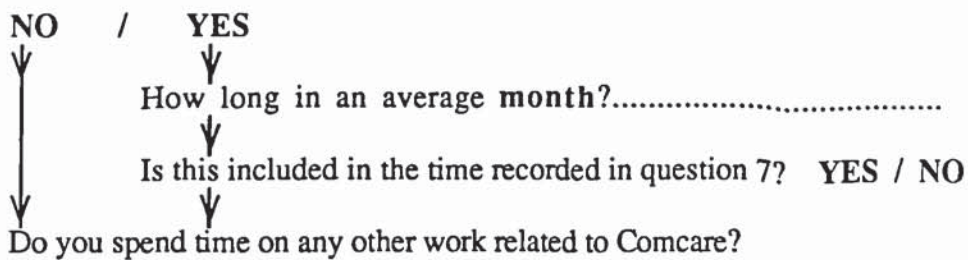
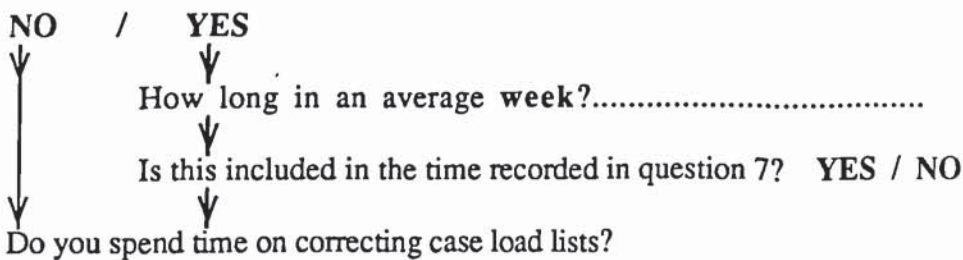
Less often ----> How many times each month?.....

How long do you spend on each occasion? If different occasions take different lengths of time, please explain.

.....

8. If you spend any time on tasks related to Comcare which you have not already recorded, please tell us about them now.

Do you spend time on correcting input errors as a result of receiving the weekly error reports? (Circle one answer and follow the arrows.)



*Please ensure that you have told us about all the time you spend on Comcare.
 Thank you.*

Attitudes to the Comcare System

We are interested in your opinion of Comcare. Please tick in the appropriate box to show how strongly you agree or disagree with each of the following statements. E.g.:

0. I watch "Neighbours" whenever I can.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
				✓		

If you wish to add any comments about the system, space is provided at the end of the questionnaire.

1. Comcare provides me with useful feedback about my work.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

2. I resent others knowing how I spend my time.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

3. I try hard to ensure that the data I submit to Comcare is accurate.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

4. I do not find data collection interesting.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

5. On balance, I think the system is worth the effort we put into it.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

6. Data collection prevents me from spending my time more usefully.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

7. We need Comcare to collect our Körner data.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

8. I appreciate the variety which data collection adds to my job.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

9. Information from the system helps my department or team to give a better service.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

10. I am afraid that the information might be used against the interests of my department or service.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

11. Providing good information is a responsible task.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

12. We do not receive enough support for our use of the system.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

13. Comcare has given me a better sense of what my job comprises.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

14. I use my professional knowledge in recording my activities

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

15. Recording my activities adds stress to my job.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

16. Using Comcare has enabled me to develop new skills.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

17. Information from Comcare helps me to plan my work.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

18. The information we provide is necessary if our service is to be well managed.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

19. I enjoy my job less because of Comcare.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

20. This type of information will be essential once the White Paper comes into force.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

21. I would rather use a Psion than forms.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

22. Taking the job as a whole, I get a lot of satisfaction from my work.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

Please tick one box to indicate your answer to the following:

23. How important is Comcare in determining how happy you are in your job?

Not a factor	A very small factor	A small factor	A fairly important factor	An important factor	A very important factor	The most important factor

Psion users only (questions 24-26):

Please tick in the appropriate box to show how strongly you agree or disagree with each of the following statements.

24. I was initially apprehensive about using a Psion.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

25. Being able to use my Psion gives me a sense of achievement.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

25. I feel confident about using my Psion.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree

Thank you for completing this questionnaire. If you wish to add any comments about the system, please use this space.

Appendix G.

Breast Screening System Report.

Breast Screening System Post-Implementation Review.

1. Introduction

1.1. This report describes an initial post-implementation review of the information system which supports the Breast Screening Service based at North Tees General Hospital.

1.2. The service began operation in April 1990 and the review took place in the last week of August 1990. At this time, therefore, the service had been in operation for five months. Peak workloads had not yet been reached as only one of the two mobile units was in use.

1.3. The review was based on demonstrations of the system, access to documentation and discussions with members of the team who have contact with the system or its inputs or outputs or who have relevant information requirements. It was not possible to include in the review those aspects of the system relating to Surgery.

1.4. Areas covered were:

- The computer system itself, including general usability and any problems experienced (Section 2)
- The collection of data (Section 3)
- Operational procedures (Section 4)
- The provision made for the information requirements of members of the screening team (Section 5)
- Confidentiality and security of data (Section 6)
- The equipment and physical environment (Section 7)
- Supporting facilities (Section 8).

2. The Computer System

2.1. Users of the system have found the user interface inconsistent and confusing in parts.

2.2. Help facilities exist although their availability is not consistent. They need to be explicitly summoned. For a system of this type, requiring so much coded entry, an optional facility to display a short help text automatically would be an advantage, especially in sites where more data entry is done by professional staff directly without the use of forms.

2.3. Other instances of inconsistency or difficulty had been noted by staff. These included the commands given to leave a screen, which vary between screens, and the commands given to select functions, which are not memorable and not always clearly identifiable from the descriptions held in the system.

2.4. The model of activity underlying the clinical aspects of the system is based on individual patients rather than on tasks. The user is expected to identify each client, then to specify the task to be performed. This is flexible and suitable for the assessment and treatment stages, but less convenient for entering screening results which arrive in batches. The ability to repeat the same functions for each client would have been a useful facility here. A bulk entry facility exists, but relates only to film taking and reading and allows only normal results to be entered. It does, however, allow the user to be prompted for user-specified items and default values to be specified

2.5. It is recommended that the facility to remove unused data items from screens should be used where appropriate, particularly on the patient history screen where a number of items are not collected. This would speed data entry by reducing unnecessary key depressions and also remove any possibility of confusion. The facility is available in the new version of the software.

2.6. The appointments system has been the subject of concern from many sites and is being revised. Staff at North Tees have found it cumbersome, requiring several screens and 4 - 5 minutes to make a new appointment when a client telephones. The system assumes that when making an appointment, women will specify the day of the week on which they would prefer to attend. It is an arduous process to look for free slots on, say, any day in the same week. This situation is expected to be improved in the revised appointments module.

2.7. The system designers did not envisage that non-attenders would be given automatic repeat appointments. In consequence, the letter type for non-attenders is classed as a result letter rather than an appointment letter, and the appointment cannot be printed on it. Typing on the appointments by hand is likely to become very time-consuming. Greater flexibility in the letters which can be produced would be an advantage. Staff have also reported that when a non-attender letter is produced, an initial appointment letter is also printed. This seems to be a problem with the use of the system: it is suggested that technical support should be consulted.

2.8. Letter editing facilities are basic but sufficient. The editor does not offer all the facilities of a modern word processor. Some difficulty with inserting text was reported. It appears that the problem springs from lack of familiarity with the system, combined

with the rather sketchy documentation, as the editor claims to be able to do all that is required. More practice on the training system before staff are asked to amend the “live” letters would probably be helpful.

2.9. System response, although not unusually bad or causing any problems, is currently slow enough to hinder a good typist. During demonstrations of the system during the review, it was noted that there was a response time of about 1 second as each data item was entered and slightly longer as the screens were completed. Performance can be expected to deteriorate as the workload and the amount of data held in the system increase. The likely effects are a tendency to type ahead, with a possible effect on accuracy, and increasing frustration as staff become more skilled in keyboard use and data entry. It has been noted that performance is worse when printing is taking place, when background updates such as batch creation are running, or when all terminals are in use. Background updates have a serious effect on the speed of printing, but are normally run overnight. It is understood that performance is monitored by Region: this should continue.

2.10. Most of the problems so far encountered have been due to lack of familiarity with the system, compounded by poor documentation. It is suggested that time should be made available for further familiarisation and outstanding problems referred to the support team promptly.

3. Data Collection

3.1. As data is largely collected on forms for entry into the system, professional staff as well as the office staff are involved.

3.2. Office staff check and amend the personal details of clients arriving at the reception desk. Radiographers record the films taken and also check personal details (on the mobile units) and take a history. The history taken is minimal as several of the possible items were considered inappropriate. There have been some difficulties with accurate completion of these sections of the client form. A variety of items in different formats have to be inserted, but the form gives no guidance as to what is expected. There are also a number of coded items. The production of a list of codes does not appear to have solved the problem: it was noted that the list produced was not in a very convenient format.

3.3. When films are read, the Radiologist records the results. This section of the forms has been found cumbersome, although the new version has been streamlined. The use of a rubber date stamp for normal results has speeded up this recording. Before this was

produced, a list showing all the possible codes was drawn up. Now, however, in addition to the use of the rubber stamp, it has been decided that items relating to "Mass" and "Calcification" will be recorded only in the notes area, except for the single item showing their presence or absence. This has the effect that the information about an individual can still be recalled, but could not be used in selection of data or analysis. It is not at present thought likely that this will be required.

3.4. In Pathology, the forms have presented no problems, although they sometimes arrive after the specimens. They are completed by the pathologists, although it is thought that the departmental secretary could carry out this task. The form is completed in addition to the department's own report forms and index cards.

3.5. There are a large number of coded items in the system, but users perceive little logic in the abbreviations selected as codes. For example, questions relating to the presence or absence of symptoms require "P" (Present) or "N" (Not present) to be entered, whereas other items which are questions expect "Y" (Yes) or "N" (No). This is seen as inconsistent. This particular example has in fact been remedied in the next version of the software, in which all such items will expect "Y" or "N".

3.6. Even though the forms are computer produced, there would have been scope for the system to aid the user by printing some indication of what is required, such as delimiters for fixed length items. Items requiring "Y" or "N" to be entered could have been printed so that the user had only to indicate one. Some of the revised forms in the new release do list the possible codes for some items.

3.7. The latest release of the software brings a significant change in the data capture form used for histopathology. Although the current forms are being used without any difficulty, the new type, designed by the NHS Breast Screening Project, are easier for the pathologist to complete. They are printed, rather than computer-generated, and require boxes to be ticked rather than the entry of codes. The software suppliers suggest that the screening office staff should use a transparent template, laid over the form, to provide codes which would then be entered into the system. This would be a cumbersome process, although one requiring accuracy rather than professional knowledge as the marking of each box can only generate one code. If difficulties were caused by this process, an alternative would be the production of a locally designed variant of the original form incorporating the codes alongside each box. The layout of the current form would allow a satisfactory design to be produced. This would, however, preclude the use of the printed pads of histopathology forms which may be made available, and there could be a cost differential. The proposed Treatment and Information module is expected to use forms in a similar style.

3.8. A similar form has been designed for cytopathology but this is not intended to be a data entry document. The new screening form for clinical assessment includes FNA cytology and all necessary codes are printed on this section of the form. It would therefore be very easy to complete. Use of the NHSBSP form would give little advantage, as it would require the personal details to be entered and the data transcribed onto the screening system forms. Transcription is usually undesirable as it is an additional task and an opportunity for errors to occur.

3.9. Changes in the latest release and those associated with the proposed treatment module will cause significant differences in the data to be collected. Adequate time should be allowed for familiarisation with these changes.

4. Operational Procedures

4.1. The service is relatively new and procedures are still evolving, but the daily routine is now well established. The screening office seems to be operating smoothly. The workload is not regular enough for completely fixed schedules to be used, as there is variation in the size of batches and the time spent at different locations. This affects the flow of work through the screening office. Timetables for screening at different locations throughout the area are drawn up well in advance so that each stage can be scheduled.

4.2. A manual defining the manual procedures in the screening office was being produced at the time of the review and will no doubt remain flexible for some time to come as procedures continue to evolve.

4.3. Peak workloads had not been reached at the time of the review as only two mobile units were in operation and a reduced volume of work had been arranged for the holiday period. However, the amount of work to be done varies and staff had felt under pressure at certain times. A concern that accuracy might suffer in these circumstances was mentioned.

4.4. Considerable attention to detail and concern for accuracy was evident in the design of office procedures. The production of documents for each client is verified and a significant amount of other checking takes place. All files for one clinic are kept together in a basket. A control sheet is used to record the location of any set of notes which is sent elsewhere. Checks of randomly chosen files are carried out each week as a means of monitoring quality.

4.5. Data is now received from the FPC through an electronic link. This has removed the need to register clients manually, which required a significant effort. The results of screening are returned to the FPC on a printed report at present, although the eventual use of the electronic link is envisaged.

4.6. The intricacies of data entry highlighted a divergence of interests: professional staff need the demands on their time to be minimised, whereas clerical staff are not considered sufficiently knowledgeable to interpret the meaning of comments, incorrect codes etc. This applies even where the system will only allow one possible entry. For example, "N" or "P" must be entered, to show whether there is a history of breast disease, but details of the history may only be entered where "P" has been specified. If the radiographer does not enter "P" but does indicate a history by entering other items, these items could not be entered if "N" had been specified, but the clerical officer is required to find the radiographer and ask her to complete the code. As this type of situation is annoying for all concerned and could lead to tension at busy times, it is recommended that when the new client form is introduced, the staff groups concerned should come to an agreement as to the respective responsibilities of each, and supporting facilities should be provided to aid completion of the forms to the agreed standard. For example, a single sheet memory jogger showing the type of input required and the possible codes, in a convenient format and perhaps laminated, could be produced for the radiographers.

4.7. The batch creation process highlights as exceptions any women who may already be on the system. The number of these duplicates will increase with time, as women who have been screened move within the area, although the population is relatively static compared with urban areas. However, as the matching criteria used are broad, there will also be an increasing number of client records which are suspected but not actual duplicates. Matching is done on any of three criteria: NHS number, surname and forename, or date of birth. The last of these is likely to generate a large number of spurious exceptions.

4.8. A potential problem concerns women who move to another GP after they have been screened. Unless the new practice was screened at about the same time, these women will not be due for screening again when other women in the practice are called. In the worst case, such clients might not be screened for five years. This conflicts with the obligation of the screening office to offer screening every three years.

4.9. The office has a good atmosphere and the office staff enjoy their jobs. Some tasks are rather routine once they have been learned, but other parts of the work, such as the entry of assessment data and following women through the assessment and treatment stages, are found more challenging. It is intended that the office staff should carry out all

the routine tasks in rotation. This will make the work less repetitive and give greater flexibility in the running of the office.

4.10. The need to fill two positions with temporary staff on short contracts has had several undesirable effects. The proposed job rotation scheme has not been able to operate fully. Temporary staff, especially when new, need more attention and are less efficient. They do not have time to build up much expertise. There has been a need for a large amount of training. It has been necessary for the experienced staff to separate out the tasks which can be done by the temporary staff. This is an additional effort and reduces their efficiency.

4.11. Operators do not spend all day at the terminal and there are adequate rest pauses during the morning and afternoon. It was noted that office staff were taking 30 minute lunch breaks: should the situation arise where longer periods are spent on a terminal than at present, i.e. all or most of the day, a longer break (45 minutes) would be advisable to avoid tiredness, lack of concentration or loss of accuracy. Staff should be encouraged to have regular eye tests and to inform the optician that their work involves a VDU, so that spectacles suitable for the correct working distance can be provided if necessary.

4.12. Screening office staff were asked to keep a record of any problems with the system or working patterns which occurred during the weeks prior to the review. However, it was reported that there had been no genuine problems: such difficulties as had occurred were caused by unfamiliarity with the system and had been resolved by reference to the documentation or consultation with support staff.

4.13. Some problems, however, were outstanding at the time of the review. One of these, which had caused some aggravation to the Radiographers, concerned the parameters for scheduling appointments. As the system will not allow a morning session to extend beyond midday, a larger workload had been scheduled for the afternoon. This solution was chosen rather than inserting a block of time before the lunch break in the afternoon session, because of the additional complication if a session needed to be cancelled. This is an unfortunate restriction in the system, although periods of work spanning morning and afternoon can be included in all day sessions. The arrangement gave the radiographers a tiring afternoon, which affected their work. It was an example of staff being forced to conform to a computer system rather than vice versa. The problem was thought to be on the point of resolution at the time of the review.

4.14. Another unresolved question concerns women with a history of breast disease. These clients already have regular mammograms. The best way of managing these women has not been found. It was originally thought that their mammograms would be done at the screening centre, but at the instigation of the woman's own surgeon rather

than as part of the screening programme. However, it would be necessary to send the results of screening to the surgeon as well as to the GP and the woman. The system is not able to do this. The preferred solution would be for the system to allow a duplicate results letter to be sent to a nominated third party, but as it does not, it would be necessary to track these women individually and send a standard word-processed letter to the surgeon.

4.15. Pathology forms are not always returned in time for the weekly meeting of clinicians, at which an action is decided and recorded on the forms. If this occurs, the form has to be traced.

5. Information Requirements.

5.1. The information required to manage the service is for the most part not provided by the information system, with the exception of the data needed for the Körner return. An agreed set of items is used for monitoring: this includes numbers of women invited and screened, response and assessment rates, cancers detected and a benign to malignant ratio. The figures are calculated from the attendances at individual clinics and the records of assessments kept in the Radiology department.

5.2. The Radiology department has devised a method of producing the statistics which relate to assessments. A form has been introduced to collect the necessary data. One column of this is completed for each woman who attends for assessment. The forms are entered into the microcomputer in Radiology and analysed by Dr. Gill on his compatible PC. These are the figures which are used for service management and monitored by the Evaluation Group.

5.3. The Superintendent Radiographer receives these statistics rather than the reports provided by the system. This gives her the necessary information about numbers screened and response rates. A separate record of technical recalls is kept: the system does not assist with this. Access to the system to check on appointments would be useful.

5.4. The Pathology department continues to use its own system, although this is limited in scope. The Pathologist's report is typed onto the standard laboratory form. One copy of this is filed in the department. It contains more detail than the computer generated form and can be read by those who are not familiar with the computerised system. In addition, this information is coded so that it can be analysed mechanically. An index of file cards is used for this but not all histology samples are included. In practice, the department does not have the necessary computing facilities to carry out much analysis.

5.5. The information requirements for Health Education are not provided by the system. These requirements relate to the role of Health Education in increasing uptake of the service. There is a need to investigate the reasons for non-attendance, so that promotional activities can be targetted where most needed. There are two aspects of this: demographic studies and follow up of individual women. The basic need would be for a list of non-attenders in each batch, showing the GP. The system does not provide any suitable list. The basic demographic information held consists of age, address, and postcode. A record of the type of employment would also be useful for health education purposes, as promotional activities and material can be made available at the workplace, but this cannot be collected. Although occupation is often used as a surrogate item for social class, this system appears to use the type of accommodation for this purpose: this item is not collected, but would in any case not be satisfactory. The Health Education department was not involved when the decision not to collect certain items of historical information was taken, but these items would not be particularly useful.

5.6. The Körner returns require information about levels of activity in a given year, and the KC62 reports cannot be used to give accurate uptake figures or other rates, as they do not follow a cohort of women. They are designed to meet the needs of the department of Health and the Cancer Screening Evaluation Unit rather than those of local managers and clinicians.

5.7. The Cohort Analysis by Screening Batch is intended to provide accurate response, assessment and biopsy rates. It follows a batch of women through screening and assessment, and can include non-batch referrals. However, it is only of use after screening of the batch is complete, as it counts as non-attenders those whose appointment is not yet due. It is not suitable for producing reports *on a monthly basis*.

5.8. The appointment statistics (SCAS) give the number of attendances of various types at clinics in a given period, but like the KC62, relate to a time period rather than a group of women.

5.9. No further statistical reports are to be provided as part of the system. It is envisaged that data will be downloaded to a PC and analysed using a suitable package. Facilities are provided within the system to extract either a file of the names and dates of birth of all women screened within a given period, or a file of the complete episodes of women in a screening batch. The file of episodes cannot include non-batch referrals. More flexible extraction facilities would be desirable.

5.10. None of these options gives the ability to produce easily the regular statistics used in service management at North Tees. A means of examining the episode details for all women whose appointments were due in a given period would be more helpful.

5.11. The reports provided are complex and the derivation of the information needs to be well understood if they are to be used. They are not always fully explained in the documentation.

6. Security and Confidentiality.

6.1. The system has been registered under the Data Protection Act. No subject access requests have been received as yet. In order to meet any request, it would be necessary to take screen dumps of all the information held about the client, and to provide explanations of items which are not readily understood, e.g. coded data.

6.2. Management and staff are conscious of the need for confidentiality. Terminals in the reception area are placed so that the screens cannot be read by members of the public and the reception desk is designed so that documents need not be open to view.

6.3. The system is password protected. Each user has an individual password which identifies them to the system. This consists of an alphabetic part, which is fixed, and a numeric part which can be changed. This is not the most secure type of system, as there are a limited number of combinations of 6 digits. Staff are able to change their own passwords and should be encouraged to do so regularly.

6.4. Printouts are held in a locked cabinet. Files which do not relate to clients in current batches are held in a lockable store room within the unit. Unwanted documents are shredded.

6.5. It is felt that the main security for the system comes from its position within the Unit. This viewpoint is frequently expressed in health care organisations, often with some justification. However, it is worth considering possible threats and the superior protection given by several levels of security. If the risks to security may involve persons who are legitimately within the Unit, more levels are needed. It is easy to allow reliance on the physical location to lead to neglect of other precautions such as logging off unused terminals, changing passwords, locking doors etc.

6.6. Backups of the data are taken three times each week, using tapes in rotation on a three week cycle. The tapes are held in a firesafe outside the unit. This represents a satisfactory level of protection against data loss, provided that the tapes are replaced

before the end of their active life and the safe is kept secure. In case of serious hardware problems, a fall-back system at Region is available through a modem link.

6.7. The transmission of data is controlled by an incremental serial number. Batches received out of sequence are not added to the database. A report of transmissions received (and sent) can be displayed. Transmissions to the FPC, when these become operational, will contain an acknowledgement mechanism for further security. These facilities should be sufficient to enable the screening office to ensure that data is not unwittingly lost.

7. Environment and Equipment

7.1. The offices are attractively decorated and furnished, as indeed is the entire unit. However, office space is limited. Both the office and the reception area are cramped and passage through the reception area is difficult if anyone is standing there. There are no flat surfaces available which are free of equipment, with the effect that staff tend to use the burster as a working surface. This could cause damage and is in any case inadequate.

7.2. The potential noise level in the office is high, as the room contains a letter-folding machine and a burster in addition to the two shielded printers, two terminals, word processor and telephone. If possible another location should be found for the letter-folder and burster.

7.3. A suitable room has been provided for the computer, and measures have been taken to reduce heat and dust.

7.4. The terminals have green or amber phosphor. The amber screens have an extremely stable display, whereas the green ones show a slight degree of flicker. The character display is not ideally designed, as individual dots are visible, there is a slight degree of blurring, and the size of characters does not follow the latest recommendations. Contrast and brightness are adjustable. The angle of the screen can be adjusted: ideally the height would also be adjustable. The keyboards are of relatively good design with suitable height, slope, and key spacing (contrast the keyboard of the word processor!), but the limited tactile feedback given when a key is depressed is potentially annoying, especially to a touch-typist. Defects of the types mentioned have been shown to reduce operator performance. However, these terminals are comparable with many currently available, and are not likely to cause any serious problems in the pattern of operation which is envisaged. Terminals should ideally be sited with sufficient space for the operator to adjust the position of the keyboard and working documents.

7.5. A number of ergonomically designed typists' chairs have been provided: these are comfortable and easily adjusted. Other chairs in the office area which are sometimes used by terminal operators are less suitable. The desks are of an adequate size with the exception of one terminal table which is too narrow to accommodate the equipment and working papers comfortably. The least satisfactory aspect of the office furniture is the receptionist's position. This is provided with a high chair, which has an unstable square base and a low fixed backrest. There is insufficient space for the occupant's legs when seated, and the desk has hard sharp edges at a low level. There is also no suitable footrest. The occupant is forced to work in an uncomfortable position, at a distance from the keyboard. The terminal is in a fixed position, as the desk is not large enough for it. This position is not suitable for data entry activities of any length: staff appear to have adapted by using the chair only rarely, preferring to stand for tasks of short duration. The main usage of this terminal is for short bursts of activity as clients arrive at Reception.

7.6. The use of upright document holders is favoured by some terminal users, and could be tried in this environment: where staff find them acceptable, they can be of particular use where working space is limited or excessive bodily movement is needed to see both the document and the screen.

7.7. The lights are correctly positioned to the side of the terminals and shine downwards with suitably limited sideways diffusion. Terminals are best positioned at 90° to the windows in order to reduce reflected light and contrasts in the field of view. The office windows are provided with good blinds. These reduce brightness and contrast in the field of view of the terminal which is in front of a window to comfortable levels. The receptionist's terminal is affected by reflections from the window behind it, and a certain amount of reflected light was noticed on the other screens. The blinds in the reception area were open when the equipment was examined. Screen-cleaning equipment was not available: anti-static sprays or wipes should be provided.

7.8. The position of fire-fighting equipment should be clearly indicated, both in the office and in the computer room. A certain degree of hazard is associated with any machinery which uses large quantities of paper and creates dust.

8. Supporting facilities.

8.1. The system manuals were initially poor. Successive versions of the manual have become more helpful and detailed, but information is still difficult to find although an

index has now been provided. Areas remain where more information and examples would be useful. The page numbering system is confusing and unhelpful.

8.2. Although some initial sessions were provided, training of more recent additions to staff has been carried out on-the-job using the live system. The training system has been of little use as it does not contain a sufficient database: the effort involved in setting this up has been prohibitive. As training on live data threatens confidentiality and accuracy, a sufficient set of data for use in training should have been provided. This could most conveniently have been done by the software supplier, as the data does not need to be local for most purposes.

8.3. The support staff at Northern RHA are highly regarded within the Unit. As well as providing support for the system, they are in contact with the software suppliers, giving the potential for feedback.

9. Conclusion.

9.1. The screening office and screening system were both operating smoothly at the time of the review, and it appeared that no serious difficulties had been encountered. The organisation of the office showed an impressive attention to detail, and a desire to provide satisfying jobs for the staff. Familiarity with the system was being gained, but there were areas which had not yet been fully assimilated. As the full workload is reached it is likely that there will be a need to pay close attention to the flow of work through the office in order to ensure that peak times remain manageable.

9.2. A number of areas have been noted where the software did not correspond exactly to the way things are done at North Tees. This is almost inevitable in a nationally used system. Problems in the appointments module are expected to be corrected when this is re-written. The provision of statistical information is a weak area of the system. As it is proposed that reporting should rely on the downloading of data to another machine for analysis, more flexible extraction facilities would be desirable.

9.3. Problems in the physical environment were largely due to lack of space.

9.4. Monitoring of system performance and other technical aspects of the system by the regional support team should, of course, continue. It is suggested that the practice of logging problems with the system, which was suggested prior to this review, could also usefully be continued. This should include not only obvious software faults, which would in any case need to be reported to the support staff, but also difficulties with using the system, areas where it is not suited to the local way of running the service, and

behaviour which is not understood. This would allow a measure of control over any difficulties that arise by providing the information needed to investigate them and highlighting those which remained unsolved. It would be particularly helpful when new releases of the software are received.

9.5. A summary of the recommendations made in this report and of additional facilities which would be of use if provided by the system will be found in the Appendix.

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Appendix: Summary of Recommendations.

1. Desirable improvements to the system.
 - More indication of the data to be entered on client forms, as has been done with some of the latest release of clinical forms,
 - Facility to notify a consultant of the results of screening and to track women referred by consultants,
 - Information about non-attenders for Health Promotion,
 - More flexible extraction of data for downloading,
 - Ability to produce cohort analysis on other criteria than screening batch,
 - Improvements to the documentation: more detail needed in parts, provide realistic examples of all reports, replace page numbering system and indicate section of the manual on each page,
 - Provide better training database.

2. Recommendations for the Screening Office.
 - Make use of the facility to remove unused data items from screens,
 - Consult support staff with regard to letters for non-attenders,
 - More time spent on familiarisation, preferably using the training system, especially for new staff and when new releases are received,
 - Continue technical monitoring by the support team, especially in relation to performance at peak workloads,
 - Logging of problems and prompt referral to the support team,
 - For new releases of software, form precise agreements regarding the responsibility of staff groups for data capture, and provide any necessary aids to allow forms to be completed to the agreed standard,
 - Ensure good working practices for terminal users,
 - Ensure that attention to security and confidentiality does not lapse,
 - Consider whether the letter-folder and burster could be located elsewhere and more working surfaces provided in the main office.
 - Provide screen cleaning equipment,
 - Indicate the location of safety equipment.