O'Brien

London Boroughs' Management Services Unit

LONDON BOROUGH OF HARINGEY
LONG TERM COMPUTER STUDY

A FIRST REPORT

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I. Introduction

This report has been produced at the request of the London Borough of Haringey in order to make more widely available a concise statement of the origins and aims of the long-term computer study which it has commissioned. Much interest has been expressed in the project and it is hoped that, by producing this interim report, some of the many questions already raised might be answered, also that by indicating the progress so far, and by giving some idea of what are the reasonable expectations, future efforts which have the same or related objectives might be co-ordinated to the advantage of Local Government (and notably London Government) as a whole.

II. Origins of the Study

The Computer Division of the Management Services Unit has been associated with the development of computer facilities in London since 1958. All the programming, planning and implementation work associated with the pioneer joint computer scheme at Greenwich (London Boroughs Joint Computer Committee formed in 1962 and now comprising the London Boroughs of Bexley, Greenwich and Southwark) was done by the Unit, and responsibility for this work still remains with the Computer Division.

In 1966 the Unit assumed responsibility for setting up and maintaining a joint service in North East London for the London Boroughs of Hackney and Tower Hamlets to be based on the use of all the integrated systems developed for South East London, and in 1967 the London Borough of Haringey joined this group. Thus at the present time six London Boroughs are using computer systems developed by the M.S.U. and it is in the context of that responsibility that part of the research effort of the Unit has lately been directed towards analysing the current trends in computer development and in formulating future requirements.

In 1966 the London Borough of Haringey completed a feasibility study directed to the purchase of a computer for its own use but came to the conclusion that there were, in fact, some pressing needs for a budgetary control service which could not be impeded by the time necessary to install and develop a new computer system. Furthermore the level of expenditure and effort which was indicated, although significant, still did not seem to offer the prospect of a really major improvement on the current and proposed pattern of computer use in Local Government. It was therefore decided to seek service from the North East London computer scheme to solve the immediate problems and also to sponsor an intensive study of the information and control requirements of the Borough as a whole which would take into account the most recent developments in computer technology, particularly in the field of direct access and communications.

The transfer of accounting functions to the North East London computer began in July 1967 and was completed by April 1968. The long-term study, which is now being carried out by the M.S.U. in conjunction with the Borough Treasurer, commenced in October 1967 and this now encompasses all the current research effort of the Unit in the computer field.

III. Terms of Reference and Organisation of Study

A joint memorandum prepared by Mr. J. Owen, Borough Treasurer of Haringey, and Mr. H. J. Dive, Director of M.S.U., which was circulated to all Haringey Chief Officers in September 1967 defined the terms of reference to the study as:—

> "To determine the possibility of setting up and maintaining borough information files in association with an integrated system for all the clerical, administrative and accounting functions of the Council. It will also examine the problems of collecting data and providing access to it, the required equipment, systems and programs and the possibilities of utilising high level programming languages and other aids. An indication will be given of costs and the likelihood of participation by other authorities."

Since October 1967 two main lines of enquiry have been followed concurrently:—

(1) The Technical Study—being an evaluation of current and projected computer equipment and related facilities.

(2) The Systems Study—a study of the present pattern of information usage by the authority, i.e. what data is required, where and when it is needed, and what constraints must be taken into account.

The broad lines of enquiry have been divided into a number of stages which are further described below.

(1) *The Technical Study*

The technical study has now reached the stages where detailed discussions are taking place with

nine computer manufacturers concerning their existing equipment and immediate future plans. The work already done has been primarily concerned with data transmission plus data origination and collection, since important advances are being made in this area and consequently the current techniques involving the large scale punching of cards or paper tape appear most susceptible to improvement.

The complete set of technical reports planned comprises:—

(a) Data transmission.
(b) Document reading.
(c) Data terminals.
(d) Data capturing (a review of all other methods of getting data into a computer).
(e) Micro-film techniques for storage and retrieval of computer data and results.
(f) Computer requirements in a multi-access system.
(g) Computer facilities available (a review of manufacturers' equipment ('hardware'), their standard program facilities ('software') and of their relevant experience).

Reports (a) to (e) have already been completed.

(2) *The System Study*

The first stage of this study, which was completed in May 1968, consisted of a detailed factual survey of every Council department, in order to obtain an overall view of the authority's functions. In the first place it was necessary to gain a proper understanding of the full range of Haringey's services, and the problems encountered in providing them. All professional and administrative procedures have therefore been studied and defined. Particular attention has been paid to the use of information at every level, by listing the records maintained and the communications and contacts regularly made. Only in this way has it been possible to see the interaction of all services in perspective.

The common report structure which was evolved for this stage is attached as Appendix 1; 18 of these reports have been produced. It will be seen that most of each report is factual and objective—only in the final section is an assessment made of problem areas and an indication given of possible lines of computer development, as a basis for discussion and further study.

(3) *The Next Stage*

The Technical and Systems Studies will be followed by:—

(a) An analysis of all functions to determine their points of contact and interdependence, especially with regard to information.
(b) A study of methods of controlling services and projects.
(c) A study of the problems of forward planning of departmental activities.
(d) The compilation of a list of all probable computer applications; and
(e) A realistic assessment of the costs and benefits of each possible computer application.

IV. A Preliminary Assessment

(1) *The Role of the Computer*

The use of computers in local authorities is now so widespread and well established that there can be little doubt that computers will continue to play a most important role in the further development of the local government service; indeed, there are many factors which will accelerate this trend and create a demand which can only be satisfied by utilising the most powerful facilities which become available.

The forces which are responsible for this continued impetus towards automation are many.

The problems of rising costs and scarcity of manpower give rise to further emphasis on economy and efficiency. To maintain the spending power of the previous year's budget in the present inflationary period requires an annual increase in income of 3% per year. In addition, due to the actions of Central Government, there has been continuous increase in the number of services to be provided, and, supported by local pressures, a continuous demand for improvement and extension of existing services. It becomes essential to plan and budget over much longer periods than hitherto and to be able to determine speedily when there is deviation from approved plans. The need to expand that proportion of total expenditure which is controllable and to ensure that the controls are effective is vital. Utilisation of long-term budgets is an invaluable aid in the extension of the field of controllable expenditure in that the longer term effects of immediate decisions become apparent.

There is at present increasing emphasis on trying to define more closely the information necessary for the making of proper decisions and then to obtain such information. Whilst there is a large volume of information within a local authority it is not always readily available and is rarely in the form and classification required for any purpose for which it was not designed. Since such limitations cannot be presently overcome, recourse must be had to sample surveys and other such methods.

There is increasing awareness that the areas where local government performance is most

vulnerable is where functions cut across present departmental boundaries. The number of local authorities who have implemented major re-organisations represents an expression of this awareness. An essential step is to provide these improved management and organisation structures with better information, a necessary prerequisite to proper administration and management and to improved performance. Management must be able to make accurate projections for the future and to modify plans in the light of current experience. This is only practicable if the collection, recording and analysis of data is aligned to produce results which are current, accurate, comprehensive and immediately usable; it is only the advent of the latest computer techniques which makes this a real possibility.

(2) *The Present Situation*

Because a sound foundation has been laid, local government is well placed to use the further advances in computer technology which have now become practical.

The facilities available to the authorities served by the M.S.U. have been powerful enough for some ambitious goals to have been set. The Leo III at Greenwich, on which the major development work has been done, is one of the largest machines in use in British local government—it has 32 thousand words of core store, ten magnetic tape decks with a transfer rate of 28 thousand characters per second, two high-speed printers, and two paper-tape readers. The additional power given by simultaneous operation of up to four programs—a most advanced feature when the computer was installed in 1963—has been fully exploited in serving the needs of a group of users. The integration of financial routines into a comprehensive expenditure and income accounting system represents a foundation of experience with which it is possible to make a realistic appreciation of what is necessary for still further development.

However the main problem areas which can be distinguished in present computer systems are the large volume of printed results which is produced and the complexity and cost of data submission. Furthermore up to now it has not been technically possible for computers to have other than a limited impact in the context of the whole authority or to tackle the general problem of duplication of records. These points will now be considered in turn.

(a) *Volume of printed output*

A term that is justly used in the context of computers is "the paper explosion" and it is often the clerical system which is unjustly accused of being responsible for this. The real problem is one of access to stored information.

Sequential processing based on magnetic tape files means that, in any one computer application, transactions must be collected until a worthwhile "batch" of data exists, sufficient to justify the subsequent sorting and matching with the entire permanent file. This batching implies that for each task, access to the computer must be periodic rather than continuous, a weekly cycle being the most common. Two problems result. First, there is a pressure on the clerical system to provide a large volume of data to a strict timetable: natural peaks of work thus tend to be exaggerated. Second, it remains unacceptable to entrust important information to the computer and to the computer only: consequently the computer output will be limited and duplicate manual records will be created, or, probably more often, the complete contents of computer files will be printed out in case some part of that information is required before the next access to the computer. Some improvements have been achieved by the use of interchangeable discs but the file capacities of these devices are rather low and not many installations have been able to allow discs containing major files to be permanently on-line and thus permit interrogation.

Thus, to take a simple example, there is a choice in a rating application between telling the ratepayer who makes an enquiry concerning his computer-held account that the information will be sent on to him or of printing very frequently information concerning *all* outstanding accounts—*all* because it is not known which ratepayer will make an enquiry. The first alternative is not readily accepted particularly where, under a previous manual system (albeit with more staff), a simple duplicate posting technique sufficed to provide the information; the second is extremely wasteful in stationery and computer time besides being clumsy in operation because of the bulk of reference documents.

One of the most disturbing problems arising from this paper explosion is the loss of significant management information when this is over-borne by other printed results; management by exception in these circumstances becomes impossible.

(b) *Data submission*

Conspicuous features of most present computer systems are the inability to use prime documents, the need for very precise and often complex rules for the completion of forms, and the large numbers of data preparation staff (clerical and punching) which it is necessary to employ. It is still customary

for a great deal of effort to be employed on the checking of forms before submission to the computer. Delays in submission of important data and the rejection of data in the computer processing stage still imply that the results which are produced lack completeness. It is difficult to see how the collection and transmission of forms through a local authority's organisation can be made to accord with the more frequent production of budgetary control and other management information which is envisaged.

(c) *Limited impact*

It is in the non-financial sphere that the failure to realise the potential of electronic data processing is most striking. Non-financial computer applications in local government at present can be grouped under three main headings:—

(i) Mathematical routines for solving problems or making repetitive calculations.
(ii) Bulk clerical routines with a high printing content, e.g. electoral register, library cataloguing, health appointments.
(iii) General techniques requiring specialist application, e.g. critical path analysis of construction projects, survey analysis for town planning.

The computer effectively replaces an existing process in (ii) above, and greatly enhances the quality of professional work carried out in (i) and (iii). All these applications have proved their value but they have only been developed in areas where the end-product justifies the special collection and preparation of data for the computer process. The number of tasks viable by this standard, however, is extremely limited, as a perusal of the Local Government Computer Committee's Index of Computer Applications will show.

If this analysis is pursued further, the factors which are inhibiting the further development of computer systems in the non-financial sphere are seen to be the volume of data which is required to be stored, the need for frequent access to this stored information and the apparent lack of any large-scale activity to justify such an approach. It is clear that it is only by attempting an evaluation on the basis of a complete authority rather than of individual departments that any progress can be made.

(3) *Duplication of Records*

The possible duplication of computer-maintained and manual records has been referred to previously; if the wider question of the recording, updating and storing of information in the authority as a whole is considered, then it is apparent that the problem assumes much greater proportions.

A local authority is concerned with its population and their environment and, to carry out its functions, information about people and property is maintained in almost every department. These records contain a great deal of common information. However, since each of these records is stored and maintained only to meet the needs of the particular department concerned, and within the limits of the information reaching them, not all of these versions will be accurate and up to date; even where a department possesses an accurate record sufficient for its immediate requirements, knowledge of the further information held by another department might still be extremely useful. Within one department it is by no means unusual for the same information to be held sectionally as well as centrally, and to be stored in a number of different sequences corresponding to the main ways in which it is necessary to refer to it, e.g. alphabetical order of persons, address of relevant property, date of last reference, etc.

(4) *The Future Requirements*

The above analysis establishes the following requirements for the next phase in computer development :

(a) the data collection process needs to be much more automatic and more flexible.
(b) Access to stored information needs to be easy, more immediate and more frequent.
(c) Results need to be available promptly.
(d) The amount of stored information should be sufficient to meet all reasonable requirements.
(e) Stored information should be flexibly indexed so as to be retrievable in a variety of contexts.
(f) The computer system must be designed to serve all departments of an authority.

The concept now being examined is that which is today known as a total system or management information system, in which the computer plays a major role in the communication network of an organisation. It holds the key records (or data base) and makes these available where needed in response to authorised enquiries. The basic records are used in conjunction with the routine data processing functions. They are updated primarily in that context but also as information is acquired anywhere in the organisation as a whole. The connections to the computer are data links capable of transmitting both information and enquiries to or from a terminal: this may be a simple teleprinter with a keyboard, a television-type display unit or even another computer.

The "data base" is maintained on a uniform basis as a means towards integrating all activities and the

total system is able to absorb a continuous stream of information, instructions and requests fed in through these directly linked terminals from all parts of the authority. Each terminal transaction must be handled in its correct order whilst the other activities are continuing in parallel, i.e. enquiries have to be answered, basic files have to be updated, data has to be collected, all to a background of the routine batch processing work (production of rate demands, payroll, etc.) which still remains.

V. The Next Stage

(1) *Completion of the Study*

The final study report is scheduled to be ready by January 1969. Sufficient work has been done at Haringey to establish the general viability of the overall concept in the context of present data transmission facilities and with the computer hardware and software currently available. The data base is being assembled under the broad headings of people, property and internal records. The problem is one of quantifying the various factors involved in the local government context, e.g. how many terminals are required in a single London authority; how much data is needed permanently on-line; how should the basic files be referenced and cross-referenced; what are the economics of such a system, etc.

The final report will answer these questions, allocating priorities to requirements according to urgency and potential advantages, and will produce a synthesis, outlining possible alternative solutions maybe at two or three different levels of cost and power in order to encompass the implications of partnership with other authorities. A phased plan for implementation is obviously also necessary; current expectations are that 1971 represents a practicable starting date for a new computer installation.

(2) *The Implementation of an Information System*

At present the main development work on information systems for local government is concentrated in the U.S.A. In the U.K. only West Sussex County Council has so far begun to implement an information system. In the State of California alone, the authorities of Alameda County, Santa Clara County and the City of San Francisco had made very substantial progress, as was confirmed when they were visited in April 1967. A "Police Information Network" serving 93 law enforcement agencies in the Greater San Francisco Bay area had been established as long ago as July 1965 by Alameda County and a "People Information System" to co-ordinate the activities of social service agencies such as welfare, hospitals, health and probation, had been established in January 1965. The latter contained over 200,000 names in April 1967.

It has become apparent from the study that it is only the very largest authorities which will be able to take these next steps in computer use on their own but even if 'the hardware' is a feasible proposition, the 'software' development will present a major investment problem. The establishment of a national computer grid from which a local authority could obtain the required computer facilities is still a very long way off. It is considered that the most powerful computer installation which could be justified by an individual London authority (now using a computer priced within the range of £100,000 to £140,000) would be of the order of £180,000 to £220,000. This would however still provide only very limited random access and very few terminals—quite inadequate to provide a full service for all departments such as described above.

When the size of development costs is also taken into account it is quite clear that it is only by co-operation on both aspects that a system with the required capacity could be established. A partnership of just three London boroughs would however be equivalent in terms of population and resources to San Francisco.

Provided that a minimum number of partners can be found to make a hardware group viable, and that the development work can be financed, it is possible to contemplate the realization of an information system by 1971 or 1972. The immediate realization of the project will depend on the formation of this hardware group, but if sufficient support is forthcoming for the development work it is intended that the planning, system design, and programming should be carried out employing techniques which will produce results capable of use by any other local authorities wishing to introduce similar systems.

To this end programming would be in high level languages to permit the use of other types or makes of installation with the minimum of re-writing. Advantage would be taken of systems of design and program modularity to give the maximum flexibility for alternative arrangements and to facilitate subsequent amendments and maintenance. Complete documentation arrangements would provide the basis for ready understanding of the system and of its operation. In this way it is felt that the best basis could be established for the utilisation of the results of the enterprise over the widest possible area.

H. J. Dive

June 1968

General Reports on Departments

List of Contents

Heading	*Subject to be covered*
1. Scope of the Department	List of functions. Summary of statutory authority. Facts and figures about performance and expenditure.
2. Organisation	Organisation chart. Notes on areas of responsibility.
3. Geography	List of premises and their uses. Geographical distribution of staff. Methods of communication.
4. Procedures	Description of professional activities. Procedure lists for administrative functions.
5. Summary of Records and Communications ..	Summary of records grouped by subject matter and location. Summary of routine contacts within the department, with other departments, and with other organisations. List of documents in use in the department.
6. Accounts	Explanation of any complexities in accounting for the service (not needed in most reports).
7. Conclusion	Analysis of information required at managerial, professional and administrative levels within the department. Suggestions for possible computer applications.

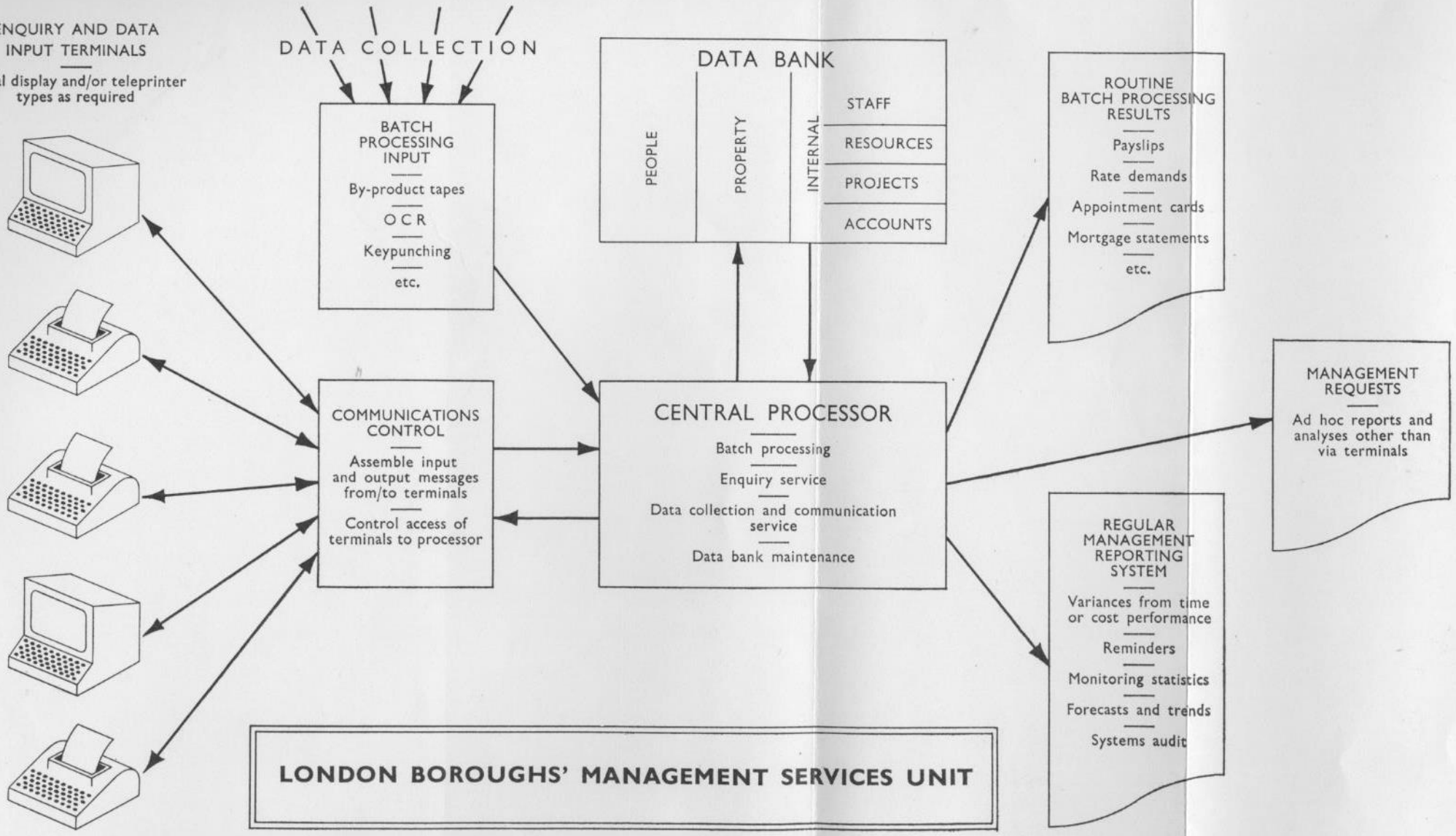
Appendices

1. Records .. .. Details (e.g. physical and logical organisation, volume) entered on a specially-designed form, grouped under 7 subject classifications:—
   - Land and property
   - People
   - Material assets
   - Staff
   - Tasks
   - Financial transactions
   - Miscellaneous

2. Communications and Contacts .. .. Details (e.g. purpose, timing, medium) entered on another special form, grouped as follows:—
   - Internal
   - With all departments
   - With each department in particular
   - With ministries
   - With other public bodies
   - With the public as users of services
   - With the public as suppliers and contractors

3. Specimen documents .. .. .. Forms, ledger sheets, clerical instructions, standard letters, etc.

THE INTEGRATED INFORMATION SYSTEM FOR LOCAL GOVERNMENT



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