



THE ECONOMIC AND SOCIAL RESEARCH INSTITUTE

Appendices (K,L,M,N,O,P) to the report,

**AN OVERVIEW OF
CIVIL SERVICE COMPUTERISATION,
1960-1990**

Robert Pye

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"An examination of these Appendices is not critical to an understanding of the main body of the Report. They are being made available primarily by way of background information."

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** These appendices are available under separate cover in photostat form only upon request to the Institute. Their examination is not critical to an understanding of the main body of the report and they are being made available primarily by way of background information.

APPENDIX K

Department of Posts & Telegraphs

[Position to end-1983.]

First Steps in the 1940s.

The first introduction to automatic data processing in the Accountants Branch was a small Power Samas 40-column punch card system to process telephone operator assisted trunk call tickets. This system was introduced on a pilot basis for Dublin calls about the end of the 1940s but was discontinued in the early 1950s in favour of a ledger card system based on Underwood accounting machines. These machines were used to deal with all the items in telephone bills, viz. rentals, local calls, trunk calls, and miscellaneous charges.

In 1963 an IBM punch card system was introduced in Telephone Accounts to replace the underwood equipment. This system also included a punch card bill with an attached payment stub which enabled a payment card to be reproduced automatically in respect of paid bills.

The first mini-computer installed by Posts & Telegraphs was at the Air/Ground Communications Station at the Department of Transport and Power at Ballygirreen near Shannon Airport in the 1960s. P&T engineers provided Aviation Radio Services for Transport and Power at that time. The system was a dual ADX6300 Message Switching System based on dual PDP-8 computers with Vermont Research magnetic drums as peripheral memory. It handled real-time teletype traffic from 15 private wire AFTN (Aeronautical Fixed Telecommunications Network) circuits. It accepted on-line messages from 10 radio operators, communicating directly with North Atlantic airline traffic. These messages were entered in a shorthand form from which the ADX composed full ICAO multiple addresses for onward international forwarding via the AFTN.

The P&T computer centre.

There were two parallel developments in P&T during the 1960s. The first built on the experience of using punched card machines in the Accountants Branch. The second came from the use of computing by engineers on work relating to the Telephone Exchanges. These two strands came together to form the Computer Unit in 1971. The P&T computer centre in Dundrum opened in 1973 using an IBM 370/135 (240K). Reflecting the influence of engineers, the programming language selected was PL/1 (which was also used by Aer Lingus and ESB; CDPS and Revenue used COBOL). While IBM equipment was installed initially the department did not have a policy of buying only from that vendor; instead the most appropriate equipment for a particular job was selected.

The telephone service.

The Accountants Branch handled the processing of accounting records for operator assisted calls. In the 1960s they switched from Underwood's accounting machines and manual sorting to automatic processing using mark sense cards. This conversion alone was estimated to have eliminated ninety sorting assistant jobs at a stroke. The volumes grew steadily so that by the late Seventies there were 100,000 trunk tickets, as they were called, being processed daily. The pricing of these calls and the production of telephone bills for subscribers was computerised in 1970 using the bureau service offered by Aer Lingus on their IBM 360/50 mainframe at Dublin Airport. In 1978, the mark sense technology was replaced by optical character recognition. This major change involved training about 6,000 telephone operators around the country to write clearly and legibly in characters of a fixed size. It also involved programming in machine language for IBM channels. With the subsequent introduction of digital telephone exchanges, call data for telephone billing also began to appear on magnetic tape.

The Savings Bank.

The Savings Bank accounts records were transferred from a Burroughs ledger card system to an IBM 80-column punch card system in 1960. Deposit and withdrawal dockets used at PO counters were in the form of dual-purpose punch cards; balance and ledger cards at HQ were also in the form of punch cards. The installation at HQ consisted of card punches and verifiers, sorting machines, collators, interpreters, ledger card printing machines, and a calculator which processed transactions and old balance cards to produce new updated balance cards.

The first system selected for transfer to computer working was the Savings Bank, which had been run on an IBM 80-column punch card system since 1960. This system was written in PL/1. The terms under which the Savings Bank operates are laid down by law, consequently the basics are not subject to much change -- programs written for this system in the early 1970s were still in operation almost twenty years later. An important change at that time was the decision to make the Savings Bank itself responsible for its own data entry. The Computer Centre simply processed the data when it was submitted, leaving the Savings Bank in complete control at all times. Data was submitted via an IBM 2780 remote card reader and printer terminal linked initially to the IBM bureau in Burlington Road. This was later switched to CPDS and then to Dundrum. By integrating with the original batch-oriented files, on-line access was provided in 1975 between Dundrum and the Savings Bank HQ in College house. Subsequently, the other savings products operated by P&T were also computerised. These included National Instalment Savings, Investment Bonds, and Savings Bonds.

Directory enquiries and printing.

A major development in 1982 was the introduction of a computerised screen-based system for directory enquiries. Its principal purpose, however, was the production of the national telephone directories. The printer was supplied with magnetic tapes and the production of the output was then automatic. This system considerably speeded the production of the directories and helped keep them more up-to-date. There were fewer errors and the costly expense of proof-reading was eliminated. At the time of its introduction the new directory printing and on-line enquiry system was believed to be the most comprehensive of its type in the world. The department is also believed to have been the first PTT in Europe to install a stored program controlled telex exchange.

Payroll.

After a thorough survey of the market, the department selected UNIPAY in 1972, the first organisation in Ireland to do so. The original impetus for this came from the requirement to automate the payroll of the Engineering Branch which employed some 10,000 people. Data entry was on ICL equipment.

When PAYE was introduced at short notice for civil servants in the early 1970s, P&T implemented a distributed system for payment of clerical, postal, and telephonist staff. There were 14 sites around the country equipped with IBM 3741s, a small mini-computer. These were replaced in 1980 by DEC PDP 11/34s and 11/44s. The software for payroll processing was completely redesigned and written in MUMPS, a software system combining a programming language, database, and operating system. The experience of UNIPAY and the IBM 3741 influenced the redesign. The environment was planned to allow the addition of other distributed systems, such as TV licence administration, on the same hardware and using MUMPS. By 1980, 18,000 people were being paid through the system.

Accounting.

The MUMPS system was used to develop an application for the main postal accounting system -- Cash Accounts. The system handled cash accounts documents from 1400 post offices on at least a weekly basis, balancing cash and stock movements. It was based on a PDP-11/44 and was implemented in 1980. The system improved the accuracy of the accounting process and reduced the staffing in the Cash Accounts section from 65 to 34.

User groups and software exchange.

P&T had a long-standing policy of open contact via user groups with outside and international organisations. They were an active member of the GUIDE project, a group of European computer users dedicated to the effective exchange of in-house software. The library maintained by the department included operating system modifications and utility programs. Software developed by P&T's computer centre was adopted for use by such bodies as the London Stock Exchange and a number of multinationals. Standards set by P&T for the use of certain newly developed software were eventually adopted by a number of large industrial groups in the UK.

Financial arrangements.

The department had delegated sanction from the Department of Finance in relation to computer expenditure; while an overall ceiling applied, the department could purchase individual items without having to refer back to Finance. This helped speed the acquisition process and allowed management more room for manoeuvre. Contractual arrangements between the department's technical support staff and outside software houses, mainly in relation to the distribution of software, enabled the department to use a significant number of software packages without charge (During the Seventies the commercial value of this option is believed to have been in the region of £100,000). The department also had a long-standing policy of justifying every system using cost-benefit analysis techniques, with the benefits of each newly installed systems being identified and subsequent savings monitored on an annual basis. Through its links with an international software house, the department was able to obtain free consultancy by providing actual case studies for training the company's consultants.

Systems development environment.

In the mid-Seventies P&T adopted what one commentator described as a fourth-generation environment for developing batch systems, incorporating an advanced high-level language and a data dictionary. This allowed for more rapid applications development than previously and facilitated subsequent amendments. For example, in one instance the data storage arrangement on the National Instalment Savings system was converted from sequential tape to index sequential with direct access on disk by changing a single parameter. Results like this encouraged the department in the course it had adopted. The mid-Seventies also saw the introduction of database management software, structured programming techniques and a second programming language for engineers (APL) as part of a long-range plan to keep the department abreast of technical developments in the industry at large. The department also adapted a quality control technique known as "software inspection", developed by IBM. Used in conjunction with a range of allied aids, significant increases in quality and productivity were reputedly achieved.

Staffing.

The staffing of the computer centre remained relatively stable during the Seventies. On the whole, the numbers of staff leaving to take up outside employment during this period was not significant. Management attribute this to the use of leading-edge technology and the level of technical challenge provided by the centre. The use of PL/1 rather than COBOL or another commercially popular language may have been a factor here, there being little demand on the Irish market for PL/1 programmers. The department also had a policy of retaining newly promoted computer staff within the data processing area wherever possible. This helped to avoid the serious loss of skills through internal redeployment. The size of the Department (some 30,000 individuals) greatly facilitated this policy.

APPENDIX L

The Health Sector

[Reference date: Start-1989]

At the time of the Review Body (1981) the computing arrangements in the Health Sector were broadly as follows:

- (a) Four of the eight health boards were linked to CDPS;
- (b) Three main voluntary hospital groups, supporting 23 hospitals in all, each had their own ICL 2903 with a processing link to CDPS, viz.
 - o North Dublin Voluntary hospitals Group (based at the Mater Hospital);
 - o South Dublin Federated Hospitals Group (based at St Vincent's Hospital);
 - o Federated Dublin Voluntary Hospitals Group (based at St James's Hospital);
- (c) Two health boards had independent data processing centres:
 - o Eastern Health Board (ICL, upgrading to ICL ME39);
 - o South Eastern Health Board (ICL 2903, upgrading to ME29);
- (d) The two remaining health boards availed of computer bureau services: Midland and North Eastern Health Boards;

In addition, some health boards had installed small computers, though in no case were these linked to mainframes. Some hospitals had also installed smaller computers, a few of whom were former clients of the Voluntary Hospitals Group.

The computerisation requirements and general awareness of the potential applications for new technology amongst the health boards underwent a gradual change in the course of the Seventies. Though reticent about confronting the corporate questions posed by data processing, they were slowly becoming aware of the implications in the longer term if the new technology was not drawn into the mainstream of hospital administration. Their demands grew to the point where CDPS, hampered by continual staff losses, could not be expected to meet their requirements. The health agencies were seeking systems which could give information to management on all aspects of hospital operations. The areas covered by these requests included stores, pharmacy and patient administration and potentially represented a considerable expansion on the then existing computer capability in the health sector. In addition to this, major new hospitals were being planned and would require a broad range of computer systems.

Main features of health sector computing in 1980.

The main features and problems with computerisation in the health sector at that time could be summarised as follows:

- (a) There was a recognisable unevenness in the pace of systems development across the health sector;
- (b) There were limited resources available, with some unnecessary duplication of systems in centres isolated from CDPS;
- (c) There was a general shortage of systems development staff amongst agencies, which problem was especially acute in centres remote from the main large urban areas. Furthermore, a lot of staff time was devoted to maintaining existing systems;
- (d) Developments in some areas were being directed by individuals with insufficient technical knowledge and experience, and there had been a number of instances where equipment of restricted capability had been installed;
- (e) The growing diversity of hardware types, with a score of vendors vying for this lucrative market, would make subsequent systems integration next to impossible, as well as greatly increasing maintenance and development overheads;
- (f) Demands by health agencies for expanded services were a strain on CDPS -- the health sector at that time comprised a substantial 22% of all public service computer systems.

Review Body.

The Review Body appointed a special study group to examine the position in the health sector. As mentioned earlier in the main text, the Review Body recommended that the Department of Health should be responsible for overall policy, co-ordination, control and development of information management services in the health sector and should establish a small computer unit to undertake this task and to issue standards, guidelines and procedures to be applied throughout the health sector. It also recommended that standardised systems and procedures should be applied throughout the health sector, with a health agency nominated as the centre of responsibility for each common system, that centre assuming complete responsibility for the initial installation of the system and for support to those agencies subsequently implementing it. According to the Public Service Advisory Council, the main vehicle for systems development and maintenance for the health sector would be the health agencies themselves. This is not how matters transpired, however. The Review Body's recommendations only received Government approval in 1984, after the Department of Health had already committed itself to a very ambitious and expensive programme for computerising the health sector.

In developing a suitable strategy, the Department of Health would have had regard to a number of factors, mainly cost, reliability, flexibility and speed of implementation. This would strongly suggest the acquisition of a packaged system, with the necessary tailoring carried out by the supplier to meet local requirements. Widespread introduction of a comprehensive system in all hospitals would contain costs while achieving the ideal of standardisation of both hardware and software. The basic procedures involved in patient admission and registration, maintenance of medical records, pharmacy control and other hospital practices were considered to be sufficiently standard to be met satisfactorily by a common system. The Department considered the experience in other countries to be supportive of this view. In settling on this course, it was fully aware of the ambitious nature of the undertaking. The system selected would have to be highly sophisticated, with a level of integration which did more than anticipate future interface requirements but constituted an intrinsic feature of the design philosophy from the outset. It would also need to possess networking capability, database software and a range of standard office automation facilities.

Merits of a centralist approach.

Apart from the obvious advantage of lower costs, the merits of a centrally developed strategy designed to achieve widespread standardisation were considered to be broadly as follows:

- o It should avoid any necessity to introduce a duplicate back-up system or redundant hardware since critical files could, in the event of a system failure, be transferred to a neighbouring location using a similar system;
- o A standard system (both hardware and software) requires fewer computer experts at each location;
- o It facilitates the greater mobility of staff, both computer and non-computer, between locations;
- o System maintenance problems are reduced since modifications effected in one location can more easily be implemented in other sites, and without a considerable duplication of effort;
- o Future developments, including legislative ones, are easier to anticipate and control;
- o Inter-site networks are easier to establish;
- o The risk of independently installed systems failing to meet minimum requirements is greatly reduced;
- o Vendor support, and therefore system reliability, is increased in proportion to their overall investment in the success of the system.

The events which ensued have become probably the main controversy in public service computing. As an NBST/Eolas report stated, the Department's approach has "come in for widespread criticism -- on the selection process through which a software supplier was chosen, on the wisdom of nominating a standard package for all hospitals, and on the functional limitations of the selected package." The issues fall under two broad headings: the manner in which the system was chosen and the extent to which its technical characteristics recommended it for widespread use in the health sector. The criticism and controversy surrounding the system since it first began to attract outside attention early in 1982 have not to date led to a complete public resolution of all the facts and it will probably be some years before a definitive assessment can be made.

Criticisms of the system selected.

Following the Review Body's recommendations for the health sector, a project group was established by the Department of Health. Taking up where the Review Body's Study Group left off, it compiled a detailed request for proposals which issued in August, 1981. In drawing up the RFP, the project group by-passed the health sector user representative group, known as the Health Computer Co-ordinating Committee, which had been established in October, 1980, and comprised administrators from the health boards and voluntary hospitals. In February, 1982, the Department awarded the contract to McAuto, a subsidiary of the McDonnell Douglas Corporation, a company which had installed systems in one out of every six hospitals in the US.

According to the Department, the McAuto proposals were finally selected having regard to the overall suitability of their products, the wider range of facilities on offer, lower costs, better support arrangements and volume discounts. Many commentators were very concerned at the apparent haste with which the system was selected and the criteria applied. Health agencies were unhappy -- some very unhappy -- with the lack of consultation. As the Department itself states, "the Department has developed a policy of computerisation for the health sector ... Details of this policy were circulated to all health agencies on 3 March 1983" -- i.e. one year after the system was selected. Prospective users and staff representatives objected to the effective granting of a monopoly to McAuto. In their view at least two systems should have been piloted. Subsequent developments support this view.

The McAuto system comprised two main packages, one for patient administration and one for laboratory services (The financial system was not awarded to McAuto) -- see Table 1 for a list of the integrated modules comprising the two systems. Both systems were written in a low level programming language, Macro II Assembler, and were designed to run on PDP 11/44 computers.

Table 1

| | |
|-------------------------------------|--------------------------------------|
| o on-line interactive system | o patient master index |
| o patient management control | o waiting list module |
| o clinic appointment scheduling | o pre-admission module |
| o outpatient appointmt.scheduling | o advanced pharmacy module |
| o ward order entry/result reporting | o cost of service module |
| o food (catering) management | o physicians' registry |
| o speciality (theatre) scheduling | o nurse allocation |
| o ward administration | o nurse scheduling |
| o advanced radiology | o advanced laboratory |
| o pharmacy information system | o three-level security system |
| o laboratory information system | o preventive maintenance scheduling. |

The main drawbacks with the strategy adopted by the Department, which ran counter to what the Review Body was to propose, were as follows:

- (a) Low-level languages were machine specific; it would be highly undesirable to be irrevocably committed to one vendor (Digital) and one model of computer (PDP 11/44);
- (b) Substantial modifications over and above those normally considered desirable for a packaged system, particularly one written in a low-level language, would be required;
- (c) The system selected had not been used in Europe, was not designed with Irish hospital procedures in mind, and normally ran in conjunction with the vendor's financial package;
- (d) The level of consultation with users, whose cooperation was critical to the success of the strategy, was wholly inadequate.

In its defence the Department could contend that, under the terms of the contract, the supplier would carry the cost of any necessary amendments. This failed to address the key issue, namely, whether the amendments could in fact be satisfactorily effected and in good time. While a low-level language system consumes fewer hardware resources, thereby containing overall costs, it can be extremely difficult to tailor in practice. Such systems ceased to enjoy a vogue since the Sixties, being superseded by the greater productivity and flexibility of third-level languages. With the Eighties witnessing the increased use of fourth-generation software, the selection of a broadly out-of-date technology for the health sector was difficult to justify. The Department also contended that the proposed system could run on the higher range of VAXs, thereby countering the charge that the system was tied to an out-of-date machine (the PDP 11/44). However, most significantly, no evidence was adduced to the effect that the McAuto suite of modules had actually been tested in a VAX environment.

Dail Committees.

The cumulative weight of these drawbacks led to the collapse of the strategy. In December, 1986, the now defunct Dail Committee on Public Expenditure (PEC) convened a hearing to examine the matter. While the question of the technical suitability of the system selected was not specifically addressed, the question of the cost-effectiveness of the system was examined, as well as the range and sufficiency of the information then available from it. At that date, certain parts of the system were in place in three pilot sites only -- Crumlin, Cork and Tralee. The contract had cost some £10m since 1982, while the itemised strategy plan was expected to cost £20m in all. Full computerisation of the entire health sector over a longer period had been estimated to cost somewhere in the region of £40m, with some 60%-70% being absorbed by hardware costs. Full consultation with users had not taken place, according to the Department, since the commitment of financial resources was not assured, with funding to 1986 being found from a variety of (unspecified) sources. The absence of central commitment was, rather illogically, used to justify the imposition of central policy formulation and control. Furthermore, the Department had undertaken no specific analysis in relation to cost benefit.

The consultants engaged by the PEC were very critical of the Department and made a number of recommendations, including the following:

- o that an external review of software policies in the Department be undertaken to determine the suitability of the software system selected;
- o that a five-year statement of strategy be made available by the Department to participating institutions;
- o that a cost-benefit analysis be undertaken to highlight the effects of computerisation in the health sector;
- o that relevant health boards and other institutions collaborate more closely with the Department on future policy issues.

The Public Accounts Committee concluded, on foot of its examination of the matter in 1988/89, that "the Department was simply learning as it was going along and doing so expensively with the major beneficiaries being the suppliers and the consultants whereas the learning process should have taken place before any commitments were entered into....Since this expensive exercise was carried out at the expense of the taxpayer, the Committee is highly critical of the entire episode which seems to be without justification."

In the wake of these findings, the Department has since abandoned its strategy, with health agencies having a free hand in determining their own IT arrangements.

APPENDIX M

Some Comparisons with Denmark

[Reference date: mid-1987]

While Denmark is very similar to Ireland in many respects, its overall approach to computerisation in the public service appears to have been more effective. Two large bureaux, Datacentralen and Kommunedata, serve central government and local authorities, respectively. During the Seventies these centres were geared to take the fullest advantage of economies of scale. Common systems were developed to perform common tasks in both central and local government. Their civil service concentrated large and important applications on one highly sophisticated and powerful computer centre. A number of very large mainframes (IBM and Amdahl) met most of the processing requirements of the public service, with users communicating from remote terminals -- 650 to Datacentralen and some 400 to Kommunedata.

There was a high level of public debate between 1970 and 1977 on the holding of personal details on computer. This was within a tradition which acknowledged the value of personal data banks. A 1924 Act of Parliament laid down that each of the Danish municipalities should establish and maintain up to date a local population register containing information about all residents of a municipal district, recording name, occupation, date of birth, residence, family status, citizenship etc. Another Act of Parliament in 1966 gave Denmark's Statistik (their equivalent of the CSO) authority to collect administrative data for the production of statistics from public bodies and to organise the necessary co-operation between the various administrative systems. The Act also stipulated that data collected for statistical purposes and referring to an identifiable individual or enterprise could not be passed on to any other Government department or private person. In 1968 the Central Population Register was computerised. An essential part of this major undertaking was the introduction of a permanent identification number for each individual person. The number was to be introduced into all sectors of public administration, replacing the many different numbers and references then in use. The Public Registers Act, 1978, gave legislative effect to existing practices and ensured that the setting up and use of such registers by public authorities did not violate the individual citizen's legal protection or private rights.

In addition to these important legislative initiatives, there were several significant developments to ensure the proper co-ordination in the growth of data processing. These included the creation in 1978 of a Board of EDP Co-ordination with the agreement of Datacentralen, Kommunedata and other corporate bodies. A number of ministries and local government organisations were represented on the Board. Where sectoral questions of administration need to be examined, EDP Co-ordination Committees are appointed by the Ministers concerned. The powers of the Minister for Finance in the

field of DP co-ordination were subsequently given statutory force in the Public Registers Act, 1978, which stated that the creation of any future central or local person-based registers must have his prior approval. Yet another body was set up in 1981 to co-ordinate the use of resources (personnel, equipment etc) between Datacentralen and Kommunedata. The Joint Agency was in effect a board of directors empowered to establish guidelines binding on both organisations.

The existence of accessible EDP registers -- some 500 by 1983 -- enables Denmark's Statistik to carry out extensive statistical analysis of several major areas of national economic importance using information already supplied to public authorities. The expensive time-consuming overhead of data collection is therefore sharply reduced. For instance, it has not been necessary to conduct a traditional business census since 1958.

What lessons does the Danish experience hold for Ireland? While hard and fast comparisons are not easy to make due to differing conditions -- for instance, more welfare and tax collection tasks are devolved upon local government in Denmark -- a number of important features can be identified:

- o There is a comparatively high level of public awareness in Denmark of the nature and merits of computerised information;
- o A good deal of public, trade union and Parliamentary debate has taken place to establish what impact progressive computerisation is likely to have on the rights of the individual and what benefits it holds for society;
- o Structures and protective guarantees have been formulated, debated, and embodied in legislation;
- o Computer-related issues have received a fair deal of attention and encouragement at Government and Ministerial level;
- o The degree of consultation with prospective users and all parties concerned appears to have been good, even in the early planning stages;
- o Emphasis has been placed on the need to remove ambiguity as to where responsibility lies for systems delivery and support;
- o Administrative machinery and recognised forums have been set up to co-ordinate public service DP activities and to maintain a coherent strategy;
- o The relative level of expenditure on computerisation in the public service has been high (for example, five times the rate obtaining in Ireland in 1980);
- o Attention was placed at an early stage on the organised use of information as a resource.

APPENDIX N

Office of the Revenue Commissioners

[Reference date: Start-1988]

1963 - 1975.

In the years prior to the eventual establishment of CDPS in Kilmainham, the area of principal computer activity was Revenue. The first computer in the civil service and one of the first in the country (an ICT 1301T) was installed in Revenue in 1963. The decision in principle to adopt computerisation on a significant scale was made as early as 1960. Revenue was very much ahead of its time in this regard. If one discounts the scientific and statistical offices of the civil service (as well as P&T), the next department to commit itself to widescale use of computers was Social Welfare about twenty years later (though management in that department might argue that 1973 was closer to the mark, with the introduction of the disability benefit system).

Revenue selected Honeywell hardware in 1967 as providing the greatest functionality, the main alternatives being the ICL 1906A and the IBM 370/165. The decision to select Honeywell was based on the fact that it was the only vendor who, in their opinion, could provide a working version of COBOL. It is to Revenue's credit that it recognised the breakthrough offered by a third generation language at such an early stage. Other routes could have left them stuck with the mire of assembly level language and all the problems faced by American organisations in the Seventies. Having satisfied themselves that there had been substantial increases in tax revenue as a direct result of computerisation, they continued to press for new ways to exploit the technology. Some evidence of the programme they set themselves is shown by the fact that the two Honeywell 1200 machines installed in July, 1967, (with an aggregate of 114K) were replaced the following year by two 2200 machines (with an aggregate of 196K) -- the duplication of equipment was to meet the internal back-up requirement. The capital investment which this involved is an indication of the support computerisation was receiving at the highest management level. The 1967 expansion was part of a major policy decision by Revenue to develop fully computerised systems for all tax heads in the long term. Apart from direct financial benefits, Revenue stated that computerisation led to a marked increase in flexibility in the use of resources, allocation of work areas and regrading of duties. Some measure of the cost effectiveness of computerisation in Revenue can be gathered from the following figures which show the relationship between nett inland revenue and administrative costs:

| | | |
|---------|-------|------|
| 1959/60 | £33m | 3.6% |
| 1964/65 | £78m | 2.7% |
| 1970/71 | £215m | 1.8% |

This sizeable decrease was probably influenced by a number of other factors -- increases in average income, increases in income tax, inflation, slow increases in tax free allowances -- but the impact of computerisation can realistically take a share of the credit.

The benefits of automation.

The operational effectiveness of the computer systems in Revenue made it easier to implement changes in the Finance Acts. For example, the provisions of the 1971 Finance Act, relating to interest on late payments and payments on account, were implemented much more speedily than could have been achieved by manual means. The provisions increased the rate of interest, shortened the interest-free period and introduced new rules relating to payments on account. The implementation of these changes involved a comprehensive range of amendments to the income tax etc suite of programs, which were completed by the end of November, 1971. In early December approximately 90,000 initial demands for the first instalment of the 1971/72 income tax and sur-tax were issued, representing a hundred percent increase on similar issues in previous years. An increased yield of about £5m income tax in the financial year 1971/72 resulted directly from this operation. Revenue considered that it would not have been possible to mount the operation if the system had not been so completely and effectively computerised.

The Health Contribution Act, 1971, provided for the collection of flat-rate health contributions from, inter alia, self-employed persons other than farmers within certain income tax limits. Commencing October, 1971, a file was set up of such persons (47,000) mainly by automatic extraction of existing computer records. This operation, which could not have been carried out on a manual basis, yielded almost £200,000 which would not otherwise have been collected in the tax year 1971/72.

Another interesting benefit conferred by computerisation, which might possibly be regarded as part of Revenue folklore, was the rounding-up of tax free allowances to the nearest 1p, instead of 25p under the original manual system. This change, which would not have been possible without automation, resulted in an increase of about £1m annually in tax yield.

The new technology also made it possible to check annually the tax liability of employees under the PAYE scheme. This involved the input of actual earnings and tax deducted in each of 650,000 cases approximately, with a computer check in each case. Subsequently, lists were produced for each income tax district of those cases where the tax deducted did not appear to agree with the liability as calculated from the records. These lists enabled inspectors to review liability in the bulk of PAYE cases.

On the whole, not only did computerisation improve the general efficiency of existing tax collection procedures but, by allowing for the more flexible implementation of changes in those procedures, it enabled more effective systems of tax collection to be introduced. For example, systems in operation in the early Seventies, which had not been envisaged in the mid-Sixties, included wholesale tax, VAT, computerised trade statistics, health contributions and construction industry tax. In addition, payments balancing, which had not been envisaged as a significant separate system, had become an important part of Revenue's overall accounting procedures. For the financial year ended March, 1973, over 90% of the total collection of all the following taxes were based on the use of computers: income tax, sur-tax, corporation profits tax, PAYE and sales taxes. This represented over 50% of all taxes collected by Revenue in that year.

Strategic re-evaluation.

Their increasing processing requirements forced another strategic re-evaluation. The equipment had again reached maximum capacity and further development was becoming impracticable. With collection under all tax heads supported by mature computer systems, over three billion characters of tax information had accumulated on magnetic tape master files. In addition, the delays inherent in large scale batch processing were causing problems for administrative staff dependent on the computers for information on tax collection. It was decided to overcome these bottlenecks by providing on-line access, country-wide, to data held on computer files and, by increasing the computer power to handle other anticipated data processing needs in the medium term. The switch to on-line systems again demonstrated the foresight of Revenue management in accurately identifying future trends. New equipment, with the capacity to support current batch applications, further expansion of those applications and the new telecommunications network, was acquired in 1973. It consisted of a dual Honeywell 6060 processor and a comprehensive range of peripherals, including special processors to handle the network communications. Internal back-up was again an over-riding consideration. The H2020-based systems were converted over a period of eighteen months, with all work being transferred to the H6060 installation by end-1974. The new system had a capital value of £2m and was the largest in the public service, handling about 1.2m Revenue accounts (2000MBs). The installation of a disk-oriented system to complement that based on magnetic tape, plus the complex suite of programs required to handle each tax system, made this period (1972-75) a very testing time for Revenue. Its success was a clear indication that the organisation had a full working mastery of the mainframe environment.

The Revenue installation had a brief contribution to make to the development of the computer bureau concept in the civil service. A number of departments made use of unutilized machine time in the second shift to process some small to medium sized jobs. In 1968, the DP unit in Finance hired an outside firm to operate a third shift on one of Revenue's machines in Aras Brugha. Revenue subsequently hired Honeywell to operate the third shift on both computers in O'Connell Street. However, the upgraded system of 1973, with its more demanding configuration, convinced Revenue of the undesirability of a third shift operation if at all possible. This had been borne out by the experience in other countries where it was found to strain staffing and machine resources as well as diluting communication between key personnel. It also left insufficient spare capacity to handle a crisis.

Outside contact.

Since there were no large users of Honeywell in Ireland, Revenue had good deal of informal contact with Honeywell mainframe users in other countries, especially the UK (e.g. Littlewoods). Revenue exchanged information with government departments in certain other European countries using Honeywell equipment and had negotiated formal back-up arrangements with two EC member states in case of a catastrophe. In addition, they received study teams from such countries as Belgium, Turkey, Cyprus and Taiwan. It had been their policy in the Seventies to encourage staff participation at conferences and to send delegations abroad to keep abreast of leading-edge developments. The 1973 conversion was carried out in the Eastern Electricity computer centre at Ipswich using night-shift and weekend working, with different teams travelling across as required. Revenue's top DP manager was president of the Honeywell Computer Users Association for the UK and Ireland, vice-president of the OECD computer group and president of the Irish Computer Society. He also had the unusual advantage, from an organisational standpoint, of combining both the technical and executive managerial functions. This helped reduce problems and delays in reconciling technical and administrative interests and objectives.

1975 - 1987.

In the period 1975 to 1987, computer equipment in Revenue was upgraded on a planned annual basis to meet anticipated needs for processing power, memory, data storage and extra peripherals. Some of these upgrades crossed the threshold into a new class of Honeywell machine, for instance from the H6060 to the H6080 in 1976 to a DPS 8/70 in 1981. New operating system releases were also introduced where they offered significant development features or improved machine performance. A significant software development was the acquisition of a database management system, Honeywell's DMIV, in 1980, in conjunction with a new version of the COBOL programming language, COBOL 74. A marked increase in disk usage to cater for on-line application files was notable throughout this

period. Memory also increased sharply, from 1MB in 1973 to 16MBs in 1985. Overall daily transaction processing volumes grew from 1,200 messages in April, 1975, to about 150,000 in April, 1986.

In addition to the ever expanding on-line applications, heavy batch maintenance has been a marked feature of Revenue work. Many of the batch systems date from the late Sixties and early Seventies; a phased re-writing of these systems has been taking place since, e.g. major redevelopments of the PAYE and VAT collection systems were accomplished in 1975-78 and 1979-83, respectively. The number of batch programs grew from 212 in 1972 to some 2,000 programs in 1986 -- over two million lines of code. Bulk data input and output methods also underwent radical change with papertape being replaced in 1978 by key-to-disk equipment and microficheing.

Position of DP within the organisation.

Within the Revenue organisation, the DP division was originally part of the Collector-General's area, its first major end-user. In 1978, it moved further into the mainstream of the organisation, alongside Personnel and the Supply Branch. A further reorganisation saw the division become part of the Accountant General's Office in 1983. Over this period, the organisational functions committed to computerisation expanded greatly. By 1986, the administration and collection of the following were dependent on computer systems:

- o VAT
- o PAYE
- o PRSI
- o Income Tax (Schedule D)
- o Corporation Tax
- o Capital Gains Tax
- o Health Contributions
- o Youth Employment Levy
- o Capital Acquisitions
- o Customs & Excise Trade Statistics
- o Customs & Excise Deferred Payments
- o Residential Property Tax
- o Revenue Payroll

In addition, computer systems were being used to support the following:

- o Income Statistics
- o Budget Estimation
- o Customs & Excise Warehousing
- o Accounts Payable

Some idea of the volume of work being handled at that time may be had from the following statistics:

| Application | Cases |
|--|--------------|
| PAYE Employees | 1,450,000 |
| PAYE Employers | 131,000 |
| Collection of Income Tax, Corporation Tax and CGT | 428,000 |
| Assessing Income Tax and Corporation Tax | 535,000 |
| Value Added Tax | 175,000 |
| Construction Industry | 36,000 |
| Health Contributions | 282,000 |
| Property Tax | 68,000 |
| Capital Acquisitions Tax | 47,000 |
| Payroll | 6,750. |

Processing of the above was concentrated on a Honeywell triple processor mainframe which supported a network of over 350 VDUs located around the country, since expanded to over a thousand VDUs. This network has witnessed a vast expansion in the volume of on-line traffic, as the following table shows:

| Year (January) | Number of VDUs | Daily average number of transactions |
|-----------------------|-----------------------|---|
| 1976 | 79 | 20,000 |
| 1977 | 84 | 25,000 |
| 1978 | 106 | 30,000 |
| 1979 | 119 | 35,000 |
| 1980 | 135 | 45,000 |
| 1981 | 149 | 60,000 |
| 1982 | 181 | 65,000 |
| 1983 | 239 | 70,000 |
| 1984 | 247 | 75,000 |
| 1985 | 288 | 80,000 |
| 1986 | 293 | 120,000. |

These statistics represent some 19,500MBs of stored data.

The burden of developing, acquiring, operating and supporting computer-based systems which improve the effectiveness of the whole organisation lies squarely with the DP division. This includes a major project in Dublin Castle to develop a large-scale microcomputer office information system. Overall direction, however, was provided through the Computer Planning Group comprising representatives of the major user areas. This Group, which extends to Commissioner level, meets at least once every quarter to examine each project in progress, where it stands, and what additional resources, if any, may need to be deployed to accelerate it towards a deadline. The Group is the main means of involving top management across the organisation in formulating strategy and lending support. Future activities coming within the Group's scrutiny will include two major projects, the computerisation of Customs & Excise data entry and a highly detailed and comprehensive study to re-write all tax systems to support an extensively integrated database.

Maximising the value of Revenue data.

The main concern amongst managers in Revenue has always been the speedy and efficient collection of revenue in accordance with statutory requirements. The generation of additional information, statistics and reports from the data collected has been of minor importance. In the opinion of some commentators, this neglect has been unwarranted ("there is no particular incentive on the part of Revenue to produce the desired statistics" - Blackwell). Revenue data could provide very revealing national statistics for a range of policy purposes -- earnings, employment, income distribution, business activities, profits, taxation, coding of firms etc. The biggest obstacle to producing tables which would help policy making outside the specific remit of Revenue itself is, according to Blackwell (1985), the need to deploy clerical staff to "clean" the data, that is remove individual identifying characteristics. While the question of data release is not, strictly speaking, an IT problem, except in so far as it relates to the availability of staffing resources, it does highlight the need amongst management generally, whether in Revenue or elsewhere in the public service, to adopt an attitude towards information technology which is broader than the automation per se of manual procedures. The information generated by a computer system should be regarded as an integral justification for the system and not merely a by-product of procedures transferred from a manual to a mechanical environment.

APPENDIX O**Department of Social Welfare**

[Reference date: Start 1988]

Some developments in the Department of Social Welfare have already been discussed in the main text. Up to 1985, CDPS was responsible for systems development in that Department. This responsibility was complete, being neither purely technical nor agency-based. CDPS worked on the basis of joint responsibility with Social Welfare management on all aspects of planning and development. Operations were the sole responsibility of Social Welfare. This co-operative participation at both management and lower levels should be kept in mind throughout this appendix.

The systems in operation in the Department fall into five broad categories:

- (a) Systems originated in the Seventies, viz. (i) general benefits, which includes disability benefit, occupational injuries, maternity allowance and (ii) treatment benefit (dental and optical);
- (b) The Central Records system which operated from late 1980;
- (c) Office automation and on-line enquiry systems;
- (d) A number of recently introduced applications, including children's allowance, pensions, a pilot system for unemployment assistance/benefit, family income supplement and rent subsidy, which were all initiated during 1984/5;
- (e) Networking and telecommunications.

General Benefit system.

The general benefit system was first installed in 1973. In line with the policy prevailing at that time, Social Welfare were not given the latitude to expand too quickly into a fully self-sufficient installation, in addition to those already operating in Revenue and P&T. Instead, a two-tier approach was adopted. Two Honeywell 716 minicomputers were used together with a remote job entry link to the IBM 370 in Kilmainham. The smaller machines handled the time-critical local processing on-line, such as claim entry and payment calculations, while the mainframe handled such batch work as master-file updating, cheque reconciliation and statistical analysis. Transaction throughput was high even then, with 50,000 medical certificates and 6,000 new claims per week. The Honeywell processors were eventually replaced in 1981 with DEC PDP 11/70 computers using DECNET software for transmission. This system provided greater processing power for increased functionality and supported a larger number of VDUs.

The application was transferred again at end-1984 to two VAX 11/780 computers. The batch work on the IBM machine was subsequently transferred to the VAXs. The overall system architecture remained similar to the Honeywell/IBM arrangement but with the notable advantage that the common operating environment for both on-line and batch processing made the phased re-design of the entire system easier to effect. In an effort to contain operations staff requirements, the on-line application was transferred again to a VAX 8600 in 1986.

Central Records system.

Following the changeover from insurance stamps to a system of pay-related social insurance (PRSI) in 1979, the department's central records sections were computerised with effect from 1980/81. This was a major turning point for Social Welfare since it committed them to a long-term strategy. The DEC proposal to use their PDP 11/70s was accepted by the department as the most flexible solution, opening up possibilities of transparent access between the Benefits and the CRS systems. This factor would have influenced the decision referred to above to migrate the Benefits application from the Honeywell machines to the PDPs.

The Central Records System (CRS) is a very large database containing employment and earnings details of over 1.5 million insured persons. The bulk of the CRS data comes originally from Revenue on magnetic tape who collect PRSI using the PAYE system. It also records details of all claims. The CRS, as the focus for the administration of all insurance-based schemes, is the conceptual hub of Social Welfare's network. The other systems feed into and draw from it. There is no reason, though, why the CRS should be restricted to coverage of insured persons only. For instance, non-insured persons who come within the orbit of the Social Welfare code -- which can, in theory, embrace all Irish residents -- could also be included.

The CRS is undergoing a phased re-design. This could result in a move away from the distributed architecture employed to date. The department states, however, that it is aware of centralised database systems of similar size and complexity which operate effectively on a distributed data network. A fairly lengthy migration time to a full-blown DBMS-type solution is anticipated; this may allow VAX-based software to be proven in the intervening period.

Telecommunications.

During 1981-82, the data network was essentially local in nature, with a small number of remote experimental connections. It comprised about 150 terminals connected to five PDP 11/70 computers located in two sites and serving six HQ buildings in Dublin and the employment exchange in Cork. In parallel with the decision in 1983 to make the major move from TRAX to VAX/VMS for Benefits and CRS,

the department carried out a strategic study of their immediate and long-term telecommunications requirements. It decided to select a local area network (LAN) in preference to the more traditional approaches such as conventional point-to-point cabling, front-end processors or a PABX solution. In pursuing this course the department ran against their consultants' recommendation. Despite their heavy investment in DEC equipment, the department installed another product, PLANET, instead which supported all standard protocols, including IBM.

Office information system.

An information system, INFOSYS, was implemented in 1983 to allow queries from the public to be answered at a number of local centres. Several Dublin and provincial information offices were linked into INFOSYS using the public telephone network. Originally INFOSYS, which currently runs on a VAX, handled dial-up enquiries in respect of general benefits and CRS. It has since been extended to cover children's allowance and pension queries. The department intends INFOSYS to incorporate new applications as they come on stream. In addition, links have been set-up to the department of Health and FAS.

1984 saw a marked increase in the number of general managers using a terminal for standard enquiries and some basic OA activities. By mid-1986 there were 140 users at management level or thereabouts availing mainly of the electronic mail, document filing/retrieval and word processing features under VAX/VMS. Some use was also being made of spreadsheet and graphics. A more comprehensive and user-friendly system, DEC's All-in-One, was implemented on a phased basis during 1985. It was the department's intention at this time that all officers at middle and senior management level would participate in a Management Information System based on All-in-One.

Hardware configuration.

The hardware configuration in the department by the mid-Eighties made it one of the largest DEC installations in Europe, with total CPU memory of 208 MBs, total MIPS of 27.5, and 800 VDUs [By 1990, these figures had grown significantly to 606MBs, 59.8 MIPS, and 1550 VDUs]. The following table schedules the hardware in Social Welfare at start 1987:

| | | |
|-------------|-----------------|--|
| Processors: | 2 x VAX 8650 | These processors (excluding the MicroVAXs) had an equivalent overall throughput of 19 x VAX 11/780s. |
| | 2 x VAX 8600 | |
| | 3 x VAX 11/785 | |
| | 3 x VAX 11/780 | |
| | 5 x MicroVAX II | |

Disks: 65 x RA81 (total c 30,000 MBs)

Terminals: 800 VDUs at over 40 different locations
140 VDU-associated printers
22 laser printers
16 line printers

Telecommunications: 194 city lines; 17 dial-in lines;
12 lines to provincial centres
(excluding shared lines).

[See Annexe A for more recent statistics.]

The large VAXs are clustered in each site. They are also connected by an Ethernet LAN over which DECNET is transmitted. The Department claims to have successfully integrated two distinct LAN technologies to create a level of resilience not otherwise achievable. Their telecommunication arrangements enable all the department's terminals, irrespective of location, to access data on any of their computers. The implementation of the PLANET and Ethernet LANs gives the end-user the appearance and functionality of a very substantial LAN with access to all processors and databases. Further developments are expected to result in even greater integration of LANs across the department.

Growth of computerisation within Social Welfare.

When examining the growth of computerisation in the department, it is important to note that the greatest expansion occurred in the space of only four to five years. Significantly, these developments created or facilitated fundamental changes in the structure of the administration. When one considers that the skills and know-how needed to manage a large computer installation take many years to acquire, the pace of change was notable. There can be no doubt that this required considerable commitment at management level, as well as firm Ministerial support. CDPS must also have been strongly committed to this rapid rate of expansion. This general policy would have been strongly endorsed by both DEC, whose equipment was exclusively employed, and the firm of consultants who have had a significant involvement with Social Welfare throughout the Eighties.

The following table will give a clear picture of the rate at which computerisation expanded in the department:

| | <u>1980</u> | <u>1981</u> | <u>1982</u> | <u>1983</u> | <u>1984</u> | <u>1985</u> | <u>1986</u> |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Number of VDUs | 50 | 150 | 250 | 300 | 450 | 500 | 800 |
| Disk storage (GBs) | 4 | 5 | 6 | 7 | 12 | 17 | 30 |
| Memory (MBs) | - | 12 | 18 | 25 | 35 | 90 | 208 |
| Computerised claims in payment (000s) | - | - | - | c100 | 800 | 900 | 1000 |

The volumes of data supported by various applications at mid-1986 were:

| <u>Application</u> | <u>Active Clients</u> |
|--------------------------------------|--------------------------------|
| Short term benefits (5 applications) | 700,000 claims per annum; |
| Central Records | 1,300,000 (c.2m records); |
| Child Benefit | 0.5m families (1.2m children); |
| Pensions | 0.5m persons; |
| Unemployment Assistance | 25,000 on computer; |
| Family Income Supplement | 6,000; |
| Rent Subsidy | 6,000. |

Note: The Family Income Supplement system is programmed in Datatrieve; all other applications are in Cobol. [See Annexe A for more recent statistics.]

Design philosophy.

The approach taken by the department to computerisation has been basically incrementalist. Instead of employing one or two large mainframes to handle their heavy processing requirements, they opted for a system comprising a totally compatible range of minicomputers linked by powerful inter-processor communications. A mainframe-based strategy was seriously considered but management in Social Welfare felt their short and medium term needs were better served by a hardware configuration which allowed the widest flexibility in dealing with systems development, project control, security, and changing administrative requirements. The two short-listed proposals in 1979 were both for minicomputers. The final selection of Digital was fully supported by both CDPS and Social Welfare. In the early Eighties the department, with the assistance of consultants, undertook major studies in networking and hardware strategy which further supported this approach. These studies were influenced by the following considerations which the department regarded as important: operational independence; reliability, availability and performance; flexibility and expandibility; security, e.g. resilience in recovering from emergency situations; ease and speed of implementation.

Minicomputers, it was considered, enabled a long-term strategy of networking and distributed processing to be more flexibly pursued -- this was an important consideration for a department whose staff were located in eighteen buildings in Dublin and about 200 offices throughout the country. It is probably fair to say that the department took a calculated risk when it opted for a minicomputer solution. Some experts in the early Eighties were of the opinion that a networked minicomputer system could not continue to expand indefinitely since the operating system overhead and the proliferating problems of inter-processor communication would become excessive; thus, when the time came to graduate into a mainframe environment, it would be impossible to do so since the investment in the minicomputer solution would have become too great.

The calculated risk was supported by their confidence in Digital's technology. Social Welfare found in Digital a good partner who continued to produce the improved hardware which was essential to the success of the strategy adopted. Digital continued to develop more powerful machines; the networking software did not disappoint, while the software development and applications tools, TDMS and ACMS, performed well. In addition, Digital found in Social Welfare a suitably sized customer to test out its new software products -- the department was quite prepared to act as a test site for original software in controlled circumstances, though they maintained a general policy of only installing proven hardware. Another factor weighing in favour of the strategy adopted was the continuing low cost of minicomputer processors -- the department estimate that the mainframe alternative would have been at least twice as expensive.

Situations arising.

The department has not been without its headaches and setbacks. To begin with, the huge increase in claimants in the Eighties had to be catered for. For example: The Disability Benefit application got into serious difficulties in 1981 -- this is a very sensitive area since a one-day stoppage can leave thousands of families without their payments. In 1984, a postal cheque payment scheme for the long-term unemployed fell foul of bank branch closures in high density areas, necessitating a return to the manual/cash approach. A major project to rewrite the general benefits system, had been deferred a few times due to pressure of work on other fronts and which did not commence until late 1983, was stopped by senior management in June, 1985, despite protests from the technical staff engaged on the project. Another important problem for the department arose from the decision in 1978/79 to use the Revenue tax number as the social insurance identification code upon the changeover to PRSI (The UK gave priority to the social insurance number).

Further research.

The introduction and expansion of IT in the Department of Social Welfare is a very complex subject and deserving of in-depth analysis. This appendix could only sketch the main issues and developments. In addition to the vast range of operational and technological changes during the Eighties, the department has undergone profound changes at an organisational and management level. The department has not been slow to address these issues as they arose but has continually re-structured the organisation at both staffing and procedural levels to best avail of technological opportunities. Given the volume of its transactions, the size of its staff, the distribution of its services network, and the extent of its client base, it is unlikely that any other organisation in the country has undergone more extensive IT related change. When one considers its high exposure to public scrutiny, it has shown conspicuous courage in addressing the challenge of new technology.

ANNEXE ARecent statistics on IT in the Department of Social WelfareA: Staffing and Clients, 1990

The department has 3800 staff in over 150 locations. It has 715,000 clients (who in turn have about 580,000 adult or child dependants). It handles gross expenditure of some IR£2.7bn.

B: Schedule of hardware, 1990CPUs

| | |
|----------------|---|
| 1 x VAX 11/785 | These processors are in three clusters comprising 4, 3, and 2 VAXs, respectively. |
| 2 x VAX 8600 | |
| 2 x VAX 8650 | |
| 2 x VAX 8530 | |
| 3 x VAX 8550 | |
| 2 x VAX 8810 | Total main memory = 606MBs |
| | Total MIPS = c 60. |
| | Estimated overall throughput equivalent to 36 x VAX 11/780. |

Disks

| | |
|------------|-------------------------------|
| 40 x RA90 | Total disk capacity = 92.3GBs |
| 29 x RA70 | |
| 10 x RA82 | |
| 4 x SI83 | |
| 20 x RA81. | |

Terminals

1550 VDUs
 147 Terminal servers
 13 line printers
 56 laser printers.

Telecommunications

A virtual LAN comprising 4 Token Ring LANs bringing data to 4 CSMA/CD segments linked by fibre optics to create one virtual Ethernet.

231 analogue multiplexers
 14 digital multiplexers
 13 digital circuits
 228 analogue circuits
 3 fibre optic circuits.

The department's telecommunications network, INFONET, is being developed country-wide to provide multi-node access to centrally held applications and INFOSYS. On completion, the network will provide central access for 2500 VDUs located around the country.

B: Applications growth

| | | |
|-------------------------------|-----------|------|
| General Benefits | November | 1973 |
| Central Records | January | 1981 |
| INFOSYS | October | 1983 |
| Unemployment Payments | January | 1984 |
| Child Benefit | May | 1984 |
| Pensions | August | 1984 |
| Family Income Supplement | October | 1984 |
| Rent Allowance | October | 1984 |
| Office Automation | January | 1985 |
| Flexitime | October | 1985 |
| Cheque Reconciliation | January | 1986 |
| Travel and Subsistence | January | 1986 |
| Management Information System | July | 1986 |
| Outdoor Staff Work Returns | September | 1986 |
| Qualification Certificate | September | 1986 |
| Parliamentary Questions | October | 1986 |
| Disability Benefit Appeals | October | 1986 |
| Medical Referral | February | 1987 |
| Free Schemes | February | 1987 |
| Electricity, Travel etc | March | 1987 |
| Treatment Benefits | May | 1987 |
| Personalised Payment Orders | August | 1987 |
| PLow (Unemployment Payment) | December | 1987 |
| Refund of Payments | January | 1988 |
| Miscellaneous Payments | January | 1988 |
| Self-Employed | April | 1988 |
| Free Fuel | October | 1988 |
| Voucher Reconciliation | August | 1989 |
| Widowers' Allowance | November | 1989 |
| Deserted Husbands' Allowance | November | 1989 |
| Carers' Allowance | January | 1990 |
| Pre-Retirement Allowance | March | 1990 |
| Free Natural Gas | May | 1990 |
| General Ledger | July | 1990 |

APPENDIX P**Local Government**

[Reference date: start-1988]

Computing in local authorities is primarily the responsibility of the Local Government Computer Services Board which was established in September, 1975, by an order made under the Local Government Services (Corporate Bodies) Act, 1971. The functions of the Board are:

- (a) To organise, administer and provide (or arrange the provision of) a service for the supply of computer facilities (including facilities relating to the preparation of data for input to a computer, computer programming, systems analysis and design and the operation of data processing facilities) for local authorities;
- (b) To co-ordinate and secure compatibility in the use of computers by local authorities generally with a view to securing the most effective use of available resources;
- (c) In matters relating to its function under paragraphs (a) and (b) above to:
 - (i) Provide or arrange the provision of training and education;
 - (ii) Carry out, promote or assist in the carrying out of research, and
 - (iii) Furnish advice, information and assistance to the Minister and to local authorities.

Operations.

Computers were first introduced to the local government sector in the early Seventies. By 1974 five of the larger authorities had acquired computers and sixteen were using bureau services. Accounting applications and the processing of large volumes of data such as municipal rates and the register of electors were the principal applications at that time. The establishment of the Board was a timely move to ensure the proper co-ordination of activities and the most effective use of resources in the local government sector. The only local authorities to operate independently of the Board are Cork and Dublin (both corporations and county councils), Wexford and Cavan.

From the earliest date the Board had a policy of pursuing the optimum degree of standardisation of both hardware and software across the sector. All users were directed to use one model of mainframe, the ICL 2903. By 1983, 28 of the 31 local authority computer installations were operating on ICL equipment. In 1982 the Board proposed a major change in hardware strategy which resulted in a decision to standardise on Honeywell equipment (the DPS6/75). It was considered that Honeywell then offered the kind of on-line facilities and terminal support which was most

consistent with the Board's long-term plan for a national network allowing distributed on-line processing. Westmeath was the first user to convert to the Honeywell DPS6 in autumn, 1984. By the end of 1986 all but one site had been converted from ICL to Honeywell. The value of the contract was reported to be in the region of £3.5m but this seems fairly conservative, covering minicomputer hardware only and excluding VAT. In the five-year planning cycle, 1983-87, the Board are understood to have worked within a £15m budget, covering hardware, bought-in applications, training, etc.

Funding IT developments.

The Board functions on a cooperative basis, being funded directly by the local authorities. It had a turnover in 1985 of about £2m. Initially funding came from participating local authorities, with payment being made on a rolling basis while a system was being developed. This method was found to be less satisfactory as a diminishing proportion of the board's activities could be clearly categorised as systems development and because the local authorities who would ultimately end up using a system were somewhat reluctant to contribute towards its initial development costs. This method was replaced in 1986 by one whereby all local authorities were levied in proportion to their size for the cost of implementing an agreed annual work plan. This plan would have to be settled in the previous year by eight County Managers and three senior civil servants meeting monthly on behalf of the entire user base. The eight County Managers are appointed at an annual convention of all County Managers.

The accent on training.

The Board, which possesses its own Honeywell mainframe, develops software for local authorities as its principal function and subsequently trains staff throughout the country in its use. The training function also entails raising the competence and awareness of local authority staff in all grades regarding IT and data processing. These courses cover the pre-implementation phase of a project, data preparation, specialist training, refresher courses, new packages, office automation, database management, spreadsheet packages, word processing, operations etc. The specialist courses include COBOL programming, systems analysis, project leading, data communications, fourth generation tools and technical courses concerning Honeywell equipment. The Board places a great deal of emphasis on training, but due to staff shortages has had to secure this service in part from outside agencies -- IPA, IMI, FAS, and a private firm providing microcomputer package training. This policy has the twin merit of concentrating in-house DP expertise on on-going development work while encouraging local authority personnel to mix with their peers from other organisations. In 1983/84 the Board took an important step when it encouraged the National Computing Centre in Manchester to enable the IPA to run its certified NCC Systems Analysis course. The primary objective was, not the production of systems analysts per se, but the promotion of good systems skills among general managers.

Structure and functions of the Board.

The Board employs some 65 staff in the two main divisions: Technical (engineering) and General Administrative Accounting (systems design). The operational structure of the Board is not immutable but is shaped and re-organised over time to match its changing requirements. To this extent the Board is striving to identify the optimum structure.

The Administrative Division has developed 12 of the 13 main local authority systems: Payroll, Payments, Receipts, Expenditure, Bank Reconciliation, Rates, Housing Loans, Housing Rents, Services Charges, Register of Electors, Traffic Fines, Planning Applications, and Stores. Only one system, the Stores System, was based on a purchased package, modified to meet local authority requirements. These systems were initially developed through concentrating on the specific needs of a representative pilot site, with the Finance Officer being the typical local contact. This approach was changed in 1982 to allow for greater flexibility in the longer term, with a working party of about 9-10 representatives of the board and local authorities meeting to define the features of a system and its level of integration into the overall system development plan drawn up by the Board. All the main systems to end-1986, except Stores and Planning, were designed as batch systems. The total number of installed systems in the 33 sites around the country at that time stood at 256 (averaging eight systems per site).

On the scientific and technical side, the Board has installed Sord micros to meet local authority engineering needs. Board staff bought in a wide range of packages covering many application areas -- CAD (mainly for roads, bridges and roundabouts), water distribution network analysis, traffic management etc.

By setting and maintaining installation standards the Board can, amongst other things, promote a greater local awareness of data processing technology. The rapid growth in DP capability in local government since 1983 has seen an expansion of local expertise beyond the purely financial area into the attainment of more clearly defined regional objectives. Some sites have adapted more smoothly than others to the transition. The pace of change and the more widely varied nature of the applications now available require a disciplined set of installation standards. The Board has found that the best operations are in sites with independent IT units, where staff have clearly defined responsibilities which they are allowed to fulfil without the distraction of being involved in the work of other units, e.g. Accounts. Clearly defined staff structures and functions very significantly determine the quality of performance of a computer unit. The Board recommends that all local authorities have a separate, self-contained computer unit with its own staff, preferably without non-IT responsibilities, and reporting directly to a member of senior management. In addition, the Board has recommended to all authorities that greater emphasis be placed than hitherto on computer training. According to the Board, the unsatisfactory results in some sites are almost

certainly attributable to a poor appreciation of the need for adequate training. The computer unit would have responsibility for ensuring that adequate training is supplied. The staffing structure of a computer unit, as recommended by the Board, should avoid unnecessary grading disparities between staff carrying out broadly identical functions at different sites. However, the Board, perhaps unwisely, stops short of recommending the grading structure to apply.

Functions of an IT unit in a local authority.

The functions of an IT unit in a local authority are:

- (a) To provide computer services for all sections of the authority as agreed with local management;
- (b) To provide all necessary training, manuals, or other information required by user units to properly fulfil their functions where all or some of these are computerised;
- (c) To provide any assistance required by users for the day-to-day running of these systems and particularly in cases of difficulty or error;
- (d) To ensure that good operational practices are applied in the running of systems, thus guaranteeing secure, timely production of the appropriate outputs;
- (e) To guarantee the security and integrity of all files and data entrusted to the unit by users;
- (f) To maintain good communication with user units so as to be aware at all times of their requirements;
- (g) To maintain good communication with appropriate Board staff so as to be aware of the proper method of systems operations and thereby keep Board staff informed of the requirements of users.

A key objective of this set of responsibilities is to ensure good communication between users, the unit and the Board. Since the Board has adopted a general policy of concentrating as much expertise as possible in local sites, with a full realization in time of "end-user computing", good communication is recognised as being essential. Otherwise, they fear, IT could slip back into an isolated corner of the administration and fail to fulfil its potential as a tool of management.

The administrative division of the Board is broken into four functional units or teams: the development team, which co-ordinates the activities of the Board; the customer service team, which handles system support, training and implementation; the planning team, which carries out research into such areas as software development tools, fourth generation languages etc; and the end-user computing team which deals with office automation. These teams are, in practice, fairly loosely constituted so as to allow for the changing priorities imposed by both users and the technology. The main guiding principle is that of greater

user participation in and control of the resources and utilities to meet his requirements. The Board are pursuing a policy of using microcomputers to ease the processing pressure on the larger machines and to download data for local modelling and analysis.

As a large customer, the Board maintains close contact with Honeywell on system performance around the country based on monthly fault logs submitted by local authorities. The Board also keeps in touch with the Honeywell Computer Users Association. It is very important for a large user such as the Board to continually represent its interests to ensure the vendor's policies in a competitive market are sympathetic to its needs. The Board is well satisfied with its policy of choosing a compatible range of mini and micro computers to cater for the requirements of large and small organisations, with the same applications software running on all local authority Honeywell machines.

Conclusion.

Since its inception in 1975, the Board has faced much the same kind of problems as other computing organisations: how to maintain an adequate level of expertise in the face of high staff turnover; how to settle on a reliable hardware strategy to meet changing long-term needs; how to widen its user base while enforcing high standards; how to develop problem-free applications for over thirty sites; how to steer a steady course towards greater long-term integration between systems, and so forth. The decision to switch from ICL to Honeywell was a brave one since it involved converting all their existing systems into a Honeywell format. The Board took the sensible course of converting "batch-to-batch" rather than trying to clear two hurdles at once by attempting to convert the ICL batch applications into on-line ones for Honeywell (The Board is currently converting these to on-line).

The Board appears to have had success in maintaining order and direction in an area which could very easily have grown in a disorganised, haphazard manner, with much duplication of effort and waste of resources. Some other countries, including the UK, have had little success in streamlining computing in the local government area despite the common factors which invite standardisation of systems and policy across local authorities -- common statutory framework, the similarity of activities, the high cost of developing new systems, and the increasing pressures on local authorities worldwide to maintain existing services with shrinking allocations.