PROGRAMME OF RESEARCH AND ACTIONS ON THE

DEVELOPMENT OF THE LABOUR MARKET

COMPUTERISATION OF EMPLOYMENT AGENCIES

MAIN REPORT

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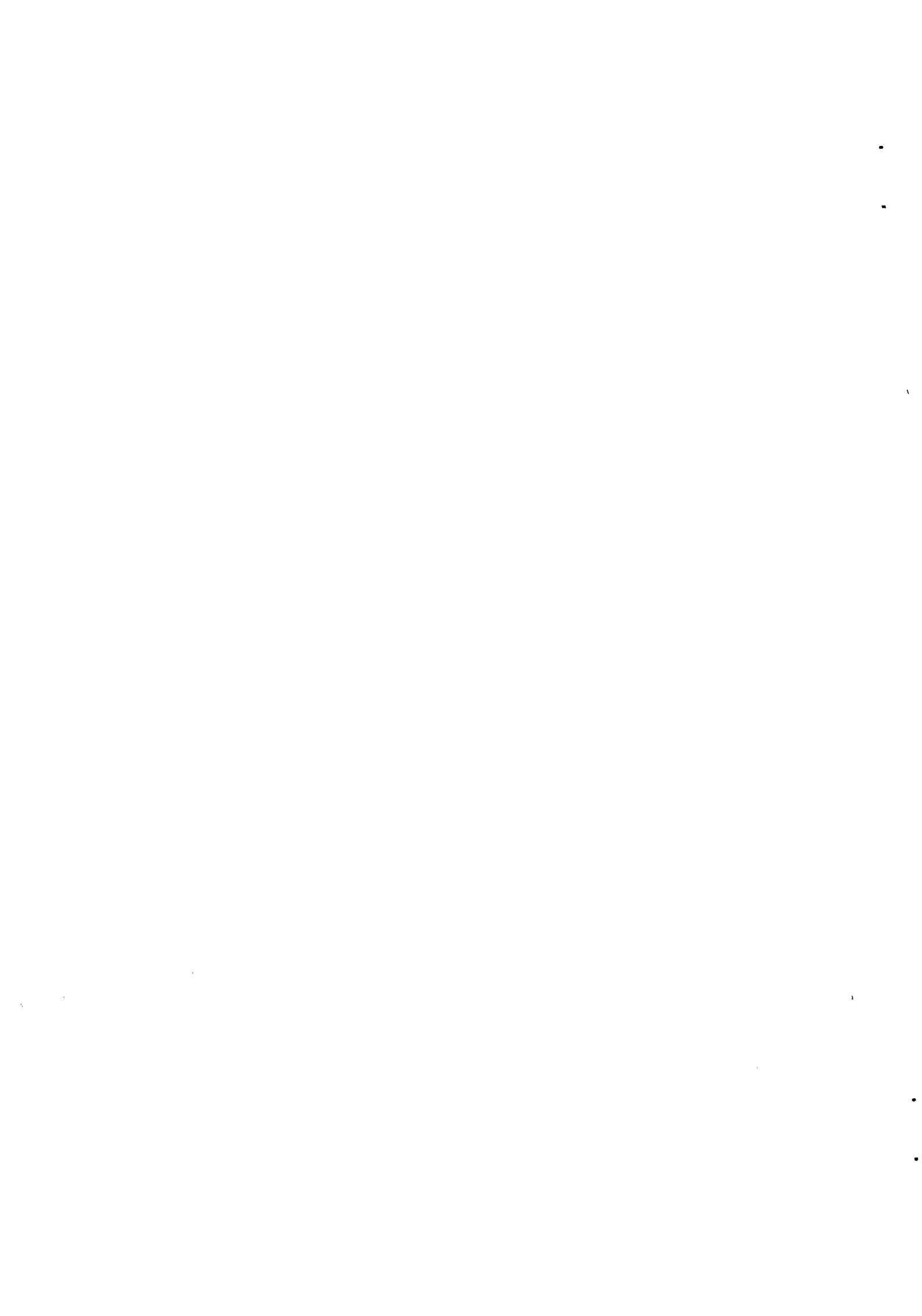   European Communities
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CONTENTS

1. INTRODUCTION

1.1 The study was conducted by the Manpower Services Commission (MSC) of the United Kingdom (UK) on behalf of the European Community (EC), specifically Directorate DGV of the Commission. The MSC appointed a study-leader to organise and carry out the study. In addition to the MSC the employment services of Belgium (ONEM), Denmark (AD), Italy (MLPS), France (ANPE), West Germany (BA) and Northern Ireland (DMS), participated in the study.

1.2 This is one of several studies initiated by DGV whose aims may be summarised as follows:

   1.2.1   to inform questions of possible policy interest to the Community;

   1.2.2   to promote co-operation between employment services of the member countries;

   1.2.3   to assist these employment services in dealing with their operational or manpower problems;

   1.2.4   to create a "pool" of knowledge.

Conduct of Study

1.3 The study was carried out between March 1980 and January 1981. Information was gathered initially by countries sending in written reports; these were discussed at a conference of participants and the Study-Leader then paid short visits to each of the participating employment services. A draft report was considered at a meeting of the participants before the final report was presented to the Commission.

1.4 It was agreed at the beginning of the study that it would be based on comparative descriptions of the systems and system developments in the participating countries and that, if time permitted, one or two aspects of the subject matter would be studied in more detail. Appendix A gives terms of reference and the timetable of the study, and Appendix K lists the main participants. Because of the amount of detailed material which could be gathered and assessed (in relation to the timing of, and the resources available for, the study) it was also agreed that the study objectives should be interpreted as covering the use of computers in the matching of jobseekers and vacancy demands, in compiling labour market and management statistics (from employment service data) and in preparing and distributing copies of vacancies.

Approach

1.5 Systems are rarely completely self-contained; they impact on each other, often in very complicated ways, and for technical or operational use they have to be described in great detail. It was not possible for this study to go into such detail because of the practicalities as well as cost and time constraints. The conduct and reporting of the study had to take account of the possibilities for gathering and interpreting the available material, the usefulness of the comparisons and possible conclusions, and the nature of the persons to whom the report would be mainly addressed.

1.6   The report is written with employment service managers in mind. It is about the use of computers: these managers have to use (or not use) them and make the decisions. The technical content has been limited so as to require only a very general understanding of what computers are about but it does assume familiarity with employment service aims, operations and problems. Specialist terms and expressions are defined in Appendix C.

1.7   It was also necessary to interpret what is meant by a comparative study. The employment services vary considerably in the factors which determine system design and operation and comparative data of a really objective nature (eg about costs and benefits) is not always available because many of the systems are at the experimental stage or in course of planning. Also, employment services exist to serve political and social as well as economic ends so that it is not easy to establish comparative criteria. Computerisation is not an end in itself; it has to be related to the aims, operations, data and organisation and the total environment of an employment service. A framework (Appendix D) for collecting and comparing information about employment service systems was therefore used.

1.8   The aspects of systems chosen for closer attention were the use of computers for matching vacancies and jobseekers and the benefits to be obtained by using them. The frameworks of reference for these two aspects are set out in Appendices E and F.

1.9   There is, probably, more reference to MSC systems experience in this report than to that of the other employment services. There are several reasons for this. Firstly MSC has, in some respects, more evaluation data available. Secondly, language and other constraints make it easier for the Study Leader to obtain. Thirdly, it makes for economy of effort to develop the study from the Study Leader's own knowledge and experience of MSC systems. It should, however, be clear from the report where MSC information is being used to expand or explain something of general relevance and where it is being used comparatively.

Acknowledgements

1.10   This report would not have been possible without the active co-operation of the employment services which participated in the Study and the help which they provided by way of material, experience and advice. MSC is very grateful for the assistance they provided to the Study Leader. If the report has merit it will be for this reason; any defects are the responsibility of the Study Leader as are the conclusions. He would also like to thank Peter Pond and his colleagues at MSC for the way they handled all the detailed arrangements and their support in obtaining, and assessing, information.

2. APPLICATIONS AND SYSTEMS

2.1 "Application" is used by systems people to derive a short general title for the activities which are to be transferred to computer operation. The title has to be meaningful to operations staff so that, eg, a "message switching" system applied to systems of printing and distributing copies of vacancy and self-service details becomes a "circulation" system. The (inevitable) use of general terms in this way detracts from the precision and discipline which make for good computer systems work. Computer staff know that accurate, detailed, descriptions and systems documentation are essential to their own efficient performance but themselves add to the imprecision of terminology when they coin expressions like "paperless" or "total" systems or "intelligent" terminal. Even "computers" now have more general data processing and communicating functions, than pure computation. This study has to follow suit. It is only possible to communicate in language of general currency.

2.3 The choice of applications for the study reflects the need to set terms of reference which are generally meaningful - and to put limits on the extent of the study - whilst choosing functions which have a sufficient degree of unity and continuity in terms of data and employment service operations. The problem is increased because there is no standard definition of "employment service". At one extreme the BA administers a wide range of manpower (including employment service) and income maintenance services (provided through a unified local office network); at the other, the placement services of MLPS, ANPE and the Employment Service Division (ESD) of MSC largely provide services of job and jobseeker and labour market information (including statistics).

2.4 For this study, therefore, "employment service" is defined as those labour market activities which depend upon two sets of information collected by all employment services, about vacancies and about jobseekers. These "core" services are the provision of information about jobs to jobseekers and about jobseekers to employers to enable them to reach agreement on engagements (ie to fill or find jobs). Also the provision of labour market information (including statistics) which may be used by employment services in their operations (eg in giving advice) for manpower (economic or social) analysis or in the management of the employment services themselves. They therefore encompass the circulation, matching and statistical applications set out in the terms of reference.

2.5 The applications are not independent of each other; there is considerable continuity in the collection, filing, retrieval and use of data for operational and statistical purposes. This reflects the fact that employment services themselves are largely information systems; they do not have a direct product. They manipulate data to permit others, jobseekers, employers or manpower agencies to make decisions. Both operational and statistical systems require the collection of a common set of identity particulars (for each individual or vacancy). Many of the characteristics of the data (eg occupation) are used both in matching and statistics and the same ADP equipment can be used to collect and process data for different purposes. However, the costs, benefits and nature of the systems may be quite different.

2.6 For example, not all offices need to circulate vacancies - at least to any extent; and computer-assisted matching may be of little benefit in small self-contained offices with low volumes of business. However, statistics and management information are usually required for all labour markets or offices. Again "circulation" may mean distribution of paper

copies of vacancies or their retrieval from a common database by means of
VDUs (visual display units). If matching is to be effective some means of
internal or external "circulation" is required in all but the smallest offices.

2.7   However, the two sets (or streams) of vacancy and jobseeker data come
from different sources and are brought together only when selections or
submissions have to be made (ie for "matching") or when supply and demand
need to be jointly considered. This division between two sets of data is
important in systems work. It accounts for the (independent) existence of
computerised vacancy circulation and statistical systems in France, Britain
and Germany and for separate, statistical, computer files in Belgium. It
also makes possible different approaches to systems development and file
structures.

2.8   "System" is also an ubiquitous word and is apt to be confusing. It has
specific meaning only in the context of particular, defined, descriptions
which set out the entities and events contained in a system, the relationships
which affect them or link them together and the mechanisms and methods which
bring about these effects; any system will therefore be dynamic. Information
systems involve an inflow of data, an out-flow and a state in between which
creates a "file" or database. Such systems will be characterised by

    a their size (volumes of data);

    b the volatility of their data (there is a big difference
    between a system in which information is relatively static
    and one in which it is rapidly changing);

    c complexity (the details associated with the entities and
    the events);

    d structures (of files and flows of data);

    e their methods of data input and output (including methods
    of retrieval).

Time (ie speed or delays in data flow) is always important (and sometimes
very important) in such systems, affecting the data capture, the quality of
data and the speed with which it can be made available.

2.9   Systems which combine clerical and computer processes are often loosely
described as computer systems. The computer procedures will normally be set
out and defined as components in such systems. However, computers are now
entering so quickly and pervasively into data handling and communications
that the totally non-computer information system is likely to be exceptional
perhaps before the end of this decade.

2.10   It is therefore possible to identify three main elements of an informa-
tion system ie data collection (which may involve more than one stage, eg,
the information passes from client to employment staff and then to an
operator for entry into the computer); file (database) creation and
maintenance; and the output (or retrieval) of data. Particularly with the
first two elements there arise questions of data integrity, ie of maintaining
that level of quality of data which is required for the output and to ensure
that the system works smoothly. Data integrity is particularly important
for computer systems. One reason is that they create opportunities for
improving the quality of data analysis, the other is that computer systems do

not usually work well (and often break down) if faced with irregularities of data. "Retrieval" raises different issues which are discussed and explained in later sections of this report.

2.11 Computer system descriptions, or proposals are often described as solutions (or a solution). However, there is rarely a single possible system (computer, non-computer or a combination of methods) and management usually faces a choice of system alternatives. There are consequences in this for the way managers go about developing and choosing systems but it does also mean that a particular system may be best for one management and not for another because of differences of conditions at the time it comes to be implemented. One of these differences also lies in the starting point for the decision; ie the "existing" system. A computer solution may be a more advantageous replacement for a relatively inefficient clerical system than for a more efficient clerical system. This is another way of saying that it may be advisable to look at the non-computer as well as the computer options.

2.12 This again makes the point that "solution" is perhaps the wrong word and "option" the better one. Systems rarely reach a stage of perfection, the problem is more one of getting the best available result (ie of optimising). This makes it necessary for managers to ensure that they have the right information about system options - and to recognise and understand what it implies - if they are to make the best decisions.

2.13 This raises a problem for system evaluation. Is any comparison to be with the existing system or between two new alternatives? And how should the alternatives be expressed? Which should be tested or evaluated firstly to establish which is the best possibility and secondly to establish the nature of the change which will result from replacing the system by a new one? Questions of measuring and evaluating systems features therefore raise another set of problems. Finally it ought to be clear from this section and what follows that systems work is complex and the decisions are often difficult. Systems both create and require disciplines in the making of decisions as well as in their design and operation.

2.14 It follows from the above definition of employment service and the discussion of the applications that to computerise them fully would be largely to computerise the employment service itself. It is therefore a big step with major implications for costs, performance and methods of service.

3. THE EMPLOYMENT SERVICES

3.1   It is said that the European Community combines unity with diversity.
The common factors shared by the employment services are as important in
explaining and contrasting their computerisation developments or proposals
as are their differences.

3.2   What the services have most in common is people. Employment Services
exist, as "brokers", to reconcile the often conflicting requirements of
people and jobs in ways which promote national aims. Their "product" is far
from being standard; people are very variable, sometimes even perverse.
Matching vacancies and jobseekers is not a routine task.

3.3   The Services are also operated and managed by people. Staff do not,
generally use data or perform tasks in the logical, systematic way that
computers do. Getting the right relationship between people and computers
often creates problems of system design. But the main system decisions are
also made by managers. How these organise so that they clearly understand
the systems problems and opportunities is another major factor in successful
systems work.

3.4   All the employment services serve free labour market institutions.
Jobseekers and employers may be constrained by economic or social forces
but otherwise they generally make, and are responsible for, their own
decisions. The services participating in the study also serve the aims of
active manpower policies and for some these aims are explicitly laid down
by law. All their governments have placed some legal constraints on employers
in order to assist groups handicapped in the labour market and all provide
creative opportunities for training or subsidised employment. However, these
vary in degree, nature and extent from country to country as does also the
emphasis placed by the employment services on their social and labour
market priorities. This community of general aim is therefore interpreted in
significantly different ways which affect the objectives of the participating
services; and therefore the approach to the use of computers. In particular
MLPS is involved in controls on engagements by employers in order to follow
certain social priorities in the filling of vacancies.

3.5   Four of the participating employment services are big "businesses".
The MSC employs about 12,500 staff on, and has a (1979/80) budget of around
£105 million for, the activities covered by the study. The resources employed
by ANPE, BA and MLPS are very roughly of the same order. ONEM is about one-
fifth of the size and AD somewhat in excess of one-tenth. All therefore
face the problems of managing large or very large organisations with public
accountability and particular difficulties of measuring performance. The
problems are not all the same; if only because of the relationships with
governments and other institutions and differences of employment service
organisations (eg as agencies or government departments). Nor are the
problems perceived in the same ways by the employment service managements;
but their needs are not all that different and computers do provide significant
opportunities for improving management information and therefore decision-
making.

3.6   Not only are the employment services large organisations but their
operations are widely dispersed. The larger countries have (or expect to
have) of the order of 800-1,000 offices and the two smaller ones 100-150.
Also they handle very large volumes of business transactions. The four

biggest services have annual flows of registrations and notified vacancies totalling roughly 6 millions and most make double that number of submissions; in Germany, with the lowest rate of unemployment, BA has (stock) files of about 1 million registrations and about 300,000 vacancies. Size and dispersion are very significant factors in computer system design. Variability generally goes with size, creating greater problems of control, communications and security of systems data; and size and dispersion also increase the problems of developing and implementing systems. In the bigger services no computer system has been, or will be, introduced (nationally) in less than two years and the larger, more complicated, systems meeting multiple applications may well take up to 10 years from initial investigation to full implementation.

3.7   Each of the employment services faces a wide variety of labour market conditions. The extent of the differences between countries and the differences of degree within countries are considerable. Appendix G gives a broad indication of the differences and, in particular, shows the considerable variations between the services in the distribution and size of their very big labour markets. Size and complexity of labour markets (because of the effect on the size of, and the interactions between, computer files) have very important implications for the design of the computer systems planned or intended by the employment services. Other important socio-economic differences (not described herein because of problems of space and available information) are levels of unemployment (affecting the matching relationships between vacancies and jobseekers); industrial/occupational structure (affecting the complexities of matching) and mobility (within and between labour markets). These factors are not independent; they compound, with other, eg organisational features, to affect the opportunities and problems of, and the possible results from, computer systems.

3.8   Again the employment services have available much the same levels of computer technology. There are some differences in the speed with which their national telecommunication agencies are adopting new techniques and the nature of the computer-system support available to the services. Any differences of opportunity arise more from government policies, management initiative or the availability of finance, than technology since most computer manufacturers offer a good deal of support and there are available well-qualified consultancy services. In fact all the employment services in this study have, or can call on, strong computer organisations.

3.9   The employment services, too, have much in common as regards service provision, organisation and management. All provide their services mainly from office locations, all operate on similar casework principles, all maintain registers of jobseekers and vacancy demands and all have fairly similar standards of casework documentation. But there are differences (important for computer system design) as to service provision (eg in the use of self-service and other methods of vacancy dissemination) of internal organisation, and functions, of systems and data relationships with other authorities or services (particularly unemployment benefit) and of managerial structure and approach.

3.10   There is also the general difficulty of deciding the appropriate level of resources, especially of staff, to devote to employment service work. In principle the amount of time staff can spend on a particular vacancy or jobseeker is not limited and difficulties of cost-benefit measurement make for problems in deciding to what extent public employment services should intervene, as placement agencies, in the labour market. The general approach therefore is to decide upon the allocation of a certain level of resources

and place on employment service managers the task of deciding how they can best be directed to the achievement of a certain balance of aims and objectives.

3.11 To use a British expression the services are "resource-allocated" as compared eg with social security operations where rights to benefits are prescribed, where procedures are closely specified and numbers of staff can be related to the demand for benefits. Employment staff have to be more selective in deciding the extent and type of assistance to devote to each vacancy or jobseeker so as to produce the best, overall, result. In principle they could spend a great deal of time on some individuals without them finding jobs. Staff also have to be selective in the amounts of information they collect and the way they communicate with clients or other offices and must endeavour to keep routine work to the essential minimum.

3.12 Employment service managers have therefore to create systems and communicate objectives which enable staff to make the best casework decisions and these systems have to be flexible because of the great variety of conditions in which the Services operate. In general the decisions have to be made as close to the problems as possible if they are to be efficient. Designing and using computer systems therefore raise questions of management control, cost-effectiveness and of other priorities. Can computers improve the "quality" of "matches" and should they be used mainly for this purpose, if necessary at increased cost? Do computers offer better opportunities for saving staff time so that staff can have more opportunity to themselves try and improve the quality of matching? Or, can staff time be saved on one activity so that it is available to be used on another service programme? And how do short-term possibilities for using computers in these respects relate to those available in the longer term?

3.13 The way employment services are responding to these similarities and differences in their computer developments are set out and analysed in subsequent sections.

4. ABOUT COMPUTERS

4.1 This section discusses certain broad features of computers and computer systems and identifies those aspects of technical problems or developments which are of most significance in the context of this study. The main ones are

    4.1.1 the "human interface", ie the attitudes and behaviour of staff and managers in relation to the adoption and operation of computer systems;

    4.1.2 technical problems of storing, retrieving and communicating very large quantities of data in complicated ways;

    4.1.3 the rate of change which is taking place in computer equipment, system opportunities and costs; including the emergence of small, relatively cheap computers of high power;

    4.1.4 the growth of computer communication systems and the general impact of computers on telecommunications;

    4.1.5 the need to appreciate that the computer is a "tool", that it is only one of a number of possible ways of dealing with systems problems and that computer systems have their limitations as well as their advantages.

4.2 There are social and industrial relations issues affecting staff and computers which extend well beyond the context of this report and which managers have to take into account generally as they do when changes of any magnitude are envisaged; they are not, therefore, discussed further. However, the interaction between staff and computer systems has been responsible for a high proportion of system failures and is a significant factor in system design and operation. The systems have to be convenient in use and seen by staff as efficient in helping them perform their tasks, and they have to be helped to adapt to the close disciplines of data integrity and collection required by computers.

4.3 System designers have techniques to meet these requirements provided the problems are properly understood and the techniques applied in ways appropriate to the particular system. There are no simple solutions because the human interface is a total design consideration affecting procedural details and often relatively small systems features with complicated effects.

If failure is to be avoided - indeed if systems are to work well - there has to be appropriate investigation, careful specification and design and comprehensive testing and evaluation. Staff using computer systems have to be adequately supported before, during and after implementation. It is not possible in this report to pick on particular features of systems because of the levels of detail and complexity. All it can do is to draw attention to certain general considerations in relation to employment services.

4.4 In the last analysis most failures - or sub-optimal systems - come back to the management function; for example perhaps to impatient managers anxious for early results or having to cope with urgent problems, to failures to provide adequate resources in quality and quantity to do the systems job required, to failure to recognise and adapt to changes in environment and system requirements during a long period of design, investigation and testing and often to the inability to specify (indeed to understand) the user's

requirements in ways that lead to the intended or hoped-for results.

4.5   The employment service applications, in particular, will need very close and continuing management attention and a very high level of systems effort if they are to succeed operationally and economically. The applications are particularly difficult. Designing vacancy/jobseeker matching systems raises severe, almost unique, problems; management information systems also are notably difficult and statistical applications affect big, politically important labour market series while employment service operations are not ideal for computer systems.

4.6   Close data disciplines do not fit well with employment service local office work. Staff have to deal with people in highly varied conditions which call for individual discretion rather than procedural discipline; recording in any individual case can be anything from the simple details of a submission to fairly detailed records of an individual's employment history, attributes and personal details. This situation is not without its positive features for computer operation since usually employment service staff are highly motivated to their job and find routine work an impediment to their main tasks. However, not all computer systems do result in a net reduction or a more advantageous distribution of the routines. Again, for a number of reasons it is more difficult to incorporate the personal qualities of job-seekers in computer records. This follows from difficulties of categorisation, the relationships between caseworker and client (they sometimes have different views about the client's abilities) and the constraints being placed by governments on the way personal data is handled in computer systems; ie the requirements of computer privacy.

4.7   The computer hardware components available for use by employment services have indivdual capabilities and limitations. These components include processing units, memory, magnetic data storage devices, input and output devices (some peripheral and some terminal) and telecommunications links. Each component will have a limit to its speed of processing, and the volume of data which it can hold. Some of these limitations and the constraints they impose on possible computer solutions are discussed below.

4.8   The storage devices at present available to, and relevant for, the employment service computer applications are magnetic tape and discs. Tape is a suitable storage medium if data does not need to be retrieved quickly, to close timetables or in complicated ways and it is generally used to take copies of data or transactions for security reasons or where analysis is only occasionally required. Disc can store huge quantities of data which can be retrieved very quickly but not nearly so fast as the speed obtainable within the computer itself. The combination of a requirement for huge data storage and very fast retrieval, is a significant constraint upon system design.

4.9   The constraint is eased where it is possible to wait whilst the information is being retrieved, but employment service staff frequently have to get at data whilst clients are in their presence; also their time is used inefficiently if tasks are held up whilst they wait for data. There are operations and applications where delay is acceptable but the matching and retrieval systems under consideration by the employment services often generate a "real-time" requirement, with very fast access to, presentation and up-date of data with typical requirement specifications of response within 5 seconds for 90% of transactions and 10 seconds for 95% of transactions.

4.10 These can only be provided with equipment of adequate capacity in which the data is organised to meet the requirement. In principle the solutions are not dissimilar from the use in clerical systems of card indexes or subsidiary file copies of registrations or vacancies but the computer systems attempt infinitely more sophisticated methods which increase the demands on computer processing, memory and programs; and thence the cost of, and time taken to design systems. These costs can sometimes be reduced by adopting software packages from manuafacturers or other sources but such packages have to be paid for, reduce the independence of management and may still require many expert staff to introduce, maintain and operate them.

4.11 Speed of access to data is also accomplished by bringing the means of communication with the computer close to the user or its prime source of data. This involves telecommunication ("on-line") links which are usually separate telephone lines (but may be by "dial up" arrangements) connected to terminals. Communication to the computer is usually through a keyboard which generates the appropriate signals and may or may not be combined with the output terminals. Oral communications with computers as yet are not generally feasible so the computer communicates with users through a visual medium. This is a printer or a visual display unit (VDU) on which messages are displayed. Some combination of these devices is usually required since there is always a need for printed information (hard copy).

4.12 The terminal configuration and telecommunications are significant cost areas in on-line systems although the latter can be reduced in some cases (at some extra cost in equipment and complications) by the use of concentrating or multiplexing devices which enable lines to be shared. Communication systems also increase the requirement for computer power since the computer has to "manage" the terminal configuration and "recognise" each terminal and/or the source of the data. Communication systems do, however, provide possibilities for dispersing or altering the distribution of computer power and storage sometimes with advantage to the system, to equipment requirements or to other costs.

4.13 Until fairly recently computers have been large installations operated by skilled staff in specially treated accommodation and much of the input/output has been close to the computer. The combination of communication systems together with the emergence of small computers (which do not need special accommodation) is changing the nature of computer operation and bringing computer power close to the actual user. Various technical developments have reduced the size and cost of processors and to a certain extent peripherals and terminals. Continued development will ensure by the end of this decade that small desk computers will be available with the equivalent power of today's very large mainframe computers. In practice there is now available almost a continuous graduation of computer power but the expressions "mainframe" "mini" and "micro" computer still have some meaning because they associate with some other characteristics of computer systems.

4.14 These have to do with security of data and operations, with the support and service facilities available from manufacturers and with overhead costs, eg of programs. Computing equipment is now very, but not totally, reliable. If data is buried in a computer and there is an equipment failure then there is no way of getting at it. There has to be security of data and operations in the event of a breakdown in a telephone line, in terminals or central equipment and this adds to the costs and complications of system design and operation; particularly with real-time systems. One solution is to have stand-by computers, or multiprocessor configurations, but this adds to the

complexity of communications. Fairly stringent requirements also exist for ensuring that data is not corrupted by some failure of programs or equipment and for reconstituting files if something goes wrong. Again this can be a fairly complicated task particularly if real-time operations are to continue with minimum delay or if there are no clerical records.

4.15 Requirements for physical security of data are similar in principle to those provided for clerical records but because computer information is more highly concentrated losses can have more serious consequences, and extra precautions have to be taken. Another facet of security which has become apparent to managers is that computer systems tend to be more vulnerable to industrial action. This can be taken into account to some extent in system design but is much more difficult because the action is more unpredictable than in other causes of breakdown or loss of data.

4.16 Because they have been in existence longest, because mainframes are costly, and to encourage the use of their equipment, mainframe computer manufacturers provide a great deal of support by way of advice, systems and maintenance facilities. This enable the overhead costs of writing programs, setting up maintenance organisations and developing systems for common use to be shared. Mini-computer suppliers have had to do likewise to compete but it takes time for the market to respond and their facilities are not yet as comprehensive. However, micro-computer manufacturers have not yet built up similar levels of support and new suppliers have been able to enter the market. Both from the supply and demand sides, the micro-computer market is different because of costs, levels of competition and the range of applications; micro-computers are replacing traditional office equipment.

4.17 It may be some time therefore before micro-computer solutions can be adopted with the same ease and security as those using larger computers. There is nothing worse than a computer system which is out of action and not promptly put right. Staff then regard clerical methods as more reliable and acceptable. However, whilst the opportunities for using computers are increasing and the costs of computer power are falling rapidly, computer processing and memory is a relatively smally proportion of the total cost of computer hardware and operations. For most systems, maintenance and computer staff constitute as great a proportion of costs as do, also, telecommunications and terminals for communications systems. Reducing computer costs therefore, is not just a matter of procurement but of designing systems which will enable this cheaply available computer power to optimise other aspects of running costs.

4.18 If data is only required to be held for local use there is no point in concentrating it in a remote larger computer unless it is more economic to do so or there are other good systems reasons. For a local office or district which is totally self-contained as regards matching vacancies and jobseekers a small local computer with limited telecommunications is an obvious solution. Statistical databases also may be held locally for line management but it is sometimes more efficient to use a larger computer for big "number-crunching" tasks.

4.19 On the other hand a very large labour market would require a number of small computers which will have to communicate with one another (either directly or through another computer: see also paragraph 9.15) in order to retrieve as well as to accept data. Whilst to share the database amongst a number of computers breaks down its size with beneficial effects on storage and retrieval it imposes new demands on processing power to handle the

communications and creates technical problems of maintaining the integrity and consistency of data when each computer is dependent upon others for the security of its own database.

4.20 Also, whereas database management systems are available for use on mainframe computers, this is not yet the case for distributed databases held on small computers, and the general standards on which such computer communications will eventually be based have not yet been fully established. There are standard interfaces, eg, for terminals, but whether one computer will communicate with another satisfactorily and at what cost and how computers and terminals will fit together in any system is more questionable; particularly where they involve equipment from different manufacturers.

4.21 At present therefore, "split" fully communicating databases are not available in a secure form and both ANPE and MSC found the risks and costs of developing such a system unacceptable. There are compromise solutions but they inhibit real-time working since data has to be exchanged in well-defined (batch) segments under conditions which enable data to be recovered if necessary; also small computers may carry out specific functions or be linked into systems for limited tasks (eg controlling terminals or validating data at entry). At present, therefore, the search for full computer matching systems particularly in very big labour markets pushes system solutions towards large expensive central installations. It is likely that the necessary standards and facilities will be available in a few years time and that employment services will then find advantage in using small computers with distributed databases because that is, in fact the way their data is organised and used at present.

4.22 These technical problems therefore raise big issues in the search for the best options for computer matching and also present the critical questions for managers as to the opportunity costs of how quickly they proceed with the development and implementation of systems and of judging the nature and speed of future events. If opportunities are to be seized, decisions have to be taken sometime, but the risks are big. Some employment services plan systems which will take until about 1987 to implement fully and may be "out-of-date" as they come into full operation. It is not only the costs and benefits of available systems which have to be taken into account but the opportunity costs of perhaps not being able to adopt better ones in a few years.

4.23 The ways in which the employment services are approaching these issues, and some of the factors which condition their approach, are set out in later sections. Here it is useful to indicate likely future developments in computers. The information is drawn from an MSC report, by consultants, on its computer strategy. The timescales are set by planning needs, the rate of depreciation of equipment (usually about 7 years), obsolescence (which depends on the rate of change) and the ability in any particular case to foresee future developments. In this case it is convenient to look at developments up to about the middle and the end of this decade.

4.24 Computer equipment and systems which are "readily available" at present are those which have been in use for some time so that good technical support facilities and the main difficulties in using the techniques have been overcome. Following behind these are facilities which are newly being put into operation (eg small computers, distributed computer systems) and which will probably reach a stage of ready availability by the middle of the decade. Clearly availability will mean different things at different times to different

organisations. Behind these are known ideas and methods which are emerging from the laboratory stage but which will require considerable development over this decade. Further ahead than this one can only be certain that rapid change is likely to continue without being able to make useful guesses at the details.

4.24.1 It is clear that computers will reduce in size and that there will be a fall in the cost and increase in the availability of computer power over most of the decade.

4.24.2 Database communication standards, methods and programs ought to become available for fairly general use; perhaps about the middle of the decade.

4.24.3 Until towards the end of this decade the main methods of storage (for on-line access) are likely to be discs and computer memory. The fundamental constraint will probably remain although improvements in speed of access will result, eg from the use of laser technology.

4.24.3 The communications options for employment services will continue to be printers and VDUs. The costs of VDUs should fall, relatively, as a result of demand and competition; printers may not fall in price but should become more economic as a result of increases in speed and flexibility. It seems likely that other methods of communicating will be limited to special circumstances.

4.24.5 There will be changes in telecommunications because of the use of micro-circuits and computers for switching (either telecommunications links or "packets" of data) and new line techniques (such as glass-fibre optics). These will increase reliability and reduce costs provided users can take advantage of the most cost-efficient methods.

4.24.6 Oral communications with computers will progress but are not likely to be in general use by the end of the decade.

4.24.7 The combination of computer databases with telecommunications should lead to rapid improvements in "information technology". It is now possible to link a television receiver to an ordinary telephone line so as to obtain access to a very large computer database. Similar private systems will develop by the end of the decade. It may well be possible for an individual to use a cheap personal terminal to retrieve rapidly from public and private computerised databases simply by dialling a combination of numbers.

4.25 If managements are to take advantage of progress and not to be "locked in" to their systems because of the costs or problems of making changes (in big organisations with large volumes of data) or because they have tied themselves to a particular supplier, they will need to develop controls on methods of choosing and designing systems which will enable them to react to change, and to adapt to the fact that systems take years to implement with considerable effects on staff and organisation. If change is rapid, systems will begin to be amended almost as soon as they are fully implemented. Managers will therefore face quite long periods in which they will have considerable systems differences within their organisation.

4.26 It is unlikely that managements will be able to avoid these problems - even if they want to. Computerisation is probably an inevitable process. Employment services have to deal with other people and organisations in a world in which information handling may change rapidly. Electronic mail (ie message distribution either by computer communication or through facsimile transmission) is likely to affect postal services in similar ways to the impact of the motor car on public transport. If they are to remain competitive the services will have to keep up with the changes and their managements will also want to take advantage of new, less costly, methods.

4.27 Employment service managers will therefore have to develop strategies for dealing with this situation; to adapt their planning systems to the changes in time-scales, ie to the fact that computer systems are more inflexible to change than are clerical systems, to the different effects on the distribution of their resource costs between methods, and to the more compli-cated interfaces with the data organisations of other managements.

4.28 These changes and other developments in computer systems are also moving them away from specialised operation and control into the ordinary operational and line management environment. Line managers at all levels will have to adapt to the disciplines and changes in organisation and control which computers bring about or require. It will be necessary to be aware not only that the computer is a "tool" with limitations as well as advantages but one which will require a continuing management involvement. It will not be enough to delegate the problems and the management issues to the systems specialist and "leave him to get on with the job". All managers will be deeply involved and the efficiency of their involvement will depend on how they shape up to the tasks.

5. COSTS AND BENEFITS

5.1 The starting point for any examination, whether it be a comparative study or a management judgement between two, or more, systems options, must be the criteria on which the judgement is to be based. In the last analysis these are economic criteria. Political or social judgements may determine the objectives of a system and some of its features but the job of a management is to achieve the best results from the use of the resources with which it is entrusted.

5.2 Managers may question (but not challenge) political or social decisions because they have to understand what they entail, to point out the systems consequences and to deal with the practical problems. Also it is often very difficult to separate the social and economic factors in decisions because of acute problems of measurement. Managers have to do their best and for given political and social objectives the choice between alternatives should then be determined on the basis of cost-effectiveness. This is the starting point for the criteria used in this study; indeed it is the only objective criterion. However, comparisons between countries are more dubious than between the systems options pursued by each individual employment service, because of differences in social policy.

5.3 The nature of the subject therefore does not make it possible to say, unquestionably, that system A in one country is "better" than system B in another. Indeed the information to do so is not available in most cases (which itself is a comment upon the state of play on cost information in the employment services) to enable such a judgement to be made. All the employment services are required to (or do) make careful estimates of computer costs and financial requirements and all the services have to indicate, with different degrees of precision, the benefits expected. Only in Britain, apparently, do quantified estimates have to be made of the effect of the system on running costs as a whole, including staff costs (ie changes in the amount of staff time or other resources to perform relevant tasks), or are attempts made to put values on benefits.

5.4 This is surprising because several of the services are looking to computers to relieve staff of routine tasks so that they can use the (saved) time more productively. It is well known, however, that computers can take more staff time in collecting data (or in other, sometimes indirect, ways) than they save and that very careful design and measurement is required. Some employment service tasks are performed millions of times in a period of a year and small differences in the time required therefore can have a big effect on overall staff costs.

5.5 Most of the employment services take the view that it is sufficient to establish in a very general way that the desired result is achieved. It is also true that the effects of a computer system may not be fully apparent until it has been in operation for some time. This creates problems since, usually, the actual measurements can only be obtained by conducting experiments but because of the great variability (of labour markets etc) it is difficult to get experimental results of general application.

5.6 Whilst this is not an easy area for measurements, therefore, it is also difficult to see how managers can expect to make good decisions without them. Certainly some measurement (ie estimate) is required to give a reasonable certainty that the expected effects will accrue. And how can decisions be

made as to the best options if the resource effects of different systems are not known? Indeed it is only by careful cost analysis, breaking down the cost into different systems areas (for example the extra cost of saving of staff time on collecting vacancy as against registrant data) that the best options are made apparent.

5.7 This is an important issue for planning (and therefore for management information) because all the services have to account for their budgets and to make forward estimates of financial requirements. In this respect the implications of large, expensive, computer systems on cost and resource distribution are very significant because they increase the proportion of overhead to variable costs, may generate additional running costs (over time), involve considerable prior investment in design and implementation as well as equipment (which involves future provision for depreciation) and significantly shift the balance of costs between different resources. By way of example a system like CAPITAL in London would involve initial costs in development, equipment and implementation (over a period of years) equivalent to about the cost of providing the employment service (in London) for a year. The comparable figure for a VACS system (in another conurbation) is just over 5½% of the annual cost of the service in that area. The balance of running costs and benefits is, of course, quite different. The example is quoted to illustrate the effect on initial resource costs.

5.8 If good decisions are to be made therefore techniques of investment appraisal need to be used and estimates have to be made at every stage of project development. It is not difficult to spend very large sums developing a system before the actual benefits begin to be realised and it may then be too late to go back and develop a better option; or to adopt more flexible system design and implementation strategies.

5.9 This makes it important to begin the process of cost control and analysis (and therefore of evaluation) before project work begins. How this is done and the degree of (costing) effort employed will be affected by the circumstances of the organisation. For example small projects may not justify as much effort as very large ones or it may be obvious when a system offers clear cost savings over (and at least equivalent benefits to) other system alternatives including the system it is to replace. The employment services therefore use different techniques depending on the requirements of their governments. In Britain, governmental computer projects are now all subjected to detailed investment appraisal using discounted cash flow techniques. Whatever methods are employed there are certain basic principles.

5.9.1 All the resources employed (and perhaps the benefits expected) have to be identified, reduced to common units of value, which are nearly always money values at standardised price levels and related to the timing of expenditure or benefits.

5.9.2 Cash flows (expenditure and value of benefits, if known) over the whole period of expenditure (including initial development and design) need to be taken into account over the useful life of the system (usually the expected life of the equipment).

5.9.3 Allowance needs to be made for the fact that there may be a greater cost in expenditure which is incurred in the early years than there is in later years. This is usually incorporated as a rate of interest but really reflects opportunity costs.

For example, if an employment service uses staff, or other resurces, to develop a computer system then they cannot be used to obtain the earlier benefits of filling vacancies or otherwise helping people find suitable jobs.

5.10   If such techniques are used systematically they have a number of advantages.

5.10.1   They fit in with estimating, budgeting and accounting.

5.10.2   They clarify shifts in resources over time and help with physical and organisational planning.

5.10.3   The relationships of expected benefits to aims and objectives over time are clearer, and strategic planning is improved.

5.10.4   The use of such cost appraisal techniques places disciplines on managers and systems designers which affect the whole approach to systems work and improve the cost-effectiveness of systems decisions.

5.11   Cost information about particular systems was not generally available during the study; partly because this is sensitive management information for some countries, partly because some employment services are at the feasibility or investigation stages in their systems and partly because some have not attempted to set out the computer strategies on which they have embarked with their broad cost implications. Also it is not constructive to discuss cost features independently of benefits. This section of the report now identifies and considers the possible benefits to be obtained from the use of computers by employment services, draws mainly from British experience to indicate the results achieved or likely, and summarizes the comparative approaches of the participants to the subject.

5.12   The benefits themselves are discussed in more detail in Appendix F. Here, the first point to be made is that computers do not introduce new benefits but only improvements. This simplifies the issue as to one of whether computers do, or are more likely to do, better than non-computer methods (or whether some computer systems do better than others). For this study the questions are whether and how the employment services have identified and quantified benefits, what improvements seem to be feasible and how they affect the objectives and priorities of the services.

5.13   In this context, MSC and ANPE have experience of computerised circulation (but ANPE has still to complete its evaluation) and AD, ONEM and ANPE have computerised statistical systems. Only BA (and only in the professional occupations) and MSC have practical experience of computer matching and BA has not yet obtained evaluation data. MLPS is beginning to get information from its Latina experiment but of a very different type of "matching".

5.14   The subject of the benefits of public employment services is known to be very difficult and a delicate one. Given an assumption that they exist - for any employment service - in the first place, computer possibilities can be summarised as follows:-

5.14.1 <u>A reduction in recruitment costs</u>. - Employers and jobseekers
do not pay for "free" services and the costs fall on the State so
that in practice, computers will reduce "recruitment" costs to the
extent that they reduce the cost of making placings. Since employment
services have "overhead" costs of maintaining jobseeker registers
(usually increased by computers) the bias is towards measuring
average cost per placing. Marginal costs may be important if
volumes can be varied and this is sometimes possible. Only MSC
has made a practice of monitoring cost per placing (or including
them in evaluations). None of its experimental, or pilot,
computer matching systems have reduced average placing costs (if all
development etc costs are taken into account) but more cost-efficient
designs may do so. Computerised vacancy circulation systems (in MSC)
have reduced circulation costs (without any reduction in placings).
The cost reductions came from savings in staff time to copy vacancies
and self-service display cards and also because the systems have been
restricted to offices with sufficient volumes of circulation to
justify the overhead costs of lines and terminals.

5.14.2 <u>An improvement in the speed of filling vacancies</u>. - In practice
this is measured by MSC as the speed of successful (ie one resulting in
a placing) submissions. The implication of filling vacancies more
quickly is that frictional unemployment will be reduced and production
increased (see Appendix F). MSC evaluations give clear evidence that
submission speeds are increased by an average of up to three-quarters
of a day in the case of a pilot matching system (CAPITAL) in London
and about one-third of a day in the case of a computerised system in
another very large urban area (see paragraph 6.37). This
improvement results mainly from an increase in speed of delivery which
was measured from the notification of a vacancy to its display in self-
service or to its receipt in the traditional matching section. It is
therefore mainly a "circulation effect". Computerised vacancy
copying and distribution systems on average reduced the time to
circulate between offices from nearly 1½ days to about one hour and
by about half an hour for distribution within each office. There
was a (resulting) comparable increase in the speed with which
submissions to employers were made. Since this is mainly caused by
speed of distribution, the improvement in speed of vacancy filling
is largely a "circulation" effect.

5.14.3 <u>An increase in the number of placings</u>. - This has no value in
itself (only as it affects the other benefits) but it is one measure
of performance which most employment services use. Perhaps more
significant are ratios of jobseekers placed or vacancies filled
since these give some indication of improvements in the effectiveness
of matching (for the service, the jobseeker and the employer). These
ratios are discussed in Appendix F, but, again, the experience of
MSC has not been that large improvements are possible or likely from
the use of computers. The results from the Jobscan system are mentioned
in paragraph 6.26.5 and the evaluation of the CAPITAL pilot system
was not more encouraging. MSC experience is that average improvements
of more than about 5% in its placing results are unlikely and that
different labour markets will produce different results. There are
severe difficulties of measurement (see section 7 especially
paragraph 7.24.2).

5.14.4 <u>Improvements in the quality of placings</u>. - Conceptually "quality" could mean:

a improvements in <u>stability of employment</u> (increase in duration of job tenure) resulting in a reduction in the employer's costs of labour turnover (and increased production);

b <u>improvements in labour market performance</u> - for example by filling more "scarcity" vacancies (which cause production blockages and therefore have a disproportionate effect on production) or perhaps concentrating efforts on skilled vacancies where the effect on production is probably greater, on average, than that of filling unskilled vacancies;

c <u>improvements in social performance</u> - placing people who are handicapped in the labour market either has an economic value (in which case it falls under other headings) or it is pursued to the detriment of "economic" performance. In this event it must follow that specified political or social objectives must be set and some other measure of value (than economic) be adduced. Contra - cyclical activities (placing people in subsidised employment, work creation schemes or training) may, for example, serve both economic and social objectives.

5.15 It is essential to bear in mind that any measurements, or possibilities (quoted in paragraph 5.14) are relative. They are improvements of a computer against a "clerical" system. Clearly an (efficient) computer system is likely to yield greater improvements against an inefficient clerical system than an efficient one.

5.16 The employment services embrace all these objectives to some extent. In Italy, where there are controls on engagements and social priorities are established by law, MLPS puts the emphasis on administering the law and ensuring that the social priorities are efficiently administered, and that the labour market works as efficiently as possible, given these priorities. In Germany, with lower unemployment, BA puts the emphasis on promoting upward job mobility and helping people adjust to the labour market. ANPE and MSC have emphasised increasing the proportion of vacancies notified and filled (and jobseekers using the service) with objectives of increasing cost-effectiveness, improving their ability to influence the labour market and to giving greater assistance to their existing registrants in finding jobs. MSC also seeks to fill vacancies more quickly. AD in Denmark, has specified speed of vacancy filling and improvement in stability of employment (duration of job tenure) as particular objectives of computerisation. ONEM sees the employment service as a general instrument of its country's active manpower policies.

5.17 In practice the specific objectives of computer systems are modified (particularly by ANPE, BA and AD) by the recognition that computers have a limited role in matching. It is the interaction between staff and computer that is important, particularly by relieving staff of routine tasks so they can use their own time more productively.

6. MATCHING

6.1   Matching, ie helping people to find suitable jobs and employers suitable workers, is the central function of an employment service. It has tended to develop as a casework process, loosely structured around trained, experienced staff suitably located for, in general, face-to-face recording and communications.

6.2   This process has been modified by involvement in active manpower policies, by improvements in communications (both transport and information) by education and by socio-economic changes which have resulted in a more mobile, involved and articulate labour force. Employment services have responded by changes in methods of disseminating information (for example self-service and the use of press, TV etc media) but the basic structure and organisation of services remains much the same, that is to say register-based using mainly "traditional" methods.

6.3   This is a model which has some defects when an attempt is made to introduce computers into the matching process. Computers do not change the process when they are used purely in order to assist staff with routines (eg in circulating vacancies) without being involved in the matching process itself. Once systems are developed to a point where computers begin to make, at least initial, selections, the process needs to be made more explicit if cost-effective systems are to be developed.

6.4   For example, to what extent does selection involve examining every available registrant (or job) to find the absolutely most suitable one (finding "square pegs for square holes") and to what extent does it involve choosing a suitable jobseeker (or vacancy) from an initial selection taken from a small (perhaps randomly chosen), section of the register? Indeed where there are thousands of unemployed jobseekers "chasing" a few vacancies, does "selection" arise at all?

6.5   These are questions which a head office administrator does not have to answer explicitly if the process is delegated to local managers and caseworkers operating very flexible, relatively unstructured, clerical procedures. No central administrator can decide whether A or B should be chosen for a particular vacancy but the attempt is being made to involve a "central" computer in the decision.

6.6   Essentially the problem demands the creation of some kind of model, or at least a good understanding of the process, to which the computer system is to be applied. Employment services and their system designers understand that computers only assist staff in matching (ie, they can only help to make initial selections). Precisely what "assisting" means is not made explicit; it is a consequence of the chosen system. Indeed the information available may not enable it to be understood at the level of detail required for good system design. It is already clear, however, that this is not just a matter of designing a computerised date handling mechanism and choosing the right selecting factors; it is about system design in total.

6.7   Appendix E discusses the matching process as a "structure". This is drawn mainly from British experience and resulted from an attempt to understand the problems which arose during, or as a consequence of, experiments in computer "matching". Most of this "process" will probably apply fairly generally (except perhaps in Italy) to the participating employment services but could vary considerably at some points. Indeed there is never an ideal

"model" for a process of this kind and the one in Appendix E is drawn more from the general experience and judgement of employment service managers than from measurements or operational research. It was also used in this study as a framework to compare computer matching developments in the participating services. Several of these developments throw important light on the process and problems of matching but it should be noted that time and the nature of the study did not enable all the accumulated wisdom of the employment services on this subject to be distilled in this report.

6.8   The Italian experience and approach is particularly interesting. The Constitution recognises certain labour market rights of Italian citizens and these have been interpreted by law and employment service administration as a set of labour market and social priorities. It is not possible, here, to go into full details, but certain job engagements (eg for family employment or direct passage from one job to another) can be made freely and have only to be reported to the placement office. Others (for managerial, most white-collar jobs and other specialised manual jobs) can be filled by employers by free recruitment but each engagement has to be vetted and authorised by the placement office. For the remaining engagements (most "blue-collar" jobs) employers can only send a "numerical" request (ie the number of jobs to be filled and the details) to the placement office. Whilst an employer can reject on grounds of industrial unsuitability, he must otherwise engage the worker(s) sent by the placement office. In this task the placement office is assisted and directed by national, regional, provincial and local Commissions which determine the professional categorisations to be used (matching factors) in making selections, issue authorisations to engage, arbitrate in worker disputes and establish the principles and practices on which lists of workers are to be drawn for vacancies.

6.9   These lists can either be occupational - ie contain those workers who have the requisite professional (occupational) skills and experience (eg languages) for the job - or from general (local) lists where specific, defined, skills are not required. Registrants are listed, in order, according to a set of social priorities (length of unemployment, family income and needs, handicaps) which are expressed in a points system (lowest points highest priority). For any appropriate vacancy the selection is taken from the top of the list or any selection from any set of otherwise suitable workers is settled on a points basis.

6.10   Vacancies have to be displayed in the placement office for the information of jobseekers with the date and time when the list is to be drawn (ie, when the jobseeker is to be selected for the vacancy) and in a very large office it is difficult to continually draw and update lists. Registrant details and their points have to be kept up-to-date in their records as far as possible but lists are compiled from those who attend to be considered for the vacancy (including those who have been selected from the register and invited to attend by the placement office). An element of "self-selection" therefore enters into the process; but only for numerical requests.

6.11   Several important facets of the matching process are clarified by the Italian approach and experience. For example when there is an "excess" labour supply the process becomes more one of discrimination than of selection. By making explicit (and codifying them in a points system) the social factors on which discrimination is to be based MLPS (and the Commissions) reduce this to a process of "selection". In this respect the MLPS experimental computer "matching" system is "computer-assisted" in the

full sense because staff (and Commissions) determine and calculate the points and the computer keeps the records and orders the points so as to produce the lists, in sequence, from which selection is made.

6.12   The main problem for the MLPS is to operate social criteria in the filling of jobs where they are most applicable and with as little disadvantage as possible to the efficient (economic) working of the labour market. Employers recruit freely (but are vetted) where jobs involve judgement, discretion and specialised skills or qualities (often those most difficult to codify for computers) and the MLPS does not intervene where jobs involve complicated economic and social circumstances such as those which arise with family employment. However, in order to operate "numerical" procedures MLPS has to "control" the labour market ie to determine engagements (and to inspect employers' records to prevent evasion). For this it must ensure that all vacancies are notified and that all (appropriate) jobseekers are registered and their details kept up-to-date.

6.13   This issue of labour market "control" may be compared with the general approach of BA in Germany (where incidentally unemployment has, until recent years, been comparatively low). BA operates on the principle of "impartiality" in which it aims to serve employers and jobseekers equally. To do this the main criteria for selection become the nature of the job ie, of industrial or commercial suitability for any vacancy. Of course there are protected groups in Germany as there are in the other countries (including Italy) but the balance of labour market intervention is substantially different (from Italy) and more typical of the other employment services. It is easier to apply in practice where the labour market is in reasonable balance and where "excess supply" does not exacerbate the social problems or "excess demand", the economic (scarcity) ones. In wartime for example countries may operate labour controls for opposite reasons to those employed in Italy today.

6.14   The use of self-selection methods as a general principle in BA, ANPE and MSC (by adaptation, originally, from Swedish experience) also sheds light on matching as a process. Employment services adopted self-service methods either to economise in staff time (so as to enable them to service greater volumes of jobseekers), or to increase labour market transparency. MSC has found that self-service has marketing advantages because it is attractive to jobseekers and employers but it has also been the experience in Britain that jobseekers sometimes match themselves against vacancies which would not always be chosen for them by employment service staff.

6.15   BA is specifically building this principle into its procedures in an attempt to improve the quality of matching. By providing a "half-open" display of most vacancies (ie without the identity of the employer) but controlling submissions through its ordinary procedures BA hopes to combine the knowledge and experience both of the jobseeker and its employment staff in the selecting process. Whether this will work better than, eg, in France and Britain (where the jobseeker is encouraged to attend frequently in self-service and only involves the employment adviser where he needs more help) is an unanswered question. However, self-service illustrates two general principles of employment services procedures. Firstly it is not economic or possible to record all the details of every registrant; employment staff have to limit recording to that which is rel' /ant and essential. Secondly, all the matching details of a jobseeker cannot be foreseen in advance in respect of every possible vacancy. Balance has to be struck between collecting data at initial registration and leaving details

to be ascertained in particular cases when submissions are under consideration. Part of the matching process may therefore take place at the submission stage, eg checking qualifications or attributes in relation to a particular vacancy.

6.16   In France and Britain also self-service is a "unilateral" method of selecting.   Jobseekers can use self-service without having to register and only the recorded details of the vacancy (and the submission) are involved. That is to say only a file of vacancies needs to be maintained.

6.17   ANPE obtains about 40% of its placings through self-service and the remainder at interviews or from the register.   It seems that about 60% result from "flow" matching (including self-service).   MSC does not directly distinguish between "flow" and "stock" matching but some 60% of placings in jobcentres result from self-service, about 7% result from "speculative" (or "initiative") approaches to employers (without notified vacancies) and another proportion are placings of students etc in temporary jobs where extensive (matching) procedures are not required.   Probably no more than 25% of placings are obtained from "register" matching and only a proportion of these from the jobseeker register.   Most vacancies are therefore filled by selecting (including self-selection from the vacancy file by or for individual jobseekers (RBM or registrant-based-matching: see Appendix E).

6.18   The concept of "matching" as a register-based process therefore requires considerable qualification, particularly the use of the jobseeker register to make selections for vacancies.   This is significant for computer system design because it is possible to increase the computer and technical requirements and costs vary considerably for a register-based, bilateral, matching system when the marginal returns for the extra expenditure may be relatively small.   Against this a vacancy circulation system "underpins" the whole process because it is required both for "flow" and "register" matching.

6.19   In contrast the use of labour market controls in Italy (as do also most job-filling schemes which apply social priorities) puts the emphasis on the maintenance of the jobseeker register.   It should also be noted that these schemes, by their nature, change the factors used in matching as well as the procedures.   In principle MLPS operates unilateral matching in the reverse (OBM) direction by selecting registrants for vacancies (and in fact neither in its computer or clerical systems does it maintain vacancy files in the generally understood sense).   Although self-selection methods are used, registrant records are necessary in order to establish the social priorities and to operate the control procedures.

6.20   This has its problems; in Italy matching is based on a combination of social and occupational factors (occupational and skills classifications) and of location.   Location is broadly defined (at present) by the Commune. However it must be very difficult in the very large labour markets to define location in this way particularly since travel-to-work patterns are usually complex and not uniquely defined upon particular, discrete, geographical divisions.   In choosing their vacancies from the "self-service" display, registrants in Italy will take account of factors like pay and travel to work (as well as other personal factors) which do not enter into the "formal" matching process there.

6.21   Other significant insights into the process and the problems of computer matching were gained as a result of an experiment, by MSC, with an experimental computer matching system (called Jobscan) at 5 offices in the Portsmouth area. The experiment had its roots in the realisation that occupational classification was not a good selecting factor for those jobs where little or no skill is required so that there is a high degree of mobility between 'occupations'. These form a high proportion of registrations (at least in Britain). The issues were not purely those of classification and computers because employment staff, themselves, felt the need for improved selection techniques in cases where occupational classification has little relevance.

6.22   A prior study was made by MSC occupational psychologists who carried out structured interviews amongst self-service jobseekers to discover the main factors used when selecting from the vacancy display. From this study those jobseeker preferences were identified which were of frequent occurrence (or significant for some types of job) and they were brought together in a "job preference checklist" (JPC). The checklist was extended to other occupations, improved in further investigation or limited trials and resulted in a form on which the jobseeker (or employment officer) indicated "Yes" or "No" to whether a particular preference, or other factor, applied in his case. The form, called the jobseeker checklist (JCL) was designed for self-completion (ie by the jobseeker himself).

6.23   A well-structured data collection method of this kind was essential because a very large number of "factors" were eventually included in the computer matching system although for most jobseekers a much smaller number (12 to 20; these were not all the same for each jobseeker) were used in making selections. Each factor was represented by one character of data and the number was reduced in computer operation because it was possible either to input all negative or all positive replies on the checklist; whichever were the least numerous. For computer matching therefore, it was necessary only to input personal data, pay required, occupational classification and up to 20 characters representing the JCL factors (which included travel-to-work). Otherwise the data was retained in clerical records. Similar procedures were adopted to collect vacancy data from employers. For this a vacancy checklist (VCL) was used.

6.24   As this was an experiment mainly to test the JPC method of computer matching (and not a pilot system) it was mounted quickly, at relatively low cost and without major changes in office organisation. Only a limited configuration of terminals for input and printing was provided, each linked by telephone line to a mini-computer. The system also included computerised vacancy circulation and the production of self-service display cards.

6.25   The computer database was used to select potentially suitable vacancies for registrants or initial selections of registrants for vacancies. These computer selections were then linked with the clerical records so that placing staff could eliminate unsuitable ones or reduce the final 'shortlist' to a suitable size. Where registrants were not present in the office when the selections were made they were invited to apply for the vacancy by post. Computer selections could be obtained using pay and occupational classification or using pay, occupational classification and checklist factors, or pay and checklist. Subsequent selection could be made by eliminating or varying one (and only one) of the checklist factors. As both computer and clerical methods of selecting were available it was possible to make some comparative measurements of the computer selections

and to draw some hypotheses (if not conclusions) about the use of the computer system by staff.

6.26   Those most relevant for this report are described below.

    6.26.1   Samples of registrants were drawn and staff made selections of vacancies from the clerical vacancy records for each one; similarly registrant selections were made for a sample of vacancies. Initial computer selections (using the checklist factors) were then obtained for each registrant and vacancy in the sample and these selections were compared with those obtained by clerical methods. About 50% of the selections which staff thought would justify inclusion in a final short list were not included in those selected by the computer (the computer made some selections which staff omitted but these were not analysed).

    6.26.2   There were a number of reasons for the disparity. Not all selecting factors were included in the computer system. Staff may have chosen registrants mainly on their personal qualities if other factors (such as experience) were not the main consideration. Also computer selection was based on a large number of factors and the absence of any one of these (or at least two) would exclude a registrant from selection. Staff were more flexible and discriminating in their choices.

    6.26.3   The checklist required registrants to produce "Yes!" or "No!" answers where they might have said "possibly" (or "maybe"). This is a severe problem of system design affecting the relationships between staff and computer in making selections. For computer selection positive (must) factors are an advantage and will enable the computer to reduce the field of selection from which staff choose. If these factors are too tightly drawn the computer will "over select" (or possibly not make the most efficient selections). If the factors used in making computer selections are softened (so as not to exclude any possibilities) then staff will be faced with more work in making selections or the initial computer selections will have to be, perhaps arbitrarily reduced. The extent to which this happens will depend on the size of the files from which the selections are made and the nature of the selection. Thinking in MSC is that the factors used in making selections will have to be varied selectively for different types of cases but whether it will be possible to program the computer to do this remains to be seen. If not, the concept of computer matching may be in question.

    6.26.4   In the Jobscan experiment it took staff some time to adjust to the method and to present data from vacancies and jobseekers in the way which produced the best interaction with computer selection. Two points illustrate the problems of communication. Firstly, the jobseekers themselves have no understanding of the way the computer system works and so cannot complete their forms with the same sensitivity as staff can. This motivates against self-completion by the jobseeker and, in the Jobscan experiment, staff had to check the forms. Secondly, communications between staff dealing with vacancies and staff dealing with jobseekers are important. The taking of a vacancy order involves interpreting the employer's requirements in a way which fits the matching systems in the office and recognises the possibilities of filling it from those registered jobseekers who are available. A too

"technocratic" (perhaps computer-orientated) approach to vacancy recording may therefore affect placings results (see paragraph 6.33).

6.26.5 A record was kept of the way submissions occurred, ie whether they resulted from a computer or clerical selection, whether they were made in self-service, as a result of selecting vacancies for a registrant (RBM; see Appendix E) or registrants for a vacancy (OBM). Only 5% of total placings (but 10% of submissions) resulted from computer selections; most placings came from self-service or other types of RBM. The computer system was used relatively more for OBM. It is not possible to say whether the 5% of vacancies would have been filled without the computer system but local opinion was that they would have been.

6.26.6 There were a number of reasons why the computer system was used to a relatively small extent. These include the inconvenience of the terminal configuration and some of the problems of getting good data and of maintaining the database. But they also reflect the judgement of staff about the system and some of its operational features. Although registrant and vacancy files are large in total, they break down in operational practice. In particular, the vacancy file is very much smaller (about one-fifth or less) in size than the registrant file and, on average, the amount of data on a vacancy is less. (This is why vacancies are usually circulated rather than registrants). The vacancy file is therefore not too big to manage or to search; particularly if there is a good circulation system. This is especially so where an occupation is well defined and easily classified. What advantage lies in taking a computer selection from say 20 vacancies for bricklayers when it is simple to scrutinize the, clerical, vacancy record?

6.26.7 On the other hand, suppose, for example, there are large numbers of unskilled people registered but only small numbers of notified vacancies. By the time selections are made from the register and the registrants are contacted, the vacancy will have been filled (by the "flow"). This is quicker and simpler for staff.

6.26.8 The Jobscan results (and other experimental experience of MSC) made another, very important, point. Very roughly the number of initial computer selections (requiring scrutiny of records and other action) made from the jobseeker file to produce one placing may average as much as 100. And a fair amount of time may be spent in trying to contact jobseekers who turn out to be no longer available. This has two consequences. Staff time "saved" by computer routines may be more than taken up in other (computer-generated) "routine" work. Secondly, if selections are made from a register which cannot be kept in a very up-to-date state (see paragraph 6.26.9) computers may make "dead" selections; perhaps to the exclusion of "live" ones. The CAPITAL pilot system of MSC was used only to a small extent for order-based matching despite the convenience and flexibility of the retrieval arrangements.

6.26.9 In practice it is difficult and often costly to maintain a very up-to-date jobseeker register, but much less so for vacancies. In Italy, registrants have to attend monthly to renew registration and each month about one quarter fail to attend – suggesting a fairly high

proportion of the register (on any day) is not up-to-date. Register checks by MSC local offices indicate a similar state of affairs. Computer systems can in fact sometimes help reduce register errors but are still dependent on the speed and frequency of communication with the registrant.

6.26.10   Estimates were made of the effect of the Jobscan system on costs and the use of staff time. The computer system introduced new procedures which took slightly more staff time than those it reduced and there were additional computer and telecommunication costs. Improvements in the use of staff time might be made by including the preparation of statistics in the computer system, or by better design, but it seems very unlikely that a system of this sort can save more than a marginal amount of staff time and there are the additional computer costs. MSC experience in this and other computer matching experiments and pilot systems is that they will only be cost-effective if they produce extra results or benefits (see section 5).

6.27   The Jobscan results put into context some considerations of fairly fundamental importance for employment services. The experiment began originally as an attempt to improve the quality of matching by incorporating more and better selecting criteria than those in general use for clerical matching. But employment staff are the arbiters of the final selection not the computer and they use criteria which cannot be included in the computer system. Will staff recognise, therefore, or can they, if the computer has made a "better" selection? And if they do will the employer then act accordingly? It would seem that (at least for some years to come) the computer will be no more than a retrieval tool. That is to say, it may help staff to find or manipulate data which they could not do in clerical systems, but it will not enable them to qualify it in better ways; at least not for more than a very small proportion of cases.

6.28   Secondly, just how much time or money is it worth spending to fill one extra vacancy (or help one particular registrant? And what is the best way of going about it? Staff at Portsmouth eventually ceased to use the computer system (except to a limited extent) but tried to use their time more effectively.

6.29   Finally, this and other experience illustrates a basic feature of all employment service placing and case work, that of selectivity - selectivity in matching vacancies with jobseekers or jobseekers with vacancies; selectivity in deciding what kind and extent of assistance to provide in each case; selectivity in deciding what combination of activities and resources are used to produce the best, overall, results. It would seem therefore inevitable that computer matching systems will be used (if the choice exists) selectively, that this will have to be recognised in choosing and designing systems, and that a decision to replace clerical with computer records may create difficulties for effective matching.

6.30   But this and related issues raise difficult (though not necessarily insoluble) problems for computer system design. In Portsmouth the staff eventually rejected the computer matching (but not the circulation) system. A computer depends entirely on staff to input and maintain the data and they may not do this well if they do not fully accept the system. During the Portsmouth experiment the database was only kept in a reasonably satisfactory state because the staff co-operated in and understood the importance of the experiment. Combined computer and clerical systems do not always sit well together in this respect, because they may generate different disciplines.

6.31   It is then tempting to reach for a solution which eliminates the clerical records so as to ensure efficient computer operation; but this then changes the whole nature of the system response. Firstly all the data is in the computer, so that all subsequent activities become dependent upon the computer retrieval systems and therefore the retrieval factors. None of these is perfect. The prime computer selecting factors of most general application are occupational classification, pay and location (ie mobility or travel-to-work). Occupational classification is imperfect (often irrelevant) for a high proportion of the business of many employment services (perhaps an even higher proportion of the jobseeker register which reflects the bias of unemployment towards those who are unskilled or have "obsolete" skills). Pay is often difficult to describe. Jobseekers may be flexible in their pay demands, so that they have to be expressed as a minimum requirement or on a broad band - even then for some the job is as important as the pay. Employers often operate pay scales which depend on age, the level of experience or other factors (and which may be difficult to reduce to a satisfactory single figure or band). Sometimes they wish to negotiate, or do not want to say in advance, what they are prepared to pay. In a proportion (perhaps a quarter) of cases therefore, it is not possible to express pay offered in a fully objective way. Travel-to-work raises similar difficulties. It is not just a question of distance, but of travel facilities and the location of the job in relation to the jobseeker's residence.

6.32   To deal with these problems it is essential to have a very flexible systems response. To build this sort of response into a computer system (especially a "paperless" one) perhaps involves the ability to produce selections from predetermined combinations of factors; or to vary the selection by changing the factors or even to be able to retrieve on any basic factor or combination of factors. With a big file this makes a specialised database, and a large terminal configuration, essential with the result that the computer costs are higher and the technical problems (eg, of maintaining a satisfactory response) increased. Of course clerical systems are imperfect too; the issue is one of relative advantage.

6.33   Secondly there is the importance of the behavioural interface (or disciplines) between staff, information, and computer systems which might perhaps be discussed and exemplified in the context of centralised order taking. Under this, vacancy receipt (and some other aspects of communications with employers) are concentrated for a number of offices at a central point, more remote from other matching activities. There are some advantages in this technique from the point of view of contacting employers (though some employers prefer to speak directly with the staff who are going to try and fill their vacancies) for organisation or in systems design. This method was introduced by MSC for the CAPITAL pilot system in London (but was later reviewed) because computer experience in USA indicated the need to maintain a high level of skill and discipline in obtaining and expressing vacancy requirements (eg, as to pay) in computer systems. However, staff who take vacancy orders may then become detached from the jobseeker's side of the business. They may see jobseekers through the computer data in a more impersonal way (it is very difficult to get sensitive personal data into a computer system or even, eg, the reputation of the firm notifying the vacancy). Also communication with other staff in the connected local offices may become more formal if the central order-taking point is in a different position in the management hierarchy. If there is one thing which characterises recruitment and jobseeking it is that it is a highly personal business; for the employers, the jobseekers and their agents.

6.34   It must be emphasized that centralised order taking is not a technical requirement of a system like CAPITAL which is very flexible in permitting data entry at any convenient point in the system. The issue arises because of problems of data definition and interpretation.

6.35   There are two other, general, considerations affecting the design of computer matching systems which might conveniently be discussed in this section although they are just as relevant to an understanding of costs and benefits.

6.36   MSC evaluations have shown that computerised vacancy circulation speeds up distribution, but that the main improvement is in circulation between offices. In areas with very low volumes of (inter office) circulation computer systems may not justify their costs. Similarly (particularly having regard to previous paragraphs) computer matching may not have much to offer in offices with relatively small files and volumes of business (possibly one third of MSC's local offices - but a much smaller proportion of total business). On the other hand, statistics need to be collected from all offices. This indicated that both on-line and off-line communications may be appropriate.

6.37   It also seems a reasonably firm hypothesis that any benefits of computerising employment service operational date will be related to file size and the extent and nature of office interactions. There will be a greater average improvement from computer circulation (and, probably, from computer matching) in the average speed and effectiveness of submissions in an area where 30% of vacancies are filled by jobseekers from other offices (ie, than those holding the vacancies) than where the proportion is, say, 15%. In Great Britain this proportion increases (though there are exceptions) with the size and complexity of labour markets; the largest being London with about 30% and the national average being about 15%. It is probable therefore that the benefits of computerisation will increase proportionately (and probably in relation to costs in view of the computer overheads) with the size of, and the number of offices in, the labour market.

6.38   For MSC the evaluation of Jobscan also directed attention to issues of "mismatch". To what extent is this problem one of matching employment service data (about vacancies and jobseekers) and to what extent is it a problem of penetration (ie, the nature and extent to which an employment service is used by jobseekers of different kinds and by employers for different kinds of vacancies)? Would computers help in matching if all the jobseekers registered with an employment service were unskilled, but all the notified vacancies were for skilled people? Is the basic problem one of improving "inefficient" clerical systems or one of mismatch between registered jobseekers and notified vacancies? Suppose the clerical systems are not so inefficient after all; MSC fills 80% of notified vacancies in Glasgow, but only about 55% in London. Are London staff less efficient, and if so why are a greater proportion of jobseekers placed in London? What are the limits of performance to be obtained from using computers?

6.39   This is fundamental for the way computers may affect the role of an employment service as it relates to the other, more commonly identified, aspects of the "mismatch" problem. To what extent is this one of finding jobseekers with the same occupational, etc, experience as the vacancy requirement and to what extent do employment services attempt to "change the nature of the match" in the interests of labour market efficiency? How is "upward labour market mobility" promoted? What techniques are used, for example, in finding suitable vacancies for handicapped jobseekers? Are they compatible with a general (matching) solution which may emphasize

"match", and not "mismatch", factors? Again, BA differentiates in its vacancy filling between those which are for only temporary jobs of very short duration and 2/5 of its placings are in such temporary jobs. Is the matching problem the same for these and do they justify the same amount of attention?

6.40   This section has raised some important general considerations affecting the possible use of computers by employment services for matching.

6.41   Good design depends on clear objectives and understanding of the process in which computer systems are to be involved. Getting the right understanding is not easy for employment service managers but without it, given the size and nature of some projects, the risks of failure are great.

6.42   In particular, "quality" of placings needs definition and the opportunities for improvement need to be clarified. There are limits to these opportunities because no employment service controls its labour market and the potential for improvement is affected by the degree of "mismatch" both in the labour market and the vacancy and jobseeker registers. There is a difference between achieving the best individual engagements (which emphasise match factors) and the best balance of engagements between jobseekers and vacancies as a whole (which sometimes involves "changing the match"). In the design of computer matching systems the selecting processes must have regard to these points as well as to the relative advantages and limitations of computer and non-computer methods (including the computer interfaces with selections and submissions made by staff).

6.43   This emphasises a point made earlier in the report that large-scale employment service computerisation affects, or has to have regard to, the nature of its intervention in the labour market. Computer matching or the problem of retrieving data from computer files, is therefore a major strategic issue in the use of computers by employment services. In principle one might attempt to distinguish three stages in computer developments.

6.43.1   There are those systems which use computers purely as data-handling mechanisms without raising the retrieval (for matching) question; for example statistical systems or computerised circulation, submission recording or file maintenance; secondly (and in combination with the first stage) use of the computer as a retrieval tool but only up to the point where selection is fully under the control of staff (for example the BA experiment with an "on-line job bank" (section 8) is perhaps in this category); thirdly the involvement of computers more fully in the matching process.

6.43.2   The first stage affects management objectives to reduce costs, or to improve data distribution and recording (eg, to increase accuracy or improve data analysis) or to change resources (eg, by releasing staff time). The second occupies an intermediate state depending on the details of the option adopted. The third stage begins to affect aims and labour market intervention policies in general. For example, the use of computer systems by MLPS is seen as an essential support to the system of social priorities in the Italian labour market.

6.43.3   Each of these stages raises the computer requirements, the cost and the time-scales of development by an order of magnitude. They therefore increase the risks as well as presenting opportunities. Previous paragraphs have questioned the potential which may exist for improving matching in computers.

6.44   It is also a theme of this section that employment service work is characterised by selectivity as to cases, the use of resources, the nature of the matching factors the various methods or systems used or as to labour markets or groups of occupations. As an example, BA has computerised the matching of professional occupations without a high-cost system (but has not apparently measured cost-effectiveness). The analysis questions the "general" computer system solution both because of the nature of employment service operations and because "matching" needs to be defined and understood; not generally but systematically so that it can be interpreted efficiently in the design of (disciplined) computer systems. If this understanding is not sought, there is the danger that general computer systems will be attempted either because of the search for solutions to problems which are not fully exposed or in circumstances where selective solutions to particular problems would yield better results.

6.45   Although some major issues are raised they are about how, and not whether, computer methods should be introduced into employment services; that is to say they are systems questions. It is not only the widespread developments in the use of computers for handling information which point to their wider use by employment services but that they are, in fact, already being used productively by most of them for some applications.

7. STATISTICS AND MANAGEMENT INFORMATION

7.1 "Information is the raw material of decision-making. Given perfect information (which would involve knowledge of future events and comprehensive measures of value) decisions would make themselves".[†] - Of course this ideal is not possible but the quality of decision-making is undoubtedly affected by the quality of the information or intelligence on which the decisions are made.

7.2 In nearly all organisations management information systems do not realise their full potential because of impediments to design and operation (for example problems of measurement). At several points in previous sections there have been references to the need to measure and to information which might improve decisions as to the choice and operation of employment service computer systems.

7.3 All the employment services provide labour market information and all of them produce statistics of unemployment and vacancies (except in Italy where there is no file of outstanding vacancies) including flows through the register, usually with detailed characteristics. They vary, however, in the emphasis which is placed upon their roles as market media (filling vacancies and placing jobseekers), as agencies for providing labour market information (eg advice to jobseekers or employers about the state of the labour market in particular circumstances) and providers of labour market intelligence (ie statistics of labour supply and demand at national or regional levels (LMI)) or local labour market intelligence (LLMI) at the local level. For purposes of further discussion it is assumed that local labour markets are defined as more or less self-contained areas in which people travel to jobs (Appendix C).

7.4 Nearly all the employment services (or the government departments to which they provide the "raw" data) use computers at least to collate or aggregate statistics (which have been extracted locally by clerical methods). Some, eg MLPS, maintain on-line computer databases of such information for immediate and easy retrieval. Others, for example ONEM and ANPE, have for some years held data in computers on a case-by-case basis (ie the statistical details of each current registrant or vacancy) so that the computer can do all the extraction, collation and analysis, as well as providing facilities for on-line access to data.

7.5 As compared with matching this is a task for which computers are particularly suited since much of it involves computation (the original function of computers) or database analysis for which computer techniques are now well developed, although the design of computerised statistical files can be complex. The main problems for computerised statistical systems lie in data collection and input which have to be undertaken by staff. If, for example, unemployment figures are taken from a computerised registrant file and staff forget to delete registrations (from the computer) when they are terminated, then the unemployment figures will be overstated. Similarly if they forget to input new registrants they will be understated. Usually these errors will be discovered and put right eventually but possibly not before statistics are extracted. Any omissions or delays in the inputting of such data therefore cause (uncorrected) errors in the stock count and the data

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[†] From an MSC internal paper about Management Information Systems.

may appear in flow statistics for a later period than that in which the events actually took place. In some circumstances delays in inputting data may compensate for delays in terminating cases; in others the errors may be compounded.

7.6   Such delays are not only caused by clerical errors. They may result from postal transmission to the computer centre or be inherent in the data. For example if an unemployed registrant neglects to inform an employment service of the fact that he has ceased to be unemployed (and a large number do not) it will not be discovered until a later date when he fails to renew his registration.

7.7   As a general rule staff will be motivated towards good data collection or computer operations where they are closely related to their operational tasks. For example, where computers help in vacancy circulation or matching. Statistical tasks tend to be more abstract and the requirements for accuracy in data collection less well understood by staff. It is sometimes possible to ensure good data collection both for operations and statistics, (and therefore reduce problems for staff who have to deal with any errors) by building on this strength at the design stage. Operational and statistical systems can often be made to fit comfortably together although there are sometimes conflicts.

7.8   Computerised statistical systems therefore create some problems which may not exist in clerical systems but they offer great possibilities for improving accuracy and quality of data in other respects, for increasing the range and frequency of analyses and for producing statistics which are too complicated, or too costly for clerical preparation. Provided arrangements can be made for all original data to be input, computers also offer possibilities of control; ie of monitoring and auditing errors or discrepancies and their causes so that accuracy can be maintained. This possibility arises both because computers can analyse and present more information and also because they keep (case by case) records which can be reproduced (and if necessary counted again) or compared with the original clerical documents.

7.9   Consultants who assisted MSC in the investigation and design of · statistical systems identified these components of accuracy and control.

    7.9.1   Definition. No measurement can be accurate (indeed it cannot really begin) without a definition of what is to be measured and in what units. Usually these will be numbers but, for example, duration may be measured in days or weeks. Definition involves eg deciding to what extent unemployment statistics shall be based upon unemployment benefit records (particularly as to the recorded spell of unemployment) or to what extent they are based upon registrations (or both) and how this is interpreted in terms of procedures. These may affect frequency
    -    of attendance, or whether dates of first and last unemployment are collected or the arrangements for transmission of information between benefit organisations and the employment service. Also whether seasonal, short-time, student, etc unemployment is to be identified and included and the methods needed to correct for delays in data, etc.

    7.9.2   Completeness of Data. Procedures are needed to ensure that all appropriate data is entered into the computer, and to measure the extent to which it is incomplete at any one time (eg when the

statistical count is taken). Clearly, missing data cannot be measured. This has to be done, in arrears, when all the late information has been received, but earlier estimates of inaccuracy due to incomplete records may also be possible, based on past experience or system control features.

7.9.3 Quality of Data. This depends on the methods used to ensure that the characteristics of the data record are maintained as accurately as possible. For example, computer checking or validation procedures may be used or there may be clerical controls on data entry or to ensure that data is not lost in postal transit.

7.9.4 Timeliness of Data. These are arrangements made to minimise or account for data delays and to adjust statistics for consequent inaccuracies. In practice the computer solution may be to collect the dates (eg of first and last unemployment) so that the computer can count according to the actual state of the individual case and not the date on which records are created or terminated.

7.10 The design of statistical systems, therefore, also raises a series of problems for solution and these depend upon the user requirement and the nature, quality and accuracy of the information required. Absolute accuracy is rarely possible but if reliable measurements are to be made, or if the measurements are to be reliably interpreted, the degree of inaccuracy in any set of figures needs to be known, given the definition from which it is measured. Any decisions based on information of unknown accuracy will be made, to some extent, on guesses.

7.11 Since accuracy and measurement depend on the definition and since this is drawn from the actual detailed procedures and systems specification, the introduction of a computer system (whether for operational and/or for statistical applications) may change any statistics already being produced. Even a system which speeds up the filling of vacancies, or the passing of information about the filling of vacancies, will have a marginal effect on the vacancy stock and may result in a marginal increase in the number of placings recorded in the first month of operation. (See also paragraph 7.24.2).

7.12 LMI is mainly used, by governments or other manpower agencies, for economic, manpower or social management or for policy formulation. Employment services themselves use it at the LLMI level in giving information and, eg, interpreting changes in performance between offices in different areas. As management information it also enters more generally into operating decisions; for example information about volumes of business usually helps determine the distribution of staffing (and other resources) between offices or local areas. Nearly all the employment services regard levels of placements as a performance indicator.

7.13 The employment services in this study probably vary more considerably in their styles and methods of management and in their use of management information than they do in their operational practices and this is reflected in the amount and quality of management information available. It is very difficult to get good quantitative comparative data (it is a major study in its own right) across six large businesses like the services participating in the study. This is partly because there are serious problems of comparing data based on different circumstances and definitions but mainly because of the types and amount of information collected (or not collected) by the individual services.

7.14 The approach to accuracy and quality of data also varies. There is a tendency in the employment services to regard accuracy in management information as of low relative importance when in fact the levels of accuracy should be a function of the use to which the information is put. These attitudes towards accuracy are possibly engendered partly by sheer problems of measurement and partly because of the limitations of clerical information systems. It is also the practice to collect information as it seems to be needed although the fluctuations in labour market and the other variables make time series analysis (of information regularly collected) very important in employment service systems.

7.15 The other big problem, which affects attitudes, is that it is difficult to put a value on LMI or management information (though it is often easier to cost). Employment services naturally give priority to operational systems and a great deal of effort has been put into computer-matching. However, equal or nearly equal benefits may be possible from improvements in management information. To spend, say, 10% of the annual budget of an employment service on developing and piloting a big computer system and then to find out it is perhaps of limited value, or that cheaper system would have been nearly as good (and more quickly implemented) is not exactly the best approach to management if a better decision could have been taken on early information. To be able, continually, to take better decisions because they are based on better information may well lead to cumulative improvements in performance.

7.16 Managers use information to assist them in their tasks of planning, directing, controlling and reviewing. All of these require or depend on some form of performance measurement. Are there better ways (systems) of performing operations? What are the best ways of achieving objectives? Are the best results being obtained from existing systems and how can they be improved?

7.17 As management information systems (MIS) are determined by management objectives and requirements and since managers have difficulty in seeing the possible benefits of computers in this direction, it creates difficulty for system designers. There are no simple ways round this, essentially management problem. Nor are there available ready-made systems because management information has to be tailored closely, to the objectives and individual circumstances of an organisation. All that can be done in this report is to draw from examples and questions presented by the study to indicate the nature of the opportunities and issues.

> 7.17.1 It would seem that employment services can fill vacancies more quickly and that this may result in important economic benefits. If they are to improve in this respect and choose the best methods, management information should be available on the speed with which vacancies are filled. This is difficult for clerical analysis but possible in computer sytems which collect comprehensive cases-by-case data on vacancies; but it does depend on specifying and defining vacancy duration.

> 7.17.2 There are difficulties in identifying scarcity vacancies and occupations. Measuring scarcity, eg, by comparing numbers of vacancies with numbers of unemployed has its limitations because employment service penetration varies from occupation to occupation and there are problems of classification. It is possible that indicators of vacancy duration may improve understanding of "scarcity" or assist in monitoring it. Measurement of vacancy duration ties in with speed of vacancy filling and so requires definition and appropriate data collection

arrangements. Section 5 of the report indicates a possible link with objectives of improving quality of placing work through the identification of scarcity vacancies.

7.17.3 "Quality" of placings has been linked with stability - ie of job tenure. Not all vacancies are for permanent jobs and not all jobseekers are permanently available. There is even an argument that employment services largely exist to ensure mobility; that manpower resources are efficiently distributed according to varying demands eg for seasonal or intermittent (large construction), jobs or that "marginal"labour resources (eg students or other people who are temporarily available) are put to good use. A high proportion of BA's total placements are into temporary jobs (other services do not apparently have this information) and research in Britain into temporary work suggested that nearly 50% of all job engagements might be categorised (on a very broad definition) as temporary. This does not necessarily conflict with promoting stability of job tenure since some jobseekers want, and are available for, permanent employment and others seek temporary jobs. Distinctions of this kind are implicit in the labour market matching function of an employment service overall. If quality (stability) is to become an objective of computer system design, not only will performance have to be monitored, but the relationship of this objective to labour market and individual needs and to employment service operations will have to be understood. Information about such characteristics of jobs and jobseekers may give a better picture of the segmentation and dynamics of the labour market than that which exists at present and have an effect on employment service objectives themselves. Indeed changes in information technology itself may eventually change labour market relationships between work contracts, the location of jobs and the duration of employment, since homework may increase.

7.17.4 As a contribution to developing its computerisation plans, MSC made an assessment of the implications for each of its local offices having regard to their size, volumes of data and communications with other offices (for circulation and matching). Among other things this showed that about a third of the network consisted of offices which did not need computer assistance for their operations but which could be included in computerised statistics by off-line data collection. The analysis therefore had considerable implications for the cost of systems and for their design in general. It was made possible because the information is regularly recorded and included in management information reports. If computer configurations are to be designed on the most cost-effective basis this kind of approach will be essential.

7.17.5 Although MSC and ANPE have computer systems for circulating vacancies the extent and nature of distribution (ie the circulation patterns) are determined by managers. Efficiency requires that vacancies are circulated to all offices which can help fill them but that staff do not waste time handling copies of vacancies they are not going to fill (or perhaps have only a very small chance of filling). Where vacancy statistics are computerised with circulation it is possible to analyse vacancy circulation patterns and volumes (regularly) in the computer in relation to the results achieved, so as to inform circulation decisions. It is more important because the computer sy..em may lift the level of control of circulation (in the case of MSC to the Area or regional level). This is therefore an example of the use of management information for control purposes.

7.17.6 There are close relationships between information for operational (matching) purposes, labour market information and management control data which is illustrated by the problems of matching very mobile jobseekers with vacancies some of which may not be easily filled from local resources. The attempt to match such jobseekers with all possible vacancies in the national (even more the supra-national) labour market imposes costs of handling large amounts of data for apparently small results and with additional difficulties of retrieval (or matching). Employment services react to this problem in selective ways, usually by involving regional or provincial offices with a broader view of the labour market (than local offices). SEDOC procedures are a good example in that they proceed from broad labour market analysis to a lower level of (matrix) comparisons of vacancy and job-seeker occupations or skills (see paragraph 8.60) down to individual selection. Computer systems are not going to provide a total answer to this problem but they may make a contribution and (like matching) it will require a careful system solution in which information for management control purposes will be important. Some systems managers tend to dismiss this question (of matching at a distance) because it is small in scale but it has implications for computer communications and such 'matches' may have better than average economic (or social) values.

7.18 The services participating in this study do not, in general, describe their management information as a system, or specify the interfaces between different types or sources of data or the use of the information (paragraph 7.16). The relationships between information and management therefore tend to be obscure.

7.19 The process of developing a MIS was stimulated in MSC by the circumstances of its creation, by the system of public accountability with which it has to comply and by a deliberate management decision to adopt a style which involved participative planning, the measurement of performance and ambitions to be as cost-effective as possible. Time has shown it to be not an easy or quick task. Early in the creation of MSC it was necessary to design a new, computerised, financial accounting system and it was recognised that this would have system interfaces with other areas of management information. A joint team of MSC staff and consultants carried out an investigation and reported on the structure of the MIS which seemed to be required for the employment service. Similar structures have since been extended more generally across MSC.

7.20 Four main components of the MIS were identified ie Financial and Management Accounting (FMAS), Staffing Information, Operating Statistics and LMI. Financial accounting is concerned with cash flow and ensuring financial integrity. It becomes management accounting when it enters into budgets and is related to the specific resources associated with particular elements of cash flow accounting and the outputs they achieve. This may be analysed according to employment service programmes, output costs (eg cost per placing), units of organisation, or individual systems or projects. Staffing information was identified as a separate component because staffing is the major resource, because there are separate accountability systems linked to numbers of staff and because of the need to relate the use of staff time to operations or to types or units of organisations (for example, MSC has compared costs and outputs of jobcentres with other types of offices).

7.21 The jobseeker and vacancy data involved in this study provides employment services with management information about its operations ie with

volumes of activities (eg registrations) or results (placings). This information is used to assess performance, may be combined with staffing information to decide staff allocations to offices or units of organisation, and may be linked with staff costs (by allocating the amount of staff time used according to the volumes of activities performed) for FMAS. In the execution of active manpower policies, employment services proceed from manpower intelligence to operating statistics (volumes of potential types or groups of jobseekers) to assess and monitor needs and achievements in relation to the possibilities and programmes (eg of work creation) available.

7.22 These four components of the MIS therefore draw from a variety of sub-systems to inter-related requirements of definition and analysis. For the Employment Service Division of MSC, for example, the ability to relate data to each local office is important because it is a basic unit of organisation as well as having a geographical relationship with its labour market.

7.23 Given the extent to which the use of computers is likely to develop over this decade, the timescales of developments and the problems of definition, design, implementation and database construction, the interfaces between data and systems cannot be neglected if the full potential of computers for helping management is to be realised. It is not possible to carry out all this design work at once but the general structure needs to be set out and understood and critical areas of systems work carried to the initial feasibility stage so that the overall design requirements can be appreciated as each individual development proceeds.

7.24 Before terminating this section there is one important aspect of management information and performance measurement which is particularly relevant for computer developments (and this study); this is evaluation. Evaluation can be regarded as a formal aspect of measurement created by the special circumstances of a project. There are certain features of project evaluation and the employment service environment which make this particularly difficult and create certain requirements.

 7.24.1 The introduction of most employment service computer systems, even for experiments, affects local office data and operations. To get information about changes it is therefore necessary to take measurements in advance of system implementation and then again after it has settled down in operation.

 7.24.2 A recent evaluation identified four main components affecting changes in performance figures. There is sampling error, that is imperfections of measurement due to the use of samples (eg of offices or performance data over periods of time) which is itself related to the degree of variance of the figures. Employment service data is also subject to strong external variables including labour market differences and fluctuations or organisational, staff etc changes. These can be considerable; GB experience is that, even at regional level, quarterly variations may be as much as 20% in placings or vacancies while at local office level the fluctuation may be up to 50% on a month to month basis. In some cases also the introduction of a computer system may affect measurement itself. Computer systems collect data differently and computers usually count more accurately than staff so that changes in data may have to be measured. Finally, there is the independent variable, ie that which needs to be measured as brought about by the introduction of the new system.

7.24.3 The information required for measurement and interpretation may not be available on a regular basis so that new measurements may need to be set up in advance of implementing the system or experiment and special methods may be needed either for new data or to assist in interpreting other information. Examples are quoted in paragraph 5.14.2 (about speed of vacancy filling and distribution) and in paragraph 6.26.5 (about computer and non-computer generated placings).

7.24.4 For most employment service computer systems there will be several components for each evaluation and it may have to be organised in relation to other requirements; for example, the contractual arrangements for testing and accepting the computer system from the supplier, or the need to arrange parallel running of the new and old systems in ways which minimise the effects on staff and organisation. Good planning for evaluation takes account of the possibilities for linking components so as to reduce costs and increase the efficiency of the evaluation. The components will include technical (eg hardware, software, telecommunications and systems) performance, operational performance (which may have to be related to systems features eg matching circulation statistics etc,) statistical performance (if appropriate) costs, and staff attitudes and behaviour.

7.24.5 There are four basic requirements for evaluation planning;

   a   the objectives to be met by the evaluation have to be specified clearly with the requirements for measurement;

   b   the evaluation has to be planned well in advance of the mounting of an experiment or pilot system; each should be seen as related aspects of the same problem;

   c   the responsibilities for carrying through particular components of the evaluation or sets of measurement have to be allocated;

   d   the evaluation has to be managed. An individual needs to be made responsible for the efficiency and conduct of the evaluation, the co-ordination and progressing of the components and the production and consistency of the report.

8. THE EMPLOYMENT SERVICE SYSTEMS

8.1   This report contains only basic, abbreviated, descriptions of the systems, plans and strategies of the participating services. The report has been compiled from more general descriptions which were completed during the study, agreed with the employment services concerned, and circulated for the information of all the systems managers. Copies of these descriptions are available from the respective employment services or, with their consent, from MSC.

AD (Denmark)

8.2   AD is a separate organisation within the Danish Ministry of Labour and works closely with a system of labour market boards. Its tasks are to be part of active manpower policies to provide labour market information and to "offer more efficient methods of matching jobseekers and job vacancies to meet the requirements that all unemployed should be matched against the vacancies they are suited for and that employers should get the best jobseekers for their vacancies". In addition to providing employment services, AD is responsible for supervising the unemployment funds which administer the system of unemployment insurance in Denmark. In this capacity it also provides certificates of attendance (claimants attend with frequencies of between one and six weeks according to unemployment fund and occupation) by claimants at its local offices. The local network consists of 27 main offices (AF), 13 of which are linked to regional offices, and about 100-150 AF with the addition of some very small, subsidiary, offices.

8.3   AD fills vacancies either by self-service or traditional methods. Press and other media are used to advertise services but not vacancies. Self selection is operated by the display of vacancies without employer details but submissions are made by placing staff. About 80% of notified vacancies are filled, on average.

8.4   AD relies for its computer system facilities and support on a large centralised computer organisation (DATACENTRALEN) which provides a great deal of the computer services for all the public organisations in Denmark. Official statistics in Denmark are also centralised in a statistical office (Danmark Statistik) so that AD works closely with these 2 organisations.

8.5   The existing systems and plans of AD are as follows.

8.5.1   All operational systems are based upon clerical procedures.

8.5.2   Statistics obtained from vacancy data are clerically compiled and analysed for labour market and management information. Aggregations are available from national down to AF level and these provide AD with stock and flow information about its notified vacancies and placings.

8.5.3   Unemployment statistics are obtained from a computerised, case by case, database (the CRAM system) of claimant data with the addition of the details of unemployed registrants who do not claim unemployment benefit. This system also gives approximations to the flows of ADs registrations, but the statistics do not include occupation or industry and the geographical definition is imprecise.

8.5.4   AD plans to computerise all its registrant and vacancy data in one large computer for matching circulation and statistics.

8.6 The CRAM system consists of a number of inter-linked files. One contains the details of all the members of the unemployment funds (ie, it is a register of insured persons) and this is linked to the Danish central population register (CPR) through a system of personal identity numbers (generally used and remembered by all the Danish people) generated from a composition of date of birth, a squence (of 3 digits) for those born on the same day and a final digit which indicates sex and also acts as a check digit. The CPR is on-line so that basic personal data can be retrieved or linked to any system by use of the personal identity number. The second, CRAM file consists of details of persons actually claiming unemployment benefit and this is provided by the unemployment funds (either on a magnetic tape or through clerically prepared data) and is based on a declaration by the claimants of their daily unemployment position. The third (KIS) file contains details of unemployed registrants who do not claim benefit (mainly young people who have not yet qualified). These are sent to the computer by the AF on daily lists of new and terminated registrations (giving the personal identity numbers).

8.7 The planned computer system (paragraph 8.5.4) which would provide for matching, vacancy circulation and statistical data collection is at the feasibility stage so a precise description is not possible. The plans are based upon working party proposals under which 2 registers would be set up, one of jobseekers and the other of vacancies. The jobseeker details required for matching would be an extension of those collected for statistics (by CRAM). The other register would contain the vacancy information (CRAM-Job). Vacancy data would be input at job notification centres which would be responsible for vacancy receipt, circulation and follow-up with the AF to ensure all orders are properly serviced. Otherwise contacts with employers would rest with each individual AF.

8.8 The working party recommended methods of on-line working in real time (5 seconds response) using VDUs connected to a central computer and with printers in every office. Most local office staff would have access to a VDU and nearly all clerical records would be eliminated. Methods of searching the vacancy file to find selections of vacancies for jobseekers and vice-versa would be developed. The system would therefore provide continuous bilateral matching facilities. Searches would be based upon trade/training (using the Danish system of occupational classification) geographical area, age and full-time or part-time work. To permit employment staff to make final selections other information (eg summary job preference requirements and labour market experience) would be included in computer records as well as the personal details. These proposals are similar to the CAPITAL system of MSC.

8.9 The working party made provisional recommendations on the process of implementation which has been adopted by AD as its planning time-scale. At present 3 stages are envisaged;

8.9.1 Six months to the end of 1980. The development of a systems specification and user requirement, the beginning of programming and development work, of data collection, of jobseeker details and of staff training.

8.9.2 Twelve months to end 1981. Completion of taking on jobseeker data, continued programming and systems testing, the purchase of equipment and the extension of staff training.

8.9.3   Six months to mid 1982. The piloting of the system in a small
area of Copenhagen; this involves the establishment of job notification
centres, the abolition of clerical registrant records, the take-on of
vacancy data and the establishment of a central systems control and
development unit.

8.10   The existence of the CRAM system will enable file reconciliation
(comparison) techniques to be employed and it is hoped that this will enable
the computerised registrant file to be kept more up to date than is the clerical
one at present. However there will be some delay (perhaps two weeks) in
getting information about terminated claims.

8.11   The strategy of AD is therefore to move very rapidly to comprehensive
computer data collection and analysis systems largely eliminating clerical
records. This would build upon existing computer files of personal and
statistical case data. From this programme, AD and Danmark Statistik (DS) expect
that the combination of computerised claimant and registrant data will enable
AD to improve its supervision of the Unemployment Funds, the maintenance of its
jobseekers register and, together with the vacancy data, the labour market
statistics. DS is expecting to fill gaps in the unemployment statistics
about occupation, industry and geographical analysis. AD seeks improvements in
the proportion of vacancies filled, the speed with which they are filled and
also the quality of its placing work. It has carried out studies of "mismatch"
(the paradox of the co-existence of unfilled vacancies and unemployed people)
and hopes that by better matching there will be improvement in job stability
(ie longer job tenure) with consequent reductions in unemployment and employers'
recruitment costs. AD hopes to achieve these benefits mainly through better
matching by its staff; assisted by preliminary selections made by the computer
and a reduction in the amount of routine clerical work.

ANPE (France)

8.12   ANPE is a self-managing public Agency accountable to the French Ministry
of Labour for the provision of employment services of matching vacancies and
jobseekers, providing labour market information and advice, helping jobseekers
to find suitable training, providing labour market statistics and assisting the
agencies (ASSEDIC'S) concerned with the payment of unemployment benefit. It
does the latter by providing facilities for the attendance of claimants
(twice monthly) at its local offices and reporting cases where entitlement to
unemployment benefit is in doubt.

8.13   It is organised into 25 regions, with 100 departments (Sections
Departementals) and 600 ALE (Agences Locales), supplemented by attendance at
the local commune where there is no ALE. Service is broadly organised
around three methods, ie self-service (appendix E), matching at interview on
first attendance by the jobseeker ("flow" matching) and register matching
(registration against the file of notified vacancies and vice-versa). ANPE
has about $3\frac{3}{4}$ million registrations (plus some jobseekers who only use self-
service), and about 1.3 million notified vacancies each year.

8.14   The following systems are in operation, under implementation, or
planned (they are described in more detail in subsequent paragraphs).

8.14.1   The computerised statistical system (of registration and vacancy
data).

8.14.2 A message-switching system for circulating vacancies (SITO 1). This is being replaced by a more up to date version (SITO 2) which also includes vacancy statistics, the recording and control of submissions and organising vacancy follow up with employers.

8.14.3 A message-switching system (LICRA) (similar to SITO 1) which connects regional offices for the inter-regional circulation of vacancies (including those of professional standard) and the passage of general messages.

8.14.4 An experimental system (recently introduced) of management information (Analyse de Gestion).

8.14.5 A comprehensive system (project SAGE) for matching, vacancy circulation and statistics of registrants and vacancies. The feasibility study for this has just been completed.

8.14.6 A system (registrant up-dating) to replace attendance by benefit claimants at the ALE by a system of postal declaration of unemployment.

8.15 The statistical system has been in operation since 1976. ALE send copies of order or registrant details on specially designed forms to 2 centralised data preparation centres from which transaction records are sent on magnetic tape to the Ministry of Labour Computer Centre for statistical processing. Analysis is possible as to stocks and flows of registrations, vacancies and placings (by occupation, industry, age etc). The amount of detail available for management information is limited.

8.16 SITO 2 will link 400 ALE to 7 mini-computers (leaving 200 offices with low volumes of circulation to provice data off-line); the programme of implementation should be completed by mid 1981. Under this system ALE are equipped with input printers connected by telephone lines to a mini-computer (each computer covers a number of regions). Vacancy details are keyed into the terminals by ALE staff and the computer reorganises the data to print out copies of vacancies (for use by staff in matching) and self-service display cards. The computer is programmed to distribute copies to ALE according to pre-determined circulation patterns but the operator can specify particular offices, if necessary. Details of submissions (as they are made) are keyed into the computer which links them with appropriate vacancies. Submissions on any vacancy order are prohibited after a specified number have been made. The computer provides regular, automatic information about the state of vacancies so that staff can organise their communications with the employer more efficiently. So as to ease implementation of the system in ALE the statistical facilities of SITO 2 have not yet been made operative. An evaluation of the results obtained by this system is in course of analysis.

8.17 Staff salary and financial information and computation is at present handled on the Ministry of Labour computer. ANPE intends to develop its own system for these applications beginning in 1981.

8.18 The experimental (Analyse de Gestion) system brings together new data about staff utilisation with operational data about registrations, vacancies, placings, training applications etc from the statistical system and from other operational information systems. These sets of data are being combined for computer analysis. The new information is obtained from monthly reports sent by each ALE to the computer centre. The reports are based upon the

planned allocation of staff by function and broad groups of activities (eg matching, reception, management etc) in units of half days which are summarised monthly. Some additional information about operational volumes (eg submissions) is also included. The purpose of this system is to enable local regional and head office management to get a better understanding of how staffing is organised and used in relation to activities and to performance. It is recognised that the information will be at a broad level of detail and not precise and that experience will need to be gained with interpretation of the data. It is hoped that it will be possible to develop ratios (as well as totals) which will assist in the monitoring and interpretation of changes in performance.

8.19   The feasibility design for <u>project SAGE</u> envisages a comprehensive computer system for collecting and processing all local office data about jobseekers and vacancies to cover matching, vacancy circulation statistics and management information: Also the processing of registrant data for ANPE dealings with the benefit organisations and for the maintenance of the registrant file, and the holding of a limited register of employer information.

8.20   In principle, the feasibility design is similar to the CAPITAL pilot system of MSC (see paragraph 8.73). It envisages the use of high power computers with substantial local office terminal configurations of VDUs and printers. A national system would require computer processing at 7 inter-region computer centres with some local intelligence to control terminals etc. Each inter-region would include between 2 and 5 ANPE regions and is expected to be very largely self-contained as regards jobseeker mobility. There is no specific provision, as yet, for computer to computer communications.

8.21   Work on the main design study is about to begin. The system will then be piloted in offices around Rouen leading, if all goes well, to its possible introduction into the Paris region in 1983. Full national implementation would probably take until 1987 but because of the cost, the system is likely to be restricted to those inter-regions with the biggest urban areas.

8.22   Some fundamental decisions are still to be made about the system design and it may differ in some respects from the CAPITAL system. Centralised order taking is not envisaged, decisions on the database have still be be taken and it is recognised that flexibility in implementation will be necessary. SAGE will have to replace the SITO2 system and there is a preference for an incremental approach which would enable applications to be built up during implementation instead of installing the full system at once in each office. Nor has a decision been taken as to the extent to which clerical records will be replaced.

8.23   Under the experimental <u>register-updating system</u> details of each new registrant will be sent to a management (computer) centre. Each new registrant will be sent a book (carnet) of pre-printed computer forms. This contains forms which the registrant has to send to the computer centre on the 25th of each month if he has remained unemployed; another form is to be sent when the registration is to be terminated and a third is sent if there is a change of circumstances. The jobseeker will complete the forms by "bar-marking" a space for each day when he was sick or in work so that data can be "read" by the computer through the use of an optical character reader. If any registrant does not return his form within 10 days he is not included in the statistical (stock) count of unemployment. The benefit authorities (ASSEDIC's) will be informed when registrations (by claimants) are made and terminated or of any other relevant information about the spell of registration.

8.24   An experiment with this system has begun. If successful it will be extended to 40 departments in 1981 and then nationally in 1982. The register up-dating system will be linked with the statistical system to compile unemployment and registration statistics.

8.25   By 1978 ANPE had a variety of computer developments including an experiment with a comprehensive system (AIDE) which had similar system objectives to SAGE but using mini-computers and distributed processing. AIDE was not successful and the experience led ANPE to conclude that split database communication systems are not feasible at present. In 1979 therefore ANPE carried out a review and obtained authority for the computer strategy and developments outlined above. It now has its own central computer and plans to be largely independent for its processing.

8.26   The computer plans are part of an overall strategy of ANPE which seeks over the next few years to increase market penetration and improve the quality and quantity of its services both to employers and jobseekers. In pursuance of this strategy ANPE plans some increase in the local office network, to considerably improve marketing and publicity (eg using TV advertising), and to modernise its management systems. Only moderate increases in staff are envisaged and the computers are expected to reduce routine work so that staff can handle more business. The overall strategy therefore depends, to some extent, on successfully implementing the new computer systems.

BA Germany)

8.27   The BA is an independent statutory agency. It has a governing body with representatives of employers, workers and public bodies and a smaller, similarly constituted Executive Board. BA management can attend Executive Board meetings and speak on matters under discussion which affect their responsibility.

8.28   The Employment Promotion Act of 1969 obliges BA to join in an active and forward looking labour market and employment policy. It requires BA to peform employment service functions (including vacational guidance and vocational training and rehabilitation) the creation of employment opportunities the calculation and administration of unemployment benefit (and certain other payments systems) and the undertaking of vocational and labour market research. In its employment service operations BA puts the emphasis on promoting occupational and geographical mobility and acts in accordance with the principle of impartiality (see paragraph 6.13).

8.29   The BA is organised with 9 regional offices, located in the Federal Lands; below these are 146 local offices and about 500 subsidiary offices. The geographical areas of the local offices broadly correspond to labour markets and the economic structure and they carry out both employment service and unemployment benefit functions. The calculation of unemployment benefit is carried out on large central computers and payment is made centrally by post or direct to bank accounts. Whilst the subsidiary offices handle general enquiries and initial documentation, most benefit work is concentrated at the local offices which are responsible for data collection. This is done by typing the details on special forms which are sent to the computer centre to be input by optical character readers. There is no requirement for regular attendance by claimants; they are called for an employment review interview after periods of up to 3 months and there are other unemployment benefit checks.

8.30   The bias of employment service provision is towards interaction between
employment staff and jobseekers. Self-service methods are not used (but see
below) and the emphasis is on "traditional" methods of service. "Initiative"
approaches to employers for particular jobseekers are encouraged and a weekly
newspaper containing details of the more mobile professional or highly skilled
jobseekers is sent to all employers with more than 200 employees. In 1977 the
BA had about 3½ million registrations, about 1.9 million notified vacancies and
1.26 million placings. However these vacancies and placings exclude those
into temporary jobs (of less than seven days' duration) of which BA filled about
850,000. Not all these involved registration.

8.31   Until recently all BA's employment service systems have been clerically
operated. The unemployment benefit computer system is now being improved by
the introduction of small computers into all the (146) local offices for data
collection and validation. Data will be transmitted to the central computer
by means of dial-up (including automatic dialling) arrangements. At a later
stage the data bases of claimant information will be held in these local
computers (with on-line retrieval) but calculation and payment will still be
made centrally.

8.32   The employment service computer systems implemented or planned by BA
are as follows.

> 8.32.1   A computer system for matching professional and managerial
> vacancies and jobseekers (the FVD system): in operation since 1974.
>
> 8.32.2   A microfiche system for circulating details of vacancies and
> providing a form of half-open vacancy display for jobseekers.
>
> 8.32.3   An experimental system in the early stages of development
> which will hold all details of vacancies against which jobseekers can
> be matched (the Co-Arb system). This can be described as an on-line
> job bank. If the Co-Arb system is successful it is hoped to extend
> it to include registrant data, bi-directional matching and statistics.

8.33   The FVD system contains only the matching and identity details of
vacancies and registrants. All the other details are held in clerical records
at the 20 specialist offices. These offices are equipped with VDUs and printers
for data entry and the receipt of data from the central computer; telecommuica-
tions are by dial-up. With the input of a vacancy or jobseeker the placing
officer will normally request a search and the computer will conduct this in
batch mode the result being printed out at the specialist office the next
morning. As the computer holds only the matching details all documentation is
produced by clerical methods except that the computer prints out an introduc-
tion form in case a submission is to be made and this is sent to the employer
with the jobseeker's other details.

8.34   The matching factors used in the system are complex including classifica-
tions for occupation, qualifications, skill and experience (4 digit code) with
pay required, mobility, availability etc. Placing officers can vary or modify
the matching factors to change the selections and get a revised list the
following day. Efficient use of the system requires knowledge and experience;
perhaps up to 6 months. The system has not yet been evaluated but the staff
think it an improvement on clerical methods of obtaining selections. However,
a proportion of placings are achieved as a result of initiative approaches to
employers; without vacancies.

8.35   For the <u>microfiche system</u> offices send details of their vacancies, including amendments and terminations, (by post) to the computer centre where they are input to the computer using optical character readers. At the computer centre microfiche are prepared containing all the vacancies (except those for jobs which last less than 7 days) in the local labour market (ie the "commuting" area which may include several offices). Two copies of each microfiche are produced; one contains the full vacancy details for use by placing officers, the other is for the information of jobseekers and contains similar details but without the name and address of the employer. There is a computer allocated identity number for use by the jobseeker when he wishes to discuss a suitable vacancy with the placing officer. As some vacancies which can be filled quickly will not be included in microfiche circulation there is an additional procedure (not yet in operation) to input the statistical details of the remaining vacancies and this will permit this system to be developed to include the computer collection and analysis of vacancy and placing statistics.

8.36   When small computers are installed in the 146 local offices for benefit data collection (ie by early 1982) they will be able to input their vacancy data locally and have it transmitted overnight to the computer centre (but the microfiche will still be returned by post). This will not be possible for the 500 subsidiary offices until they are on line through Co-Arb (possibly by 1986).

8.37   The BA has designed special microfiche viewers to fit their specific requirements. These have very large screens and the microfiche holder is motorised so that the selection of groups of vacancies for visual examination is controlled by a key pad. The jobseeker starts with a section of the microfiche which gives him instructions on how to operate it and find different types of vacancies. The BA is introducing this system as a quickly implemented method of providing half-open vacancy display for jobseekers and to improve the placing officer's access to vacancies in his wider labour market (ie to improve vacancy circulation). The microfiche system offers good possibilities for improving the transparency of the labour market, and the provision of space for self-service methods (according to the British model) is not therefore, necessary.

8.38   The <u>Co-Arb system</u> will replace the placing offices'microfiche as a means of holding and retrieving vacancy details, on-line and in real-time. In the first stage of development the local computer will hold all the vacancies of those offices which are on-line and will have communicated to it, overnight, by the central computer those circulated from other areas. Microfiche will continue to be produced for the half-open vacancy display (in microfiche viewers).

8.39   The placing officer first enters occupational classification (4 digit code), the working hours (full-time, part-time or home work) or the qualification (1 digit). Thereupon the number of vacancies for this occupational classification will be displayed on the screen automatically, according to regions. Further search characteristics to input are the location (5 digits) or a district, whether the jobseeker is handicapped or not and whether or not the jobseeker has a driving licence, as well as a further number of 2 digit codes for professional knowledge, skills and types of experience. Also it is possible to input the desired salary as a search characteristic.

8.40   Briefly the coding system is as follows:

8.40.1   The qualifications code is a single digit 5-level code
covering technician level; apprenticeship equivalent (3 years); formal
training or equivalent experience (of 2-3 years, which includes eg basic
nursing skills and certain recognised engineering skills); 2 years
recognised learnership (covering many office workers) and semi-skilled
(3 months "on the job" training).

8.40.2   Skills and experience are coded by a 2-digit addition to the
main system of occupational classification. Up to 10 such 2-digit
codes can be used for any jobseeker or vacancy. Codes which "must" be
satisfied in the selection are identified by an X otherwise they are
treated as "may" items which can be introduced or modified as part of
the dialogue with the computer in the process of selection. When a
selected vacancy is displayed the computer lists the items included in
the search and shows whether they are "must" or "may" items. "Must"
items must be satisfied for a vacancy to be included in the selection.
Where "may" items for the jobseekers and vacancy coincide they are
placed one above the other in the display. Otherwise "may" items are
displayed separately. The 2 digit codes (the Schlusselsystem) cover
skills and experience supplementary to the main classification system.
For example, for a motor mechanic they may cover the types of vehicle
and areas of work on which he has experience eg body-work electrics
inspection etc.

8.40.3   The above classification system is not suitable for unskilled
or many semi-skilled jobs or for workers with little skill and experience.
For such jobseekers the placing officer will not usually enter an
occupational classification but input a "P" instead of the qualifications
code. Instead of the Schlüsselsystem a different 2 digit code
(hauptarbeitsbedingungen) is used which covers types of work (eg work
with machines) or working conditions (eg outdoor work, work involving
extreme conditions etc).

8.41   This system of retrieval is the main aspect of an experiment system
(at Marburg) which will be evaluated in 1981. If the results are promising
the experiments will be extended to offices in 2 additional districts (in
Hesse) in the same year.

8.42   BA sees the use of computers as contributing to a general strategy of
achieving better labour market equilibrium. For this general strategy a
"points-of-main-effort" programme involves improved co-operation with employers;
increasing the transparancy of job offers available in the labour market;
expanding the capacity to improve employment advice in the fields of pro-
fessional training and in connection with placement and introducing modern
technical aids. The computer systems are expected to contribute to the main
strategy by helping to improve the quality of counselling and placing perform-
ance by providing better, faster and more comprehensive information and by
freeing staff time spent on routines.

8.43   It will take some time to implement this strategy. The microfiche
system is expected to be fully implemented by about the middle of 1982 (about
the same time as the introduction of small computers for the benefit system)
and large-scale pilot work on Co-Arb (covering a whole region, probably Hesse)
is likely to take until the end of 1982 so that full implementation of the Co-Arb
system is unlikely before 1986. To extend it to include other applications
(eg bilateral matching) will probably take longer.

8.44   In 1979 BA took a broad decision to use computers in the employment
service. Developments in other countries, its experience of computerised match-
ing in the professional occupations and its considerable computer experience
together with its assessment of likely future developments in computing led
BA largely to reject centralised main-frame solutions for employment service
applications in favour of the wide-spread use of small computers. The technical/
cost factors in this decision were the limitations of centralised hardware and
the costs of long-distance data transmission. Although committed to the use of
small computers in its offices for unemployment benefit work BA is otherwise
proceeding experimentally (and by staging applications) so that it will defer
some of the decisions about its computer configuration until a later date. A
compromise is being attempted between a fully dispersed, fully communicating,
computer system and the more "centralised" solution being adopted by some other
services. BA envisages a large number of "star" networks each with its own
computer in most of its (146) large offices to which the subsidiary offices
would be on-line through tele-communication lines. The sizes of the computers
will therefore vary with the size of labour markets; BA hopes to be able to
"fit" its computer power to each labour market. To provide security for real-
time operations each will have a stand-by computer.

8.45   The basic computer architecture is therefore developing as one of 2
levels of processing. All the "heavy" tasks (statistics payments etc) will be
done centrally as well as those for which a wider labour market or inter-
regional processing are appropriate. The central computer will also be used to
reconstitute or update the local databases for those applications where the
local computers need to hold data which they do not themselves collect (eg
vacancies circulated from other networks). The local computers will handle
data collection and control, local communications and hold and interrogate the
local databases (eg for "matching").

8.46   There are similarly two levels of communications. Long-distance data
communications with the central computer will be by dial-up arrangements as
far as possible, communications with the local computers would be by VDUs
and printers connected on-line through permanently connected telecommunications
lines. It is expected that most placing officers will have access both to a VDU
and a printer so the terminal configuration will be large if the system is
introduced nationally. Although BA is proceeding cautiously with an eye to
future developments its computer strategy therefore is one of progressive
development through the more immediate possibilities (eg the microfiche system
plus vacancy and placing statistics) to a computerised on-line vacancy bank
and then to other applications. This computer strategy encompasses both
employment service and payment systems.

MLPS Italy

8.47   The operations of the Italian Employment Service flow from constitutional
principles translated into law and regulation. These establish the MLPS as
the responsible authority for providing employment services and administering
the laws affecting engagements and dismissals. The MLPS is given a monopoly
of placement though recruitment through media other than private agencies is
not prevented. The procedural principles and the actual operation of place-
ment is also laid down by law under which MLPS is assisted in employment
service administration by a system of Commissions who jointly determine (with
the placement offices) the registrants who are to be selected for vacancies
(and therefore the actual engagements). The system of control over job
engagements is briefly described in paragraph 6.8; but it is not possible

in this report to convey an adequate understanding of Italian systems as a whole. Only those aspects which are necessary for some understanding of MLPS computer developments are included.

8.48   MLPS placement offices also assist the agency responsible for unemployment benefit by making payments and checking the periods of unemployment, but claimants are relatively few compared with the total register and, in general, this task has little impact upon the employment service. However, the Italian regions have considerable, devolved, powers including vocational guidance and training, supervision of apprenticeships and mobility and resettlement payments. Apart from casework, the regions do not affect the placement offices which administer the placement laws, assist jobseekers to find suitable jobs or training, and employers suitable workers, and provide labour market advice and information.

8.49   There are 20 Italian regions, but the line of management of the placement offices passes from the personnel division of MLPS through 94 provincial offices to about 8,000 local offices based upon the Communes, so that most offices are very small, and somewhat isolated. In contrast some very big cities have only one or two offices. A new law is being promoted which would reduce the local network to about 800 offices. MLPS would then have an organisational structure of 20 regions enclosing 95 provinces with about 800 districts each with a local office. Without this reduction in the number of offices, computerisation of local office procedures will not be feasible.

8.50   Under the law all workers (with the exception of family workers, seafarers, managers and public employees) must have an employment card. For all young and other appropriate workers this includes a Health Certficate and for handicapped or disabled workers a Certificate of Invalidity. The employment card is a record of the occupations, qualifications, education and employment of the individual. It is kept up to date by employers and retained by the placement office when a person is registered as unemployed; the placement office then issues a certificate of registration (C1). There are other documents, some of which affect the placement process including a Certificate of Family Status (which regulates family allowances) and a permit which is issued by the placement office prior to engagement and contains details of job qualifications and priorities. With the exception of certain cases (see paragraph 6.8) employers are legally bound to employ the person nominated by the Commission/placing office. There are also quota provisions imposing on employers and public bodies of 35 or more workers the liability to employ a quota (total 15% in 1968) of handicapped workers. These include disabled people (or the widows and orphans of people who were disabled) and refugees. Firms make a quota return twice a year showing the total numbers of employees and handicapped employees. Firms which are below quota must then make a formal request to the placement office for sufficient workers to bring them up to quota. Whenever a person who has been compulsorily employed by a firm (ie, under numerical or nominative procedures) leaves his job, this must be reported to the placement officer within 10 days. If an employer notifies a vacancy and the placement office does not fill it within 4 weeks, then the employer is free to recruit an available worker and obtain an employment permit from the placement office.

8.51   For the placement offices to administer these legal requirements, unemployed workers have to register so that their employment priorities can be established and employers are compelled to notify their vacancies. The placement office handles 4 broad categories of vacancies which employers

notify on different forms. For a numerical request (form O/NUM) the employer provides details of his address, industry, location and the matching requirements of the job, for a nominative request (O/NOM) the employer provides his address, the details of the nominated worker, the details of the head of his family and the requirements of the job. The last 2 sets of data are required so that the local office can check and record the engagement. For a direct passage between jobs (RPD) similar information is provided by the employer, but no matching details; only the occupation. In addition he has to give details of the job being terminated. For a direct engagement (CAO) the information is the same as for RPD without the details of the vacated job.

8.52   There is a standard form of registration on which the jobseeker provides personal details; details of the head of his family; previous employment and training; qualifications and knowledge of languages; occupations (up to 3) and skills; status (eg, unemployed, new entrant to employment, mobility, whether or not immediately available) his "protected category" (handicap); training required and details of family circumstances or other social factors which with his length of unemployment (date of registration) determine his points and therefore his priority on any list. This personal documentation is retained in the placement office in a set of files. For those registrants who are seeking work a card system is also created for matching and statistical purposes. Every change of circumstances involving employment re-registration, or family details will involve recalculation of a registrant's points, amendment of his documents and the re-ordering of the "position lists" from which registrants are drawn for vacancies. From these documents the placement office also has a legal requirement to produce for public authorities various sets of information such as lists of people with certain qualifications or details of labour supply by occupation. The compilation of position lists and the filling of vacancies is also partly accomplished as a result of self selection procedures (see paragraph 6.10).

8.53   The MLPS employment service systems are as follows:

8.53.1 Labour market statistics of labour supply and placements (but not stocks of outstanding vacancies) and certain statistics for management are compiled every month on standard clerical reports. These reports are posted via regional offices to the computer centre where they are entered on-line to the computer which collates them to give provincial, regional and national statistics. A computerised statistical data base has been created from which this information can be retrieved, on-line, through VDUs or printers.

8.53.2 Vacancies are circulated by postal or telephone methods. There is a telex system for circulating vacancies between provincial, regional and national offices to be matched against mobile jobseekers.

8.53.3 Local matching of jobseekers and vacancies together with the procedures involved in the control of engagements is a clerical operation at present without technical aids.

8.53.4 There is an experimental system to computerise local office data for numerical, nominative and direct procedures together with the drawing of special lists. This will also provide statistics and enable local offices to retrieve the details of registrants at other offices (the local office system).

8.53.5 It is proposed to replace the telex system with computer communications and eventually computer matching. (The "SEDOC system").

8.54 The local office experimental system is running satisfactorily in 3 offices in the Latina area. Subject to satisfactory evaluation the experiment will be extended to Naples, Turin and Milan in 1981. If evaluation remains satisfactory it will then be extended to cover the remainder of the Piedmont and Latzio regions (65 offices under the proposed new organisation) by some time in 1983. If full national implementation is agreed it is unlikely that the system will be fully in operation before about 1987. However, though the first experiment has worked well the files are small, the vacancy demand is relatively low and the problems of matching in complex travel-to-work areas have not yet been encountered.

8.55 Some standardisation of procedures has been necessary for the local office computer experiment because of the procedural discretion exercised by the local Commissions. Partly because of the legal requirements, registration is still on clerical documentation but the computer holds all personal details and the employment and placing records with other data in coded form. It has replaced the card index system used for matching, for statistics and for the drawing of position lists. The computer will automatically update its records with new engagements or placings and it is possible that a national system would require a historical file of up to 33 million personal records. The computer system also links family records so that any change in family circumstances will enable the points of all the family members to be amended in the computer system and position lists to be revised.

8.56 When a person has completed registrant's forms, occupational qualifications, status, points etc are coded by the placement officer and the details are input through a VDU on-line to the computer. Based on the input data the computer generates a personal identity code (similar in principle to the AD system) and prints the registration card (C1) and an enrolment certificate. The computer-generated identity number is included in the C1 and a separate copy is provided to be attached to the employment card. If the registrants details are already in the computer the operator enters his identity code and the computer prints out the historical record. The registrant's details are then updated via the VDU and a new certificate and enrolment form are printed. Registrants who remain unemployed have to attend once a month to revise their registration. Attendance is confirmed by stamping the reverse of the C1 and revision is signalled to the computer by the input of the personal number and an operational code, the revision being noted on the computer record. The computer system enables the registrant file (and position lists) to be updated twice daily with new enrolments changes and terminations and for new position lists to be provided virtually on request. The occupational lists contain name, personal code, dates of birth and enrolment, occupational skills and numerical rating (list position); general lists also give the registrants occupational code.

8.57 When an employer notifies a numerical request a copy is displayed in the placement office with the date on which the job is to be filled. The occupational and skill factors specified by the employer are input to the terminal and the computer prints a position list and letters tc be sent to selected registrants. The selections are made by staff from the top of the list. The letter instructs the registrants when to attend the placement office. At the specified time the placement officer collects the C1's of the selected registrants who attend and of any others with the required skills who have themselves seen the displayed vacancy. From these the

registrant(s) with the lowest points is offered the job(s) and, if he accepts, his details and those of the vacancy are input to the computer, which notes the computer record with the placement details and prints out the permit(s) which the worker(s) will hand to the employer. Similar procedures are adopted for noting the registrant records and issuing permits in the case of nominations or for recording direct engagements; except that in the last case the engaged worker does not have to attend the placement office.

8.58   If a computerised office has a vacancy for which it does not have a sufficient number of candidates, it can examine the computer files of other offices to see if there are registrants with the requisite skills and experience. If so (and the local Commission is agreeable to the selections) the chosen workers are invited to attend their own placement offices. If they then wish to be submitted to the job they are referred to the office holding the vacancy which follows the usual procedures to issue a permit. The computer system also permits the drawing of lists on variable search criteria. Any datum can be used in the search provided it is on the computer file and any datum can be linked to another by logical operators (eg, list all with specified occupation and educational qualifications); the data to be included in the list can also be specified.

8.59   The system for matching mobile jobseekers with vacancies which cannot be filled locally (the "SEDOC system") is based upon the SEDOC procedures established by the European Commission (DGV) for matching between the countries of the Community. Jobseekers complete a registration form containing all their matching details and requirements together with particulars of mobility and housing and family circumstances; they can either be registered at the local placement office or at the provincial office but they have to attend once a month to maintain their registration. Employers complete a form which contains details of the company, location, job requirements, pay and facilities (housing) available. Vacancies in other countries (as well as summary data) are sent to a division of MLPS head office (UMOTEM; the office for geographical and territorial mobility) and these are circulated to the provincial and regional offices.

8.60   From their files of vacancies and jobseekers provincial offices compile lists of summary data (identity and matching details) in coded form. These are distributed by telex to other provincial offices and the regional and head offices (UMOTEM). From these summary lists occupational matrices are built up so that it is possible to identify (by a province, region etc) where there are vacancies and jobseekers with the same occupational classifications or qualifications. From these matrices the provincial offices proceed to individual matching using the full records of vacancies and registrants. If the matrix continues to show unfilled vacancies which cannot be filled by matching, then these vacancies are advertised in the national press and on television, by UMOTEM.

8.61   This system began to be implemented in 1979 and by the end of that year 48 provincial and regional offices had been incorporated in the system. It is planned to complete by the end of 1980. In the medium term the telex network is to be replaced by on-line communication to the central computer which hold a database of SEDOC vacancies and jobseekers. Data entry and output will be in real-time and it will be possible to search the database for summary information. Comparisons of the summary data to make possible selections of vacancies for registrants (and vice versa) will be carried out in batch by the computer and transmitted to the appropriate offices the next day but more detailed matching will have to be done at the provincial offices

from the clerical records. The computer will also produce statistical information. An occupational matrix of outstanding job offers and registrants will be produced from time to time. In the long term it is possible that the data in the computer will be enhanced to incorporate the final stages of matching but no design work has yet been undertaken.

8.62   There are greater difficulties of maintaining up to date records in the SEDOC system because of problems of communicating with jobseekers and employers at a distance and over longer periods of time. Periods of "validity" (ie, automatic cancellation or suspension of action) are therefore contained in the SEDOC system. For example, (unless previously cancelled) a vacancy will be presumed to be valid for one month from entry into the computer, as will also a submission of a jobseeker to a vacancy. If it is decided to institute recruitment procedures (ie to advertise a vacancy) then matching and submission action will be suspended on the vacancy until the results of the advertisement are known. The computer will also generate personal identity numbers for registrants (the same as those in the local office system) and also company identity codes so that it will be possible to retrieve vacancies for the individual firm or link registrant records in the two computer systems. In contrast to the local office computer system the SEDOC computer will hold an up-to-date record of unfilled vacancies and this vacancy file will be maintained by recording vacancies filled, cancellations submissions etc. Placings will automatically reduce the number of unfilled vacancies and note and terminate the registration.

8.63   No timetable for computerising the SEDOC system has been planned because implementation depends to some extent on the results of the experiments with the computerised local office system and the speed with which the telecommunications for this are implemented.

8.64   If these computerisation plans are successful, therefore, MLPS will have two computer matching systems based upon somewhat different principles. The SEDOC system of matching mobile jobseekers is similar to those of other employment services in that engagements are determined by the employer and the jobseeker (not the placement office). The local office computer system is mainly designed to support the regulation of engagements under which the employer has to engage the worker who is submitted (or vetted) by the placement office. These engagements are mainly determined by the selecting factors (and not the other way round as it is in the "free" matching) which are either the points system on general lists or the occupational classification and points on the occupational lists. The selecting factors used in the local office system are not therefore "market determined" and major re-design would be required if MLPS were to develop a "free" labour market matching function at the local level. This may also inhibit interfaces between SEDOC and local office systems.

8.65   However, the main objective of MLPS must be to operate the social priorities according to the law with the minimum of disadvantage to the operation of labour market as a whole. The clerical procedures for maintaining files, creating position lists and making selections are not working sufficiently well and the computer system is expected to be more efficient both for social and "labour market" matching; as well as for handling routine operations.

8.66   The computer requirement is generated mainly by the local office system. For this the computers will have to hold very large quantities of data to be flexibly retrieved, on-line, and much in real time. The envisaged computer architecture will consist of two large central processors and nine large

inter-regional computers (each with a stand-by) connected through concentrators in 95 provinces to about 2800 terminals in 800 offices. Terminal provision is to be approximately on the basis of one VDU and one printer between 2 placement staff. The central computers will be used for statistics, for processing (eg the SEDOC system) which involves mobility above the inter-regional level and to support control and provide for communications between the inter-regional computers. The database is organised on the Siemens (SESAM) DBMS system of file management linked to operating systems and communications programs designed to ensure a high level of flexibility. All input is in real-time but output routines are handled either in real-time or batch mode. To maintain adequate response conditions (in general 3-5 seconds) batch procedures (with on-line printing) are used wherever convenient. The terminal dialogue is inter-active and designed to assist the operator as much as possible.

MSC (Great Britain)

8.67 MSC provides training, work creation opportunities and manpower intelligence as well as operating an employment service through its employment service division (ESD). Its responsibility extends to Great Britain. Northern Ireland has independent powers of administration and its systems differ in some respects. ESD is organised into 18 Areas comprising 120 districts and about 1,000 jobcentres. Approximately a fifth of these are very small with only one or 2 staff and mainly in rural areas. There are about 100 offices in Greater London and about 40-50 in each of the (4) other, big, conurbation labour markets. The MSC works closely with the Department of Employment (DE) which administers a comprehensive state system of unemployment benefit and collects and processes statistics of employment, unemployment and job vacancies. MSC also co-operates with the educational authorities who provide vocational guidance and placing services for those in and leaving full-time education. A separate branch (PER) of ESD holds the register of professional and managerial jobseekers and vacancies and charges employers for filling and advertising their vacancies.

8.68 In 1973 MSC began a process of modernising the employment service which is now almost complete. The main objective has been to improve its penetration, standing and quality of service so that it can better perform its functions of placing and advising registrants and fill its notified vacancies as quickly and as efficiently as possible. Its future strategy envisages a more selective approach to improving services in those geographical or other sectors of the labour market where it can do most good but it has recently come under considerable pressure because of cuts in public expenditure by the Government which are leading to a reduction in its employment services.

8.69 The modernisation programme also introduced concepts based upon 3 "tiers" of service. The first is the provision of self-service (or self help) facilities under which vacancies are displayed (without the employers' names) for the open information of jobseekers (or other material is provided). This is coupled with quick reception and submission procedures. Behind this is a second "tier" of matching and of general employment advice and assistance in obtaining jobs or training for those registrants for whom self-service is insufficient. Finally the third "tier" consists of special services for handicapped and other people including introduction to training rehabilitation and other schemes. In practice service provision is less distinct than the 3 "tiers" might imply; the structure is partly to enable clients to be serviced quickly and efficiently in accordance with individual needs and partly to enable resources and employment service skills to be efficiently

organised to meet those needs.

8.70   Modernisation also emphasized the importance of improving management systems both because of attempt to improve efficiency in the use of resources and the methods of public accountability which MSC has adopted or with which it has to comply.

8.71   The employment service systems in existence, under implementation, or at the pilot stage or the subject of experiments are as follows:

8.71.1   Statistics and management information from vacancies and registrations are extracted and compiled mainly by clerical methods. Statistics of unemployment are obtained by combining data from registrations and unemployment benefit claims and the clerically extracted data is sent by post to the DE (central) computer to produce national, regional, and labour market (travel-to-work area) figures. ESD management information (Operating Statistics) is extracted and aggregated clerically and used to produce performance figures and ratios. Comprehensive computerised systems of statistics and management information are planned which will involve the holding in computers of the individual details of claimants, registrants and vacancies (on a case by case basis) for statistical analysis. (The JUVOS system).

8.71.2   Vacancy circulation has been based on the postal distribution of copies of vacancies and self-service display cards or by telephoning details in urgent cases. In the very large labour markets there are circulation systems using electronic facsimile transmission (over permanently connected telephone lines). To replace these methods computerised systems (VACS) for circulation and vacancy statistics are being introduced in all those offices (about 600 out of 900 , outside London) with sufficient volumes of circulation. A computerised (Messageswitch) system of vacancy circulation similar to SITO 1, of ANPE, was implemented in London as a temporary measure pending the planned extension of the CAPITAL system. (but see paragraphs 8.75.4 and 8.84)

8.71.3   The CAPITAL pilot system for matching, circulation and statistics in the Greater London area is described below.

8.71.4   MSC has experimented with computer matching using a mini-computer in a medium-sized labour market (Jobscan) and micro-computers in separate offices (Mach Match).

8.71.5   The PER computer matching system for professional and managerial vacancies and jobseekers.

8.72   The VACS system is similar in computer configuration and its circulation system to SITO 2 (ANPE). Like SITO 2 it adds a (file) processing and retrieval capability to messageswitching so as to provide vacancy and placing statistics. This will also make it possible to add further development ments for operational and information purposes; including the switching of details of submissions and placings made between offices. Modular principles have adopted in system design and implementation so that each new system contains additions or improvements which can be "fed back" into previous versions. Offices which are not connected to a terminal send copies of notified and terminated vacancy details by post to the nearest computer centre to

be input for statistics. Where appropriate such vacancies can also be included in computer circulation. An integrated approach to the design of clerical and computer procedures has been adopted because the system combines clerical and computer operations. An architecture of 7 (inter-regional) mini-computers (excluding London) is expected to be completed by the end of 1983 (but see paragraph 8.84) with a central mini-computer (in MSC, HQ at Sheffield) for development work and to control communications. As compared with ANPE, MSC has not yet enhanced the VACS system to include submission recording and order control because an assessment of its potential in relation to longer-term computerisation strategy is being undertaken.

8.73   The CAPITAL pilot system was designed mainly with regard to the special problems of London where occupational and travel-to-work patterns are complex and where there is a large network of offices handling about 1 million registrations and half a million vacancies each year. Efficient and speedy methods of data handling are therefore essential. The system computerises matching, circulation, production and circulation of all vacancy display cards and statistics, and holds details of employers. Most clerical records are eliminated and nearly all data is held in a central database for on-line data input and retrieval in real-time by the use of VDUs. Personal details which contain sensitive information about registrants are retained on supplementary clerical records for reasons of privacy and form about 10% of the registrant records. Computer data is organised in a (DBMS) database management system. Each office has an ample provision of VDUs and is equipped with a printer to provide copies of display cards and for any other "hard copy" which is required.

8.74   For selecting vacancies for jobseekers (and vice versa) the following factors are used;

> Occupational classification (the national system, CODOT), location, average weekly pay, age, sex, the possession of a driving licence, whether the job involves shifts, working on Saturdays or is part-time, and whether or not the jobseeker is prepared to work in central London.

The prime matching factors are occupation and location (a segment of a local office area) and then all the other matching factors are brought into play. To determine the locational area on which to match, a table is programmed into the computer which for each location determines a list of other locations in the travel-to-work pattern, in descending order, according to ease of access from the base location. This is on the principle that a jobseeker will prefer to work as near home as possible. The geographical extent of the search depends upon the size of the wage offered and is progressively widened to provide a sufficient number of selections. Lists of selections are presented in order of preference. The selecting factors all have to be satisfied but they can be varied in a number of ways and additional retrieval (enquiry) methods are also possible as well as automatic bilateral matching. The computer is also programmed to provide (in batch mode), a list of automatic support programmes, for example it weekly prints out lists of vacancies to be followed up with employers.

8.75   Design work on the CAPITAL system began in 1973 with a view to full implementation by the end of 1976. In fact the system was introduced on a pilot basis in 15 London offices in 1976 using rented equipment. The pilot was successfully evaluated in 1977 and in 1978 led to a recommendation that the system be extended to the rest of London involving the purchase of a large,

central, computer installation and terminal configuration. There were delays in reaching a decision for various reasons.

8.75.1 Technical authority for procurement procedures was obtained but, in view of the size and costs of the project, there was an examination to see whether modifications were possible to spread implementation. A proposal to split the database to cover, say, 4 geographical segments of Greater London and thus proceed in stages was shown to be more costly and to involve greater technical problems. Also there was no advantage to be gained from modifying or implementing the system to provide only for certain applications (for example an on-line job bank) because of the integrated nature of the system design and implementation planning.

8.75.2 Implementation of the system involved increased expenditure (on a discounted cash flow analysis) although there were considerable savings of staff time. The additional expenditure was more than offset by the estimated value of economic benefits, principally from faster vacancy filling, which gave a positive net return on the proposed investment. However, this estimate of viability depended on assumptions about procurement costs, the recovery of staff savings (ie staffing reductions) and the level of benefits. These are affected by the state of the labour market; particularly the anticipated future level of unemployment (see Appendix F paragraph 4). Further analysis was undertaken to establish the sensitivity of the costs and benefits to these factors. This showed that the system was still likely to produce a positive (if reduced) net benefit in most conditions, provided the staffing economies could be achieved.

8.75.3 The staff unions opposed the system particularly because of the staffing reductions. Negotiations were inconclusive.

8.75.4 The Government has now imposed substantial reductions on the staffing and budgets of MSC particularly for its employment service operations. Also the average level of unemployment has increased since the evaluation. Towards the end of 1980 MSC reappraised the project because it had become clear that adequate staff time would no longer be available to fully exploit the system for matching and that the large increase in unemployment would make the benefits more difficult to achieve. Reluctantly, it was decided to terminate the CAPITAL project.

8.76 PER (Professional and Executive Recruitment) charges employers for filling vacancies and the use of computer matching was seen as an advantage in providing and marketing the service. The computer system uses the DE main-frame computer and all communications are in batch mode using postal transfer of data between the PER offices and the computer centre. Vacancies are handled by trained consultants and candidates complete forms which give comprehensive details of qualifications, experience, employment and job requirements. These forms (and the vacancies) are coded and sent to the computer centre to be keyed into the computer; as are also deta ls of submissions made, placings and terminations. The computer therefore keeps con- tinuously up-dated files containing all the details of vacancies and registrations.

8.77   Computer selections of jobseekers are made for each new vacancy and existing vacancies are continuously compared with newly entered candidates. The computer selections are sent, with printed details of the candidates, to the PER consultant handling the vacancy so that he can make the final selection to go to the employer. Candidates are then notified of the full details of the vacancy. The computer produces a wide range of statistics and management information.

8.78   The computer matches on a combination of occupational classification (with additional classifications for experience, techniques or groups of professional qualifications) location, salary, qualifications code (educational or professional level) and age. A single digit is entered to indicate how long matches shall continue to be produced for each individual vacancy and other codes are entered for purposes of statistical analysis.

8.79   The PER computer system has worked satisfactorily though subject to some difficulties. A considerable amount of staff time is required for coding, editing and data entry; the batch system makes it a somewhat inflexible method of getting at information in the computer files and there are difficulties in maintaining the registrant file in an up-to-date state so that when the computer produces selections of registrants a proportion are no longer available. There is another interesting problem. Registrants have to provide a lot of personal and matching detail but only a small proportion reach a final short list and the others are not aware of the extent to which their details may be considered for vacancies. If because of this they fail to maintain or renew registrations then the value of the registrant file is diminished. This affects performance; because of the system of charging employers most PER selections are "order-based" (OBM).

8.80   The PER computer matching system is being abandoned as a contribution to staffing economies sought by the British Government. It is also relevant, however, that the system has proved to be expensive in staff time in relation to the results obtained. PER is moving towards a "self-service" system of circulating details of vacancies to its candidates by means of a newspaper. The computer will be used to hold minimum candidate details, to provide a mailing list and for statistical and management information.

8.81   The Jobscan system is described in section 6 (paragraph 6.20 et seq). The Mach Match system was similar in principle but used individual micro computers in the experimental offices and did not provide for the circulation of vacancies. Several of the Mach Match experiments have been completed and have produced similar evaluation results to those of Jobscan. The more recent experiments are being used to obtain additional evaluation data about the nature of the computer selections. In addition an experimental database has been created on the MSC computer at Sheffield utilising the details of registrants and vacancies from the Jobscan computer. This database is to be used for further investigations into the distribution of "matching" factors between registrants and vacancies, and methods of retrieval.

8.82   JUVOS describes the combination of a number of data collection methods from which will be created computerised statistical files for labour market analysis and management information. There are 3 components.

    8.82.1 Vacancy data will be collected in the VACS system. Management information about vacancies and placings will be processed regionally or nationally as appropriate by MSC computers and vacancy

data for labour market demand analysis will be passed to the DE computer for central processing. This component should be completed by 1984.

8.82.2 Under interim JUVOS arrangements unemployment statistics will be obtained from unemployment benefit claims. Information from registrations will be passed by clerical procedures to unemployment benefit offices to be linked with claims data (for the same individual). Calculation and payment of unemployment benefit is computerised and transaction details will be passed to the DE computer to create a statistical (case by case) file. Details of registered unemployed people who do not claim benefit will be passed to the DE computer on monthly lists. The system of unemployment statistics is complicated by the fact that some benefit claimants register for employment service with Careers Offices of the local authorities (who provide services for people leaving education). It is hoped to complete this component of the system by the end of 1983.

8.82.3 It is envisaged that statistical details of registrants (registrant data) will be collected by ESD through the VACS computer system using off-line procedures in those offices not connected to a computer. Initial design is well advanced but further development will depend on detailed cost analysis and be subject to the overall computerisation strategies of MSC and DE. If registrant information is computerised it can be linked with claims data in computers (instead of clerically, paragraph 8.82.2). ESD registrant files are also maintained in an up-to-date state by reference to terminated claims at present using clerical methods. Computerisation would enable much of the file maintenance to be transferred to computers and should improve the accuracy of the registrant files. Details of placed registrants will also be linked with the vacancies which they fill so as to give ESD more detailed information about the characterisitics of registrants who are, and are not, placed in jobs.

8.82.4 Although implementation of the three JUVOS components is proceeding independently a co-ordinated approach to design and implementation has been essential because of the close procedureal links, because of certain design features which affect statistical definition and accuracy and because of the requirements for computer file management and processing.

8.83 In 1978/1979 ESD had a variety of computer systems developments and opportunities which led it to attempt to set a strategy for computerising its registrant and vacancy data. The components of this strategic planning exercise are set out in Appendix H. The results of this attempt - particularly the analysis of timescales, questions of cost and benefit and the uncertainties about computer matching - led, in 1979, to the adoption of an interim strategy. This involved the implementation of CAPITAL in London and VACS (paragraph 8.72) elsewhere together with the interim JUVOS system; all by ˙)84. To establish a longer term strategy for implementation by the end of the decade there was to be a 2 year programme of further studies into the best forms of computer matching (or retrieval) systems and into the assessment of the possible benefits of computerisation.

8.84   The more recent decision to abandon CAPITAL has modified this interim
computerisation strategy.   The CAPITAL system is being abandoned and replaced
in the pilot offices by the Messageswitch system (paragraph 8.71.2).   This is
a temporary measure.   The further studies into matching are being combined
with a feasibility study of a computerised on-line job bank.   The studies are
expected to show whether this can be developed (on a viable basis) by
modifying and extending the VACS system or whether major changes in hardware
and systems will be required.   This modification of the strategic investiga-
tion is partly required in order to enable a decision to be made, about the
end of 1981, as to the future configuration in London and South East England.

8.85   In 1979, also, the MSC, which does not have a central ADP organisation,
also promoted a study of a general computer strategy for all its divisions.
The report suggested a form of ADP organisation, made recommendations on
resource and facilities planning and indicated a flexibile approach to the
development of a computer architecture.

Northern Ireland

8.86   The Employment Service of Northern Ireland has one very large office,
in Belfast, but the nature of its remaining office network together with the
level of unemployment does not make computerised matching systems a viable
option.   Registrant and unemployment statistics are computerised by means of
a (COMPUS) statistical system which is similar in design to that of ANPE
(paragraph 8.15).

ONEM (Belgium)

8.87   The aims (to promote active manpower policies), functions, and to some
extent the organisation of ONEM are laid down by law.   Constitutional
developments in Belgium have created uncertainties about future employment
service organisation because of the devolution of certain functions to the
regions.   As well as those covered by this study ONEM's functions include
vocational guidance and training, advice on work creation opportunities, and
supervision of the system of unemployment benefit.   Also as a consequence of
the training and work creation schemes, ONEM makes about 70,000 payments a
month for which it uses computer systems.

8.88   In addition to the (main) "traditional" method of providing vacancy/
jobseeker matching services and its plans (paragraph 8.91) to extend self-
service, ONEM produces a national bulletin which is sent to all its offices.
This contains lists of unfilled vacancies and opportunities in the public
services.   Use is made of regional radio networks to disseminate job informa-
tion and vacancies may be advertised if they remain unfilled.

8.89   The actual payment of unemployment benefit is made by one of three
private, or public, organisations.   Before these can begin to make payments to
any claimant, the assessment has to be authorised by ONEM.   Also to enable
the expenditure of these organisations to be audited ONEM has to keep records
of all claimants so that the total monthly payments can be assessed.   This
task is complicated because payments are made in arrears of the period for
which payment is claimed and ONEM is developing a computer system to hold
claimant data and perform the calculations.

8.90   There is a system of daily attendance by (wholly unemployed) claimants
at their local Commune to certify unemployment.   On attendance a card is

stamped and this provides the basis for the payment of daily unemployment benefit. Some (eg older) claimants are excused attendance. Claimants must also register for employment with ONEM and if they fail to attend for three consecutive days at the Commune the ONEM local office is informed. This attendance therefore provides a link between the benefit and the registration records and assists ONEM with the maintenance of its registrant files.

8.91   ONEM is an independent unit within the Belgium Ministry of Labour. It works closely with, and under the direction of, a committee consisting of representatives of employers and workers and delegates from the main government departments. The office network consists of 30 local (and sub-regional) offices together with subsidiary offices making a total of about 100. ONEM is experimenting with self-service on similar lines to the British method and has opened 7 job offices, 2 of which are in Brussels.

8.92   ONEM's systems, system developments, and their interfaces, are as follows:

  8.92.1 A computer system (based on a large central computer) for making payments to individuals (or their employers) on training or work creation schemes.

  8.92.2 The system of supervision of unemployment benefit payments which is carried out by clerical methods at present. ONEM plans (and is experimenting with) the computerisation of this activity using terminals on-line to the central computer for data collection and retrieval. This will create an on-line database of information about individual claimants (who also have to register).

  8.92.3 A computer system (the statistical system) for collecting and presenting information about individual registrants, people who have applied for or who are undergoing training and about individual vacancy orders. The system is used to produce statistics and "placing" information (described below).

  8.92.4 Vacancy details are circulated by clerical methods. Those which cannot be filled locally are sent to ONEM head office for duplication and distribution and they may also be included in the national bulletin.

  8.92.5 An experiment is to be mounted to improve placing work by linking local offices on-line to the statistical database (paragraph 8.86.3) through VDUs (the placing system).

8.93   For the statistical system local offices send daily lists of data about registrants, training applications, people who enter training and vacancy orders as these begin and are terminated (or are amended) to the computer centre where they are input on punched cards. The computer maintains a sequential file for statistical analysis and an up-to-date random access file, on disc, for on-line retrieval in real-time. From these files are produced regular statistics and a set of fixed format messages which are either posted to local offices or accessed on-line by those offices with terminals. The data held is as follows:

  8.93.1 For registrants; sex, occupation (code), qualification (code), Commune (5 digit code), date of birth, nationality (or work permit in the case of non-nationals), branch of activity (industry, 2 digits),

date unemployment began, special characteristics and "movement" (ie new, amended or terminated (with reason) registrations). Each registrant case is identified by its characteristics (ie office, classification, date of birth etc).

8.93.2 For vacancies; the employer's name and address, the occupational code, order number, date received, sex (if appropriate), qualifications required (code), languages required, maximum age limit, place of work and "movement".

8.93.3 Similarly there are forms for use when a candidate offers himself for training and when he begins training. The characteristics are broadly similar to those for registrants with the addition of the date training began and is expected to terminate.

8.94 This data is used (the placing system) to assist placing work. If a placing officer has a registrant whom he cannot submit to the vacancies of his own office he can refer to the computer-produced lists of other offices (those offices which are on-line can ask the computer for a print-out). The placing officer can look at all the vacancies or those in particular occupations, for all or any combination of offices, or look at all the available vacancies, by occupation, for a particular office. From these lists he can make an initial selection on the characteristics listed in paragraph 8.93.2. If he finds an apparently suitable vacancy he then telephones the office holding the vacancy in order to get further details and to arrange for a submission to the employer. Similarly, a placing officer with a vacancy which he has difficulty in filling, can scrutinise the data about registrants and people in training to see if he can identify a potential match. He can then get in touch with registrant offices in appropriate cases, but because the lists do not contain the names of the registrants, these offices have to search their clerical files to find the one with the appropriate characterisitics.

8.95 For its experimental unemployment benefit computer system ONEM intends to equip each local office with VDUs for data entry and retrieval and also a printer. This equipment will be used to create a computerised database of information about benefit claimants from which the computer will make an assessment of benefit due for each individual claimant and work out the monthly amounts to be paid. Similarly, local offices will also be equipped with VDUs and printers to enable the placing system to be operated on-line and more flexibly; this will also provide a mechanism for on-line inter-office communications. The capacity of the central computer has been increased and programming is well advanced. The experiments will begin this year in two offices (TOURNAI and COUTRAI) and if these are successful the systems will be extended to all the 30 sub-regional offices. The priorities as between implementing the computerised benefit and placing systems (following the experiments) have not yet been decided.

8.96 The computer strategy of ONEM is therefore to develop the facilities for interrogating its statistical databases so as to improve placing work whilst otherwise continuing with clerical records in local offices. The placing system is an interesting development of an aid to inter office matching from a statistics system; most of the other employment services are making computerised statistical data collection contingent upon operational (computer) systems. This again illustrates the central character of the information used by employment services for statistics, labour supply and mattching. However, the ONEM strategy is somewhat pragmatic (perhaps

because of constitutional uncertainties) and it has no immediate plans for greater integration in its data requirements and retrieval methods.

9. CONCLUSION

9.1 The objectives of this study were to describe the relevant Computer Systems, to compare (or assess) them, to identify problems, to suggest solutions to the problems and to compile this report. The systems are described in preceding sections, especially section 8. In the strict sense, a comparative assessment has not been feasible because of future uncertainties, because of differences of policy and objectives and because the necessary information, particularly about costs and benefits is not available.

9.2 This section, therefore draws together the experience of the participants to expose and qualify the main problems, to compare (where possible) their approaches to similar problems and to suggest methods of dealing with them. They are identified as

- the problems of employment service applications;

- the management problems;

- the cost/benefit problems;

- the 'matching' - or retrieval - problem;

- particular technical problems;

- the problems of computer architecture and strategic planning;

- some possible implications for SEDOC.

9.3 A report or a study of this kind cannot be totally independent of judgement: it is involved to some extent in all systems work and management. Clearly, judgement must enter to a greater degree into this section and so it must be as much attributable to the writer as to the information on which he draws. Nor is it the purpose of the report to attempt either the management or the systems decisions. In any case, although the employment services have a great deal in common, quite small differences in tasks or conditions can have considerable effects on systems and (as section 3 illustrates) the differences in the services are substantial.

9.4 In computerising, or attempting to computerise, their vacancy and jobseeker data on a large scale - as are most of the services participating in this study - employment services are undertaking three large and very difficult tasks.

9.4.1 That of computerising matching on which it should not be assumed that the problems will be solved easily or quickly, indeed, experience shows it is going to be very difficult.

9.4.2 The transfer to computers of large and politically important statistical series of unemployment and vacancies. In some cases computerisation may change the levels of measurement and statisticians will have to manage and interpret changes in series over long periods of implementation; particularly if data collection is linked with matching systems.

9.4.3 That of creating more sophisticated management information systems, generally accepted to be difficult to design and create.

Improvements in management information are not just a matter of choice
(although computers have considerable potential for improving it), they
go with the disciplines required for choosing developing and implement-
ing computer systems because these are more logical in operation,
require tighter disciplines from management and can have significant
effects on costs and organisation.

9.5   Employment service managers are, almost certainly, going to have to face
up to the problems of using computers. Employment services are in the informa-
tion business, they deal with people and jobs, they do not control their labour
markets and they will therefore have to adapt to general changes in their
operating environment. Computers are now entering rapidly into information
communication generally (ie into public systems) both as to the transmission of
and the access to data. This is in addition to the private systems of those
organisations which have dispersed operations or are separated from the data on
which they depend. The computer opportunities for employment services are
likely to develop at an increasing pace.

9.6   Employment services are highly dispersed organisations, handling very
large volumes of data and with some other characteristics which add to the
difficulties of designing an operating computer systems. There is great
variety in the nature and size of their labour markets, and the attitudes,
qualities, needs and skills of the people and organisations which they serve
and therefore in the data which they handle. In addition employment services
pursue their activities and achieve their aims almost entirely through people,
whose behaviour is not always compatible with the requirements of good
computer operation.

9.7   For employment services involved in large scale computerisation the
main problem is a management one; almost certainly the most important. Most of
the possible or envisaged, computer systems have such an effect on resources,
are so costly and may enter so powerfully into the business of the employment
service that they command the attention of top management. Though these
managers cannot but be involved, the nature of the decisions and the problems
are such that they must be approached dispassionately and on the basis of good
management information.

9.8   Computer systems, generally, are prone to failure and employment service
computer systems perhaps involve greater than average risks. The degree of
risk increases with the size and cost of the project, the length of the time-
scales from initiation to completion and the rate of change; in the circum-
stances of the organisation itself as well as the technology. This is borne
out by the experience of MSC (see paragraph 8.75) and many of the planned or
envisaged systems are large with long timescales to completion. These increase
the requirements of project control and management, the importance of the
assumptions on which the user requirements and projects are based and the need
for an assessment of their sensitivity to possible changes.

9.9   There are general issues for managers in ensuring that projects are
adequately resourced in quality and quantity and that project work is based on
sound investigation and experiment, but there are certain critical areas of
project work over which close management control is essential.

9.9.1   The formal starting point for the development of a computer
system is usually expressed in a user requirement. It is tempting to
make this a prescription for all the problems faced by an employment
service in the hope that computers will solve them. Deriving a user

requirement is, or should be an interaction between that which is
desired and that which is possible - having regard to costs and
opportunities. If the project is a big one with long timescales,
the priorities will also need to be set out. In the case of the
employment service applications the interactions between requirements
possibilities and costs are fairly critical so that the drawing up
of the user requirement and its interpretation involves not only
systems and operational, but also management, skills and involvement.

9.9.2   Again because of the nature of the tasks, the resources
involved and the timescales of decision making, effective management
control during a project is particularly important. Project work
needs to be staged, subject to continual formal and informal review
and at each stage the design assumptions, objectives, user requirements,
costs, problems and opportunities and the planning implications need
to be confirmed. The mechanics of control should ensure that any
system decision of significance at or between stages is taken with
appropriate management involvement and understanding.
As project work progresses it becomes more difficult to change
direction or to stop; too much is involved. To stop may involve
high costs not only in what has been expended already, but in
reversing what already has been done. Most experimental or pilot
work on employment service systems can only be carried out in an
actual operational setting which involves organisation, personnel
and industrial relations, perhaps even public relations issues.
It is not impossible on a large project to get into a position where
a decision either to stop or to continue, becomes a matter of
management credibility.

9.9.3   The importance of good, objective, evauluation cannot be
overemphasised; also the disciplines and difficulties involved.
Evaluation is not just a question of whether a system "works" or
even whether it meets its specification. Evaluation is an aspect of
performance measurement yielding management information. The main
objectives of an evaluation will be to confirm that performance is
up to specification, to identify opportunities for improvement, to
ensure that the system is still the best option, to measure the
changes it brings about so that effects on general costs and
performance can be assessed, (on which systems decisions can be
taken), to make measurements of the effect of the system on data
(eg statistical series) so that future information is correctly
interpreted and to gather information which will be required in the
subsequent stages of a project (eg as to the best methods of
implementation). Every experimental or pilot system is therefore
a vehicle for gathering essential information about several features
of systems work; particularly bearing in mind that the experiments
are often very costly and may take a long time to carry through.

9.10   The next main problem, as perceived by most of the systems managers,
is that of costs or the levels of expenditure. This is discussed in section
5 where it is identified as an issue of cost-effectiveness. Better informa-
tion on the running costs (especially staff time) of systems is needed if
the objectives of computer design are to be achieved; together with a more
explicit formulation of benefits. Practical experience so far suggests
that a too sanguine expectation of substantial increases in placings from
computerisation is not justified and that more work on the definition and

assessments of benefits is needed if good decisions are to be made. These are not always which systems to adopt, but what combination of options for different types or groups of labour markets and sections of the organisation. Accurate measurement of benefits, and of some cost elements, is not always possible but nor is a high degree of accuracy always required.

9.11 A major computer systems issue for employment services arises with computer matching; ie initial selection or data retrieval from computer files for clerical matching. Paragraph 6.43 attempts to differentiatate levels of approach in what is essentially a "continuous" problem. The progression (of paragraph 6.43) from "routine" computerisation up to "full" computer matching continually increases the systems problems raises the costs and timescales of developments and implementation and the issues of management control. MSC experience has cast doubts on whether computers will be able to 'match' more efficiently than people do, given the nature of labour markets, but a solution, at least, of the retrieval problem is essential to progress in the use of computerised data handling and communications in employment services. Opportunities for using computers are going to increase and employment services will be affected by external developments in information communication. The general developments may, themselves, affect the nature of the system solutions. Whatever the developments, however, employment services are not going to get good solutions unless there is sufficient understanding of the matching process and its requirements for system design.

9.12 Experience so far with computer matching also questions the extent to which computers can enter into this process but it is certainly limited because computers can only help to select; because employment services cannot change the nature of an externally determined process; because computers cannot handle all the data involved in the "match" and because there are acute problems of organising the data which they can handle in order to produce efficient selections.

9.13 To use computers in matching involves linking, in a fruitful relationship, cold, logical, highly disciplined computers with emotional, imaginative, very variable people. The difficulties are reduced where people and computers join in tasks which are well-defined and follow clear rules which can be logically described. Most employment service work is not like that. Staff have to decide on which tasks and cases they will concentrate attention and how they are to distribute their time as well as how they go about particular activities. Even to introduce computers into employment services to reduce routine work therefore involves the danger of a contrary result. To attempt to use computers in order to obtain results (eg in improved quality of placings) which are not defined, not quantified in even a general way (eg as to the areas of work or types of cases affected) - perhaps not fully understood - is asking a lot of system designers. It is not their task to make management decisions (except in their specific design and implementation roles) and there are limitations to the extent to which management itself can usefully join in system design. The role of managers is to plan to control and to direct.

9.14 It would therefore seem that matching is not a "natural activity" for computers. System solutions will be required to the retrieval problem which may have to be varied for different types of matching (OBM RBM etc) or groups of clients or labour market corditions. There are several reasons for this.

9.14.1 There are interactions between the system solution, the size of the database and the operation of the retrieval factors. In a batch system with a delayed response (or where clerical records also have to be scrutinised) staff need limited, fairly precise, initial selections because of the delay and difficulty of interrogating the database(s). More "selectivity" is also needed if the database is very large. An on-line immediate response system (with all the required data in the computer) makes it feasible for staff to scrutinise, quickly, a wider initial selection and the selecting factors can then be less precise.

9.14.2 The possibilities for designing logical retrieval procedures is affected by the following. In consequence, very high levels of design skill, system investigation and experience will be required for success

- none of the matching factors can be described specifically for all vacancies or jobseekers

- the prime ("must") factors for most vacancies or jobseekers are not uniquely related to a few, main, characteristics; some of these (eg experience) are not easy to codify or otherwise "describe"

- most of the factors are not independent of others; nearly all are "maybe" items, at least in some circumstances

- the required degree of 'precision' in selections may well be itself affected by the state of labour market supply and demand. Employers are probably less restrictive in their requirements when labour is short. It is not yet clear whether this also affects the selecting factors themselves.

9.14.3 Both these (paragraphs 9.14.1 and 9.14.2) aspects of the retrieval question have implications for the costs and timescales of systems. The solutions (especially to paragraph 9.14.2) may be relatively costly in software and data collection.

9.15 All the systems managers face a variety of technical problems to which they are applying the disciplines of their techniques. There is one, particular problem of designing systems with inter-communicating databases, which might, in turn, enable costs to be reduced by the wider distribution of computer power thus permitting the use of low cost, small, computers. More generally available opportunities for designing and maintaining split databases may exist by about the middle of this decade which employment services should be able to adopt provided they are not by then "locked in" to other systems, or the wrong suppliers. In principle the only secure solution at present is one database or separate databases (eg for different geographical areas). Employment services plan compromises or modifications to the "one database" concept; for example by carrying out local functions on inter-regional computers and concentrating databases for statistics - or, eg, matching in the professional or more mobile occupations - on the central computer. BA plans to hold its (non-statistical) databases locally on small computers and to duplicate those parts of the database (eg circulated vacancies) which require to be held on more than one computer. This would be achieved by batch up-date techniques using the central computer.

9.16 Whatever the compromise, it is, by definition, an "incomplete" solution and will depend for its effectiveness on being able to identify largely self-contained "segments" of data which can be contained within the computer solution. These segments will usually be through geographical combinations of labour markets or separate occupational or organisational divisions. To the extent that "gaps" or "overlaps" continue to exist such systems may, in general, be more costly or less efficient or both. This is not an argument for not going ahead; for any organisation with a need for database communications, opportunities exist as well as problems. But the database communications problem is an aspect of system design of considerable strategic importance.

9.17 This, and other, problems mainly arise because of the rate of technical change in relation to the timescales of system development and decision making. Among the employment services these have created differences of what might be called system design philosophies and through them the approach to systems choice and decision making. In turn these create the need for · clear, well established, computer and systems strategies and plans.

9.18 Two such (perhaps opposing) broad philosophies of computer system design can be seen at work in the participating employment services. On one side there is the attempt to design systems which will be very flexibile and meet a variety of possible (current and future) demands in operation. This "total" philosophy is illustrated by the CAPITAL system of MSC, and to an extent (for different reasons) by the computer architecture proposed by MLPS; also the computer plans of AD and probably of ANPE (for project SAGE). Since (at least for the bigger services) these systems may take in some cases up to 10 years to implement fully they must (if they are to be flexible) make provision for computer matching and provide a variety of data retrieval methods. This also involves, by implication, a general solution (see paragraphs 6.26.3 and 6.29).

9.19 Since this approach also has to deal with very large files in complicated labour markets it results in a system with high capital and operating costs and complex file structures (in MLPS and MSC a database management system (DBMS)). Whilst the nature of the solution provides flexibility in operation, it tends to be inflexible as to changes in the system itself and not at present suitable for use with small computers. For most services this tends to negate "totality" (for the service as a whole) and may only be cost-effective in large labour markets or particular conditions (as may exist, for example, in Italy). If, in consequence, such systems are restricted to the very big labour markets another solution will have to be found for the smaller labour markets and there will be differences in organisations and systems in the service overall (which increase "hidden" costs). If the major systems are extended to smaller and more dispersed labour markets the benefits will probably be less in relation to costs thus affecting the viability of the system as a whole.

9.20 The contrary philosophy is one of pragmatic (and therefore of possibly unco-ordinated) developments: or of a deliberate attempt to come to terms with change by seeking flexibility to change or to adapt the systems, themselves. The basic principle of such an approach is one of modularity in system design, implementation and operation; that is a deliberate attempt to design systems so that parts can be more easily changed. The concept of modularity "implies something that is clearly identifiable, manageable and interchangeable without causing major disruptions to the whole of which the module is a part". Modularity will therefore be different for different

aspects of systems; ie hardware, software, applications included, implementaation (or the levels of systems in operation at any one time) and perhaps as to labour markets or operations. In employment services the application of modularity to management units will depend on the extent to which they reflect labour markets. Paradoxically, modularity may be more realistic as a "total" concept because it must look to systems design for the organisation as a whole, (if it is to be effectively modular). It will have to take account of the fact, for example, that for most of the next few years any service will have a mixture of systems; possibly for all the time if rapid change continues and major systems have to be replaced by new opportunities in a few years time. In a way it also recognises the great variety of circumstances with which employment services have to cope.

9.21 Any conflict between the two concepts (given present technical solutions) is likely to arise in the very large labour markets. In practice however the conflicts may be reduced. For example, equipment not required in one system may be used in another and cost analysis by MSC also showed that the VACS system could be introduced, in conurbations, and recover its costs before being replaced by CAPITAL (with its longer implementation period) if this was decided. ANPE also sees its SITO system as a short-term solution pending the introduction of SAGE in its larger labour markets.

9.22 What has not yet been demonstrated is whether "intermediate" solutions (eg circulation systems like VACS or SITO 2) can be developed and extended to provide satisfactory on-line data retrieval systems for matching, until they are replaced, and whether or not the "total" systems will be "locked in" when perhaps better opportunities become available. For employment services planning big database systems the issue turns critically on the costs and benefits to be obtained from large computer matching systems in the very big labour markets as opposed to waiting and meanwhile being satisfied with the intermediate options. This itself emphasises the importance of good management information about the costs and benefits of different options.

9.23 MSC experience, and this report, indicate the need for caution in attempting a too rapid development of large-scale matching systems and a greater degree of flexibility in planning. The key area of development is in the retrieval systems to be used for matching since these very largely determine the computer system design. A better idea of the possibilities may arise from the attempt being made by BA to create on-line vacancy retrieval systems (using small computers) and also the further investigations planned by MSC. All the computer matching experiments or pilot systems will have something to contribute to the understanding of this basic problem.

9.24 Whatever the outcome, employment services will be faced with computer developments which extend over quite long periods of time thus increasing the problems of planning. For managements the timescales make this problem one of having a computer strategy and for systems designers one of planning the general structure - or architecture - of their overall computer systems. These are not separate activities and they can only be part of a total strategy for the organisation. Computer disciplines therefore impact on management systems, competence and practice to the highest level.

9.25 These issues first emerged for MSC in 1978 when it recognised that it had several, apparently unco-ordinated, computer developments. One issue was whether certain of these were "on the implementation path" to longerterm systems, ie whether they could be expanded to include new applications and adapt to technical opportunities. A short study produced an obvious

answer that in order to ensure that one is on the right road one has to
know the final destination. If it is not known, however, it may still be
possible to establish the general direction of movement and to weigh each
decision as to whether it promotes or impedes progress. In 1979 MSC came
to the conclusion that it needed a more explicit strategy (the components
are described in Appendix H).

9.26   This can be seen as a forward extension of planning, the extent of
which will depend upon aspects of the strategy; for example it may be easier
to forecast implementation timescales   than the timing of technical changes.
In the case of MSC the strategy also has to integrate with its planning sytems
which normally follow annual or biennial cycles. The development of this
strategy had the effect of concentrating attention on the main (computer
system) issues and critical areas of uncertainty where additional analysis
or investigation were needed. In particular it pin-pointed the need for a
solution to the retrieval problem and meanwhile emphasised short-term develop-
ments which give a positive return whithin (appropriate) strategic planning
timescales. Consideration of the possible computer architecture emphasised
some of the technical and systems issues of paragraphs 9.18 to 9.22.

9.27   Given that all the employment services face the same problems of
future uncertainty and the same technical opportunities a well-considered
computer strategy seems a necessary development for other managements engaged
in large-scale computer projects. Carried through properly it is a discipline
which brings together system opportunities, costs benefits, present and
likely future developments and organisational needs and constraints and puts
them into a time pattern. At very least it is essential that such managements
take a "hard-headed" look at their timescales of development. It might then,
eg, be recognised that a too optimistic view of the pace of development may
lead to the failure to adopt short-term possibilities; or to recognise that
one development is not going to produce a comprehensive solution.

9.28   It was agreed that this study would not specifically examine the SEDOC
system but would attempt to identify any computer systems issues which might
have a particular relevance for DGV. It was also agreed to explore possible
problems of computers in matching between countries. SEDOC was brought, to
some extent, into the study because MLPS is using certain features for one of
its systems which is eventually to be computerised.

9.29   In general (with the possible exception of MLPS), the participants did
not see the creation of separate (national) computer systems raising significant
problems for inter-country mobility given that the (SEDOC) requirements are
known so that they will be able to design suitable system "interfaces". On
the whole these are likely to be mainly clerical methods; eg the extraction of
information from one computer system for clerical transfer to another.

9.30   The problem of inter-communicating databases (paragraphs 5.22 and 9.12)
will in any case inhibit the development of direct database links between (as
it does within) employment services. Any such solution would take some years
to be fully effective particularly since some employment services are adopting
computer systems which may have to be replaced, or significantly changed, when
the new methods become available. The opportunity to consider nese develop-
ments should begin to arise in a few years time but in any case the solutions
will depend upon international standards and issues which transcend purely
employment service questions.

9.31 To specify systems and policy issues for SEDOC to an adequate level of definition would require a bigger study than this one. SEDOC was developed to assist employment services in their inter-change of information about jobs and mobile jobseekers and to support the Community provisions for free movement of workers. It consists of a set of procedures and a method of codifying occupational and other details which employment services use as one of their methods of inter-communication. In order to identify suitable job or jobseeker opportunities this leads them to systems adjustments between SEDOC and their own employment service procedures. In this sense, and for purposes of discussion, SEDOC (as a system) might be defined as an inter-country employment service matching system, as a system of occupational, etc, codification and as a form of (inter-country) labour market information.

9.32 To develop good computer systems with their greater requirements for discipline and certainty will involve clarity of policy and good communications about system developments between the Commission and Community members. It is no more possible in this report to make specific systems recommendations at this level than it is for the individual participants in this study. However, the issues of planning, system flexibility and design philosophies are no less relevant. The following observations may help promote some understanding of the nature of the problems and the opportunities.

9.33 The design of any system which attempted greater integration of individual (country) systems or for promoting inter-country mobility - as distinct from a limited provision for improving opportunities to move between countries - would have to recognise a number of factors (in addition to the objective itself).

9.33.1 Firstly, even with assistance from computers, inter-country placing work may be more expensive both in systems costs and the use of staff time (than for local placing) so the response of the employment service is likely to be very selective; ie in choosing cases and methods which seem likely to produce the best results.

9.33.2 In matching jobseekers with vacancies at a distance employment services usually adopt a general principle of keeping to the shortest lines of communication in any particular case. To replicate (on a Community level) the service that exists within countries would require that they communicate directly at office-to-office, region-to-region and nation-to-nation levels and not purely through one central channel or channels. In principle a "total" SEDOC system would be part of a "total" matching system. This report has cast doubt on the "total" system concept. The wide differences in labour markets and other circumstances, to which has to be added language problems, will inhibit a single (ie general) system solution. Even then most countries are grappling with computer systems problems for their very large, conurbation, labour markets as a first priority. They will also have mixed computer and clerical systems for at least the next 4-5 years.

9.33.3 Such a system would have to deal (to a greater extent) with the problems of "retrieval" and the interfaces between computers and staff behaviour. One sure way of creating adverse staff attitudes is to present them with a lot of seemingly unproductive extra coding and data.

9.33.4 In practice the dividing lines between "fringe" (international) and national labour markets are not purely geographical (ie across national borders) and do not follow a distinct, hierarchical, pattern. Labour mobility between, say, the Republic of Ireland and UK, because of language, geography and historical links, is vastly different from that between the Republic and Germany.

9.33.5 Components of the SEDOC system (ie occupational and experience coding, documentation and "summary matching") are being incorporated in the MLPS (mobility) system. Whilst this will give some experience of the SEDOC system in operation at the national, regional and provincial levels it will have to go through 2 later stages before it becomes a full computer matching system. Also the Italian Employment Service and its systems differ in some major respects from those of the other participating countries. As an experiment (for SEDOC) therefore, this may not be indicative of the problems and opportunities in the other services.

9.34 To see the SEDOC system of codification as a way of improving communications across language barriers is a valid but perhaps limited concept. It runs into the problems previously mentioned (eg in paragraph 7.34, on occupational classification as a matching factor). The wider the range of functions a codification system tries to serve and the more detailed it is the greater may be the cost of using it in practice and the more likely it is that it will be less efficient for each of the purposes which it services. As in matching, generally, codification is only a partial solution to the problems of communication. Even the codification systems themselves face problems of translation.

9.35 On the other hand labour market intelligence plays a significant part in policy, in administration and in computer developments; and classifications can be important in this context. The main points suggested by this study are as follows.

9.35.1 There are differences of definition (in employment service data) which classification and computers may not remove. For example scarcity vacancies (collated in the SEDOC system) may possibly reflect levels of employment service penetration (particularly of skilled and professional vacancies) as much as the actual labour market conditions (see also paragraph 6.38).

9.35.2 At the Community level it could be important to identify and clarify the requirements for information (derived from employment service operations) in the near future. Employment services are moving toward computer systems which whilst offering better opportunities for analysis, may be more difficult, or take longer, to change than clerical systems. Any points of definition which may affect the nature of computer system design itself will certainly need early attention.

9.35.3 In this connection only MLPS is "building" SEDOC classifications into its computer systems (but retaining the national classification for some areas of matching); most of the other services see it mainly as a statistical requirement but have not taken specific steps to include it. They propose to use national (or new) classifications for matching. Compatibility of these classifications with SEDOC will determine whether computer conversion tables will be effective. If

staff have to code several classifications in their matching systems problems will arise.

9.36   Finally, an attempt has been made to address the study to the aims set out in paragraph 1.2 and the objectives of paragraph 9.1. The issues which have been identified are mainly those of management and systems rather than of broad policy or particular design details. It also has to be remembered that this study has been limited to certain applications and that employment services have other opportunities for using computers or communication systems. Nevertheless the report emphasises that the computer is only a tool, not a solution to all employment service problems. Computers may raise major issues of manpower information, technology and communications policy in general but these are wider than purely employment service interests and bigger than this study. There are certainly aspects of employment service systems where co-operation and the sharing of information must be of value to the Commission and the Community members; despite many differences the employment services have a great deal in common. Perhaps this report will help to identify where the best opportunities lie.

Terms of Reference and Timetable for the Study

A1.   The study was to include

A1.1   A description of the computer systems in use, or experimented with, in the employment services of the participating countries, relating the computer applications to the environment in which they operate and to the philosophies on which they are based.

A1.2   An assessment of alternative approaches to similar employment service problems and of the experience gained by participating countries, as a basis for possible conclusions towards formulating computerisation plans.

A1.3   Possibly more detailed study of a small number of themes of general interest: for example, the choice of jobseeker or vacancy factors entering into computer matching systems, the perceived or assessed benefits to be obtained from computer systems or the approaches to organising computer systems work.

A2.   It was agreed that the study objectives should be interpreted as covering the use of computers for 3 sets of applications.

A2.1   The collection and analysis of statistical information about notified vacancies and registered jobseeker$.

A2.2   The circulation of vacancy details (which includes, where appropriate the distribution of vacancy information for self-service or "open" methods of providing employment service).

A2.3   The matching of jobseeker demands against vacancy offers and/or vacancies against jobseekers.

A3.   The conference on 3 June 1980 decided that the use of computers for matching jobseekers and vacancies and the benefits obtained (or which might be obtained) from using computers, should be studied in more detail. These seemed likely to raise the strategic issues.

A4.   The time-table for the study was as follows:

- participants to prepare and submit material to MSC, by March 1980
- conference of participants   3 June 1980
- interim report to the European Commission on progress   July 1980
- visits by the Study Leader to participating employment August   - services to collect additional material and for   September discussions   1980
- progress report   October 1980
- a second conference   Der ember 1980
- a final report   January 1981

In the event the second conference was delayed until 14 January 1981 and the final report until the end of march 1981.

Abbreviation used in the Study

AD	Arbejdsdirektoratet
AF	Local office of AD
ALE	Agence locale (ANPE local office)
ANPE	Agence Nationale Pour L'Emploi
BA	Bundesanstalt fur Arbeit
CODOT	The British system of occupational classification. Classification of Occupations and Directory of Occupational Titles
CPR	Central population register (paragraph 8.6)
DBMS	Database management system (a technical method of organising data in a computer)
DE	Department of Employment (Great Britain)
DGV	Directorate - General V of the European Commission
DMS	Department of Manpower Services (Northern Ireland)
DS	Danmark Statistik (Danish central statistical office)
ESD	Employment Service Division (of MSC)
FMAS	Financial and Management Accounting System (of MSC)
GB	Great Britain (UK excluding Northern Ireland)
JPC	Jobseeker Preference Checklist (paragraph 6.21)
JCL	Jobseeker Checklist (paragraph 6.21)
LMI	Labour market intelligence (for definition see appendix C)
LLMI	Local labour market intelligence
MIS	Management information system
MLPS	Ministero del Lavoro e della Previdenza Sociale
MSC	Manpower Services Commission
NI	Northern Ireland
OBM	(Vacancy) order-based matching
ONEM	Office National d L'emploi
PER	Professional and Executive Recruitment (part of MSC)
RBM	Registrant-based matching
SEDOC	Systeme Europeen de Diffusion des Offres et des demandes d'emplois enregistrees en Compensation internationale
SS	Self Service, or Self Selection
VCL	Vacancy checklist (paragraph 6.22)
VDU	Visual display unit - a computer terminal
UK	United Kingdom (of Great Britain and Northern Ireland)
USA	United States of America

Terms used in the study with particular meanings

Accountability

How managers account for their responsibilities and performance. In ESD this is through systems of planning, objectives, performance measurement and reviews of performance.

Aim

The general purpose(s) of an employment service eg "To help people find suitable jobs and to help employers find suitable workers".

Application

See paragraph 2.1 of the report.

Architecture

Used in the report in the context of computer architecture ie the general structure and design features of a computer capability.

Batch

Data input/output method where data is not processed at its point of origin but collected into batches for subsequent sequential processing; generically distinguished from on-line systems.

Bilateral matching

Any system which both permits jobseekers to be matched against a file of vacancies and job vacancies against a file of registrants. It follows that a computer file must hold both registrant and vacancy matching data for computerised bilateral matching (see unilateral).

Careers Services

Employment and vocational guidance service provided by local authorities in GB - usually for young people under the age of 22.

Case-By-Case

Where data for each individual entity is held separately so that analysis of any attribute is possible.

Circulation

See paragraph 2.1 of the report.

Claimant

An individual who seeks payments of unemployment insurance benefit or unemployment assistance.

CODOT

GB system of occupational classification. CODOT is a system containing a 5-digit coding referring to the classifications and the descriptions of occupations.

Communication system

A computer system in which users communicate directly with the computer using terminals and telecommunication links.

Configuration

A general word to describe the arrangement of peripheral devices and communications with a computer.

Appendix C

Conurbation	A large urban area comprising more than one town.
Cost-effective	Used in this context to denote a system which will produce more benefits in relation to cost than a current or alternative one.
Dial-up	A connection between a terminal and a computer using an ordinary telephone line under which the connection has to be made by the operator. Where the connection is made automatically by the computer (using a special device) it is called "auto-dial".
Database	An integrated system of data storage servicing more than one function.
Dispersed Systems	A concept in which each user's system is similar to, but usually separate from, other users' systems.
Distributed System	Each user's system is similar but there are telecommunications between the various users.
Evaluation	In the ESD a formal set of procedures to measure the effects of introducing a new system on a variety of factors (eg costs, operating performance, statistical accuracy).
Facsimile Transmission	A method by which printed material is scanned, transmitted as electronic signals (usually through a telecommunications link) and reproduced at a distance.
Frictional Unemployment	That component of unemployment caused by short-term changes in employment. Spells of unemployment between jobs create a "pool" of unemployed, the size of which is affected by the efficiency of the methods of job changing.
Greater London	An area of about 20 miles in radius which is administered by the Greater London Council. ie, it is a local authority area (of regional size).
Hardware	A general term to describe computing equipment.
Input/Output Measurement	The ratio between a set of (or individual) outputs and the cost of resources required to produce them. ESD measures, for example, the average cost of producing a placing or the staff cost per placing (ie, average amount of staff time used in producing a placing). (Also referred to as unit cost).
Labour Market	In the context of this report the term refers to recruitment mechanisms or a geographical area (see travel-to-work) It could, of course, refer to an occupational or some other division.

Matching	Selecting and submitting jobseekers for vacancies and vice versa. A successful match is one which results in an engagement (see order and registrant based matching).
Matching Factors	Those attributes of a vacancy or jobseeker which are used in making a selection.
Mainframe	A computer typically costing between £200,000 and £1,000,000 (at 1979 prices), capable of supporting large numbers of peripherals, controlled by a complex operating system, and usually requiring an air conditioned operating environment.
Mismatch	The expression is used to denote a situation in which some jobseekers have difficulty in finding jobs although there are substantial numbers of unfilled vacancies. In this report it is also used to refer to a situation in which an employment service has an imbalance between notified vacancies and registrants.
Manpower Intelligence	Information used to interpret or predict changes in manpower requirements or availability.
Microcomputer	A computer, typically costing under about £2,500, with a simple basic control system, capable of supporting a limited number of peripherals, and with limited memory and data storage capacity.
Minicomputer	A computer, typically costing between £6,000 and £100,000 run by a more sophisticated operating system than a microcomputer, capable of supporting more peripherals, and with greater memory and storage capacity.
Modularity	Components of a system (or features of a system) being clearly identified and designed so that they can be changed without affecting the remainder.
Objective	An objective is something which is specifically intended to be achieved. It must be specified, quantified wherever possible and the time on or by which it is to be achieved must be stated.
On-line	Where a user is connected through a terminal to a computer by means of a telephone line. The connection may be either by dial-up or by a permanently connected line.
Open reception	A system under which an employment service displays details of notified vacancies with the name and address of the employee. Where these details are omitted the term "half-open" reception is used (by BA) (see also self-service).

Order based matching (OBM)	Selection of a short list of jobseekers apparently suitable for a job vacancy order.
Operating Statistics	Used to describe ESD management information of the measurement of operational activities and outputs (eg numbers of vacancies, registrants or placings).
PACTEL	A firm of consultants who conducted a computer strategy study for MSC, referred to as the PACTEL report.
Penetration	Used by MSC to refer to the number of placings as a proportion of total labour market engagements (jobs filled). Vacancy or registrant penetration refers to the proportion of vacancies notified or proportion of jobseekers who use the service.
Pilot system	A small-scale trial of a (final) system preparatory to general implementation.
Program	A set of detailed instructions to a computer.
Real-time	See paragraph 4.9 of the report.
Reconciliation	A method by which a file of registrations is maintained in an up-to-date state by comparing registrations with other files in respect of the same individuals (usually a file of unemployment benefit claims or records of attendance).
Registrant based match (RBM)	A selection of apparently suitable job vacancies for an individual jobseeker (usually, but not always, registered).
Registration	Used to refer to a set of casework documents held by an employment service in respect of a person; usually to enable it to perform a number of functions (eg matching, casework advice, the collection of statistics or the recording of activities in respect of the person concerned).
Retrieval	In this study the word is used to describe the whole set of arrangements in a computer (or combined computer and clerical system) by which a user gains access to data.
Star network	A computer configuration in which each terminal in a system is connected to the computer by a separate telephone link. The computer is usually located centrally to reduce communication costs so that the lines radiate from the computer centre.
Selection	Used in this context to refer to the selection of a short list of apparently suitable jobseekers for a vacancy or vice versa.

Self service	A method by which details of vacancies are displayed without the name and address of the employer. When a jobseeker selects a vacancy from the SS display he gives the details to a receptionist who arranges and appointment with the employer. Also referred to as self-selection (see also open reception).
Speed of Vacancy Filling	Filling vacancies more quickly is seen as a method of increasing production or reducing frictional unemployment. In principle this is measured as the period between notification of a vacancy and the date the individual begins work. In MSC it is defined as to the date on which the successful submission is made.
Split database	Used in this report to indicate a situation in which parts of a database are held on different computers.
System	See paragraph 2.8 of the report.
Submission	The introduction of an apparently suitable jobseeker to an employer.
Terminal	A device by means of which a user or an operator communicates with a computer via a telephone link.
Time series	A set of statistical tables giving measurements of the same variable over regular intervals of time.
Unilateral matching	Selections of jobseekers for a notified vacancy (order based matching, OBM) or of vacancies for an individual jobseeker (registrant based matching RBM).
Travel to Work Area (TTW)	Defined areas in which (most) people both live and work. The detailed information is obtained in GB from the population census. DE defines such areas at about the 80% level. (ie as containing 80% of employees who also reside in the same area).
Validation	A method by which a computer checks input data to ensure that it compares with an actual code or pattern.
Viewdata	A computerized system for the storage and retrieval of textual information by many organisations and their customers, using the telephone network and VDU's. British experience is with the Prestel system of the UK public Telecommunications Agency.

Framework for collecting, comparative, information about computer system developments in the participating countries (paragraph 1.7)

D1. Because of difficulties of comparing very different systems and conditions, and of identifying in advance problems for comparison it was decided to create a framework for collecting information about the operations and characteristics of employment services which affect design, choice and implementation of their computer systems.

D2. In practice this framework had to be used flexibly because of the different ways employment services organise their information and managerial responsibilities. The main items of the framework were:

D2.1 The relevant functions and aims of the employment services with the legal, etc requirements which basically determine the aims of system design in general.

D2.2 Employment service objectives and systems of assessing performance against objectives which determine the computerisation objectives; supplementary to these are the specific computer system objectives themselves and how they contribute to performance against general objectives. In effect, why computerise and what benefits are expected?

D2.3 Employment service organisation which influences systems management and computer configuration.

D2.4 The methods of providing employment service ("traditional", self-service etc) which determine operational features of the chosen computer applications.

D2.5 The basis on which decisions are made ie the nature of the choices between computer and non-computer alternatives and how they are made; particularly as to the way costs and benefits are assessed and enter into decisions.

D2.6 Employment service volumes of business which have the most significant effect on computer power and computer file organisation. Also the labour market factors which affect the distribution and character of the volumes to be processed.

D2.7 Other factors affecting design and operation including labour market supply and demand and the interfaces with other systems (eg unemployment benefit) or organisations.

D2.8 Technical factors, including the account taken of the likely or possible effects of technical change and the approach to particular technical problems.

D2.9 Descriptions of systems in use, projected or subjected to experiments including applications, design, implementation etc.

D2.10 The problems and possible solutions identified by employment services.

D2.11 Inter-country system links in employment service work (on a very broad, general, level).

D3.   A discriminating approach was adopted to the collection of this
information according to the circumstances and problems of particular employ-
ment services and its relevance in any particular case (ie system or employ-
ment service).

The Matching Process

E1.   In relation to employment services matching can mean either:

    E1.1   Helping the labour market to achieve the best reconciliation in the demands of jobseekers and the requirements of employers.

    E1.2   That process which leads in any particular case to an engagement (ie the actual beginning of a job by an individual as a result of an offer from an employer).

    E1.3   The internal process within an employment service which results in the submission of a jobseeker to a vacancy.

E2.   A definition as in para E1.1 goes beyond the functions of an employment service (eg, it would include the provision of training) as defined by this study.   This appendix defines matching as in para E1.2 while para E1.3 is categorised as internal (to an employment service) selection.   As section 6, paragraph 6.42 of the main report suggests para E1.2 is not, in all cases, necessarily consistent with para E1.   For the rest of this appendix however (unless otherwise indicated) a "match" is equated to an engagement (ie, as in para E1.2).

E3.   The matching process in which employment services are involved may (for convenience in reverse order) involve the following steps, or components (they are not necessarily distinct).

    E3.1   Engagement. This is an offer by an employer to a jobseeker leading to the commencement of a job.

    E3.2   Submission. This is the introduction of a willing jobseeker to an employer.

    E3.3   Final Selection. This is often referred to in employment services as "matching". It involves the selection of a jobseeker (or more than one) or of a vacancy (perhaps from a short list) to attempt a submission.

    E3.4   Initial Selection. This is the choice of a short list from the field of pre-selection.

    E3.5   Pre-Selection is the elimination of part of the field which might be considered for selection. Initial selection might be limited to jobseekers in the local area; to certain occupations or groups of jobseekers (for example, the disadvantaged) or it might be limited, eg, by having a separate system for professional occupations. The identification of supply and demand situations (or matrices) between different regions or labour markets on an occupational basis might also be considered a method of pre-selection if it is intended to lead to the matching of jobs and jobseekers across longer distances.

E4.   It should be noted that computers (in systems so far considered) do not enter into stages E3.1 - E3.3 (inclusive).

E5.   The existence of two distinct sets of data of jobseekers and vacancies and the nature of the communications with individuals makes possible various "modes" of selection, which may be associated (singly or in combination) with different computer systems or "solutions".

E5.1 In "continuous" bilater al matching (ie, selecting) every job-seeker is compared with "all" (ie, according to the methods of selection) the vacancies notified during the currency of his registration (in order to produce initial selections) and all vacancies are compared (as long as they are current) with all registered jobseekers. This requires the continuous maintenance of two files of data (jobseekers and vacancies) and (by definition) involves further examination to produce "final" selections. The efficiency of this "mode" depends on the state of the files, the methods of comparing data and the subsequent opportunities for acting upon the selections by contacting and submitting the registrants.

E5.2 Unilateral selection by comparing vacancies against registrant data (or vacancy order based matching: OBM) requires the existence of a registrant file and depends for final selection and submission on getting in contact with the selected jobseekers. It is also discontinuous, ie requires a separate initiative each time a vacancy is to be subject to selection methods.

E5.3 Unilateral selection by comparing jobseekers against vacancy data (or registrant based matching: RBM) requires the existence of a file of vacancies and is also discontinuous (in practice the jobseeker may not need to be registered for this method (see para E5.3.1)). In most cases it will take place with the jobseeker present which is convenient for final selection and submission. There are subsidiary categories.

E5.3.1 Self-selection (SS) from vacancies advertised "outside" the local office (ie, in press, radio, TV etc media or through other agents). In this case the jobseeker needs to contact the office (or the employer in fully "open" service, when the employer's identity is disclosed).

E5.3.2 Self-selection (or self-service) from vacancies displayed within the local office; 'half-open' (ie without the employers identity) methods are employed in those of the participating employment service which use this system.

E5.3.3 RBM with the jobseeker present. In this case the placing officer makes the selection in discussion with the jobseeker.

E5.3.4 RBM when the jobseeker is not present in the office. Except that selection is made from a vacancy file (less difficult to maintain) this is similar in subsequent practice to E5.2.

E5.4 Speculative or initiative submissions of jobseekers require a bank of knowledge about employers but not vacancy file maintenance.

E5.5 In principle "speculative" selections of individuals for vacancies is feasible (private "head-hunting" agencies practise it) but is not employed by the employment services.

E6. The computer system response required for these different methods varies considerably. Ignoring, for the moment, their use, eg, for recording submissions or collecting statistics, E5.4 and E5.5 do not involve computer (selecting) assistance; E5.3.1 and E5.3.2 require only vacancy (and display card) circulation; E5.3.3 involves only the maintenance of a file of vacancies; E5.2 and (perhaps but to a lesser extent) E5.3.4 involve only the maintenance of a registrant file and E5.1 the maintenance both of files of vacancies and registrations.

E7.   The value of any method of obtaining 'matches' therefore will be related to the opportunities for using it, the extent to which it enters (or could enter) into the process and the nature of the individual cases or groups of cases to which it is applied; ie the selectivity of operation within the whole flow of data.

E8.   In employment service work, particularly, it can be misleading to refer just to jobseekers or vacancies in general. It is immediately apparent that the former exhibit great differences but it may be less obvious with vacancies which are impersonal "pieces of paper". In practice vacancies might perhaps be categorised (for the matching process) into these groups.

> E8.1   Ordinary vacancies in which matching is determined mostly by the job characteristics.
>
> E8.2   Ordinary vacancies which are also characterised by legal or social requirements - such as those (quota) vacancies restricted to particular types of handicapped people. In this case the vacancy is as much characterised by the 'people' as the 'job' requirement. The bias is more towards 'fitting' the job to the registrant than vice versa.
>
> E8.3   Vacancies, such as those for apprenticeships or for trainees where the match is almost entirely characterised by the qualities (and/or education) of the jobseekers (and occupational classification and qualifications may well be irrelevant). As pay may also not be a major consideration and mobility may be essential the prime matching factors may well be jobseeker interests and personal qualities (see also paragraph 6.31).
>
> E8.4   Similar considerations (E8.3) may also apply in "matching" the demands of people for training against training opportunities (for which, in some circumstances, vacancy procedures may, in fact, be used).

E9.   The matching process is also affected by the circumstances in which it takes place. The purpose of "selection" is to reduce the field of apparent suitability to a manageable size. Briefly:

> E9.1   A small file can be scrutinised fairly quickly and does not require sophisticated treatment.
>
> E9.2   Very large files will tend to produce unmanageable short lists and require either considerable pre-selection or very "tight" selection criteria (eg, as in Italy). This either places very high demands on the efficiency of the selecting factors, or it becomes a process of discrimination or elimination or - most usually - it is arbitrary; eg the first available (satisfactory) applicant gets the job ("first come first served").
>
> E9.3   The balance in the "selecting" process will be affected by relative sizes and flows of vacancies and jobseekers of various kinds; for example the extent to which (considered) selections are made from stocks or suitable submissions are made from "the flow".

E10. In principle there would seem to be 4 methods of classifying and structuring the factors used in comparing vacancy and jobseeker data to make

selections (although in practice they may not be distinct).

E10.1 Digital codification. For example as in occupational classification where highly condensed descriptions (usually of work content) are represented by about 5 digits. This method tends to lead to number sequential methods of filing and retrieval. The quality of this type of codification depends on the homogeneity of the work content of jobs within the occupational definitions. Codification systems of this type can be made more efficient at the expense of increasing the range and detail of the classification system and therefore of the costs of codification.

E10.2 Grid referencing. This method has been employed in the British Jobscan experiment and is similar in principle to punched card systems. In it, job or worker characteristics are represented by holes or spaces in a grid. In principle also this method can be multi-dimensional. For example it can involve one column or grid (in effect a matrix) or progression through a series of grids, perhaps representing different occupational groups. Or it could be used to supplement occupational descriptions as to skills and experience required. It would seem that the use of this technique must largely determine the method of collection of data from the employer and the jobseeker and involve some degree of "rigidity" in classification, but it has significant advantages for data collection and computer file structure. This is because the system largely works on the possession or absence of, particular, well-defined characteristics which are represented by each entry on the grid.

E10.3 Keywords. If used in computer systems the words or language (at least with present technology), have to be logical in interpretation and precise in meaning. Otherwise they tend to be interpreted differently by different staff or when used in describing vacancies and jobseekers; or in describing different types of jobs and jobseekers. This requirement leads to the need to create technical dictionaries which can only be used by well trained and experienced staff and take perhaps a year or two to get established in operational use. As with coding systems (and perhaps to a greater degree) there is a fairly large initial investment in developing the keyword dictionary. However, keywords have some of the flexibilities of ordinary language in that a word may be differently interpreted according to the position or context in which it is used (eg "photography" may be used to denote occupation, experience or type of product).

E10.4 Text matching. This expression is, here, used to refer to information held in the form of unstructured plain language. Normally it has to be used in conjunction with some forms of classification. Being unstructured the use of plain language creates problems of retrieval but it is the method to which clients themselves are most accustomed and therefore most suitable for any (eg self-service) method which is to minimise the intervention of employment service staff (or computers) in the process.

E11. None of these methods occur exclusively in systems partly because each has its own advantages. All are used fairly flexibly in clerical systems. Codification is used for occupational or industrial classification, positional referencing is used in the layout of forms which contain matching information and some words (eg as to experience) are used with more precise meanings by employment service staff (and the experienced jobseeker) than by the general public.

E12.   In considering or comparing methods of matching or making selections therefore the main variables would seem to be (in addition to costs and benefits).

> E12.1 The aims and objectives of employment service matching; including legal constraints (eg, as they affect paragraph E8).

> E12.2 The methods used (paragraph E5) and the extent to which computers attempt to enter into these processes.

> E12.3 The matching environment eg size of files, nature of labour markets, types of vacancies (and jobseekers).

> E12.4 The selectivity (or generality) of the attempted system solutions.

> E12.5 The nature of the retrieval systems, the matching factors which are used; and other aspects of "quality of data".

E13.   The purpose of describing matching as a process is therefore to ensure that the consideration or analysis of any part of the process has regard to the effects on the whole; particularly that initial selections are not treated in isolation from factors which may make them invalid.

Benefits of using Computers in Employment Services

F1. The cost/benefits of employment services have been argued about for
years without very positive results. This appendix therefore does not
attempt the impossible, but;

- it lists the (relevant) employment service functions resulting from
  the use of jobseeker and vacancy data

- it identifies the possible benefits flowing from those functions

- it links them with the computer possibilities

- it examines the thinking and approach of the employment services
  towards these benefits of computers

- it attempts to indicate the requirements for understanding or
  assessing the benefits.

F2. The main outputs of an employment service are as follows.

F2.1 As a labour (recruitment) market mechanism for matching people
and jobs; also for placing unemployed people in suitable training or
work created opportunities.

F2.2 As a casework capability for helping and advising jobseekers and
employers which may or may not result in placings.

F2.3 As a source of labour market intelligence (statistics) for
assisting its own management and other manpower agencies or governments.

F2.4 As an agent for assisting the social security administration by
reporting cases where unemployment benefit is in doubt or by placing
cases where unemployment benefit is in doubt or by placing benefit
claimants in jobs more quickly than would otherwise be the case.

F2.5 It is also the function of employment service managers to manage
their own resources as cost effectively as possible so as to maximise
their results.

F3. The possible benefits are as follows

F3.1 A reduction in unemployment (increase in employment) or an
improvement in production (or both) would follow from filling empty
jobs (vacancies whether or not notified) more quickly than otherwise
would be the case.

F3.2 There might be a relatively greater improvement from filling
certain types of vacancies more quickly, for example where production
is held up because certain types of workers are scarce. Alternatively
there might be greater gains to production from (quicker) filling of,
eg skilled or managerial vacancies than unskilled ones. The possibili-
ties are endless, however. For example there might be gr at gain from
preventing or repairing flood damage or getting in harvests when speed
is important or keeping traffic moving in winter.

F3.3 Placings which increase stability of employment would result in
a reduction in labour turnover, thus reducing employers recruitment and

associated labour costs. In itself this need not directly reduce unemployment. For example a placing might result from direct movement between jobs. Again the increased stability would have to be productive and not result, eg, in a worker remaining in a job where his skills were under utilised. Clearly there is a trade-off between "stability" and "mobility" in which the internal labour market of the employer will be as important as the external one (see also section 7, paragraph 7.17.3).

F3.4 Employers' direct recruitment costs are reduced when their vacancies are filled by "free" employment services instead of by agencies or media which charge. In the last analysis any such service (public or private, free or charging) is a cost to national output. The economic benefits will only flow if the least costly and most efficient method is used, ie, if the costs of filling a vacancy by an employment service are lower than the alternative (or the benefits are greater). However, given the existence of an employment service, the existing charge on production will be reduced if this service makes its placings more cost effectively, for example by using computers to reduce costs.

F3.5 Placing, eg, a handicapped person (or any marginal addition to the labour force) in employment will yield an economic benefit, if he/she then makes an additional contribution to output which would not otherwise have occurred. This will not be so, for example, if it results in another (perhaps more productive) person remaining unemployed, but it may be so if the handicapped individual has personal abilities or skills which are above average and can be fully utilised. "Quality" (economic) of placings may, eg, mean placing blind telephone switchboard operators, but not necessarily placing handicapped lift attendants in areas of heavy unemployment. There may be social or political advantages from such placings, but they may only be gained as a consequence of lower total output or at least be neutral in their economic affects.

F4. The overall effects of employment services on the generation of benefits is therefore very complex. As a broad summary;

F4.1 Where there are unemployed resources, the possible economic benefits will be lower because vacancies will generally be filled more quickly and there will be lower shortages of workers. Placing one individual is more likely to be at the expense of another (see paragraph. F5 below). However, unemployment will vary from area to area; often there are areas (skills or geographical) of scarcity where faster or better placings will yield benefits providing the opportunities are correctly recognised. If benefits are then calculated on a broad or average basis, the full value will not be obtained in each case.

F4.2 The filling of vacancies more quickly by employment services will have its full economic value where there is full employment because there will then be (by definition) sufficient demand for the extra output. If the economy is at less than full employment, faster vacancy filling may only reduce the extent to which employers recruit in anticipation of their labour turnover.

F4.3 Economic analysis usually assumes that resources will flow to

to the point where they can be utilised most efficiently, but the
economic system is less than "elastic" because there are impediments
to mobility. "Full" employment may have a different definition in
particular sectors of the labour market because of rigidities in the
practices of employers or workers. Employment service activities may
help off-set these inelasticities.

F5.   The value to be put on any apparent improvement in economic response
therefore requires to be modified where less than full employment will affect
the result. This is called the "displacement" effect and has to be taken
into account in output valuation. The measurement techniques are therefore
somewhat less than exact. The practice of MSC has been to estimate (eg, from
speed of vacancy filling) the employment value (eg 1,000 vacancies filled one
day more quickly will equal 1,000 days extra employment) then to value this
(eg at average daily earnings) and then to multiply the result by a factor
(eg 0.7) for "displacement".

F6.   This enables a notional cash (flow) value to be put on the output which
can be used in conjunction with actual (costs) cash flow to determine the
value of cost/benefit ratios or to establish a return on investment.

F7.   Computers may therefore help employment services realise the following
economic benefits.

    F7.1   They may reduce costs of operations, eg, save more staff (or
    other) costs (net of computer staff) than the additional expenditure on
    computers and telecommunications. If, however, there are changes in
    volumes, perhaps caused by the computer system, these have to be taken
    into account and this will result in the measurement of some form of
    unit cost.

    F7.2   Computers may help fill vacancies more quickly. That is they
    may speed up submissions leading to quicker engagements by employers.
    This requires that (comparative) measurement is made of the affects of
    the computer system on the speed with which jobs are filled (or success-
    ful submissions are made).

    F7.3   Computers may improve the "quality" of placings resulting from
    better methods of selection. Before measurements can begin "better
    matching" has to be defined and the expected results will need to be
    identified (see paragraph 7.9.1 of the main report).

    F7.4   By providing better labour market information computers may
    enable employment services to identify their objectives more closely
    and to have a better understanding of how they achieve or might achieve,
    results.

    F7.5   They may help improve the quality of information available to
    other agencies, or to governments for economic or manpower management.

F8.   Employment service thinking on these issues (and the evaluation data
they have, or have not, obtained) is broadly discussed in paragraphs 5.14 to
5.17 of the report. Whilst acknowledging the problems which surround this
subject of cost benefit measurement the thinking does not appear to be well
structured or totally objective. For example if computer assistance is seen

(as it seems to be in most cases) as a way of enabling staff to make more comprehensive searches of their files, then some experimental work would seem to be sensible before large sums are committed to computer projects. Simulation of computer searches (or relatively inexpensive experiment) is by no means impossible. Again if the objective is to save staff time on routine work an attempt to estimate (or to measure experimentally) the likely effects of the proposed computer system does not seem to be an undue precaution before embarking on major computer expenditure.

F9. Given a sufficient degree of confidence based on the best available methods of measurements (or estimates) and an assessment of the risks (including the sensitivity of the measurements to degrees of error), an approach on these lines might be useful.

> F9.1 Will the computer system produce at least equivalent benefits at lower costs, taking account of all expenditure ?

> F9.2 Where the computer system will increase both costs and volumes will there be a better ratio of outputs to costs (eg, will there be a fall in the cost per unit of output) ?

> F9.3 If there is doubt about the extent of the improvement in benefits what judgements can be made about them and their value and what measurements should be attempted. Does a balanced, analytical and objective judgement about benefits justify the proposed expenditure. This would imply that at least the best possible methods would be used to measure or estimate the likely benefits.

F10. The above discussion concentrates on economic benefits (ie, increases in production). Employment Service activities may also affect the distribution of public expenditure which does not in itself necessarily increase output. For example faster placings which reduce frictional unemployment may reduce the level of claims on unemployment benefit or the need for subsidised employment. Estimates (similar to those in paragraph F5) have been made by MSC of these effects, again applying the displacement factor (placing one individual in a job may result in another being unemployed).

F11. Paragraphs 6.37 and 6.38 of the main report refer to general volumes and ratios of employment service activities and outputs. These are forms of measurement which all employment services employ although they are not directly related to economic or social benefits because all placings will not have the same value. Whilst, these outputs have the advantage that they can be measured, it is important that any changes are interpreted as accurately as possible. Time and available space (as well as problems of understanding) do not permit a full discussion in this report but these points might be made.

> F11.1 There are great variations in labour markets which themselves vary with changes in the economic cycle. Any measurements will have to be comparative over time and allow for the variables described in paragraph 7.24.2. MSC has attempted to compensate for these variables by using control groups and "before" and "after" measurements but interpretation is still very difficult.

> F11.2 Because labour markets do vary so greatly the same results cannot be expected in similar offices (or from experiments) in different areas.

F11.3   MSC experience is that results are affected by levels of "pene-
tration" (ie the proportions of jobseekers who use the employment service
and of vacancies notified by employers) and that these levels are affected
by different conditions. For example greater proportions of jobseekers
will register when unemployment is high or increasing and this will give
staff better opportunities to fill vacancies. However, less vacancies
may then be notified since there may be less jobs available and since
employers may fill them from people who apply direct to the firm.
Understanding these affects and monitoring changes over periods of time
is very important if the impact of new computer systems is to be assessed.
If numbers of placings vary because economic conditions affect the
number of jobs available, then attention may be concentrated on ratios,
ie the proportion of vacancies filled or registrants placed. At least
if computers improve matching, then (other things being equal) there
ought to be an improvement in the proportion of vacancies filled. The
fluctuations in these ratios will therefore again have to be interpreted
and understood.

F12. If employment service managers are to attempt to improve performance by
using computers, therefore, they will need to adapt to difficult disciplines
of using management information and to be able to assess and understand the
factors which affect performance.

Countries of the EC. Table 1: Populations and their Distribution (1972/3)

	TOTAL POPULATION (millions)	PERCENTAGE IN			PERCENTAGE OF POPULATION URBANISED	POPULATION DENSITIES PER SQUARE KILOMETRE
		AGRICULTURE	INDUSTRY	SERVICES		
Belgium	9.67	4.4	43.4	50.3	66	319
Denmark	4.96	9.8	34.2	56.0	74	117
Eire	2.98	25.7	30.3	44.0	44	43
France	51.25	12.9	39.3	47.7	63	96
Italy	53.9	18.2	44.3	37.5	45	182
Luxembourg	.34	9.3	48.3	42.4	62	137
Netherlands	13.19	6.9	36.6	56.5	80	366
United Kingdom	55.67	2.7	43.7	53.5	80	220
West Germany	61.28	7.8	49.1	43.1	78	249
USA (for comparison)		4.2	30.7	60.2	75	

Table 2, Rank size of City Regions (1972/3)

CITY REGION	POPULATION (000s)	CITY REGION	POPULATION (000s)
London	12,762	Copenhagen	1,380
Rhine - Ruhr	10,419	Naples	1,233
Paris	8,714	Torino	1,178
Randstad	4,353	Lyon	1,075
West Midlands (UK)	2,981	Brussels	1,075
Rome	2,920	Marseilles	964
Greater Manchester	2,541	Lille	881
Hamburg	2,407	Genova	842
West Berlin	2,240	Newcastle on Tyne	804
Glasgow (Clydeside)	2,008	Antwerp	663
West Yorkshire	1,945	Palermo	659
Stuttgart	1,935	Bremen	606
Liverpool (Merseyside)	1,823	Dublin	566
Milan	1,750	Hanover	554
Mannheim - Ludwigshaven	1,578	Nuremberg	515
Frankfurt-en-Main	1,520	Sheffield	513
Munich	1,502	Bologna	500

From G N MINSHULL (The New Europe, 1978)

Components of Computer Strategy

H1.   The components of the employment service computerisation strategy of MSC
(paragraph 9.25) were as follows.

H2.   The main assumptions were stated on which the strategic thinking is
based.   It is very important that these are continually kept in mind.   If one
or more becomes invalid the whole strategy will be affected.   Two such
assumptions were, for example, that the employment service would continue to
be provided from office locations and that self service methods would be used.
Similarly the main planning, system and decision papers (from which the
strategic analysis had drawn) were listed for future reference.

H3.   Next the criteria on which the strategic thinking was to be based were
set out.   These were the aims and objectives of the employment service to
which the computer systems should contribute.   Cost effectiveness was speci-
fied as the criterion for choices between alternatives and computerisation was
not to be an end in itself: non-computer alternatives were not therefore
excluded where more efficient.

H4.   Other related developments in plans, of particular relevance, were dis-
cussed and related to the strategy paper; for example a review of the aims and
objectives of the employment service was nearing completion.

H5.   The environmental factors affecting systems work and decisions were set
out and their strategic context assessed.   These were technological factors;
technical change; data, organisational and systems interfaces; particular
features affecting systems work (eg volumes and size of business, staff
attitudes etc); also the nature and implications of labour markets (in Great
Britain) including an analysis of the local office network in relation to
office volumes of business, communications etc (see paragraph 7.17.4).

H6.   Applications were then specified and discussed.   The main applications
flow from the data about jobseekers and vacancies (the substance of this
report) but the strategy was concerned with local office data in total so that
the relevance of other management information (eg about staffing and other
resources) and other operations (eg occupational guidance and information,
training and rehabilitation services (to jobseekers)) had to be assessed.

H7.   Systems (including relevant non-computer systems) were then described
and analysed, including their status (as existing, planned, experimental or
pilot systems) with their strengths and weaknesses, drawing from evaluation
data (from which the strategic importance of "matching" and the "retrieval
problem" were deduced).   In combination with the assessment of costs and
benefits (see below) the systems opportunities were then related to the labour
market and organisational features (paragraphs H4 and H5, above).

H8.   Costs and benefits were analysed in relation to each of the computer
system possibilities and their expected (labour market) areas of implementation.
This exposed the existing or possible system conflicts and uncertainties.

H9.   The existing systems and the planned or possible developments were then
analysed as to their planned or possible time patterns in relation to the
regional (18 Areas) organisation of the employment service.   This took account
of the patterns of replacement of the existing (electronic fascimile trans-
mission) systems of vacancy circulation.

H10. The previous analysis and discussion then led to the projection of <u>an interim strategy</u> involving the implementation of the CAPITAL system in London and the relatively inexpensive, quickly implemented, VACS system else-where. A programme of research or investigation was recommended to enable a long term strategy to be agreed.

H11. This strategic analysis was conducted by a small systems team under the control and direction of the Computer Development Group (composed of senior managers) which oversees all computer developments in the Employment Service Division of MSC. It was carried out over a period of about 9 months and involved some additional studies of certain aspects (eg matching, costs and benefits) of the strategic analysis.

References

This report is mainly based on material provided by the employment services in writing or in the course of discussion. It is therefore based largely on unpublished material. The published material or specific reports to which reference has been made for this report are as follows.

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PROGRAMME OF RESEARCH AND ACTIONS ON THE

DEVELOPMENT OF THE LABOUR MARKET

COMPUTERISATION OF EMPLOYMENT AGENCIES

SUMMARY REPORT

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Study no. V/80/32

SUMMARY REPORT : THE USE OF COMPUTERS IN EMPLOYMENT SERVICES

Introduction

S1 The Study was conducted by MSC of the United Kingdom for the European
Commission with the co-operation of the Employment Services of Belgium (ONEM),
Denmark (AD), Italy (MLPS), France (ANPE), West Germany (BA) and Northern
Ireland (DMS). MSC appointed a study leader. The terms of reference called
for a description of the computer systems of the participants and an assess-
ment of their experience and alternative approaches to similar problems as a
basis for possible conclusions. Summarised, the objectives of the study
leader were to describe and compare systems, to identify problems to suggest
solutions and to compile a report.

S2 The conduct of the study had to take account of the problems caused by the
amount of information to be examined, the limits set by the resources
available for the study, delays created by translation and a need to carry
through the majority of the work in about 6 months. The comparative analysis
was based initially on MSC experience, information on which was more readily
available to the study leader and in some respects more extensive than that of
the other participants. In practice, however, comparative assessments of the
systems did not prove feasible because of the difference in employment service
objectives, some, immeasurable, future uncertainties and the fact that adequate
data about the costs and benefits of the systems was not available.

S3 This, in turn, made it difficult to establish criteria for comparisons. A
systematic approach to the collection of information was therefore adopted
based on those factors which determine system design and operations. These are
the employment service aims and functions; their objectives; the methods of
making decisions and assessing performance; their management, organisation and
provision of services; their operating environments especially business volumes,
labour market differences and system interfaces; also the relevant technical and
systems descriptions and problems.

S4 These are factors which show the close association between these systems
and management of the services. The report is mainly written with
employment service managers in mind and as far as possible in non-technical
language. Abbreviations and special terms are described in appendices to the
main report. A good knowledge and understanding of employment service (ES)
operations is assumed.

Applications and Systems

S5 To set limits to the extent of the study whilst choosing functions with
sufficient unity and continuity of data it was agreed that it cover the use of
computers for the 3 applications of matching vacancy and jobseeker demands, of
vacancy circulation and of providing labour market statistics and management
information. These are "core" activities which depend on 2 separate sets of
information collected by all the employment services about vacancies and about
jobseekers. They come together only when they are linked in matching or
making submissions or when labour supply and demand need to be jointly
considered. However, the applications are not independent since the same data
may be collected for matching, circulation or statistics and computing
equipment may be used for different functions.

S6 The word "system" has no particular meaning except in the context of

specific defined descriptions. Usually, computer systems will also include clerical procedures. An ES is an information system which involves data collection, file creation and maintenance and the output or "retrieval" of data. Quality (accuracy and integrity of data), which affects data collection and file structures, is essential in computers both to maintain efficient operation and the quality of the output data. "Retrieval" raises some particular problems for ES computer systems and they are discussed in later paragraphs.

S7 There is rarely one possible system and managers and system designers face problems-of identifying, assessing and choosing the best options. The choices will depend not only on the options themselves but the conditions in which the systems are to be implemented including the nature and efficiency of the systems which are to be replaced. They therefore have to be described, specified and evaluated as to their requirements, procedures and effects.

S8 The data and applications covered by this study are central to ES operations. To convert them, on a large scale, to computer systems is a big step with substantial implications for management, for costs, performance and methods of service and affecting ES objectives and labour market intervention in general.

The Employment Services

S9 The Employment Services have a great deal in common. They exist to serve people and they obtain their results through people, operational staff and managers. They exist in free labour markets (though Italy controls engagements for social reasons) and are involved in active manpower policies. At least 4 of the services are very big businesses and all face particular problems of management. They are widely dispersed and there is great variability in their clients, in labour markets and in their socio-economic environments. All provide casework services mainly from office locations, but there are significant differences in service provision; for example as to the use of self-service methods.

S10 The great variety of conditions makes for differences in the services which are significant for computer systems since these can be substantially affected by relatively small features. This variability, also, is compounded with differences of objectives, of public accountability and government policy, of the organisational and data relations with other bodies and in the styles and methods of management within the employment services themselves.

S11 One general feature of employment services has considerable implications for their systems. Because of the difficulty of deciding what level of service to provide to clients, collectively or individually, the services are generally allocated a certain level of staff and other resources and have to decide how these shall be distributed and to meet their service objectives. The impact of this system of control through "resource allocation" extends down to the local organisation and delivery of service and calls for the exercise of discretion and procedural flexibility by caseworkers and managers because of substantial differences in their total circumstances. "Selectivity" therefore enters into the management, casework and procedures of employment services. In consequence. employment service work and conditions present some particular difficulties for computer system design and operation because computers follow logical principles and prefer standard, disciplined, procedures. In turn this increases the difficulties for ES managers and system staff in choosing, creating and managing and designing computer systems.

About Computers

S12 The main features of computer systems which are significant for this study are:

S12.1 The "human interface", ie staff attitudes and behaviour towards accepting and operating these systems.

S12.2 The computer is not an infallible "tool"; computer systems have limitations as well as advantages.

S12.3 Certain technical problems of complicated, high volume, data storage, communications and retrieval.

S12.4 The rate of change taking place in computing equipment and possibilities.

S12.5 The considerable improvements in "information technology" resulting from developments linking computers and telecommunications.

S13 The general personnel and industrial relations implications of major system changes are not specifically dealt with in this report, though they are important. However, the interaction between people (staff and managers) and computer systems is a major factor in successful operation and a frequent cause of system failure. This results from the much tighter disciplines which are required and other possible effects. If these lead to sub-optimal performance the problems are compounded and staff may reject the system concerned. The"human interface" is therefore a total design consideration often affecting quite small, as well as major, features of design with complicated effects, particularly given the nature of ES conditions.

S14 This places high demands not only on system designers but also on the quality of management. In the last analysis most system failures usually come back to the management function because of impatient managers or over-ambitious system objectives or failures in project direction and control.

S15 Certain ES applications have the potential to raise the requirements of computer operation to a very high level of response which require demanding, or advanced techniques. This considerably increases the technical problems, particularly in very large labour markets because of the huge amounts of data to be stored and retrieved. Storage, on discs, is a constraint on design because it is not as fast as computer processing and this combines with the need for speedy access to increase the cost and complexity of the system. This puts pressure on management not just because of the technical problems but because of the risks created by the high costs, by long timescales of development and implementation (perhaps 7-10 years) and by the considerable effects on operations.

S16 These risks and problems (of management decisions) are compounded by the high rate of change in computing equipment. The continuation of current, established, developments will result by the end of this decade in small, cheap, desk computers of equivalent power to the very large "mainframe" computers of today which also require (costly) special installations and skilled operating staff. The computer processor, though important, is not the main element in total system costs. Other major areas are staff time, telecommunications, maintenance and the terminal configuration so that the design of cost-effective systems will depend upon using this cheaply

available processing power to optimise other costs; ie on total system choice and design.

S17 At present there is almost a continuous availability in the amount of computer processing power and storage but the choice between mainframe, mini and micro computers is affected by other considerations of system and data security and the support (eg with maintenance and programs) available from computer suppliers or other agents. Security is very important (and depends on maintenance and design features) because when data is in a computer, operations can be totally disrupted by any failure of the system; including, for example, a telephone line. Security can only be improved at additional cost and complication in design; for example by providing duplicate, standby, facilities. Mainframe, and to a lesser degree, mini computers attract this kind of support. Micro computers are a more recent development and the market is differently organised because their cost enables   small suppliersto compete effectively.

S18 There could be cost and other advantages to dispersed organisations like employment services in having local databases held in small computers which is the way their data is organised, at present, in clerical systems. Such developments are presently inhibited by technical problems of sharing, intercommunicating, databases between more than one processor (or "splitting" the database). Also there are problems of linking equipment from different sources in computer communication systems before general standards are fully in operation and the necessary levels of support have developed. These problems are likely to be overcome in a few years time. Meanwhile those services which plan dispersed databases or to use small computers have to compromise in their system design or otherwise limit their system ambitions.

S19 Technical change is a major factor in systems planning and strategy because long timescales of development make timing critical to the opportunity costs of investment decision making. Forecasting is possible to some extent since "readily available" systems are those now in general use, those developments just being put into operation (eg small computers) will be "readily available" in a few years time and those opportunities which will be available at a later date are now seen to be emerging from the laboratory. Continued change, thereafter, also seems probable. Judgement about these changes and the timescales of system development, depreciation and obsolescence suggest forecast periods of about the middle and end of this decade. Consultants have presented MSC with this picture.

S19.1 A fall in the costs and size of processors over most of this decade.

S19.2 Database and communications methods and programs and other support with small computers should be available by about the mid 1980s.

S19.3 Present methods of storage (on discs) are likely to continue in general use until towards the end of the decade. There will be improvements in speed of access but the fundamental constraint may remain.

S19.4 Visual display units (VDUs) and printers are likely to be the terminals mainly available for use by employment services until towards the end of this decade. However, they (especially VDUs) should fall in cost and improve in operation. Oral communications with computers are not likely to make much progress, for general use, in this period.

S19.5 Changes in telecommunications methods and techniques will increase flexibility and reliability in the next few years and eventually lead to a reduction in costs.

S19.6 There will be rapid developments in information technology, combining computers, micro circuits and telecommunications. By the end of the decade, given the right systems, individuals may be able to retrieve from a wide range of data-bases with the aid of a , perhaps personal, terminal. Mailing systems using electronic and telecommunications methods may result in a deterioration in the present, physical, methods of postal distribution.

S20 Despite the problems, ES managements are going to have to face up to these developments if they are to maintain their relative efficiency. They provide services in competition with other media, are dependent on general changes in data and communications and will have to react to the consequent changes in labour markets. They will therefore have to develop appropriate management systems, strategies and methods of decision making.

S21 It is also relevant that these changes are moving computer systems away from specialised operation into the ordinary line management environment. It will not be enough to delegate the problems and the management issues to the systems specialist and "leave him to get on with the job". All managers will be deeply involved and the efficiency of their involvement will depend on how they now begin to shape up to these tasks.

Costs and Benefits

S22 The criteria for choosing systems, adopted in this report, can only be cost effectiveness (ie the optimum cost/benefit ratio) within political and social objectives. With the exception of MSC, and possibly MLPS, the participants do not generally use costing techniques which permit investment decisions of this kind. There are several reasons for this, including the uncertainties of future events, the state of the systems (eg as experiments) and the problems of measurement. More effort needs to be put into costing if good decisions are to be made.

S23 This is not just the bare issue of cost (or benefits) comparisons of systems. The disciplines involved are those which go with good overall planning, system design and project management and control. For example, several participants expect their eventual computer systems to relieve staff of routine work, ie to reduce the staff time required. However, they have apparently not attempted, at least more than superficially, to estimate the effects. Only such understanding (even given some difficulties of measurement), can expose whether savings in one direction are offset by other, perhaps indirect, effects as is often the case with computer systems; or indicate whether the expectations from such computer systems are themselves realistic.

S24 Moreover the use of techniques of investment appraisal such as discounted cash flow (DCF) analysis are likely to improve understanding of the effects on financial and manpower budgets as well as physical and systems planning. This is very relevant to some of the previous discussion, especially paragraph S20. Large, expensive, computer systems introduce capital provis on and overhead costs into employment services to a much greater degree than most clerical procedures and involve replacement policies, provision for depreciation and very large initial expenditure on design and development before results can accrue. Managers have to balance judgement as to the advantages of long term

projects over those with quicker, if lower, returns. By way of example, the hardware and initial, overhead, costs of design, development and implementation of MSC's CAPITAL system in Greater London are greater than the cost of providing the present, equivalent, methods of employment service for more than a year. Without the right disciplines and management information, it is possible to commit a large proportion of such expenditure and then find that it is too late to change the system.

S25 The very difficult subject of employment service benefits is simplified in this study to one of whether computers are likely to do better. The participating services are expecting significant benefits from the use of computers, but only MSC has attempted to specify or measure them and then only in respect of the speed with which vacancies are filled; although with good results. This is partly because experience in the other employment services is limited, and then mainly, to circulation and statistical systems.

S26 The potential benefits themselves may be broadly summarised as follows though it has to be borne in mind that such improvements are relative and will depend on the quality of the alternatives with which the comparison is made.

S26.1 An <u>increase in the number of placings</u> or the proportion of vacancies filled does not have a value in itself, but would increase other benefits. MSC experience with its circulation systems and pilot or experimental systems of computer matching, does not encourage the expectation of improvements of more than about 5%, even in relatively advantageous conditions. However, a high proportion of MSC placings are produced by, relatively efficient, self-service methods.

S26.2 <u>Employers recruitment costs</u> are not affected where they do not pay for service but the cost to the economy is reduced if employment services operate at lower costs. None of MSC's computer matching systems have reduced placing costs but computerised circulation systems have possibly done so.

S26.3 Improvements in <u>the speed of vacancy filling</u> of up to $\frac{1}{4}$ of a day, on average, have been obtained, by MSC. This largely results from increased speed in distributing and handling vacancies and so is mainly a circulation effect. Results are likely to vary between labour markets according to the extent to which vacancies are filled by jobseekers from other local offices. Increased speed of filling vacancies implies a reduction in frictional unemployment, but the value of this will depend on labour market conditions, particularly the levels of unemployment or labour scarcity. This effect is discussed in more detail in an appendix to the report.

S26.4 Improvements in the "<u>quality"of placings</u> could arise from improvements in stability of employment resulting from better matching or the filling, eg, of scarcity vacancies or those (perhaps skilled) vacancies with a better than average economic return. However, none of the employment services (although claiming the possible benefits) have identified how or in what circumstances such benefits may arise. This is despite the existence of conflicts between, eg, speed and "quality"of placings or concentrating on stability of employment to the possible detriment of mobility. This is a serious weakness because to achieve such objectives probably affects systems design itself or could lead to computers producing unintended changes in ES performance. It leads to the design of "general" as compared with specific computer system solutions, discussed later in the summary.

S26.5 Improvements in social or political performance are assumed either to reflect improvements in economic benefits or to be consciously pursued to the detriment of the economic return, or to be so complicated in their effects as to require political objectives and judgement.

S26.6 The benefits from improvements in statistics and management information have not been specified or measured by the employment services and this may not be possible. Some examples are given, subsequently.

S27 All the services expect these benefits to some extent from their computer systems but with different degrees of emphasis. ANPE and MSC look for increases in placings and in the speed of vacancy filling. AD also seeks improvements in the stability of employment and BA has objectives of promoting upward labour market mobility. ONEM does not have specific objectives but a general concentration on promoting active manpower policies whilst MLPS sees its computer system as a means of improving the efficiency with which it administers the regulation of engagements in the interest of social priorities.

Matching

S28 An examination of the approach to computer matching experiments and plans strongly suggests that there is some conflict of objectives and has been insufficient understanding of the matching process for good system design. The actual results are mainly from MSC.

S29 The issues may be summarised as follows.

S29.1 The design of matching (ie retrieval) "factors" for use in computers is orientated   towards getting the best individual selection but employment services often have to try and persuade employers and jobseekers to modify their requirements so as to contribute to good labour market adjustment, ie to reduce "mismatch".

S29.2 There are differences in the matching philosophies of the employment services depending upon whether, eg, labour market objectives require "impartiality" as between employer and worker requirements or whether labour market needs or social criteria tend to put the emphasis one way or the other.

S29.3 "Matching" is a far from homogeneous activity; high unemployment with few vacancies creates a process of discrimination in which "selection" is either irrelevant or imposed (for example as is the case in Italy). The requirements (eg for apprenticeships) sometimes emphasise personal rather than job characteristics and for many unskilled or semi-skilled jobs occupational classification has little place in matching. Sometimes social priorities (eg programmes for handicapped people) not only introduce new factors into the selection process but make for an entirely different type of "match" (eg finding a sympathetic employer). These all operate against the use of a "general" set of matching (ie selecting) factors for use with all types of cases as well as some other features of systems design. This is very important because the nature of the selecting and retrieval mechanisms largely condition the system design.

S30 Much of the thinking about computer matching has emphasised the ability to select from the whole registrant or vacancy file continuously; both vacancies against registrants and registrants against vacancies. This is partly with the

objective of ensuring that every registrant is included in selection. There are other practical reasons why this cannot be done even in computer systems, but computer selection itself provides impediments.

S31 A more disciplined understanding and analysis of the matching process is required if good, efficient, computer system designs are to be achieved. The report puts forward a structure or "model" of this process which breaks down matching, sequentially, into possible stages of pre-selection; initial selection; final selection; submission and engagement. Employment services (with the exception of MLPS) are not involved in the engagement and computer selection does not go beyond the first two stages. This is because computers cannot possibly select from all the information which staff use. This "process" also differentiates between methods of matching including 'bilateral' systems and those which match only in one direction ie by comparing vacancies with registrants (vacancy or order based matching; OBM) or jobseekers with vacancies (registrant based matching: RBM).

S32 In fact ANPE and MSC (the only services to collect this information) fill most of their vacancies by flow (RBM) matching including self-service (SS). ANPE achieves 60% of its placings in this way (40% SS) and MSC a greater proportion since 60% of its placings are by SS. Probably no more than 25% of MSC placings are made as a result of selection from the stock registers of vacancies or jobseekers and only a proportion of this 25% results from OBM. There are several reasons why this is so, but the main one is that flow matching with the jobseeker present in the office is more efficient, and takes less staff time and uses information provided by the jobseeker when the submission is made. All the requirements of every vacancy cannot possibly be foreseen in advance.

S33 Concepts of matching as a register-based process therefore require considerable qualification. This is highly important because computer systems which attempt OBM or bilateral matching have to cope with very large registrant files with big increases both in the cost of systems and their timescales of design and implementation. This is not an argument against collecting registrant data for other reasons, nor for not attempting some form of OBM. It does emphasise the risks of pursuing complex systems for what may be very marginal results based on inadequate management understanding and control of projects.

S34 These and other, fairly fundamental, issues for matching - and not only in computers - were illustrated by the results obtained by MSC from an experimental computer matching system called Jobscan. This system used a large number of matching factors, averaging 12-20 (not all the same) for each jobseeker or vacancy. Both computer and clerical records were retained which made comparative measurements possible. The system also incorporated computerised vacancy circulation and SS display card production. The computer was used to make initial selections (up to 20, but more could be examined if required) which staff then checked and reduced by reference to their clerical records.

S35 The experiment yielded much useful information. The main points were;

> S35.1 Only 10% of submissions and 5% of placings resulted from computer selections and most of the vacancies would probably have been filled without the computer system. The limited use of the computer system was partly because the experiment used only a few terminals (printers), but it mainly reflected the greater matching efficiency of the clerical system. For example why should staff consult both computer and clerical files if they have to select, eg, for an individual with a specific

occupation from only a few vacancies. Also why bother to make computer selections from the register if the vacancy is filled quickly from the "flow" of large numbersof jobseekers.

S35.2 As many as 100 initial computer selections (for several vacancies or jobseekers) were made, on average, to achieve one placing. Compared with this MSC has a ratio of submissions to placings in SS of about 5 to 1. Of course the time content of a selection is not the same as a submission but it does give some indication of the resource effects. Computer systems may (or may not) reduce time spent on some routine activities, but they may have indirect, contrary, effects.

S35.3 It seems unlikely that placings resulting from computer selection were of better quality, if only because the computer can only make initial selections. Employment staff use information not held in the computer and are the arbitrators of the final choice. Often they employ different criteria (eg jobseeker motivation and personal qualities). Even if the computer did make a better selection would staff recognise this and include in their final choice? And would the employer then make the engagement? This (and, eg, paragraph S39.4 below) questions whether computer selection itself, can make more than a very minimal contribution to improving quality of placings; at least with the techniques so far used or available.

S35.4 Selections were taken of registrants for a sample of vacancies, and vice versa, using clerical procedures. These were then compared with initial computer selections for the same samples of vacancies and registrants. About 50% of the clerical selections which experienced staff thought might justify inclusion in a final shortlist were not selected by the computer. It made some selections which staff had not identified, but these were not analysed or confirmed. There were a number of reasons for the disparity including the selecting factors used, the fact that the computer did not have all the (matching) information about the vacancies and jobseekers and also the different pre-selection methods of clerical and computer systems.

S35.5 In any group of, say, ten initial computer selections from the jobseeker register, three or four, on average, would include individuals who were no longer available for jobs. This results in wasted effort, means that the computer makes "dead" selections, (to the exclusion of others)and affects staff attitudes to the system. This is another problem, particularly for OBM methods of selection, especially in computers. The state of the register depends on frequency of contact with jobseekers and the rate at which the register "turns over". It is very difficult and can be expensive in staff time to keep jobseeker registers in a very up-to-date state.

S35.6 Of ten initial computer selections only three or four on average, would be considered suitable by staff. This is partly because the job-seeker register consists mainly of unemployed people and (compared with the "flow") is biased towards the unskilled or those with obsolete skills or those with labour market or social problems; perhaps partly resulting from long term unemployment. Such personal characteristics are difficult to incorporate in computer systems and create problems of computer privacy.

S35..7 Because of the increase in the speed of distribution of vacancies and display cards there was a noticeable increase in the proportion of vacancies filled by the SS method. Staff retained computer circulation but rejected the computer "matching".

S35.8 Estimates showed that the Jobscan system required more staff time and there were additional computer and telecommunications costs. Improvements in the system (eg, by including statistics) might be made but it is unlikely that more than a small amount of staff time will be saved by this type of system. To be cost-effective extra benefits are needed.

S36 It should not be assumed that the jobseeker register is of little importance to employment services. It has substantial costs and so recording must be relevant and kept to the minimum; one of the reasons for SS methods. Registration is essential for all the social objectives of employment services (eg, towards handicapped or other disadvantaged people); it provides valuable statistics and it meets other needs for recording submissions and placings.

S37 The Jobscan system took more staff time partly because the use of both clerical and computer records added to data collection. One 'solution' is to eliminate nearly all clerical records but this places additional demands on the computer system and greatly increases problems of data security since all records are in the computer. Everything then depends on the methods of data retrieval and there are changes in the behavioural interfaces between staff, information, clients and systems. Management relationships are affected since some decisions have to be made at a higher (systems) level. Staff may also see their clients through impersonal computer terminals and there may be barriers to good staff communications for matching if, eg, vacancy handling is centralised away from the staff who deal with jobseekers.

S38 Relating the matching process to systems also suggests that any benefits of computerised matching or vacancy circulation will be greater in the biggest labour markets because of the volumes of data and the interactions between the registers of different offices. Perhaps also when unemployment is low. The results of any experiment at one time or in one place may not, therefore, be representative of other areas or conditions and, some additional measurement and theoretical work may be needed if such results are to be properly interpreted, or extrapolated.

S39 Computer matching therefore raises the greatest issues amongst the ES applications and is a major strategic factor in the design and choice of systems because it places the greatest demands on computer response and costs. Nonetheless a solution to the problem of retrieving jobseeker and/or vacancy data will be required if the challenge of computer opportunities is to be met by ES managements. High skill (backed by experiment and research) will be required to develop efficient factors for use in computer selection and changes in clerical procedures and records must be approached with caution. It may be some years before computers can contribute to better quality matching and meanwhile computer systems must be so designed that they do not impede staff in making selections. ES work is highly personal and is characterised by selectivity. To apply "general" solutions in order to achieve certain features of system design or because the problems and processes are not fully understood puts management at considerable risk.

S40 As a very rough general approach to system choice the following stages might be considered.

S40.1 First there is the use of computers purely for data handling as in circulational or statistical systems. At the second stage will be systems which handle routine data and also use the computer retrieval tool where selection is totally in the hands of staff (for example the BA is experimenting with an "on-line job bank"). Thirdly there will be those systems which involve computers more fully in the matching process .

S40.2 The first stage affects management objectives to reduce costs, to improve data handling and to change resources, eg, by releasing staff time. The second will occupy an intermediate stage depending upon the details of the option adopted. The third affects aims and labour market intervention policies, in general.

S40.3 Each of these stages raises the computer requirements, the costs and the timescales of development by an order of magnitude. They therefore increase the risks as well as presenting opportunities.

Statistics and Management Information

S41 Most employment services use computers for the relatively simple arithmetical task of adding up clerically extracted statistics. However databases can be created containing the relevant information about each individual entity or case so that the computer can do all the statistical extraction and analysis. This "case by case" form of statistical database is the computerisation aim of most of the employment services.

S42 As compared with matching, statistical database analysis is a task for which computers are particularly suited and for which there are well-developed techniques. Nonetheless there are problems, particularly, of good data collection and accuracy which make for some complications and require careful design. Given the right design solution, improvements in the frequency, range of analysis, accuracy and quality of statistical data are possible, but not always at reduced costs. Useful savings in staff time seem to be possible.

S43 Given the right circumstances and design features also, computer systems give the potential for "control", ie providing fairly close estimates of the accuracy of the statistics produced and the possibility of monitoring the effects of any changes in procedures and data on the statistical outputs. This involves close systems procedural and data definition (ie all the factors which produce the required outputs), completeness of data in the computer and control over errors of omission, quality of data, ie methods to ensure accuracy in the individual records and timeliness of data.

S44 Timeliness of data is important, especially in computer systems, both
because of the effects on operations and on the data itself. MSC has average
daily registrant flows of about 8000 and a delay of 1 day in terminations
means an error of that amount in any stock count as well as flow errors. But
there are many causes of delays and volumes fluctuate considerably so that,
without control, the degree of accuracy is unknown within several thousands.
Control and greater accuracy can be obtained in computer systems which hold
case by case data with designs which include the collection of dates (of
events) so that the computer can extract statistics accordingly. However,
this calls for very careful analysis (probably operations research) and design
which itself requires good, advance, knowledge of the statistical requirement.

S45 This is the more important since employment services collect statistics
of vacancies and unemployment for manpower economic and labour market
intelligence (IMI) on which major decisions are taken. Local labour market
intelligence (LIMI) is used by employment services together with statistics
of their business flows in planning and measuring their performance.

S46 The employment services do not generally describe and specify their
management information as a system (MIS) and they tend to regard accuracy
in operating statistics as of low relative importance when the degree of
error needs to be known if any measurement is to be understood. Small
performance changes may mean the difference between accepting or rejecting an
expensive system. Without such knowledge management decisions are based on
"guesses" so that quality of management depends on the right degree of accuracy
in the information on which decisions are made. Time series analysis of
statistics collected regularly are also needed in view of the fluctuations
in data caused by changes in labour market conditions.

S47 The value of management information is difficult to measure but a good
computerised MIS may yield better returns than some of the matching systems
on which so much effort is being expended. Its value in fact depends on the
ability of managers to use it and decide what is needed; ie on the nature of
the organisation and "style" of management. It is not enough to design for
data collection and hope for the best. The way the data is used has more
effect on the general structure of the system and therefore computer process-
ing and files. So the general structure of an MIS has to be identified in
advance of the design of any system which includes this application and
critical areas of MIS design need to be clarified in their effects on systems
work as a whole.

S48 The report cannot therefore do more than indicate the nature of the
opportunities presented by management information and examples are quoted
of information on vacancy duration as a possible measure of labour scarcity,
of speed of vacancy filling (to increase benefits) and analysis of registrant
flows to illustrate labour market segmentation and dynamics so that
objectives like 'quality' of placings can be better understood. Also the
combination of operating statistics with cost data to help monitor cost
effectiveness.

S49 An important element in management information, very relevant to this
report, is evaluation. Systems or experiments can only be mounted in local
offices and take a long time to complete. Measuring changes therefore requires
information about levels of performance before the system is introduced and
then again after it has settled down in operation. Good evaluation involves
tight disciplines and the report makes some comments on the requirements.

The Employment Service Systems

S50 In a short summary only brief indications can be given of the computer systems of the participating services. In fact only short basic descriptions are given in the report and fuller, individual, descriptions have been written about the developments in each employment service.

AD (Denmark)

S51 AD provides employment services from about 150 local offices (AF), supervises the system of unemployment insurance (which is provided by unemployment funds), provides attendance by claimants at its AF to certify unemployment and has some other manpower service functions.

S52 There is a, computerised, central population register (CPR) in Denmark and each citizen has a personal identity number (also held in the computer and mainly derived from date of birth). Other computer files can therefore be linked to the CPR to obtain basic personal details or for checking files. Most public sector computer systems work and processing is handled by a centralised organisation as are most government statistics.

S53 Linked to the CPR are centralised computer files (CRAM) of all insured persons and of those actually claiming unemployment benefit from which unemployment statistics are provided. These are supplemented by a computer file (KIS) of those registered unemployed people who do not claim benefit compiled from daily lists of new and terminated registrants prepared by the AF.

S54 AD plans to develop, by end 1981, a comprehensive computer system with all its AF on line through VDUs and printers to a central, main frame, computer with fast (real-time) response and the abolition of practically all clerical records. The proposed design is similar to the CAPITAL pilot system of MSC (see paragraph S70.3) with vacancy receipt centralised at job notification centres. In conjunction with the CRAM files this would provide all statistics and management information, vacancy and SS circulation and (bilateral) matching and retrieval facilities.

S55 The programme is ambitious both in timing and extent and follows a strategy of speedy, comprehensive, computerisation to improve matching, circulation, the provision of statistics and the supervision of the unemployment funds. Computerisation has been stimulated by studies of labour market "mismatch" and AD hopes to achieve improvements in job stability and speed of vacancy filling.

ANPE (France)

S56 ANPE has about 600 local offices (ALE) which are organised into 100 departments and then 25 regions. Some increase in the number of offices is planned. Matching services are provided through SS, "flow" and register matching. It has no responsibility for unemployment benefit but provides fortnightly attendance for claimants at its ALE and reports cases of doubt to the benefit authorities. It has depended to some extent for its computer services on the French Ministry of Labour but has now created its own central computer installation and intends to be largely independent for systems. Its computer systems plans and projects are as follows.

S56.1 A computerised statistical system of registrants and vacancies. Copies of local office forms and transactions are sent by post to 2 data preparation centres which pass a magnetic tape to the Ministry of Labour computer centre. This system provides unemployment and vacancy ¬ statistics and some, but not all, management information.

S56.2 A system SITO 1 which links terminal printers in ALE to a configuration of mini computers. This circulates multiple copies of vacancies and SS display cards according to pre-programmed patterns. It is being replaced (by mid 1981) with a more modern version, SITO 2 which will link 400 ALE to 7 mini computers leaving 200 offices with low circulation to provide their data off line. SITO 2 includes a processing capacity and maintains up-to-date files of vacancies, submissions and placings. The clerical records are all retained but the computer provides regular information about the state of vacancies to enable staff to organise their communications with employers and to control submissions. The system is also designed to include vacancy and placing statistics.

S56.3 A message-switching system for vacancies and general messages LICRA (similar to SITO 1) links regional offices.

S56.4 An experimental management information system, Analyse de Gestion collects and analyses monthly reports from ALE about the use of staff time by function and groups of activities measured in units of a half day. This is linked with operating statistics (of registrations, placings, training applications etc) to assist in monitoring and interpreting changes in performance. ANPE will also develop its own computer systems for staff salaries and other financial information with a view to developing a more comprehensive MIS.

S56.5 Project SAGE envisages a comprehensive system for matching vacancy circulation and statistics which is also similar to the CAPITAL system. However, ANPE does not plan to have centralised order taking, may retain some of its clerical records and proposes to implement in a more modular fashion. This is partly because SAGE will have to replace SITO 2. Design work has begun with a view to a pilot trial and, if successful, implementation in the Paris region in 1983. A national system would require 7 large, inter-regional, mainframe computers each with a separate database, but because of costs the system may be restricted to 4 (out of 7) inter-regions which contain the biggest labour markets.

S56.6 A register up-dating system is at the experimental stage. If the experiment succeeds, it will replace fortnightly attendance at the ALE by monthly postal declarations by registrants. A computer file created from the statistical system will be held on a computer at a management centre to which registrants will send their forms each month. These will be marked to show days of unemployment or sickness or when unemployment ceases. The forms will be input to the computer by optical character readers. This system will create a computerised statistical file of registrant data from which information about terminations will also be sent to the ALE to help maintain their clerical files. When SAGE is implemented, the computerised registrant

files (for matching) can be maintained by computer checks.
Information about periods of unemployment will also be sent to the
benefit authorities.

S57 ANPE has ambitious, demanding, computer system plans which support a
general strategy of improving its services and labour market standing. It
hopes that the computer systemswill enable this to be achieved with only
moderate increases in staff.

1   BA (Germany)

S58   BA administers unemployment benefit (UB) and other payment systems as
well as a number of manpower, including employment, services. It has a
large computer organisation with a central installation of main frame
computers which calculate and make UB and other payments. Matching in the
professional (FVD) occupations, which is concentrated at certain offices, has
been assisted by the central computer since 1974, but an attempt to extend
this to other occupations was unsuccessful. BA's own experience as well as
a study of computer developments in other countries has led it to adopt a
strategy of using small computers. It rejects centralised systems except for
its 'heavy' payments and statistical tasks. The central computers will also
be used to amend or update databases held in small computers.

S59   There are 9 regional offices (in the Federal Lands) with 146 local
offices (LO) and about 500 subsidiary offices. Benefit work is largely
concentrated at the LOs which send their data by post to the computer centre
where it is input using optical character readers (OCR). Claimants and
registrants do not have to attend regularly but are called for interview at
intervals of up to 3 months.

S60   The computer systems are as follows.

        S60.1   The FVD System. Data is input   on-line using VDU's with
        output (ie selections) printed on-line the next morning using "batch"
        procedures. Telecommunication links are achieved by dial-up
        arrangements. Only the matching and identity details of jobseekers
        and vacancies are held in the computer. Fairly complex coding systems
        of occupation, experience, professional skills and qualifications are
        used in making selections together with pay and mobility. The system
        is considered a success but has not been evaluated.

        S60.2   A microfiche system is being implemented. The microfiche hold
        all the vacancies in the local commuting area in 2 sets, one for the
        use of the placing officers and the other, without employer details,
        for the information of jobseekers. Microfiche viewers have been
        specially designed. Vacancy details are sent by post to be input to
        the central computer by OCR from which the actual microfiche slides
        are posted to the local and subsidiary offices. The postal delays
        will be reduced at the LOs when small computers(on-line to the central
        computers) are introduced there for UB purposes and in other offices
        when they are on-line through the Co Arb system (paragraph S60.4).
        The display of vacancies on microfiche for jobseekers is intended to
        improve labour market transparency. Submissions will continue to be
        made by placing staff.

S60.3 Small computers are being provided at all the LOs so that UB data can be entered on-line and then transmitted, over night, by automatic dialling arrangements to the central computer. The computer will eventually hold local databases of claimant data so as to reduce dependence on clerical records and the central computer. Supplemented by registrant information this system will also provide unemployment statistics and management information.

S60.4 The Co Arb system is at the experimental stage and can best be described as an on-line job bank to provide registrant matching (RBM), vacancy circulation and vacancy and placing statistics, though it may be developed for other applications. An experiment is in progress in one district and will be evaluated in 1981. If results are promising, it will be extended to 2 more districts. Successful evaluation could then lead to national implementation; perhaps by 1986. Under this experimental system the computer is used to search the vacancy bank (see paragraph S40) containing all the vacancies notified in the local labour market and those circulated from other areas. Occupational, experience and locational factors are coded and other factors are employed. To obtain selections, registrant matching details are input to (but not retained in) the computer which then displays the number of vacancies which match. Summary data or the full vacancy details can then be obtained. Matching details of jobseekers can be entered progressively and can be varied, flexibly, so as to conduct a search. For unskilled registrants factors which cover type of work or working conditions can be used, instead of occupation (see also paragraph S44.1).

S61 BA therefore envisages a computer architecture with two levels of processing, at central and local levels, and, similarly, on-line communications using both permanently connected lines and auto-dial arrangements. The success of Co-Arb depends to some extent on the ability to "fit" the local computers to labour markets (particularly in large urban areas) so as to avoid excessive duplication of databases or discontinuity in vacancy retrieval. The FVD system will remain on the central computer because of the degree of mobility in these occupations. The computer strategy is based on progressive development so as to achieve the more immediate possibilities whilst proceeding by careful experiment towards future opportunities. It supports a general strategy of improving equilibrium in the labour market by increasing the transparency of job offers and improving the capacity of the service to help individuals adjust.

MLPS (Italy)

S62 It is not possible in a short summary to give an adequate picture of Italian conditions and systems. There is control of job engagements to support social priorities and the placement office (PO) is assisted by Commissions which determine job categorisations, social criteria and the selection of registrants. Jobs involving family employment or direct passage from one job to another have to be reported by the employer to the PO. The employer can recruit for managerial, "white collar" and specialised manual jobs subject to an engagement permit (nominative request) from the PO. For the remaining ("blue collar") jobs the employer can only make a

numerical request (number of vacancies) and must engage the worker(s) submitted by the PO (unless unsuitable). Such vacancies are displayed in the PO and there is SS as well as "traditional" matching but all selections are made on a system of points based on family circumstances, length of unemployment (registration) and handicaps. Control is enforced by law and a labour inspectorate; it is also supported by legal regulation of dismissals.

S63   In principle matching is by OBM, ie by selecting or checking jobseekers. This and the maintenance and updating of the points system requires that all jobseekers are registered and that their records are kept up-to-date. They have to attend monthly at the PO. A change in family circumstances (including one member of the family getting a job) affects the points of the whole family. Up to 33 million live and historical jobseeker records could be involved in a computer system.

S64   A (legal) reorganisation of the Italian Employment Service is required if computerisation is to be successful. Some 8,000 existing POs will be reduced, especially in rural areas, to about 800 but with some increases in big labour markets; Rome (3 million population) has one office at present. Also there will have to be more consistency in the way the Commission operate the social criteria.

S65   Although a database of (clerically compiled) statistics is held on a central computer all existing MLPS systems are clerical. An experimental computer system (in the Latina area, giving good results) computerises all data about registrants and updates records with any changes, including engagements from direct, nominative and numerical requests. The data is held mainly in coded form and clerical records (partly for legal reasons) are retained. The system prints lists or selections of registrants for numerical requests in points order and also prints the permits. The registrant records are also continually updated with changes in circumstances (eg with placements and thence consequent changes in family points) and the monthly attendances. Lists of registrants can also be provided according to qualifications or various other factors.

S66   The envisaged (national) computer architecture consists of 9 large, inter-regional computers connected through concentrators to about 2,800 terminals in 800 offices and to a central computer. This will process statistics, matches which involve national mobility and will control communications between the inter-regional computers. The computer files are complex (a database management system) and all input and most output is in real-time with fast response, though batch procedures are used wherever possible.

S67   MLPS also has a system for matching mobile jobseekers against vacancies which cannot be filled locally based upon (SEDOC) procedures designed by the European Commission for Community matching. Records are held at provincial offices and information about vacancies and registrants is exchanged by means of a telex system. This is also linked to regional offices and a head office branch (UMOTEM: the office for geographical and territorial mobility) so as to include vacancies circulated from other Community countries. UMOTEM also advertises those vacancies which cannot be filled by matching. The telex system and certain "summary" matching procedures are to be replaced by a computer system and, perhaps, eventually

by computer matching but timing depends on the implementation of the, experimental, local office system and completion is unlikely before 1987.

S68   Because of the regulation of engagements, matches in Italy are determined by the factors used in selections and not by the market as in the other employment services. The clerical system of MLPS is not very efficient because of the amount of data to be handled. It is anticipated that computerisation will both improve selections and data handling for the system of regulating engagements. The main objectives of MLPS are to operate the social priorities and controls, according to the law, but with the minimum of disadvantage to the efficient operation of the labour market. Although close attention is being paid to costs the computer system is justified mainly on social and political grounds. A configuration of large computers is probably essential having regard to the nature of the tasks to be performed.

MSC (GB)

S69   The ES Division (ESD) of MSC has about 1,000 jobcentres (JC) 100 of which are in Greater London and about 40-50 each in 4 other large conurbations. There is a philosophy of structuring services to promote "self-help" and enable staff time to be concentrated on cases and activities where it will be most effective so that self service as well as traditional methods of matching are used. Modernisation of the employment service began in 1973 and is now nearly completed. This included the development of computer systems to improve both management and operations. MSC works closely with the Department of Employment (DE) which administers a comprehensive system of unemployment benefit (UB), through separate UB offices, and provides statistics of employment, unemployment and vacancy demand.

S70   ESD computer systems and plans are as follows.

S70.1   The JUVOS system(s) brings together a number of sub-systems in order to create computerised statistical files to provide unemployment, vacancy and those management statistics which are obtained from ESD registrant and vacancy operations. Vacancy and placing statistics for management will be extracted through the VACS system (paragraph S70.2) and processed by ESD on its mini computers and the LMI statistics of vacancies on the DE computer. Unemployment statistics will be collected through the DE's computerised UB payments system with registration details passed to the UB offices to be included in the UB computer. This is an interim measure (interim JUVOS) and should be completed by 1984. Later when ESD computerises its own registrant data this will be linked with claims data in the computer and this will assist in maintaining registrant files in a more up-to-date state.

S70.2   The VACS system will link about 600 JCs on-line through 7 mini computers, with about 300 JCs off-line. It is similar to the SITO 2 system of ANPE but provides vacancy circulation and (vacancy and placing) statistics. The system could be further developed to meet other needs but decisions on this are being deferred pending the full development of an ESD computer strategy. It is planned to complete

the VACS implementation (excluding London) by 1983. A system (Message Switch), similar to SITO 1, was introduced into London as a temporary measure pending full implementation of CAPITAL.

S70.3   The CAPITAL pilot system was developed, beginning in 1973, for Greater London where jobcentres handle about 1½ million registrant and vacancy records each year. It covers all 3 applications as well as holding a file of employer's details. Most clerical records are eliminated and vacancy receipt and follow-up are largely concentrated at vacancy notification centres. The computer data is organised in a (DBMS) database management system for speedy response in real-time operation to give very flexible access to data. The (15) pilot offices each have a generous supply of VDUs and a printer which produces SS display cards and other material. The system provides continuous bilateral matching and the entry of a vacancy or a registrant generates a selection for further examination by staff. There are other retrieval procedures. Selections are based on matching factors of occupational classification, location, average weekly pay, age, sex, the possession of a driving licence and job requirements such as shifts, part-time etc. Tables of locations are programmed into the computer and the geographical extent of any search or selection depends upon the size of wage offered. It is progressively widened to provide a sufficient number of selections. Lists of selections are presented in order of preference.

S70.4   The CAPITAL system was successfully evaluated but though it considerably reduces staff time for routine work, the heavy capital and running costs of a full system for Greater London would involve increased expenditure. For its viability the system depends upon the value of economic benefits because vacancies are filled more quickly. When these are taken into account the system produces a positive net return, the size of which depends upon assumptions made about procurement costs, the reduction in staff time and the level of unemployment. Sensitivity analysis of these factors showed that CAPITAL would still be cost-effective in a variety of conditions but that the economic benefits would be reduced by high unemployment. In 1980 the MSC decided to abandon the CAPITAL system because of the increase in unemployment and because the British Government has imposed reductions in staff to the extent that it will not be possible to fully exploit the system. Also whilst the pilot system received technical approval there was an investigation to see whether modifications were possible to spread the costs of implementation, for example, by splitting the database to cover geographical segments of London or by implementing only certain applications. Neither of these were possible because of the integrated nature of the design or because they would increase technical problems and costs.

S70.5   The Jobscan experiment was carried out in a number of offices using a mini-computer linked by telephone lines to keyboard printers. The results are discussed in paragraphs S37-S39. Similar, Mach Match, systems in a few jobcentres using separate micro-computers produced comparable results.

S70.6   A computer matching system in the professional occupations, PER, has operated successfully since 1974. It was partly introduced to support a system of charging employers to fill their vacancies. It is now being abandoned because of the staffing economies imposed by the Government. The matching procedures are somewhat similar to those in the FVD system of BA but nearly all registrant and vacancy details are included in the computer records and the system is expensive in staff time for data collection. Also communication with the computer by post using batch processing makes it an inflexible and somewhat inconvenient system for matching.

S71   In 1978/9 ESD had a variety of computer systems developments which lead it to attempt to set a strategy for computerising its registrant and vacancy data (described more fully in the report). The problems of matching and uncertainty about future computer developments led to the adoption of an interim strategy based on the VACS and JUVOS systems with further studies to determine its future systems and the computer configuration. The recent decision to abandon CAPITAL has changed the pattern of further studies which now include a feasibility study of an on-line job bank. This is to be completed by the end of 1981 so as to give early information about the required computer configuration in London ie whether to implement VACS or an on-line job bank, there.

DMS (N Ireland)

S72   Northern Ireland has independent powers of administration over its employment services and designs and operates its own systems. It has a computerised statistical system (COMPUS) similar to that of ANPE. The size and nature of the local office network does not justify further computerisation, at present.

ONEM (Belgium)

S73   In addition to providing an employment service, ONEM makes payments under training and work creation schemes for which it uses computer systems. It has its own central, main-frame, computer installation. It is also responsible for supervising the system of unemployment benefit which is mainly administered by unemployment funds. To do this ONEM checks and authorises payments and calculates the total reimbursements to be made to the unemployment funds. Wholly unemployed claimants have to attend daily at their local Commune and this provides the basis of the daily payment of unemployment benefit and is a link between the claimant and registration records. The local office network consists of 30 local (and sub-regional) offices with about 70 subsidiary offices. ONEM is also experimenting with SS on similar lines to MSC and has opened a number of job offices.

S74   The computer systems of ONEM are as follows.

S74.1   There are statistical, case by case computer files of vacancies, registrations and people who apply for and undergo training. Local offices send data by post on daily lists to the computer centre where the details are input on punched cards. The computer maintains a sequential file for statistical analysis and an immediate access

file, on disc, for on-line retrieval. In addition to regular
statistics (ONEM publishes a large amount of information) a series of
fixed format messages are printed and sent to the local offices.
These contain details of registrants vacancies and people in training
including sex, occupation, qualifications, Commune, industry and the
office holding the registration or vacancy (which also include the
details of the employer). Local offices use these reports to identify
apparently suitable vacancies or registrants at other offices.
Subsequent action is then arranged by telephone.

S74.2   Certain offices are already on-line to the computer with
printers but ONEM plans to link all its local offices on-line to the
computer through VDUs and printers (the placing system) and to create
an on-line file of claimant data to assist in supervising the
unemployment benefit system. The use of VDUs on-line is intended to
improve the speed and flexibility of the (existing) placing system and
to provide for on-line communications between local offices.

Conclusion

S75   This study has not raised questions of broad policy or of individual
design details but it does identify some important issues of management and
general systems work. Because of gaps in information (eg, about costs and
benefits or future events) any conclusions must involve a degree of systems
judgement on the part of the study leader. The problems identified are those
of the applications themselves; of management; of computer matching or
"retrieval" from registrant and vacancy databases; of particular technical
issues; and of strategic planning. Some possible implications for the SEDOC
system of the Commission are also discussed.

S76   The employment service environment is not an easy one for computer
systems because of the dispersed operations, the volumes of data and great
variations in clients and labour markets. The applications are difficult.
The matching problem will not be easily solved - quite the reverse - the
statistics face problems of accuracy and data collection for big,
politically sensitive, series and management information systems are known
to be very difficult to get right. And yet improvements in management
information are essential for choosing and implementing good computer
systems.

S77   The most important problems arise for managements. Managers are going
to have to face up to the changes brought about by computers and to the
impact on their management systems and decision making, in general. For the
employment services engaged in large scale computerisation the effects on
resources and services are such as to require the attention of top
management. Though these managers must be involved they have to remain
objective and create the right conditions for good decision making and
control. Some of the systems covered in this study are so big and costly
that they can reach a point in development where it is very difficult to
change or go back. Bearing in mind the impact on staff and organisational
relations - sometimes even public relations - it is not impossible to get
into a position where a decision either to stop or go forward becomes a
matter of management credibility. There are comments in the report on

some critical aspects of management control, ie the user requirement project direction and control and evaluation.

S78   Some of the systems managers also thought a significant problem was that of costs or the level of expenditure. The report identifies this as an issue of objectives and cost-effectiveness. Expectations from computer matching have been too optimistic and more careful estimates and analysis of, or investigation into, costs and benefits are required. There are three requirements which managements need to follow. Firstly there is a need for more clarity of thinking on, and better definition and measurement of, benefits. Secondly there has to be more understanding that computer systems can affect staff behaviour and line management responsibilities in ways detrimental to performance. Thirdly, and most important, managers need to ensure that the options are specified, costed and presented in ways that lead to good decisions.

S79   The major systems issue arises with computer matching systems because of high costs, long time-scales and the need to get better systems of data retrieval than have so far been achieved. Matching is not a "natural activity" for computers because the factors used in making selections do not follow well-defined, logical, sequences. This, retrieval, problem has to be solved if employment services are to get the full benefit from the developments now taking place in computers and telecommunications.

S80   The services have good technical, systems, staff capable of making a success of advanced systems within the limits of good, current, practice. But they are facing a "generation change" in systems due to the emergence of low cost small computers allied with advances in telecommunications. The levels of support, by way of distributed databases, standards and communications software, have not reached the point where distributed database systems on small computers can be adopted with confidence or at reasonable cost. This technical problem compounds with the other issues to complicate, and add to, the risks of decision making. It is a question of opportunity costs, whether to wait and be satisfied with systems which possibly give lower, if quicker, returns; or adopt the best of what is available of the comprehensive systems; or whether to try and promote systems which may be adaptable in future meanwhile accepting compromises in database organisation.

S81   Risk and compromise are involved in all systems work but at present it is exceptional in degree. Given an uncertain future the time-scales of development and implementation make this a matter of strategic planning. If one's destination is uncertain all one can do is try and move in the right direction. MSC experience and practice in this respect is discussed in the report. Computer strategy must be founded on general strategy and this again emphasises the close alliance which must be created between systems design and management, generally; as well as the management disciplines.

S82   The study illustrates this by comparing differences of approach between, indeed within, the employment services which affect computer architecture and planning. On one side are the so-called "total" systems like CAPITAL and, possibly, SAGE as well as the plans of AD; also, for different reasons, those of MLPS. These systems are designed to be very flexible in operation and to meet a variety of current and future

needs. They must therefore provide for matching and different retrieval procedures which result in high capital and operating costs and long time-scales of development. Several features of this type of design make for difficulty and cost when it comes to changes in the system itself (see for example paragraph S70.4). Moreover they cannot be "total" for the organisation if services find themselves with a mixture of systems, after all, because of the time taken to implement them or because they are limited to the very big labour markets.

S83 The converse approach is one of pragmatism in systems development which is only possible with less complicated or less costly systems and can lead to piecemeal development. Neither of these approaches need be wrong in all circumstances; as is shown, for example, by the needs of MLPS and the benefits, to ANPE, of SITO 1 over a number of years. However, neither approach, on its own, is compatible with good planning in circumstances such as those faced by employment services which need to be responsive to external changes.

S84   If change is to be taken into account in computer planning - and that is what planning is all about - then change has to be part of the design philosophy and the systems have to be flexible in adapting to change; at least this is a conclusion of MSC. The basic ingredient of such a design philosophy is modularity which "implies something that is clearly identifiable, manageable and inter-changeable without causing disruptions to the whole of which the module is a part". It is a paradox that modularity has to be "total" if it is to be applied to the organisation as a whole. Modularity will have different aspects for hardware, software, applications and implementation. MSC experience also emphasises the need for caution and good planning before attempting too rapid development of, big, matching systems.

S85 To limit the size of the study it was agreed that it would not specifically include the SEDOC system of the Commission but that it would explore any problems which might be created by national developments.

S86 The participants (except, perhaps, MLPS) did not see the existence of separate, national, computer systems as creating such difficulties given that SEDOC requirements are known and that they are able to design suitable system "interfaces", which are likely to be mainly clerical in operation. In any case the problems of inter-communicating databases will inhibit substantial developments in the near future. The issues of system planning, flexibility and design philosophy discussed previously are no less relevant at the supra-national level and clearly variability is much greater. The procedural costs in matching between countries are likely to be higher (than local matching) and therefore to require a greater degree of selectivity as to cases and activities. At the Community level, even more than at the national level, the "general" computer solution is unlikely to be feasible. What is important is that policies should be as clear as possible, that there should be good communications about system develop-ments between the employment services and that the Commission and any Community requirements, eg for statistics or labour market intelligence, should be clarified; particularly where they may have implic cions for definition and therefore for system design itself.