TABLED PAPER

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

JOINT COMMITTEE OF PUBLIC ACCOUNTS

ONE HUNDRED AND SEVENTY-FOURTH REPORT

USE OF ADP IN THE COMMONWEALTH PUBLIC SECTOR-ACQUISITION OF SYSTEMS IN THE PUBLIC SERVICE

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(7) Discharged 17.8.78
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DUTIES OF THE COMMITTEE

Section 8 of the Public Accounts Committee Act 1951 reads as follows:

8. The duties of the Committee are -

(a) to examine the accounts of the receipts and expenditure of the Commonwealth and each statement and report transmitted to the Houses of the Parliament by the Auditor-General in pursuance of sub-section (1) of section fifty-three of the Audit Act 1901;

(b) to report to both Houses of the Parliament, with such comment as it thinks fit, any items or matters in those accounts, statements and reports, or any circumstances connected with them, to which the Committee is of the opinion that the attention of the Parliament should be directed;

(c) to report to both Houses of the Parliament any alteration which the Committee thinks desirable in the form of the public accounts or in the method of keeping them, or in the mode of receipt, control, issue or payment of public moneys; and

(d) to inquire into any question in connexion with the public accounts which is referred to it by either House of the Parliament, and to report to that House upon that question,

and include such other duties as are assigned to the Committee by Joint Standing Orders approved by both Houses of the Parliament.

PREFACE

SUBJECT

This report is mainly about the acquisition of medium-scale and large-scale computer systems. It also deals with the procurement of equipment to expand existing systems, and with maintenance services. It does not look in detail at procurement of software, or services other than maintenance.

Although many of the general principles discussed in the report are applicable to the acquisition of services and software, this important area has some special characteristics which deserve more detailed investigation at a later date.

The present report is one of a series on major aspects of computer acquisition and usage to be presented to Parliament over the next few months. Others in the series will deal with:

- The Public Service Board's MANDATA system;
- The planning and co-ordination of ADP developments;
- The efficiency and effectiveness of installed computing equipment;
- The collection and dissemination of statistical material by the Commonwealth.

PURPOSE

The purpose of this report is to recommend to Parliament a number of changes in the process of acquisition of automatic data processing (ADP) systems and services in the Australian Public Service.

The benefits aimed at are:

- *Reduced direct cost of the acquisition process to both government and suppliers.*
- *Earlier achievement of benefits of ADP due to shortening of the procurement cycle.*
- *In many cases a closer matching of system to needs than can be achieved with present practices.*
- *Improved effectiveness of operational systems.*
- *Increased competition leading to reduced cost of products and services.*

SCOPE

The terms of reference of the Public Accounts Committee's ADP inquiry are:

1. To investigate computing matters raised by the Auditor-General in his Report for the year ending 30th June 1976 and earlier reports.

2. In relation to computing in the Commonwealth public sector:

   (a) Inquire into the procedures adopted to identify needs for computing equipment.

   (b) Inquire into the procedures in use to procure computing equipment.

   (c) Ascertain in selected cases the utilization and effectiveness of installed computing equipment.

While the terms of reference refer to the "Commonwealth public sector", the Committee has concentrated in the first instance on ADP matters within the Public Service. We intend to examine ADP within statutory authorities at a later date.

Consideration in the Selection of Subject Matter

A number of matters raised by the Auditor-General in his recent reports point to a failure by some department managers to shoulder fully their responsibilities for the planning and control of ADP system acquisition and operation, and for the effective contribution of ADP systems to departmental objectives.

The Committee therefore decided that an important issue to be examined was the extent to which departmental management had been initiating and controlling ADP development as opposed to computer technical personnel doing so.

In his report for the year ended June 1976, and later reports, the Auditor-General commented adversely on the Public Service Board's MANDATA system. Consequently the Public Accounts Committee began to examine MANDATA during 1977. It found that MANDATA was a high-cost development in which - in its early stages at least - the pursuit of technical objectives appeared to have assumed major proportions and the setting of policy objectives and user-management involvement appeared to be minor and inadequate. The Committee therefore decided to continue its inquiry into MANDATA in more detail in the expectation that MANDATA would provide useful case material for the broader issues of Part 2 of the Committee's terms of reference.

During the Committee's inquiry into MANDATA the Government became aware of some unsatisfactory aspects of the procurement in progress for the Australian Bureau of Statistics. Cabinet subsequently initiated a re-examination within the Public Service of the mechanism for informing Cabinet about intended major computer acquisitions and obtaining approval for them. The Public Accounts Committee, in following its terms of reference, was simultaneously investigating this subject area. In view of the urgency of re-establishing normal computer procurement, the Committee decided to postpone for a short time the submission of its MANDATA report and give primary emphasis at this stage to Sections 2(a) and 2(b) of its terms of reference. This would assist Parliament to review proposed new arrangements for the approval and audit of computer acquisition. The present report addresses those issues.

The Committee has completed its inquiry into MANDATA and will report on that matter in the near future.

The Committee expresses its appreciation of the co-operation and assistance accorded to it by officers of the Public Service and suppliers of computer equipment and services. The information and material provided has greatly assisted the Committee in its prompt presentation of this report to Parliament.

The Committee also acknowledges the outstanding contribution of its technical advisor, Mr Peter MacGregor of P.K. MacGregor and Associates, in the preparation of this report.

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1.2. Major Principles

In this section we identify the basic principles and axioms on which the recommendations of this report are based.

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* 'Acquisition' in this report means the entire process of identifying the need, assessing the appropriateness of automation, specifying the requirements, purchasing or otherwise obtaining the computer system, and setting it to work.

\+ 'Procurement' means that part of the acquisition process concerned with specifying the requirement to suppliers, selecting a supplier, and purchasing (or leasing) the computer system.

(ii) The process, and each individual procurement, should be as open as possible.

1.2.5. Free Competition

It is the Government's policy to promote free and open competition between suppliers to the maximum extent practicable.

1.2.6. Co-ordination of ADP Development

(i) In order to maximize overall economy and effectiveness of Government operations, there is a need for a degree of co-ordination of data processing development and usage, aimed at, for example:

- The possible provision in the future of Government-wide information systems;
- The achievement of economies through the common use of data transmission facilities.
- The aggregation of Departmental plans for resource demand forecasting;
- The collection of statistics on computer populations, usage, costs and procurement;
- The achievement of economies through the sharing of software;
- The efficient utilization of unused and available resources such as computer time, equipment and personnel.

(ii) Co-ordination is the harmonious combination of agents or functions towards the achievement of a given goal. Hence the goal or goals must be identified before co-ordination is possible. There should be no attempt to co-ordinate except towards clearly defined objectives.

(iii) Some of the possible goals towards which co-ordination of ADP might be aimed are properly matters for Government policy

1.2.2. Efficiency and Effectiveness of Procurement

The procurement process should be carried out as efficiently and effectively as practicable. The objective should be minimum cost consistent with the achievement of clearly identified goals of procurement.

1.2.3. Effectiveness of the ADP System which is Acquired

Although in this report most attention is given to improving the efficiency of the procurement process, potentially the greatest benefits from improved acquisition procedures are expected to come from resulting improved effectiveness of installed computer systems.

The Committee considers it fundamental to maximizing the effectiveness of large computer installations that the Department Head should:

- Set goals for the contribution that the computer is to make to the achievement of departmental objectives.
- Commit himself and the department to achieving those goals.
- Fully understand how the computer will contribute to departmental objectives.
- Closely involve himself in all stages of justifying, planning and acquisition of the computer system.
- Monitor the contribution that the operational system actually makes to departmental goals.
- Control operation and further development to maximise the effectiveness of the computer's contribution.

1.2.4. Fairness and Honesty

(i) The procurement process and individual procurements must be, and be seen to be, impartial and fair.

1.2.1 Parliamentary, Ministerial and Management Control

(i) Parliament should be aware of all intended computer acquisitions which are expected to have significant impact on employment within the Public Sector.

(ii) For major computer acquisitions, Ministers and Permanent Heads should not only be aware of technical factors but should also have regard for relevant political or social implications.

(iii) The Permanent Head of each Department is responsible for establishing, subject to legislation, Administrative Arrangements and Ministerial direction, the tasks and functions to be performed by his Department.

(iv) The Permanent Head of each Department is responsible, subject to consutation with and direction by his Minister, for the identification of major tasks and functions which are to be performed by computer.

(v) The Permanent Head of each Department is responsible for:

(a) setting the objectives for each computer system's contribution to Departmental goals;

(b) the selection of the most appropriate computer system for his department;

(c) obtaining the results from the computer, the estimates for which were used to justify acquisition of the computer system.

(iv) The Permanent Head of each Department is accountable to his Minister for the achievement of the results from the computer, the estimates for which were used to justify acquisition of the computer system.

decisions. Examples are the provision of a Government data communication network and the integration of information systems of different departments. Co-ordinating bodies should bring such potential policy issues to the attention of the Government for decisions.

1.2.7. Control and Audit or Acquisition Process

(i) The approach used in the acquisition of a computer system is one of the most important ingredients of its operational effectiveness. Therefore controls and audit should be applied to the acquisition of major systems as well as to their operation.

1.2.8. Resource Allocation

(i) Each Computer project should be evaluated on its merits by those with budgetary responsibility for the program in which the project falls. Therefore an ADP annual budget for the whole of the Public Service Service is not necessary.

(ii) The rate of data processing development within the Public Service is likely to be limited by the availability of personnel with the necessary skills to carry it out, at least for the next few years. Therefore Service-wide ADP total resource planning is necessary to ensure, as far as possible, that resources will be available when required, either through the use of the private sector, internal development or recruitment.

(iii) Where suitable data processing resources (hardware, software, computer time or human resources) exist in the Service and are available for use, they should be used in preference to obtaining new capabilities.

1.2.9. Use of the Private Sector

(i) Where resources are available from the private sector (such as computer time or

personnel) such resources should be used in preference to developing new internal capability unless it can be shown that it is not in the interests of the Commonwealth to obtain the capability from outside the Service.

1.2.10. Cost to Suppliers of Tendering

(1) The procurement process should be no more costly to suppliers than is necessary to ensure that the Government's procurement objectives are met.

1.2.11. Technical Review of Departmental Proposals

(i) The technical soundness of a department's ADP proposals is the responsibility of the Permanent Head of the Department.

(ii) Since not all Departments contain the necessary technical competence to ensure sound plans, there should be a source or sources of computing expertise to advise and otherwise assist Departments who request such assistance.

(iii) In reviewing departmental proposals in the exercise of its co-ordinating function, the co-ordinating body (for the time being the Public Service Board or the IDC on ADP), should advise the Permanent Head of the department of any technical shortcomings that the review body believes exist in the proposal together with advice for the correction of such shortcomings.

1.3. Present Practice

The procedures in use for computer system procurement in the Australian Public Service Board have not changed very much over the past sixteen years. In that period nearly $150 million dollars have been spent on computing equipment for the Service, and for the most part the procedures have served the Commonwealth reasonably well.

However, in many respects the present procedures and practices do not fully satisfy the requirements set out in the previous section.

This section briefly reviews the present practice against the foregoing paragraphs of section 1.2.

1.3.1.

Parliamentary, Ministerial and Management Control

The potential impact of large computer acquisitions on employment is of increasing concern to Parliament. The Committee considers that procedures should be developed which will ensure that where there are substantial unemployment effects of large computer systems, Parliament should be advised of the intended acquisition beforehand. Present procedures do not provide for this.

Management Control

The Committee has been advised that, with some notable exceptions, there has been a tendancy for Permanent Heads to over-delegate the acquisition of large computer systems, even in some cases where the application of the computer formed the backbone of the administrative work of the department. We therefore consider that new procedures should re-emphasise and facilitate the vital role that the Permanent Head must play in the acquisition of a major computer system within the department. In particular, the setting of quantified goals for the computer's contribution to departmental effectiveness, and accountability for achievement of those goals, must be emphasised.

Review of departmental proposals has until recently been almost entirely a 'technical' review. This is why the procedures have proved inadequate in bringing to the attention of the Government a matter which proved to be a politically sensitive one.

1.3.2.

Efficiency and Effectiveness

The major component of the cost of present procurement is the time it takes. Little effort has been made in the past to set standards and controls for computer procurement to enable costs to be brought to account.

1.3.3.

Effectiveness of the ADP Systems which is Acquired

Since there is as yet little in the way of quantified objective setting for the computer's contribution, and little measurement of actual effectiveness against objectives, it is difficult to say whether or not the

present procedures lead to fully effective systems. The Committee considers that in the absence of such goals and measurement, they probably do not.

1.3.4.

Fairness and Honesty

No evidence or indication of dishonesty or impropriety in past procurement has been brought to the attention of the Committee.

However, there is sometimes anxiety among suppliers about whether they are receiving fair treatment. The Committee attributes this in large measure to the secret and arm's length nature of most major computer procurements.

We consider that this anxiety would be reduced if the whole process were more open. There are clearly some things that should not be communicated to any supplier or potential supplier - such as the information given in confidence by another supplier, or information which would place the Commonwealth in a less advantageous bargaining position, or information which cannot be given freely and equally to all suppliers, or deliberations of teams engaged in vendor selection, and so on.

While recognising the need for confidentiality in such matters, we consider that the more open the entire process, the less opportunity there is likely to be for dishonesty or impropriety, the more clearly will the process be seen to be fair, and the simpler it will be to audit it to ascertain whether any dishonesty actually occurred.

The Public Service Board should prepare suitable guidelines for officers to follow in their dealings with suppliers.

1.3.5.

Free Competition

Not all procurements are seen by all suppliers to be fully competitive ones.

1.3.6.

Co-Ordination of ADP Development

The present co-ordinating mechanism is the IDC on ADP. In our view the IDC on ADP does not have clearly identified goals agreed to by Government, for ADP co-ordination in the Public Service.

1.3.7.

Control and Audit of Acquisition Processes

The present procurement process has few formalized controls and no audit is carried out of individual major procurements.

1.3.8.

Resource Allocation

The Public Service Board has commenced ADP resource planning. We consider this an important forward step.

The Committee understands that at the present time there is considerable amount of unused off-peak data processing capacity available on CSIRO's computer network (CSIRONET).

The Committee recognises that CSIRONET was developed primarily to serve the computing needs of CSIRO scientists. Nevertheless there may be economies in making this Australia-wide computing service available to, and suitable for, a wider range of Public Service Departments consistent with meeting its principal objectives. The Committee has noted that in October 1978 CSIRO issued a broadened charter for CSIRONET. According to the new charter, the Division of Computing Research "should provide a range of standard computing services available to arms of Government, tertiary educational institutions and industry". The Committee considers this a forward step in the rationalization of Public Sector computing.

1.3.9.

Use of the Private Sector

Present procedures do not appear to prevent (though they do not specifically encourage) the use of computer time or personnel from the private sector in preference to developing internal resources.

1.3.10.

Cost to Supplier of Tendering

The present tender process for large computer procurements is exceedingly costly to suppliers. Accurate figures have not been presented to the Committee but estimates have been given that tendering for a medium sized system of say $1 million value can cost a supplier between $100 000 and $200 000. One supplier indicated that

tendering for the Australian Bureau of Statistics had cost his firm $1 million to the present time.

1.3.11.

Technical Review

The Committee has been advised that in many cases management of computer procurement is delegated to technical levels within a department with little involvement by the Permanent Head. The Committee considers that although the Permanent Heads cannot and should not be expected to become experts in computer technology they should acquaint themselves with broad concepts of data processing to help them more effectively to manage computer acquisitions and to communicate essential aspects of the acquisition to their Ministers.

Under present arrangements technical assistance is available from the Public Service Board ADP Branch and the IDC on ADP. The Committee believes that the Public Service Board has an important role to play in disseminating information and training. The Board[24] suggested to the Royal Commission on Government Administration that it should play a greater role in providing programming, systems analysis and other support services.

The Committee is examining this suggestion in the broader context of co-ordination and planning of ADP and will report on it to Parliament at a later date.

1.4. SUMMARY OF RECOMMENDATIONS

The following recommendations derive from the foregoing sections 1.1 to 1.3:

(1) *Parliament should be advised of the details whenever a Minister endorses a proposal for a 'major' computer acquisition.*

(2) *The Department of the Prime Minister and Cabinet and the Public Service Board should issue guidelines for determining what constitutes a 'major' proposal and which should be made known to Parliament.*

(3) *Prior to its acquisition, quantified objectives should be set for the contribution that each proposed computer system will make to departmental goals.*

(4) *Prior to an acquisition which might have significant impact on employment within the Public Sector, estimates should be given to Parliament of the anticipated costs and benefits and all expected effects, including effects outside the Department which is acquiring the system, both tangible and intangible.*

(5) *The actual contribution of major computer systems to departmental goals should be measured against initial objectives and the variances accounted for.*

(6) *Detailed objectives and criteria for selection of supplier should be established for each procurement before beginning the procurement.*

(7) *A decision to proceed with a major computer procurement should be based on its expected ability to meet a standard minimum objective criterion of cost effectiveness calculated according to the Public Service Board's guidelines.*[35]

(8) *A detailed description of the procurement process when it has been defined, should be published so that it may be clearly understood by the Public Service and suppliers.*

(9) *Details of contracts entered into for computer equipment, software and services should be published in the Commonwealth Gazette. Such details should include any significant deviations from Government standard terms and conditions, price, and in the case of system procurement, the configuration of equipment and software.*

(10) *The Government's intention to procure computer equipment, software or related services without open tender (e.g. by a certificate of inexpediency) should be published in the Commonwealth Gazette not less than 14 days prior to approval of the requisition by the authorising officer, to enable all suppliers who wish to compete for the business to show cause why they should be invited to tender.*

(11) *The workings of co-ordinating bodies should be fully open to Parliamentary scrutiny.*

(12) *Departmental proposals (as specified in ADPIC 9[62]) should continue to be reviewed by a co-ordinating body.*

(13) *Internal departmental controls should be applied to the acquisiton of ADP systems to ensure that, inter alia;*

- *a computer is ordered only if it is likely to produce greater benefits than other processing alternatives;*
- *the most suitable facilities and/or services are selected;*
- *a pre-installation plan is prepared against which results and progress can be measured.*

(14) *Internal audit should be applied at appropriate intervals to evaluate the soundness, adequacy and application of acquisition control processes within departments.*

(15) *Standards of time and cost should be established for procurement against which review and co-ordinating bodies should be held accountable for costs incurred and benefits lost.*

(16) *The Auditor-General should audit major ADP acquisitions periodically and report to Parliament on his findings.*

The recommendations below follow from evidence and arguments presented in later sections of this report.

(17) *The Public Service Board, in conjunction with the Department of Administrative Services, should:*

a) *carry out an analysis of actual times required for all phases of Government and private sector computer procurement;*

b) *by comparison, identify areas in which potential savings are possible;*

c) *set time standards for each phase against which delays can be costed and brought to account in conjunction with the acquiring department;*

d) *Record the actual costs of each phase of major procurements.*

(18) *Review and co-ordinating bodies such as the IDC on ADP and the Public Service Board should be publicly accountable for the costs saved and benefits lost due to their function. The Auditor-General should review and report on the activities of these bodies relevant to computer acquisitions, including the review of costs and benefits.*

(19) *New administrative arrangements for computer procurement should be based on a cost/benefit analysis which takes into account the effect of delay on both incurred costs and lost benefits.*

(20) *Data systems specifications should be used in preference to equipment performance specifications in the procurement of an initial computer system or the expansion of an existing system by additional components.*

(21) *When equipment performance specifications are used for the procurement of an initial system or the expansion of an existing system by additional components such specifications should be designed to promote competition to the fullest extent practicable.*

(22) *For complex projects a two-stage proposal/tender process should be considered in which*

(i) *The first stage invites proposals (not tenders) for the solution of the problem defined in the mainly functional specification.*

(ii) *The second stage calls for tenders from a limited number of the respondents to the first phase, based on a more detailed technical specification which may combine data system requirements and equipment performance requirements.*

(23) *The Public Service Board should, as soon as practicable, develop and publish an ADP information manual for departments' use in evaluating tenders and proposals for computer systems or parts of systems. The manual should include methods for*

a) *assigning a monetary value (i.e. the value to the department) to all 'desired' capabilities or characteristics specified in the request for proposal or invitation to tender;*

b) *assigning a 'cost' to the absence of each desired capability or characteristic from each supplier's proposal, to be used as a penalty to the supplier in costing his proposal;*

c) *calculating the total cost - direct and consequential - of each supplier's proposal over the entire system life.*

(24) *Departments should be required to determine the detailed evaluation method and criteria, including the desired capabilities and characteristics and their values, before inviting proposals or calling tenders.*

(25) *The specification of requirements accompanying a request for a proposal or an invitation to tender should include the following information:*

a) *The value to the user of each desired capability or characteristic;*

b) *For each desired capability or characteristic, the method which will be used to calculate the cost penalty which the supplier will incur in the evaluation if he does not include that capability;*

c) *The expected system life to be used for the purpose of costing.*

(26) *The Public Service Board should increase its activity in the development of standards and guidelines for sound ADP practice and procedures.*

(27) *Standards develop for the technical features of computing equipment and software should not be such as to limit competition among equipment suppliers or prevent the Government from benefiting from future technical progress.*

(28) *Technical standards should be arrived at through a process of wide consensus and should not be developed in isolation from industry or users.*

(29) *Consequently, where it is desired to promote a technical standard, the standard should be explicit and open for discussion. The Government should not attempt to achieve uniformity through the specification of mandatory technical features except where such features have been explicity identified as proposed or approved Government standards and after wide discussion throughout the Government and a high degree of consensus.*

(30) *A task group should study the advisability of and appropriate timing for establishing a packet-switched data network for Australian Government use conforming to international standards. We suggest that this group be required to submit its recommendations, to Cabinet by the 30th June 1979.*

(31) *The development of data processing standards should be made more formal. We suggest the constitution of a Government computer standards committee consisting of for example representatives from among major user departments, the Public Service Board, Telecom, the CSIRO Division of Computing Research, and major computer industry associations. The objective of such Committee would be to achieve maximum economy through interdepartmental standardisation, subject to not restricting competition among suppliers or limiting the Commonwealth's ability to capitalise on technical innovation. We suggest that the committee would make recommendations to the Public Service Board on the adoption of appropriate ADP standards.*

(32) *In expanding or augmenting an existing computer installation with peripherals and/or processors where plug-compatible equipment is available in Australia, competitive tenders should be sought for the required peripherals and/or processors unless grounds for a certificate of inexpediency exist.*

(33) *In procuring a complete system of processor(s) and peripherals where the architecture selected for the processor is such that plug-compatible units are available, then competitive tenders should be sought for such equipment unless grounds exist for a certificate of inexpediency.*

(34) *In either of the procurement situations described in 1 and 2 above, the need to obtain compatibility with existing peripherals or processor(s), or to obtain a particular computer architecture should not be grounds for a certificate of inexpediency unless it has been definitely established that plug-compatible peripherals or processors are not available.*

(35) *In deciding whether to mix vendors on one site, due regard should be paid to any additional costs which this will involve, for example in system integration and maintenance, and such costs should be offset against any cost saving.*

(36) *Specifications of maintenance requirements should be designed to ensure free and open competition, equal opportunity, and careful consideration to all maintenance suppliers who wish to participate in Government business.*

(37) *The purchasing authorities should design purchasing procedures for maintenance service which*

a) *ensure that consideration is given to all qualified maintenance vendors who wish to participate in Government business;*

b) *are not unnecessarily complex and costly having regard to the size of the contract to be let.*

(38) *Because of the difficulty of selecting representative tasks and because benchmark results may not be representative of later performance in a real job environment, benchmarks should normally only be used to verify suppliers' performance claims.*

(39) *The Department of Administrative Services should examine the feasibility of simplifying the procedure for minicomputer purchases of low aggregate dollar volume, including an examination of an annually renewed published contract with each supplier.*

(40) *In designing improved acquisition procedures and in preparing guidelines for the documentation of departmental proposals, the Public Service Board should ensure that the procedures for minicomputers are simple and of a cost consistent with the dollar value of the equipment.*

2. INTRODUCTION

2.1. COMPUTER PROCUREMENT IN THE APS - A BRIEF HISTORY

Electronic digital computers were first used for business and government administration in the U.S.A. and U.K. during the early 1950's.

The Australian Government's first computer was installed in 1955 at the Weapons Research Establishment to assist in scientific research. In 1962 the Public Service installed its first major computer for administrative work in the Department of Defence.

Large computer systems (large by the standards of the early sixties) were installed in the CSIRO Division of Computing Research in 1964 and the then Commonwealth Bureau of Census and Statistics in 1965. These two organisations played a major role in the early development of Government computing. This occurred because other departments, in building up their own data processing systems, relied heavily on the use of CSIRO and Bureau facilities as well as expertise.

Moves to Co-ordinate ADP Developments

The Public Service Board has also played a major role, perhaps the dominant one, in the development of electronic data processing in Australian Government administration. In the performance of its duties under Section 17 of the Public Service Act, the Board early assumed the role of co-ordination of ADP development and usage. In 1959 it sent a memorandum to the Prime Minister's Department recommending the establishment of an interdepartmental committee to co-ordinate the automatic data processing activities of the Commonwealth Government administration. Its memorandum (58/4429, 19 November) stated [23] that:

> Current and foreseeable developments in the use of electronic computers within the field of Commonwealth Government's administration in Australia require the early establishment of more formal machinery to co-ordinate all aspects of a Government ADP program.

While section 17 of the Public Service Act sets out the duties of the Public Service Board to

> devise means for effecting economies and promoting efficiency in the management and working of Departments

section 25(2) of the same Act places on each Permanent Head responsibility for the general working, and for all the business of his Department.

Thus because of the distribution of powers by these two sections of the Act, the Public Service Board has found it necessary in the past to:

> generally operate by persuasion of individual departments subject, where necessary, to direction from the Government level.[24]

The Interdepartmental Committee on Automatic Data Processing

In March 1960 the Prime Minister approved the establishment of an IDC on ADP as recommended by the Public Service Board.

The initial terms of reference suggested by the Board for the IDC on ADP were:

(i) To co-ordinate the planning, development and utilization of ADP systems for scientific and office work in Commonwealth departments (excluding Department of Supply 'joint project' activities).

(ii) To co-operate as necessary with Commonwealth statutory authorities and with the Department of Supply (in respect of 'joint project' activities in relation to ADP matters of common interest.

(iii) To determine purchase and/or rental of electronic computers and associated peripheral equipment by Commonwealth departments (excluding Department of Supply 'joint project' purchases).

(iv) To advise the Electronic Computing Facilities Committee or any Commonwealth department on matters referred for consideration by the Interdepartmental Committee.

On June 3, 1960, the Board advised Departments of the creation of the IDC, stating:

> The main purpose for which the Committee is established is to co-ordinate the planning, development and utilization of ADP systems for scientific and office work in Commonwealth administration. The Committee is to be closely acquainted with activities leading up to the stage of a proposal for the purchase or rental of electronic computers or associated equipment and will need to devise the means which will facilitate the processing of such proposals.

> The concept of horizontal co-ordination involved in the Chapter of the Committee is not in any sense to be construed as limiting the importance of the active role that each department must play in the development and use of ADP systems nor as detracting from the responsibility of each Permanent Head for all the business of his department.

Power to Control Purchase of Computers

Although the IDC on ADP did not possess executive powers in purchasing matters, agreement was reached in September 1960 with the then purchasing authorities that any proposals for the acquisition of computing equipment would be referred to the Committee for comment before decisions were taken. This practice is still in effect.

As the Public Service Board points out[30]

> all proposals from departments concerning the acquisition of ADP equipment (except those solely for Defence classified purposes, military operational use, or which form an integral part of other plant) are referred initially to the IDC. The tendering/ contracting authorities will not proceed with procurement action in the absence of Committee support.

The relationship between the Public Service Board and the IDC on ADP has been an important factor in the practical working of the IDC. Not only has a Board officer always chaired the IDC but the Board's office acts as the operating arm of the Committee. In that capacity it advises the IDC on the justification for proposals to acquire computer equipment or services and the adequacy and completeness of the tender specifications and subsequently reports on the department's selection of computer facilities or services.

We therefore conclude that from the early days of computer acquisition in the Australian Government the Public Service Board and the IDC on ADP have significantly influenced the extent and direction of computer development both through their advice and persuasion and through their *de facto* power to control purchasing of computers. In a future report we will discuss more fully and make recommendations on the roles of the IDC on ADP and the Public Service Board.

The Purchasing Regulations

In this brief review of the major historical influences on Australian Government ADP development we must look at the way the existing purchasing regulations and directions have been applied to ADP procurement.

In our forty-second report we reviewed the history of Finance Regulation No. 52. As applied to computer procurement (over $5000 in value) this regulation requires the calling of tenders unless, as provided in Regulation 52AA, the equipment can be obtained under an existing contract between the supplier and the Commonwealth or a State, or an officer authorised for the purpose certifies that such public invitation would be impracticable or inexpedient. Certificates issued in this way are commonly called "certificates of inexpediency". Regulation 52AA prescribes other grounds for exemption from calling public tenders but such grounds do not normally apply to computer procurement.

The computer marketplace is an extremely competitive one with many suppliers usually contending for the business. Consequently the calling of public tenders frequently results in six or more complex tenders being received. On the other hand most certificates of inexpediency result in single-source procurement in which there is no competitive bidding.

Thus in practice, for most large computer system procurements, the choice for the purchaser is between public invitation to tender or, if the grounds of impracticability or inexpediency exist, the complete bypassing of competitive procurement. The former process frequently results in so many tenders being received that the purchasing department cannot fairly and fully analyse them all in the time that it has allowed for this process. This and other delays inherent in full scale tendering can make the process self defeating: while aimed among other things at promoting competition, its built-in delays can themselves sometimes make it impracticable or inexpedient to go to tender and thus form the grounds for a sole source procurement.

New approaches to procurement procedures are required and we make a number of recommendations in Chapers 3, 4 and 5.

2.2 CO-ORDINATION AND PLANNING OF ADP DEVELOPMENTS

A Commissioner of the Public Service Board[8] told the Committee that the Board:

> ...believes quite firmly that there is a need for fairly strong central co-ordination of computer purchasing or procurement... We are completely opposed to individual departments being given the responsibility for buying what they like, how they like, when they like on their own assessment of their needs.

The Board[28] cites the attitude of some overseas governments in support of its view that ADP activities should be centralised, stating that:

> most overseas industrialised countries have found

it desirable to provide some form of central co-ordination of ADP activities in central government administration.

The Committee considers that a degree of co-ordination of computing development is necessary and that the Board has a charter under the Public Service Act to provide co-ordination (but not control). The Committee also considers that the major responsibility for computer developments must lie with the managers whose work the computers are to perform - the permanent heads of Departments.

We see no reason to suppose that proven principles of sound management in the private sector do not also apply to management in government or that the ingredients of an effective computer system are significantly different in government from those in the private sector. Such principles dictate that managers must identify their functional goals, devise the means to achieve them and ruthlessly examine results against expectations. The computer in a department is there to help - in some cases to enable - the department to achieve its goals. In the end the line management of the department must have the responsibility for choosing and implementing the means to achieve the department's goals, just as the line management must be accountable for the success or otherwise in achieving such goals.

The Board has advised the Committee that the necessary skills to choose, design and implement appropriate computer systems do not exist in all departments. The Committee considers that it would be appropriate for the Public Service Board, under section 17 of the Public Service Act, to implement a vigorous program to develop a high level of self-sufficiency in user departments in computer system planning and development.

The Committee notes and supports the program of ADP resource planning that the Board has initiated. We caution however that computer developments must grow from real needs in functional areas. To impose a "master strategy" for computing on the Public Service which is unrelated to needs as perceived by users could in our view result in considerable overall inefficiency in computer usage and in technological obsolescence. Developments should grow upwards from needs, not downwards from philosophies about where information processing is thought to be going.

2.3 THE COMPUTER MARKET TODAY

While Government computer procurement practices have changed very little in essentials over the past twenty years, there have been significant changes during that period in the structure of the marketplace, in available products and services, and in basic strategies of information processing. Such changes can be expected to continue and accelerate over the next few years.

They will have a bearing on procurement practices and we should therefore examine whether the machinery established for computer purchase in the 1960's is going to meet the requirements of the 1980's in an optimum way.

The Birth of a Software Industry

Until ten years ago the emphasis in procurement was on the central processor. Software came with the central processor without additional charge. When a supplier for the central processor was selected, the purchaser automatically committed himself to a period of accepting the supplier's software or writing his own if it could not be obtained from the supplier of the central processor. He also had little or no choice when it came to purchasing the peripherals, either the initial ones or those required for subsequent expansion of processing capacity: they had to be bought from the supplier of the central processor.

This situation began to change in 1968 when IBM, the largest supplier announced that it was considering separation of some of its services from the total package. This step, commonly called 'unbundling', meant that many major items of software began to be priced separately from the central processor. Most major suppliers have now taken steps towards unbundling and the industry trend is expected to continue in that direction.

Unbundling initially caused many problems for users and suppliers, particularly in relation to the method of pricing software and to proprietorship. However, a stable basis of industry practice is emerging which increasingly provides opportunities for would-be alternative vendors of system software. Unbundling gave great impetus to the independent software industry, revenues from which in the U.S. are now growing much more rapidly than from computer mainframes.[41]

As a consequence there is an increasing range of program products available from a wider range of competitive sources including Australian software firms at competitive prices. Increasingly therefore, opportunities exist for the Government to obtain some of its software requirements at lower cost from these sources than from the supplier of the central processor and certainly at lower cost than it can be developed within the Public Service.

Cheaper Hardware - More Costly People

Among recent developments in electronics, the miniaturization and attendant reduction in cost of electronic components has had enormous consequences. Today a micro-processor measuring a few millimetres square has the same processing power as a computer, which ten or fifteen years ago, represented the forefront of technology and occupied an entire room. For the same performance some components which were worth $70 ten years ago, today cost a fifth of a cent.[42]

In the same time that costs of components have reduced over a thousandfold, costs of people to program the computers and to design systems have more than doubled. Programming has become a much more significant component of the total cost of a large system and there is far less justification now than there was ten years ago for users or suppliers to spend a great deal of programming effort to get the last ounce of power out of the hardware. Consequently staffing implications becomes a major consideration in system planning and design and in the selection of products products and vendors.

The Growth of Services

Faced with the threat posed by the growing number of minicomputer suppliers, the traditional manufacturers have responded by offering a greater range of services and more and more elaborate software. In addition, the number of independent (i.e. independent of the traditional mainframe manufacturers) suppliers of services has greatly increased.

In 1976 growth rates in DP revenues in the U.S. were:[41]

- Mainframe 5 per cent
- Peripherals and terminals 11 per cent
- Services and software 24 per cent
- Minicomputers 24 per cent

Services which can now be bought from independent service suppliers as well as from the major mainframe suppliers are computer time, maintenance engineering, facilities planning and construction, data processing education, programming and systems analysis, facilities management, project management and a wide range of consulting services.

Consequently, as with software, an increasingly wide range of competitive sources of services is available to the Government, with potential for cost saving.

Plug-compatible Peripherals and Processors

It is now possible in Australia to buy IBM-compatible peripherals from a number of suppliers and it is also possible to buy from a number of suppliers central processors which will run IBM software.

The U.S. Federal Government has now established standards for input/output channel level interfaces for all medium and large-scale computer systems procured by Federal Agencies. This will have the effect of forcing manufacturers who want U.S. Government business to standardise their peripheral interfaces for magnetic tape and magnetic disk equipment. The benefit of this to the purchaser will be that in due course he will be able to buy magnetic tape and disk equipment for most makes of medium and large-scale computer from a large number of alternative vendors.

The Trend

The foregoing clearly points to a developing marketplace in which there will be increasing opportunities for the buyer to select component goods and services from a number of competing sources in order to meet his requirements at lowest cost. Some of the changes that this implies in the processes of procurement are dealt with in Chapter 5.

2.4 ADP IN THE PUBLIC SERVICE - SOME STATISTICS

Statistics of ADP expenditure and usage by statutory authorities are not at present available in summary form. Hence the total expenditure on ADP in the public sector, as distinct from the Public Service, is not known. However, the Public Service Board has compiled statistics[56] on computer expenditure and usage by departments and those few statutory authorities staffed under the Public Service Act and subject to Treasury Directions. The statistics therefore exclude most statutory authorities and CSIRO. They also exclude Defence computers of a classified nature and computers used for dedicated laboratory, process control or similar applications in specialized systems. The figures obviously fall far short of total ADP expenditure in the public sector. They do however, give an approximate indication of the magnitude of spending on ADP within the area covered by this report and its recommendations.

Capital Expenditure

Over the five year period ending 30 June 1978, the total general Government component of expenditure on new fixed assets was $2007 million.[58] During the same period expenditure on computing equipment (excluding data communications equipment) by Public Service departments other than for Defence classified projects, was $63.5 million[56] or 3.0 per cent of total expenditure on new fixed assets.

Number of Computers

The number of computers installed in Government departments, excluding Defence computers of a classified nature, at March 1978 was[29]

Large and medium scale computers	70
Small Computers	392
Total	462

(By comparison in the U.S. Government there were 11,328 computers installed in Federal agencies in January 1978) [57]

Installed Value

During the period 1962/63 to 1977/78 the Australian Public Service spent approximately $150 million on the purchase and hire of computing equipment (including data communications equipment).[56]

The corresponding figure at the end of 1972/73 was approximately $75 million. Thus there has been an average annual growth rate in equipment spending of 15 per cent during the five year period 1973/74 to 1977/78.

Annual Expenditure

The total expenditure on ADP by departments, excluding Defence classified computers, was $98.1 million in 1977/78.[56]

Further statistics are to be found in the Board's report on ADP Resource Planning - 1978.[56]

Applications

At March 1978 there were over 194 major applications systems in use across 27 departments, with a further 83 major systems under consideration or development. A list of these applications is in the Public Service Board's Annual Report for 1977/78.

CHAPTER 3

THE ACQUISITION OF COMPUTER SYSTEMS AND SERVICES

Some procedures and practices currently in use of ADP acquisition are unduly costly with little compensating benefit. A protracted procurement cycle results in cost penalties because benefits to be derived from the installation of the computer system are deferred and because the delay sometimes results in less efficient application of human resources to system development tasks during the procurement cycle.

Moreover, in some cases present practices and procedures tend to be inflexible, inhibiting the optimum match of vendors' solutions to the user's requirements.

The Committee therefore recommends a number of changes to present procurement practices and procedures. The Committee considers that these changes will result in a reduction in the average time to procure computer systems and will help to ensure that where a computer system is installed it is closely matched to user requirements.

Our recommendations are based on an analysis of evidence and opinions presented by Departments, the Public Service Board, the Department of Administrative Services and fourteen major suppliers.

In this inquiry, no evidence or suggestion of impropriety in past or current computer acquisitions was presented to the Committee. On the other hand, numerous examples of inefficiency and ineffectiveness have been brought to the Committee's attention by witnesses.

Not surprisingly, some suppliers disagree with some past Government decisions on the selection of an approach or of a vendor. The Committee has discounted special pleading and has taken account of those suggestions by suppliers on which there was a high degree of consensus or which were supported by other evidence available to us. In this regard we have drawn heavily on U.S., Canadian and U.K. practice.

3.1. CATEGORIES OF ACQUISITION

The Government purchases a wide range of ADP goods and services to satisfy a great variety of application needs and ranging in cost on any one procurement from a few thousands of dollars to

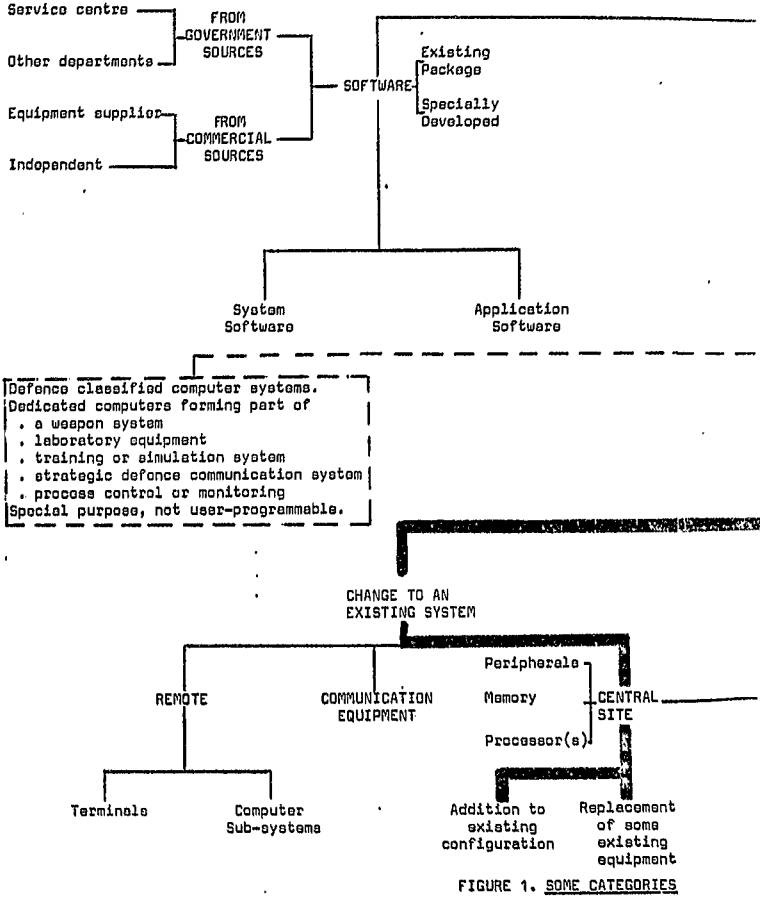
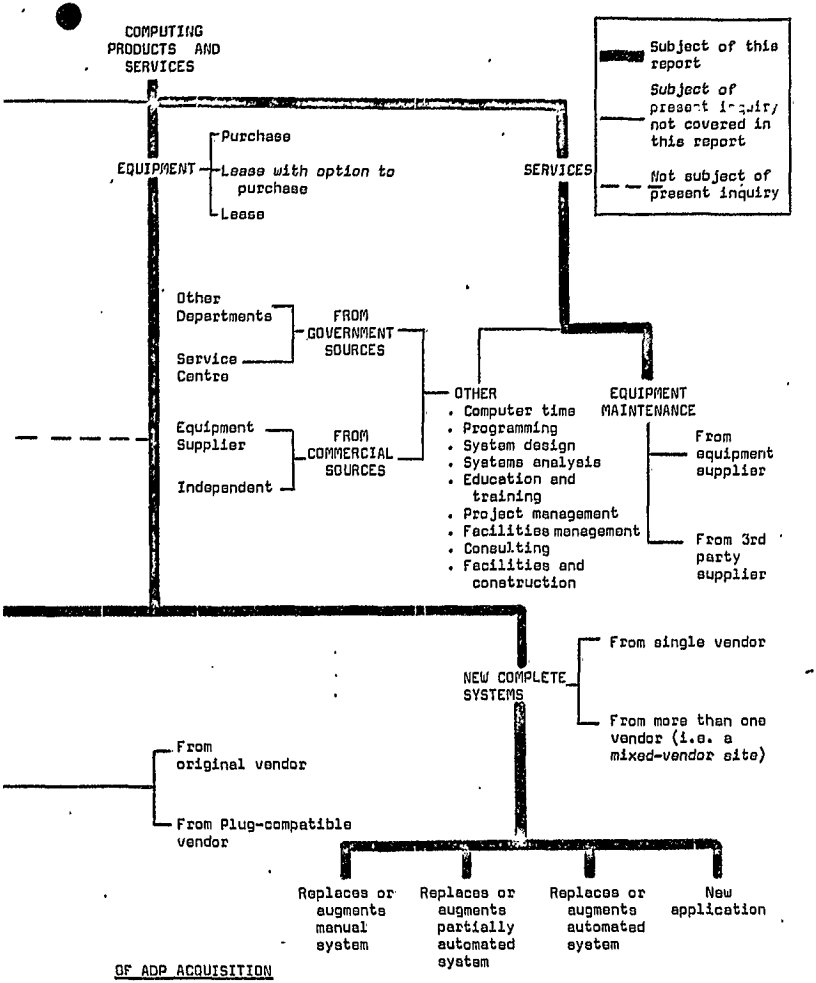


FIGURE 1. SOME CATEGORIES



OF ADP ACQUISITION

twenty million dollars or more. Figure 1 shows the principal categories of ADP acquisition with which this present report is concerned, as well as some special types of systems with which the report is specifically not concerned. The report mainly deals with the procurement of medium scale and large scale complete computer systems or with changes to existing systems by way of addition or substitution of equipment. The bulk of the present ADP procurement approach was designed to or has evolved to cope with this problem. Because of the changes in the structure of the computer industry and market, other aspects, particularly services, are becoming more important and will require increased attention in the formulation of future procurement policies and practices. In Chapter 5 we make a small number of specific recommendations about the procurement of services, particularly third party maintenance, and many of the recommendations in this Chapter in relation to system procurement also touch on the procurement of services.

This Chapter deals mainly with hardware procurement from the beginning of the feasibility study to the end of acceptance testing.

3.2. STEPS IN THE ACQUISITION PROCESS

The main steps in the recommended general process for the procurement of medium and large scale computer systems are listed below:

*1. Identify departmental goals.

*2. Identify result areas which are key in achieving goals.

*3. Review performance in key areas.

4. Analyse constraints on performance in key areas.

*5. Identify alternative means of alleviating constraints.

*6. Check appropriateness of automation (including social and organizational implications).

*7. Establish broad departmental plans.

8. Perform cost/benefit analysis of alternative approaches.

9. Perform preliminary feasibility study.

10. Perform research study if appropriate.

*11. Prepare analysis of alternative approaches.

12. Make provision in budget estimates for purchase of equipment.

13. Issue preliminary notification of site requirements.

*14. Perform detailed feasibility study and recommend procurement.

15. Identify procurement objectives.

*16. Determine appropriate method of procurement.

17. Prepare operational requirements specification.

18. Compare with objectives.

19. Prepare plans for manpower needs.

20. Determine evaluation criteria.

21. Compare with objectives.

22. Advertise requirement.

23. Issue specification.

24. Evaluate responses.

25. Perform preliminary benchmarks.

26. Select short-list of suppliers.

27. Revalidate and improve evaluation criteria.

28. Issue detailed site requirements.

29. Invite formal tenders.

30. Evaluate responses.

31. Perform benchmarks.

*32. Select vendor.

33. Raise contract and place order.

34. Begin system development, program conversion and training.

35. Take delivery of equipment.

36. Performance acceptance tests.

37. Begin implementation.

38. Begin operational use.

39. Perform post-implementation review.

*40. Compare performance with objectives.

NOTES:

a. The * above indicates a step after which, in the Australian Government context, the permanent head of the department should discuss his recommendations with his Minister, obtain Ministerial agreement to his plans, and if appropriate obtain the Minister's formal approval.

We consider that it would be appropriate to obtain formal Ministerial approval to proceed after steps 7, 14, 16 and 32. We suggest that it may be appropriate for Cabinet to give approval after steps 14 and 32.

b. Steps 1 to 7 should be part of the normal management process of planning and departmental performance review. These steps should be carried out periodically and independent of specific ADP plans. Naturally since these steps deal with fundamental questions of the role and performance of the department, good management practice dictates that the Minister should be involved frequently and in detail.

c. It is particularly important that at stages 6, 11 and 14, the Minister should be informed fully of potential social or organizational implications or other aspects that could be of a politically sensitive nature.

3.3. OBJECTIVES OF THE PROCUREMENT PROCESS

Guidance on the objectives of the procurement process may be found in Section 31 of the Department of Finance Directions[47]. These state that:

> *Due regard is to be paid at all times to economy in purchasing. Public tenders are to be invited whenever it is reasonable to expect that this will result in more economic purchasing.*
>
> *All who wish to participate in Government business are to be given the opportunity to do so.*
>
> *When procurement has been exempted from the quotation/tender procedure, selection of suppliers must stand up to public scrutiny; it should be evident that all potential suppliers have been given an opportunity to obtain Government business and that in the selection of the supplier and the terms of the contract, the basic criterion has been the best interests of the Commonwealth.*

The Department of Administrative Services[46] advised the Committee that the basic policy of purchasing on Commonwealth account is that -

> *The procurement process shall aim at obtaining the best value for the money spent - accordingly the lowest suitable tender should be accepted.*
>
> *Procurement shall be carried out by free and open competition to the greatest extent practicable.*

The Committee considers that the procurement process must be designed to meet the above objectives and in addition should satisfy the following requirements:

1. *The process should be rational, defensible, fair and plainly seen to be fair to all participants.*

2. *Procurement should be carried out with due regard to national purchasing policies which may be in force from time to time such as those aimed at supporting Australian industry.*

3. *Procurement should be carried out in as short a time as practicable.*

4. *The procurement process should be designed to obtain maximum benefit from the knowledge and experience that exists within the supplier organizations.*

5. *The procurement process should include a central review function so that where a procurement has ramifications outside the departments concerned steps can be taken to ensure that the overall best interests of the Commonwealth are being served.*

6. *The process should ensure that all Commonwealth experience relevant to the project is available to the user department throughout the procurement cycle.*

7. *The process should provide for user management, Ministerial and Cabinet check-points at appropriate places.*

8. *The process should ensure a full exposure of the implications of any proposal - to the Permanent Head, the Minister directly responsible and, if appropriate Cabinet or a Cabinet Committee. Particular proposals should set out the range of options available. It needs to be recognised that in some circumstances, ministers and permanent heads may for good reasons wish to adopt solutions which are less cost effective than the solution considered optimal by officers. In the extreme, Ministers may wish to do less/more computing for less/more money than is indicated by a departmentally preferred proposal.*

9. *The process should automatically bring to the early notice of proposals proposals which involve possible difficulties such as conflict of interest.*

10. *It should include submission of a comprehensive plan for implementation against which further performance can be checked.*

11. *The process should give special treatment (minimum exposure) to defence classified proposals.*

12. *It should provide for simplified treatment for small and non-controversial proposals.*

13. *It must contain flexibility to meet changing needs and newly developing technology.*

14. *The process should ensure exposure of significant policy issues to Ministers.*

15. *In the absence of amended legislation, the process should be consistent with the statutory requirements placed on the Public Service Board and permanent head.*

3.4. HOW WELL DO PRESENT PRACTICES SATISFY THE OBJECTIVES?

A number of desirable steps of the computer acquisition process have been outlined in section 3.2.

This section deals with steps 14 to 37, from the beginning of the full feasibility study to the beginning of implementation.

Principal Problems

The major unsatisfactory aspect of present procurement practice is the length of time it usually takes. Moreover in spite of its sometimes inordinate duration, it is not well-geared to make full use of the experience and knowledge available in the industry. In other respects it fails to ensure that an optimum solution is achieved to the user's real problem.

Even without the cost delays, the process is unduly costly to Government and suppliers alike because of inefficiencies in the use of resources in tendering and in evaluating tenders.

3.4.1.

Delays in Procurement

Many witnesses directed the Committee's attention to the long time interval which usually elapses in Government procurement between the identification of the need for a computer and actually setting it to work.[60] The Department of Administrative Services has estimated[64] that under proposed new administrative arrangements for the acquisition of computers, the time required for them to acquire a computer from the beginning of the feasibility study to the beginning of implementation would be over forty-eight months.

Delays in procurement are costly to the Commonwealth through the deferment of anticipated benefits, and to departments and suppliers through inefficiencies in the use of resources during procurement. Moreover suppliers must frequently earmark resources in anticipation of receiving the contract. It is costly to have these resources inaccessible to other projects they may wish to work on.

MANDATA may be cited to illustrate the possible magnitude of the cost of deferred benefits. In 1977 independent consultants estimated the present value of total costs of MANDATA to 1988/89 to be $67.0 million. The present value of all benefits over the same period was estimated to be $122.2 million giving a net-present-value for the project of $55.2 million. Using a discount rate of 10 per cent per annum, the reduction in net-present-value of the project due to a month's deferment in starting it is $440 000.

We have estimated (see Appendix 4) that under reasonable assumptions as to the total cost of new computer projects initiated each year, the average benefit/cost ratio of such projects, and the average life of such projects, *each month by which the average (net-present-value weighted average) procurement cycle is reduced will result in annual increased net benefits to the Commonwealth of $490 000.*

Procurement Times in the Private Sector

One supplier has provided the Committee with a comparison in typical times for Government procurement and in the private sector. These are reprodeced in tables 1 and 2. The figures for the private sector are based on fourteen actual procurements. The various steps in the procurement process are different in the degree of overlap between the steps. For example, private organizations frequently overlap system implementation with delivery time so that the beginning of pay-back is as soon as possible after delivery - often in the same month. In contrast to this, equipment is frequently delivered to the Government before the department concerned is ready to use it. MANDATA provides an example.[12,13]

The tables below are based on the un-overlapped portions of the various phases as this gives the best indication of the total time from identification of potention benefit to start of pay-back of that benefit. It will be seen that the typical time for Commonwealth procurement is greater than three times that for the typical time for the private sector. If the average (net-present-value weighted aver-

TABLE 1. COMPARATIVE PROCUREMENT TIMES

(Minimum, typical, and maximum times in months)

GOVERNMENT		PRIVATE SECTOR	
Identification of Opportunity Evaluate Opportunity	2-4-6	Identify opportunity	0-2-
Approval to Proceed	2-12-24	Quantify (and sell) the need	0-1-
Prepare Specification	2- 6-12	Validation by Organisation	0-5-1
Approval to Specification	2-12-24	Prepare (and issue) Specification	0-0-1
Issue of Specification	1- 2- 3	Submission by vendors or choice of vendor	0-0-
Response by Suppliers	2- 4- 6	Final decision process	0-2-1
Evaluation of Bids	3- 6-12	Delivery period	1-9-1
Award Recommendation	0- 1- 2	System implementation or time to start of pay-back	0-0-1
Approval to Recommendation	2- 6-12		
Award of Contract	0- 1- 2		
Delivery Time (6-12-18) System Development	6-12-24		
System Implementation	1- 6-12		

TABLE 2. SPECIFIC PRIVATE SECTOR PROCUREMENTS

(Times in months)

Organisation / Location, Industry	Identify opportunity	Quantify (and sell) the need	Validation by organisation	Prepare (and issue) Specification	Submission by vendors or choice of vendor	Final decision process	Delivery period	System implementation or time to start of pay-back	TOTAL CYCLE	COMMENTS
Melb. Manufacturing	⊢ 3 ⊣		12			⊢ 8 ⊣	6	0	29	New application, phased to late 1
Melb. Manufacturing	2		3			3	16	1	25	New application
Melb. Manufacturing		1	2			4	11	0	18	Upgrade
Syd. Manufacturing	2	1				0	17	6	26	New application.
Syd. Manufacturing	⊢ 12 ⊣			2	3	12	4	8	41	- new application. - change supplier.
Melb. Transport		1				2	4	0	7	Upgrade
Melb. Transport		1				3	8	0	12	Conversion of application.
Syd. Transport	4	4				0	5	0	13	Upgrade
Melb. Petroleum		1	7			1	10	0	19	Upgrade
Syd. Petroleum	⊢ 3 ⊣					1	12	0	17	Upgrade
Syd. Insurance	3	3	1			2	4	0	13	Upgrade
Syd. Insurance	2					1	15	1	19	New application (estimated implemen
Syd. Finance	5	1	2	10	2	1	9	12	42	New application (estimated implemen
Syd. Finance	8	1	5			0	1	12	27	New application.

age) procurement time for the Commonwealth could be reduced by 12 months - bringing it to about twice what it is in the private sector - annual savings of about $6 million could be realized.

Another supplier stated that "the time taken for a conservative commercial organization such as a bank to achieve the same end is in our opinion one-third that of a Government department".

No doubt the Public Service will have access to more accurate figures for Government procurement than those provided by the suppliers and these should be used to identify areas in which potential savings are possible.

Delays by Review Bodies

A significant component of the time-cycle for procurement of large computer systems is the time taken in obtaining the endorsement for approval of departmental proposals by the IDC on ADP. A procurement chart prepared by the Department of Administrative Services[60] shows 9.2 months allocated to obtaining IDC approval or IDC support. This number does not include the time taken to prepare submissions to the IDC.

If 9.2 months is in fact the average time (weighted average according to project net-present-value) which is added to the procurement cycle by IDC review, then that review could be costing some $4.5 million per annum in deferred benefits (see Appendix 4). The Committee considers it unlikely that the IDC review produces annual benefits of equal magnitude.

It has been pointed out to the Committee that review bodies such as the IDC on ADP are not at present accountable for lost benefits due to delays in the review process.

Recommendations

1. *The Public Service Board, in conjunction with the Department of Administrative Services, should:*

   a) *carry out an anlysis of actual times required for all phases of Commonwealth and private sector computer procurement;*

   b) *by comparison, identify areas in which potential savings are possible.*

   c) *set time standards for each phase against which delays can be costed and brought to account (Recommendation No. 17)*

2. *Review and co-ordinating bodies such as the IDC on ADP and the Public Service Board should be publicly accountable for the costs saved and benefits lost due to their functions. The Auditor-General should review and report on the activities of these bodies, relevant to computer acquisition, including the review of costs and benefits. (Recommendation No. 18).*

3. *New administrative arrangements for computer procurement should be based on a cost/benefit analysis which takes into account the effect of delay on both incurred costs and lost benefits. (Recommendation No. 19).*

Method of Specification of Requirements

ADP procurement specifications may range from general descriptions of the job to be done through to specific product descriptions. Most fall between these extremes. Typically a specification describes the general objectives which the system is intended to accomplish, some of the data processing requirements which underlie that accomplishment, some equipment performance specifications and some desired equipment design features.

An officer of the Public Service Board said in evidence[66]

> There are two broad approaches to the tender specification. One can take what is normally called a functional approach in which one describes essentially the functions which the proposed ADP system is to perform, and leave it to the tenderer to provide particular solutions to it, or one can take the specification rather further in terms of the sorts of hardware and software systems that would be required in order to set up the system. We tend here in the Government administration more towards the hardware approach to specifications than to the functional one...

The Board subsequently provided the following comments on this matter:[65]

> The normal practice of departments is to issue a mixed functional/hardware specification in order to save time and resources required by manufacturers in answering the specification, and to save time and resources in evaluation of tenders by the departments...
>
> Prior to preparation of specifications departmental requirements are invariably discussed with major suppliers and views on possible solutions to their requirements are sought.

During the time between issue of the specification and closing of tenders, tenderers have ample opportunity to question the department at length on its requirements, and to put forward counter-proposals where the manufacturer feels he can offer acceptable solutions to systems problems...

For larger departmental systems, the issue of a purely functional specification, influenced as it would be by legislative and security requirements, would be a substantial task. While it is agreed that tenderers have an advantage in the knowledge of particular equipment and software, the resources required by the tenderer to respond to such specifications (without some hardware/software guides) would also be substantial, and may in fact restrict responses to those tenderers who could mount a substantial effort within the time frame between issue and closure of tenders.

If a purely functional specification were to issue, with no thought given to the desirable hardware/software interfaces, then the evaluation process would become more difficult as negotiation with tenderers on the best fit of function to hardware/software is explored. The possibility of tenderers underquoting resources in order to get initial business can not be overlooked.

Considerable expertise in current computing technology is available within the departments presently using computers. This expertise is availed of in re-designing old systems and designing new systems for implementation. When specifications for new or replacement equipment are being considered, the expertise available within the Service is used to assist the tendering department in the preparation of specifications of a combined functional with desirable hardware/software features.

The same personnel involved in the preparation of the specification consult with manufacturers regarding their ability to perform the functions and assist in the evaluation of subsequent tenders. It is submitted that this process reduces the time and effort spent by both parties on the tenders.

...Liability for non-performance should be addressed. Machine-houses restrict liability to hardware and software malfunction, and under these circumstances the acceptance of a tender based solely on the manufacturer's assurance that his equipment would perform the function may not be in the best interests of the department. Manufacturers will not accept terms which give the departments redress for equipment not performing up to expectation unless performance rates are explicitly stated.

Suppliers' Views

The Committee invited the comments of suppliers on the question of functional versus hardware specifications and their responses are summarised in Appendix 2. Clearly a number of suppliers do not agree that they have ample opportunity to put forward alternative proposals.

Communication with Suppliers

The Committee considers that in some circumstances the functional specification is appropriate and in others the hardware specification or a combination of the two types may be preferable. Whichever type is used, it is important for the guidance of the user, and in the interests of free competition, that each tenderer has had an adequate opportunity to present his case.

The reason why so many of the tenderers prefer a functional specification is no doubt that each feels it gives him more opportunity to influence the user in the direction of that solution which will best accommodate the tenderers' products. Such influence, so long as it is restricted to rational persuasion, is a legitimate function of every marketing company and should be encouraged, not defeated, since it plays an important role in making the user aware of the full range of choices available. Although ADP expertise has increased markedly within the Public Service over the last few years, departments will always have a great deal to gain by thorough consultation and discussion with suppliers.

Regardless of which kind of specification is issued the Committee considers that a change of attitude towards franker more open discussion with all interested vendors is in the best interests of the Commonwealth. Users should take full advantage of suppliers' skills in the application analysis phase and, for complex projects, should give all interested suppliers the opportunity to present generalised solutions prior to final tendering.

We agree with the Public Service Board that it is not feasible to use wholly functional specifications as a basis for formal tendering. It is often feasible however to present suppliers with a statement of the objectives which the system is to accomplish and invite them to present their approaches to solving that problem. If this were done and coupled with a shortened formal tendering stage - limited to those suppliers who had convincingly demonstrated that they had a feasible solution - the Commonwealth could obtain the benefit of vendor solutions without the heavy cost to all concerned of the present full-scale tendering process.

Two-stage Procurement: Proposal/Tender

A two-stage procurement process is in use in the U.K. Civil Service for computer system procurement.[55] A similar approach for complex system procurement in Australia has been suggested by C.H.P. Brookes.[44] The Committee sees considerable merit in the proposal and has included the appropriate steps in the generalized acquisition process outlined in section 3.2. The 'proposal' phase consists of steps 22 to 27; the 'tender' phase consists of steps 29 to 33.

The benefits of this approach to the Commonwealth are:

- A range of conceptual solutions is presented for consideration early in the acquisition cycle before the department's approach has become rigid or committed - hence there is more flexibility to adopt new ideas.
- Conceptual solutions presented are not massive and highly detailed and hence can be studied in much less time than those presented through full-scale tenders.
- The two-stage process provides more flexibility to tenderers to present a finely tuned solution in the final stage.

Benefits to tenderers(which ultimately reflect in the systems prices) are:

- Tenderers may use the 'proposal' phase to qualify their chances of success in the overall acquisition.
- Overall costs of tendering to the Commonwealth are reduced because only simple benchmarks are required in the first phase.
- The average time for tendering to government is reduced.

Broadly, it is envisaged that a largely functional specification would be issued to all suppliers who wish to participate, along with a statement of the value which the department placed on the satisfaction of various requirements. Suppliers would discuss these requirements in detail with the department and submit proposals (not tenders) identifying the approach which they would take to the problem, with costs.

Using the evaluation criteria which had been previously communicated to suppliers (see section 3.4.3.), the purchaser would analyse the proposals submitted and would select a short list of suppliers to be invited to tender. Suppliers whose solutions were considered unsuitable would be advised and the reasons would be given. It is suggested that the U.K. practice be followed of requiring each of the prospective tenderers on the short list to sign a 'memorandum of agreement' as a necessary condition to being invited to tender.

In this memorandum each supplier would certify his ability to provide those parts of his first proposal which were fundamental or essential to his particular solution to the problem and also his ability to meet any mandatory requirements previously identified in the first specification.

Relatively simple benchmark tests and demonstrations may be required at this stage to verify performance claims.

It is envisaged that the second phase would be entered by those suppliers who had submitted conceptual solutions which were satisfactory to the purchaser, had certified that they could meet the mandatory requirements, had certified that they could provide those features which the purchaser considered essential to their respective proposals, and who wished to proceed through the final tendering phase. In developing detailed procedures for this approach use could be made of the experience of the U.K. Civil Service Department[93].

The Committee considers that this two-stage approach is appropriate when the application is large and complex, is in the forefront of technology or has not been tackled before in Government Departments or instrumentalities. It is not considered appropriate for the acquisition of minicomputer systems, the extension or replacement of existing equipment or where new applications are envisaged which are straightforward data processing tasks.

Architecture-specific Specifications

Conversion of application programs from a computer of one make to that of another manufacturer is usually a very expensive operation. Even conversion of programs from one computer in a manufacturer's range to a different model in the same manufacturer's range can be very expensive. The cost of this conversion has in the past tended to discourage changing manufacturers when upgrading equipment and has therefore worked against fully competitive procurement. The situation has improved for the Government with the availability now of several sources of IBM-compatible processors.

However, for other system architectures from other manufacturers there are, as yet no readily available plug-compatible equivalents. When grading such systems by changing the processor, the cost of conversion of programs works strongly in favour of the supplier of the existing processor since in general only he can supply a processor which is more or less compatible with the existing one.

Only one customer is large enough to force a change in this situation - the U.S. Government. The U.S. House of Representatives Appropriation Committee has been advised by a Staff Committee that

> (Program) conversion is a protectionist strategy that complicates free and open competition to the advantage of the vendor. If the vendors chose, they could successfully compete against one another's product lines with plug-compatible equipment.[54]

The U.S. Navy has concluded that a specific architecture could be specified in a request for a proposal without restricting competition. This is based on the ability of suppliers now to produce computers which at relatively low cost can emulate another computer.

The Committee has noted this development with interest and considers that in due course it is likely to have considerable ramifications in the Australian Government's procurement practice.

Recommendations

1. *Data systems specifications should be used in preference to equipment performance specifications in the procurement of an initial computer system or the expansion of an existing system by additional components. (Recommendation No.)*

2. *When equipment performance specifications are used for the procurement of initial system or the expansion of an existing system by additional components such specifications should be designed to promote competition to the fullest extent practicable. (Recommendation No.)*

3. *For complex projects a two-stage proposal/tender process should be considered in which*

   (i) The first stage invites proposals (not tenders) for the solution of the problem defined in the preferably largely functional specification.

   (ii) The second stage calls for tenders from a limited number of the respondents to the first phase, based on a more detailed technical specification which may combine data system requirements and equipment performance requirements. (Recommendation No.)

3.4.3.

Evaluation of Tenders

In Australia Government computer procurement it is not normal to reveal the evaluation factors to tenderers either before or after tendering.

Evidence taken by the Committee indicates that in many instances of computer procurement the objectives of the computer system are not thoroughly worked out by Departmental management before purchase. If overall objectives are poorly defined, it is unlikely that clear and firm evaluation criteria can be identified. It is not surprising therefore that detailed evaluation factors are sometimes not worked out by the department which will do the evaluation, until after tenders are received. In some cases the ideas that are put forward in proposals cause a re-evaluation by the acquiring department of its needs.

In our view, use of the formal tendering process to call for ideas is not only unnecessarily costly to suppliers who are responding to requirements which have not been clearly thought through; it is also an extremely inefficient way to achieve the infusion of ideas and solutions to the functional problems.

In contrast to the Australian practice of not revealing the evaluation factors to tenderers, the Comptroller General of the United States has held that "it is improper to use evaluation factors which are not revealed to all offerors."[25]

Typically specifications for computing systems state 'mandatory' and 'desirable' requirements.

In our view mandatory requirements should be few in number and strictly enforced. This will have the result that any supplier who cannot meet the mandatory requirements will probably not submit a tender. Most requirements will then fall into the 'desirable' category and the evaluation problem becomes that of weighing the mix of desirable features or functions offered by one vendor against the different mix offered by another.

This means that a rational evaluation of computer system tenders cannot be based on price alone but must take into account all the consequential costs of each tender as well. The evaluation method used should do this in a rational, methodical and defensible way.

The view of the U.S. Comptroller General stated above is consistent with an evaluation method which assigns a cost penalty to each tenderer which does not provide any given desirable feature. Only if tenderers know what the penalty will be for not providing a feature can they make sensible decisions on what cost to undertake to provide it. It is clear that suppliers will be in a better position to maximise the effectiveness of their proposals if they know in advance exactly what the rules of evaluation will be.

A number of formal and structured approaches to computer systems selection have been published. The 'requirements costing' approach suggested by E.O. Joslin[43,53] is useful and has been recommended by the Californian Intergovernmental Board on Electronic Data Processing for use in computer procurement by Californian Government agencies.[27]

Problems of Suppliers Influencing Evaluation Criteria

The U.K. Civil Service Department[55] has raised the possibility that if the evaluation model is fully revealed to tenderers they will seek to have it changed to suit their own products. Our view is that there are circumstances in which it is quite proper to allow tenderers to influence part of the evaluation model. This is explained below.

The evaluation model consists essentially of a list of mandatory and desirable functions and features (functions are what are required from the system as effective output; features are specific methods of implementation). Each function or feature has assigned to it its estimated monetary value to the user.

The value assigned by the user to each functional capability is the sole concern of the department and is not open to discussion with suppliers. However each supplier may have a different method of achieving a desired functional capability. If the user assigns monetary values to features rather than to functions he may find it difficult to defend his value assignment in discussion with a supplier who can perform the same function using different features.

We suggest therefore that, in general, monetary value should be assigned to functions before beginning discussion with suppliers. The values should be communicated at the outset to suppliers but the rationale behind such values should not be discussed with them.

On the other hand, firm values should be assigned to features only after extensive discussion has taken place with all interested suppliers. It is quite proper during this stage for suppliers to try to influence the value which the user will place on particular features.

At the time of issuing a specification for proposal or tender, the value of each feature and function becomes firm and is revealed to tenderers and from that time onwards is not varied.

If the two-stage approach recommended in section 3.4.2 is employed, the values of functions and features should be reassessed before issuing the final set of evaluation criteria with the invitation to submit a final tender. It is possible that this final specification will contain new functions, the desirability of which has become evident during the analysis of proposals from the first stage.

Recommendations

1. *The Public Service Board should, as soon as practicable, develop and publish an ADP information manual for departments' use in evaluating tenders and proposals for computer systems or parts of systems. The manual should include methods for*

   a) *assigning a monetary value (value to the department) to all 'desired' capabilities or characteristics specified in the request for proposal or invitation to tender;*

   b) *assigning a 'cost' to the absence of each desired capability or characteristic from each suppliers' proposal, to be used as a penalty to the supplier in costing this proposal;*

   c) *calculating the total cost - direct and consequential - of each supplier's proposal over the entire system life. (Recommendation No.)*

2. *Departments should be required to determine the detailed evaluation method and criteria, including the desired capabilities and characteristics and their values, before inviting proposals or calling tenders. (Recommendation No.)*

3. *The specification of requirements accompanying a request for a proposal or an invitation to tender should include the following information:*

   a) *The value of the user of each desired capability or characteristic;*

   b) *For each desired capability or characteristic, the method which will be used to calculate the cost penalty which the supplier will incur in the evaluation if he does not include that capability;*

   c) *The expected system life to be used for the purpose of costing. (Recommendation No.)*

CHAPTER 4

NEW PROCEDURES

In this chapter we review the 'interim guidelines' for computer acquisition currently under development by the Public Service, and we suggest some alternative guidelines.

4.1 THE 'INTERIM GUIDELINES'

In recent months considerable effort has been devoted to producing guidelines for procurement by the Department of the Prime Minister and Cabinet, the Public Service Board and the Department of Administrative Services. The Committee has reviewed the 'interim guidelines' produced by these departments and has concluded that, if implemented, they will not result in efficient and effective computer system procurement. The guidelines are largely oriented towards review, approval and checking. They do not deal with the inefficiencies that exist in the present process; indeed if implemented they will exacerbate many of the present inefficiencies.

The interim guidelines do provide adequate opportunity for ministerial scrutiny during the procurement cycle, for a large amount of IDC surveillance and for an independent assessor. They therefore seem to have the potential for satisfying objectives 7, 8 and 9 of section 3.3 of this report. Whether they will in practice achieve any higher degree of effectiveness of installed computers or will guarantee fair and open competition or will prevent impropriety or will ensure that political and social outcomes are anticipated will depend very much on the detail of implementation.

The proposed procedures are certainly long and complex. We have pointed out that the main thing wrong with the present procurement phase of the total acquisition cycle is its length. The interim guidelines would add further delays to an already excessively long and costly process.

The interim guidelines do not contribute to the achievement of, or recognise the need for, moving the task of computer system procurement more firmly into the hands of departmental management. The great emphasis that they place on review and checking by the IDC suggests that they may even have the opposite effect - that of further reducing the generally already inadequate level of involvement and control exercised by permanent heads in computer system acquisition.

Changes in the IDC on ADP proposed by the Department of the Prime Minister and Cabinet

The recognition that IDC review of computer proposals has largely been a technical review led to the recent proposal - which is

embodied in the interim guidelines - that the IDC would in future consist of two components. One would be the present nominally technical committee. The other would have the function of providing policy advice to Cabinet, endorsement of departmental plans for data processing, and the provision of advice on broad resource allocations, on rationalization and co-ordination.

The Committee considers that the change in the structure of the IDC on ADP should as an interim measure, be beneficial.

The Committee agrees that informed technical and policy advice on computing matters, beyond that supplied by individual permanent heads, will be required by Ministers. Under the interim guidelines such advice would come from the IDC on ADP, the Public Service Board, or an independent adviser.

The IDC may continue to be a useful source of *ad hoc* advice but we consider that delays introduced by IDC review under present interim guidelines will result in costs far beyond the value of the review function which the IDC will perform. A far more rapid review of departmental proposals is necessary.

4.2 SUGGESTED GUIDELINES

In this section we suggest new interim guidelines designed to ensure that there is adequate opportunity for ministerial scrutiny without the delays inherent in the guidelines described above.

The Committee recognises that the Department of Administrative Services has a role in the procurement of computer systems and related services. This role derives from the Administrative Arrangements Order and the Government's decision that the Purchasing Division of the Department should assume responsibility for the procurement of computers. It may be necessary for the Department of Administrative Services to acquire or develop additional skills to enable it to perform the computer purchase operation effectively. It is also recognised that in order to implement the following procedures it will be necessary to raise the level of computing technology skills within the Public Service Board.

(1) Responsibility for the review of departments' computer proposals could be vested with the Public Service Board. Technical evaluation would be carried out by the Board's Management Systems and Efficiency Division. The review of broader issues such as the relation of the proposal to Government policy would be carried out by the Commissioners.

(2) The Board would be charged with responsibility for the speedy processing of proposals.

(3) The Board would draw on assistance as required from the IDC on ADP, individual experts within the public sector, or

independent consultants. Such assistance could be required in reviewing policy issues or technical ones. In the latter case use could be made of the CSIRO Division of Computing Research which has been charged with the provision of a specialist consultative service.

(4) Some proposals, at the discretion of the Board, could be submitted formally by the Board to the IDC on ADP for consideration but this would not relieve the Board of its accountability for delays. The IDC would report back to the Board promptly its views on each proposal submitted to it.

(5) The time for review would be reduced if the Board were kept fully informed of departmental proposals from the beginning. Board liaison officers could be assigned to assist departments in the preparation of proposals.

(6) A proposal which was fully consistent with long range ADP plans previously submitted by permanent heads in its annual returns to the Board could be expected to require less review time than if it had not been foreshadowed.

(7) All proposals should be accompanied by a procurement and implementation plan. This should be a mandatory requirement. The plan would include the proposed procurement method and the detailed tender evaluation model.

(8) Selected departments such as Finance, Prime Minister and Cabinet, and the Department of Administrative Services should be provided with brief details of proposals lodged with the Board to permit them to comment if the proposals contain aspects of special interest or signficance.

(9) The Board's officers should be responsible for drawing Cabinet's attention to proposals which involve possible difficulties, such as conflict of interest.

(10) It is emphaised that none of the above in any way should be permitted to reduce the obligation of each permanent head fully to inform his Minister of all important departmental aspects of each computer system proposal.

(11) The role of the IDC and the Board is not to approve or disapprove proposals. It is to bring to the notice of Cabinet issues which should be Cabinet's concern but which otherwise might escape notice.

(12) There is, in addition, the question of the co-ordinating role of the IDC and the Board. Recommendations will be made on this in a later report.

(13) Although the past work of the IDC on ADP has been largely aimed at assessing the technical soundness of proposals, not all its members have been expert in computer technology (nor, we are sure, would they claim to have been). In the implementation of a two-level IDC, of which one level is technical, the level of computer technology expertise should be higher than on the old IDC. This would require some changes in the membership.

CHAPTER 5

RELATED ISSUES

This chapter deals with a number of issues which, although important, are not central to the acquisition of complete computer systems.

5.1 STANDARDS

The Committee recognises that there are advantages to the Government in obtaining a degree of uniformity in the technical features of its computing equipment and software and in the techniques by which the equipment and software are used. However the Committee considers that great care must be exercised in adopting standards which promote uniformity to ensure that such standards do not sigificantly limit competition among suppliers or impede technical progress.

Equipment and Software Standards

The standardisation of equipment and programming language features, data formats and communication protocols offers advantages of economy through greater ease of sharing equipment, software, human resources and data between departments.

However there are disadvantages in the adoption of standards which are not in world-wide use. In a field where the technology is changing rapidly the premature adoption of standards may make it more difficult to capitalise on technological developments.

International Standards Organization(ISO) standards are reached by a a process of consensus among the various national standards organisations. Competing manufacturers are strongly represented on these organizations. The result is that the standard finally adopted is of such restricted scope and technological level that no-one takes serious objection to it. It therefore lags well behind the current state of the art and is likely to be incomplete because it will have had everything removed from it which conflicts with the interests of one or more manufacturers.

There is therefore a temptation to adopt interim standards. For example the Public Service Board[28] advised the Royal Commission on Australian Government Administration that:

> certain standards, particularly those designed to assist in transmission of data by computer/communications methods through and across communication networks, are required urgently but will not emerge from official sources for many years. The Board's Office in association with the IDC on ADP is developing interim standards in this area for APS use. An acceptance

of this approach through the APS would have considerable merit in improving efficiency and economy. The approach will, of course, have to be sufficiently flexible that advantage can be taken of technological advances as they occur without adding appreciably to overall costs.

The Committee considers that the adoption of such interim standards as APSS/1 "Communication Link Procedure Between Computers (Half Duple)" throughout the Australian Public Service has little to recommend it since the current trend of data communication development is towards packet-mode switching using international or at least widely accepted communication link procedures, such as X25, which are different to the so-called Australian Government Service standards.

Data Communication Standards

This area is certainly recognised internationally as requiring standardisation. Nevertheless, as mentioned above, it is an area of rapid technical development and hence one in which there is a danger that standards might be rapidly out-moded. The developing pattern is one of national and global networks linking computers, data bases and users.

At present Government departments and authorities operate several nationwide communication networks, mostly incompatible with one another yet serving similar needs. Much of the communication traffic could be more economically served by a single network if the network were standardised. Clearly, because of the anticipated requirement for the transmission of data across national boundaries and to allow the Government to use standard products rather than specially developed products, it is important that the standards be established at an international level.

Telecom at present plans to introduce a digital data network which it expects to be operational in 1981. This is a pilot network which will form the basis for a future public switched data network and could provide packet switching, circuit switching or a combination of both with higher reliability than the present use of the telephone network for data transmission.

An international standard data communication protocol (X25) has just been recommended by CCITT. Several manufacturers provide standard software for data transmission conforming to X25 protocol and it is expected that most manufacturers will do so in the near future. We therefore appear to be close to an acceptable standard for a packet-mode network interface which could be used by the Australian Government for shared use of a packet-switched network by all departments and instrumentalities. One shared network could be expected to offer greater economy and better service than the existing separate departmental networks based on the switched telephone network and leased lines. Moreover the

support by the network of an interface standard such as X25 would allow suppliers to offer standard software for control of data communication instead of software specially developed for the Australian Government. This should result in considerable cost savings.

The Committee notes that the Public Service Board has established an interdepartmental working party known as the Data Transfer Advisory Group to advise on and where necessary develop standards and convention relating to the formating and representation of data traversing the networks. The Committee suggests that this working party, or another, should examine the advisability of establishing an Australian Government data communication network conforming to international standards.

Standards of Practice

To assist user department management, the Public Service Board should place great emphasis on documenting and promulgating sound management practice for the development and control of data processing systems. Officers of the Board have stated that departmental managers are not exercising their responsibilities in relation to ADP planning and development. It would be easier for them to do so if they were better informed on sound practice in ADP development.

The Committee sees the benefits arising from the promulgation of such standards and guidelines to be:

- The more rapid development of sound ADP management practices among users;
- The achievement of uniformity in such practices to facilitate the transfer of personnel and programs between departments;
- A reduction in the need for review and modifications of departmental plans by co-ordinating bodies such as the Interdepartmental Committee on ADP.

Almost all areas of computer system planning, design, implementation, operation and use can benefit from the promulgation of guidelines and standards. However, there are a number of areas requiring urgent attention and the Board should give high priority to developing detailed guidelines and standards for management control and audit of ADP systems and for project management. Other areas in which detailed guidelines are required are:

1. Tender evaluation methods: A more uniform approach to tender evaluation which is widely understood by suppliers as well as departments would have a number of benefits. (See section 3.4.3)
2. Programming standards: These are absolutely essential, particularly in major developmentprojects such as MANDATA.

They not only contribute to good design of individual program modules but they facilitate the building of product sets that can work together harmoniously. They also improve communication between the people who deal with the software, particularly when the latter comes into use.

3. Submission of computer plans for management approval: The work of those responsible for reviewing and authorising computer system proposals would be simplified if a sound uniform approach were in use for preparing proposals for approval or endorsement.

4. System development specifications: Standards for functional, systems, and program specifications facilitate the communication of departmental managements' requirements to designers and thence to programmers. This helps to obtain the involvement of management at key points throughout the system development and enables management to review progress against functional needs.

Recommendations

1. *The Public Service Board should increase its activity in the development of standards and guidelines for sound ADP practice and procedures. (Recommendation No. 26)*

2. *Standards developed for the technical features of computing equipment and software should not be such as to abridge competition among equipment suppliers or prevent the Government from benefiting from future technical progress. (Recommendation No. 27)*

3. *Technical standards should be arrived at through a process of wide consensus and should not be developed in isolation from industry or users. (Recommendation No. 28)*

4. *Consequently, where it is desired to promote a technical standard, the standard should be explicit and open for discussion. The Government should not attempt to achieve uniformity through the specification of mandatory technical features except where such features have been explicitly identified as proposed or approved Government standards and after wide discussion throughout the Government and a high degree of consensus. (Recommendation No. 29)*

5. *A task group (we suggest the Data Transfer Advisory Group) should study the advisability and appropriate timing for the establishing of a packet-switched data network for Australian Government use conforming to international standards. We suggest that this group be required to submit its recommendations to Cabinet by the 30th June 1979. (Recommendation No. 30)*

6. *The development of data processing standards should be made more formal. We suggest the constitution of a Government computer standards committee consisting of, for example, representatives from among major user*

departments, the Public Service Board, Telecom, the CSIRO Division of Computing Research, and major computer industry associations. The objective of such committee would be to achieve maximum economy through interdepartmental standardization, subject to not restricting competition among suppliers or limiting the Commonwealth's ability to capitalise on technical innovation. We suggest that the committee would make recommendations to the Public Service Board on the adoption of appropriate ADP standards (Recommendation No.)

5.2 PRIVACY OF DATA

The Public Service Board[30] has stated that:

> ...there is a growing need in Government for the rapid flow of information within and across departmental boundaries.

It was for this reason that the Board established an interdepartmental working party known as the "Data Transfer Advisory Group" to advise on and where necessary develop standards and conventions relating to the formating and representation of data traversing the networks.

The Committee intends to examine next year the extent to which economies might be achieved through the conceptual and/or physical integration of certain sets of information within the Government. The matter is a complex one whose difficulty is compounded by the need to protect the privacy of personal data, for example as provided by the Income Tax Assessment Act.

The Crisp Committee[19] took the view that the "full use (of Taxation records) by the Statistician would not only improve the compatibility of official data systems but would present opportunities for achieving substantial savings in the public and private cost of providing statistical services." The Crisp Committee then went on to say that there should be changes in the Income Tax Assessment Act to permit the Statistician access to individual taxpayers' records for purely statistical purposes. The Committee sees difficulties in this approach.

Recent developments in the United States are of interest. The U.S. Federal Government sees considerable advantage from the point of view of efficiency and economy in linking the more than 11,000 computers distributed throughout Federal Government agencies by means of a Government data communication network. However the Privacy Act of 1974 specifically precludes most inter-agency sharing of personally identifiable information without the individual's consent.

In a recent report to Congress the General Accounting Office considered the extent to which a Government computer network might be designed which would still give adequate protection to

private information. The GAO pointed out that before features to ensure security of data could be specified in requests for proposals from contractors, it was necessary for the department to decide on what levels of security were required and to specify them formally, stating what information was to be protected, how it was to be recognised, who should have access to it and how those people were to be recognised. The immediate need therefore according to the GAO was for a set of guidelines for establishing security levels, for procurement and for developing adequately protected systems. The GAO called on the Office of Management and Budget (which is responsible for overseeing the implementation of the Privacy Act) to provide such guidelines.

In Australia, clear policies and probably legislation identifying privacy rights for personal data are a desirable prelude to the orderly implementation of widespread interdepartmental sharing of information[19] The economic justification appears to exist in certain cases; the technical problems are probably surmountable; the missing ingredient is a clear policy and/or legislation on privacy for use in setting technical design objectives in particular cases.

The work of the Australian Law Reform Commission is expected to form the basis of such policy and legislation in due course. It is likely that the integration of Commonwealth Government data systems will not proceed very far until specific guidelines are produced. The Committee intends to examine interdepartmental rationalisation of data systems in the near future and will report on this matter to Parliament next year.

5.3 PLUG-COMPATIBLE EQUIPMENT

We have pointed out that opportunities increasingly exist to obtain the components of an ADP system - central processors, peripherals, software and maintenance service - from different suppliers.

When a department wishes to expand its installation by adding more peripherals or memory, or by changing the central processor, the department should according to the prescribed purchasing procedures[47] call tenders if alternative sources of supply exist unless it is inexpedient or impracticable to do so. Until a few years ago there was no choice of sources of supply since the only vendor from whom the user could buy peripherals to work on a given computer was the manufacturer of the computer. Now, however, several suppliers market peripherals, processors and memory in Australia which are compatible with those from a major mainframe supplier.

Experience in the U.S.A.

In 1969 the General Accounting Office of the U.S. Federal Government stated[26] that the Government could "achieve large savings through the use of more economical sources of supply

for peripheral equipment and components."

The Report identified:

- Selected peripherals which were directly interchangeable (plug-to-plug compatible) with certain system manufacturers' perpherals, which, if replaced by lower cost peripherals, could save Federal agencies about $28 million annually.

- Other non-plug-to-plug components which could replace similar system components which would save Federal agencies about $100 million. However before such savings could be realised standards must be developed to solve interface problems.

Since that time very slow progress has been made by the computer industry on the development of interface standards to solve the problems identified in the GAO Report.

In March 1973 the National Bureau of Standards prepared a report entitled "Means of Achieving Interchangeability on Computer Peripherals". The findings and recommendations of that report call for the development of interface standards along with other suggestions for improvement in the peripheral area. Emphasis on solving the standard interface problem was increased early in January of 1975 when the National Bureau of Standards received additional funds to help develop interface standards.

U.S. Computer Interface Standards

Progress in the development of interface standards for non-plug-to-plug components has been slow, while many millions of dollars have been saved in the plug-to-plug compatible area. In June 1978, over seven years after the GAO recommendation, the National Bureau of Standards announced proposed[61] computer interface standards. The proposed standards will apply to the input/output channel level interfaces of all medium and large scale computer systems procured by the U.S. Federal Government. Federal agencies will be required to use these standards to assure the fully competitive procurement of magnetic tape and disk equipment. Use of the standards is expected to save the U.S. Government more than $55 million over the next five years. It is interesting to note that the proposed interface standards are the first Federal information processing standards that cannot be waived by individual agencies. Waiver will be granted by the Secretary of Commerce at the request of individual agencies on a case by case basis only when in the Secretary's judgement, "a major adverse economic or operational impact would occur through the use of the standards".

The standards are:

Input/output channel interface;
Power control interface;
Channel level operational specifications for magnetic tapes;
Operational specifications for magnetic disk.

In order to obtain U.S. Government business, most manufacturers are expected to adhere to these standards. The Australian Government may therefore anticipate greatly increased flexibility in purchasing peripherals in the future.

Why Users are Sometimes Reluctant to Buy Plug-compatible

There are several reasons why a user might prefer to give add-on business for peripherals to his current supplier. For example:

(a) A mutually beneficial relationship of trust and confidence may exist between a user and supplier which could be damaged by putting the business elsewhere.

(b) The user fears that by mixing equipment of different makes or bringing in third party maintenance, there will be problems of site management, allocation of responsibility for faults, etc.

(c) The user may have the impression that if he mixes products and/or services from different vendors he won't get the same support from the main vendor that he has been used to in the past. An example of this attitude was quoted in the Australian Financial Review of 10th October 1978:

> Senior scientists in Canberra admit frankly they would be concerned for the future of the support being offered by IBM at Salisbury if a plug-compatible computer had been chosen for WRE.

It is proper to weigh such possibilities when considering whether to purchase from the original supplier or to obtain peripherals from other manufacturers. However, these considerations must be weighed against the possible monetary savings in going to an alternative supplier. Without judging the merits of the case to be put by the plug-compatible vendors, the Committee considers that they do have a case to put and should therefore be able to participate in the tendering process according to the principles set out in the Department of Finance directions.

A number of departments do currently have mixed-vendor installations, at least one of them being at the instigation of the Public Service Board through the IDC on ADP.

The ADP Branch of the Public Service Board and the Department of Administrative Services have informed[8] the Public Accounts Committee that they welcome the advent of suppliers of plug-compatible processors and peripherals,[71] particularly now that some plug-compatible suppliers are willing to rent or lease their equipment as well as sell it outright.

Recommendations

1. *In expanding or augmenting an existing computer installation with peripherals and/or processors where plug-compatible equipment is available in Australia, competitive tenders should be sought for the required peripherals and/or processors unless grounds for a certificate of inexpediency exist. (Recommendation No.)*

2. *In procuring a complete system of processor(s) and peripherals where the architecture selected for the processor is such that plug-compatible units are available, then competitive tenders should be sought for such equipment unless grounds exist for a certificate of inexpediency. (Recommendation No.)*

3. *In either of the procurement situations described in 1. and 2. above, the need to obtain compatibility with existing peripherals or processor(s), or to obtain a particular computer architecture should not be grounds for a certificate of inexpediency unless it has been definitely established that plug-compatible peripherals or processors are not available. (Recommendation No.)*

4. *In deciding whether to mix vendors on one site due regard should be paid to any additional costs which this will involve, for example, in system integration and maintenance, and such costs should be offset against any cost saving. (Recommendation No.)*

5.4 THIRD-PARTY MAINTENANCE

Whereas in the past ADP equipment was maintained in most cases by the supplier of the equipment, now there are organisations who make a business of providing maintenance service regardless of who supplied the equipment. This kind of service, though well established in the United States, is at present provided in Australia by a very small number of vendors.

Some advantages to the Government of having third-party maintenance suppliers in the marketplace are that:

a) They may quote lower prices for the same service level.

b) By introducing a competitive element in which the computer vendor cannot assume that he will automatically get the maintenance business, they will improve pricing and performance levels of maintenance from the computer vendors.

c) Third-party maintenance service can be provided by Australian-owned companies.

Arguments advanced against taking third-party maintenance are commonly based on the following attitudes:

a) The user fears that the maintenance organisation might not have ready and continuing access to spare parts.

b) As with plug-compatible peripherals, the user may have the impression that if he goes to third-party maintenance he won't get the same support from the main vendor as he has been used to in the past.

c) The user may feel that the third-party vendor has insufficient repair and refurbishment facilities available in Australia and that this increases the risk of failure of his computer system.

d) The user may feel that the third-party maintenance vendor will have trouble in recruiting and retaining appropriate staff.

It is certainly proper to consider these matters in making the decision on who will maintain the equipment. However in the interests of economy and to further the objective of free and open competition we consider that the Commonwealth should normally seek competitive tenders for maintenance when it wishes to enter into a significant contract or renew an existing contract for maintenance service.

Small Maintenance Contracts

As with small equipment purchase, the cost of procurement of small-value maintenance service may be unduly large in relation to the value of the contract. This would be particularly true if the situation becomes highly competitive as it may well do under a program of encouragement for third-party maintenance. Under such circumstances a simplified maintenance service procurement procedure should be developed.

Attitude of the Purchasing Authority

In evidence to the Committee[8] the Department of Administrative Services advised that it had no objection in principle to the use of third-party maintenance. The Department indicated that the Australian Government Stores and Tender Board, before it was absorbed into the Purchasing Division of the Department of Administrative Services, had been very interested in the question of computer system maintenance and its cost and had been encouraging third-party maintenance. The Department undertook to provide the Committee with statistics on the number of times that third-party maintenance tenders had actually been successful and with a paper on other matters on their files on this subject. At the date of writing (14/1//78) this has not been received.

Recommendations

1. *Specifications of mainteance requirements should be designed to ensure free and open competition and equal opportunity and careful consideration to all responsible maintenance suppliers who wish to participate in Government business. (Recommendation No.)*

2. *The purchasing authorities should design purchasing procedures for maintenance service which*

   a) *ensure that consideration is given to all responsible and qualified maintenance vendors who wish to participate in Government business;*

   b) *are not unnecessarily complex and costly having regard to the size of the contract to be let. (Recommendation No.)*

5.5 LEASE VERSUS PURCHASE

In the early years of development in data processing in the Public Service nearly all equipment was purchased outright. In recent years an increasing amount of equipment has been leased or rented by the Commonwealth.

We consider that the method of acquiring ADP equipment should be determined after careful consideration of the relative merits of all methods available such as purchase, lease, lease-with-option-to-purchase, or lease-to-ownership. The method chosen should be that which offers the greatest advantage to the Commonwealth under the circumstances which pertain to each situation.

A comparative cost analysis of the alternative method of acquisition should be performed to determine which method would provide the Commonwealth with the lowest overall cost over the total system life. Departments should consider the residual value of the equipment to the Commonwealth as a factor in the comparative cost analysis for any plan in which title to the equipment would be vested in the Commonwealth at any point in the contract period.

Used Equipment

There is now a large market in certain types of used central processors. If warranted as new, and if the availability of parts and maintenance service can be guaranteed, there is usually no reason reason why such equipment cannot perform as well as the same equipment purchased new. If these requirements are satisfied and the equipment is available at less cost than corresponding new equipment, used equipment should be given serious consideration.

5.6 BENCHMARKS

Several suppliers commented to the Committee on the high cost of benchmaking in many Government procurements. They claimed that the process was not necessarily productive of useful information because of the difficulty of obtaining truly representative benchmarks. Moreover, many vendors are skilled in achieving benchmark results which bear little relation to the general performance of the equipment and software in practice. Elsewhere in this report we suggest that for large complex systems the Government should first establish a short list through extensive discussions of the operational requirements with all interested suppliers. Only those on the short list would go through the full tendering process.

We anticipate that if this scheme is adopted, extensive benchmaking would only be required of short-listed tenderers, although simple benchmarks may be required in certain circumstances at the end of the first 'proposal' phase.

We note that the ADP Procurement and Contracting Guidelines of the State of California[27] state that benchmarks are to be used to validate vendor claims and should not be used to compare one vendor with another.

Recommendations

Because of the difficulty of selecting representative tasks and because benchmark results may not be representative of later performance in a real job environment, benchmarks should normally only be used to verify suppliers' performance claims. (Recommendation No. 38).

5.7. THE PROCUREMENT OF SMALL COMPUTERS

Some suppliers told the Committee that the Commonwealth's method of purchasing minicomputers required almost as much work by suppliers and the purchaser, as the procurement of a large system.

The procurement cost to the Commonwealth for small systems is therefore higher, in relation to the cost of the computer itself, than for larger systems.

Similar experience in the U.S. Government caused the General Accounting Office,[26] to report to Congress that

> Agency personnel told us that intolerable procurement delays were resulting in minicomputer procurement from their own internal documentation requirements as well as from G.S.A.'s documentation requirements. Most of these requirements were developed before minicomputers appeared on the scene.

One possible approach to reducing the cost of the Commonwealth's procurement of minicomputers is to negotiate annual contracts with minicomputer suppliers - which would be published - so that minicomputers may be bought from such suppliers on the basis of quotations rather than full tenders. The annual reaffirmation of each suppliers' contract would require very little time, since variations introduced at the end of each year would normally be minor ones.

The time required at present for contract discussion on each purchase is only one factor in the delays of procurement. An analysis should be made of other ways to reduce the time and cost of such procurement to a level consistent with the low cost of minicomputers.

The experience of the U.S. General Services Administration could be sought in designing improved procedures.

Recommendations

1. *The Department of Administrative Services should examine the feasibility of simplifying the procedure for minicomputer purchases of low aggregate dollar volume, including an examination of an annual renewed published contract with each supplier. (Recommendation No. 39)*

2. *In designing improved acquisition procedures and in preparing guidelines for the documentation of departmental proposals, the Public Service*

Board should ensure that the procedures for minicomputers are simple and of a cost consistent with the dollar value of the equipment. (Recommendation No.)

CHAPTER 6

CONCLUSIONS

The Committee believes that computer system acquisition in the Public Service since the first computer was installed in 1955 has been generally satisfactory. The highly competitive nature of the market place has greatly assisted the Commonwealth to achieve value for money in its purchases over the years.

Fortunately, the market shows no sign of becoming less competitive. There are many more choices open to the purchaser now than in the early days. While this slightly complicates the task of buying and managing a large computer installation it also means that no supplier can automatically assume that he is going to get either all or none of a large computer system order. This helps to sustain a healthy and competitive environment, to the long-term advantage of both users and suppliers.

Future procurement policies and practices must be deliberately aimed at encouraging and sustaining this highly advantageous situation.

Co-ordination of computer development across the Service is important because many computer systems can have effects beyond the boundaries of the Department installing the computer. The Public Service Board and the IDC on ADP have performed the necessary co-ordinating function in the past. While some beneficial effects have been achieved from co-ordination, the delays introduced into computer procurement in the interests of co-ordination have had a damaging effect in some cases. In recent years the costs of such delays have in our opinion outweighed the benefits of co-ordination.

Unfortunately, co-ordination has veered too much towards centralised control of ADP development. The Committee considers that control must be in the hands of departmental users: if they are not fully competent to exercise such control, the Public Service Board should devise ways to increase their competence levels, for example by training, by the production of manuals, and by advice.

The Committee attaches great importance to a high level of personal involvement by permanent heads in the acquisition of large computer systems. Invariably such large systems have a significant impact on the workings of the department and the permanent

head must therefore understand the implications of the computer from the outset. There is another important reason why the permanent head should be involved: computer procurement needs to be managed. Not only is procurement a costly process in itself; if it is not performed properly the effectiveness of the system when it is installed can be greatly diminished.

Ministers and in many cases Cabinet must also be fully aware of the future implications of major systems. Indeed Parliament itself should be aware of the expected impact before major commitments are made - especially where there could be significant displacement of personnel by the computer.

Computers will play a much greater part in future Public Service administration. Over the next few years computers can be expected to play a much greater part in the lives of all of us, though for the most part they will be silent and invisible servants behind everyday life.

Whether new technology in the long-run turns out to be a benefit or a curse depends entirely on what goals we set for ourselves and how well we manage the technology in the achievement of those goals.

In a narrower field of application - that of Public Service administration - the benefits of computers also depend on what goals we set and how well we manage the computer in their achievement.

The Committee's ADP inquiry is mainly about the management of the computer - of its acquisition and of its use. It was once said that war is too important to be left to the generals. The management of the computer cannot be the sole province of technologists. Managers must establish the ends before the computer specialists establish the means.

For and on behalf of the Committee.

M.J. Talberg,
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Joint Committee of Public Accounts,
Parliament House
CANBERRA

David M. Connolly
Chairman

23 November 1978

APPENDIX 1

GLOSSARY

ADP	Acronym for 'Automatic Data Processing'.
Algorithm	A fixed step-by-step procedure for accomplishing a given result. A defined process or set of rules that leads and assures development of a desired output from a given input.
Architecture	The design of a computer and the way in which hardware and software interact to provide basic facilities and levels of performance. Computer manufacturers design computers to meet the needs of particular segments of the market and any particular model is designed to meet some or all of a number of design objectives.
Automatic Data Processing	The term was originally used to differentiate the automatic processing of business and administrative data from scientific and technical computing. Although these two broad classes of computer application require different approaches to program design, and to some degree, different equipment and software capabilities, the distinction is not as important as it used to be. Developments in computers, software and processing techniques have occurred which allow either type of application to be done efficiently in many large computer systems. In this report the term ADP is used to cover all applications of general purpose digital computing systems, considering scientific and technical computing.
Benchmark	A point of reference from which measurements can be made. In general use it refers to a test designed to compare the performance of two units of equipment or to ensure that equipment performs at the standard of its specifications.
CCITT	Consultative Committee in International Telephone and Telegraph.

Channel	The data transfer path between central processors and peripheral controller or the equipment which controls data flow between central processors and peripheral controllers.
Circuit Switching	This method, unlike packet switching, makes and breaks a circuit connection. The data flow through the connected circuit is not stored at the switch location. To handle high speed traffic efficiently the physical path must be connected and disconnected very quickly.
Configuration	The particular set of equipment so connected to form a single computer centre or system for various computer runs.
Cost Benefit Analysis	A method of establishing a cost and benefits comparison between a number of alternative means of undertaking a pre-determined activity.
Data Systems Specifications	(i) The delineation of the objective which the system is intended to accomplish; and (ii) the data processing requirements underlying that accomplishment. The latter includes a description of the data output and its intended uses, the data input, the data files and record content, the volumes of data, the processing frequencies, timing, and such other facts as may be necessary for a full description of the system.
Digital	Pertaining to the utilisation of discrete integral numbers in a given base to represent all the quantities that occur in a problem or a calculation. It is possible to express in digital form all information stored, transferred, or processed by a dual state condition.
Equipment Performance Requirements Specifications	A statement of those hardware factors such as cycle time, computing speed, memory capacilities, and expandibility (modularity) and the related software which are a measure of the operating

	capability of equipment and which, when applied to the data systems specifications, provide a measure of the operating time required to process the applications involved on that equipment.
Feasibility Study	The initial procedures and criteria for the determination of suitability, capability and compatability of computer systems to the organisation concerned. A preliminary systems analysis of potential cost savings and new higher level of operations, decision making and problem solving capacity as a result of computer procurement.
G.A.O.	U.S. Federal Government General Accounting Office.
Hardware	The mechanical, magnetic, electrical and electronic devices or components of a computer.
IDC	Inter Departmental Committee
Interface	A common boundary between automatic data processing systems or parts of a single system.
Jobmix	A batch or group of application programs running concurrently on a computer.
Magnetic Disk	A storage device on which information is recorded on the magnetised surface of a rotating disk.
Magnetic Tape	A tape or ribbon impregnated or coated with magnetic material on which information may be placed in the form of magnetically polarised spots.
Mainframe	Originally implied the main framework of a central processing unit on which the arthimetic unit and associated logic circuits were mounted, but now used colloquially to refer to the central processor itself.
MANDATA	A computer system operated by the Public Service Board for personnel and establishment administration.

Network	The interconnection of a number of points by communication facilities.
Packet Switching	This refers to a network in which the data items are stored at the switching nodes. The nodes are computers which receive the data, store it, and then forward it to next part of the network. There is no physical switching of lines. The data is transmitted in blocks, which are called packets. Each packet contains a header giving routing instructions.
Peripherals	Various units or machines that are used in combination or conjunction with the computer but are not part of the computer itself.
PERT	Program Evaluation and Review Technique. Use of PERT requires an extensive analysis of an overall project in order to list all the individual activities, or jobs which must be performed in order to meet the total objective. These activities are then arranged in a network that displays the sequential relationship among them. Areas which impose the greatest time restrictions on the completion of a project can be highlighted.
Plug-Compatible-Equipment	Equipment which is directly interchangeable with other system manufacturers' peripherals, processors and memory.
Program	A plan for the automatic solution of a problem. A set of instructions or steps that tells the computer exactly how to handle a complete problem.
Protocol	One of the basic considerations in designing computer networks is the physical transmission of data from one computer to another. In the absence of transmission errors this becomes a relatively simple task. Once errors are introduced, however, problems of correct data sequencing and synchronisation of the transmitter and receiver appear and must be solved. The solution consists of

a data communications link protocol which assures the correct sequencing and integrity of data transmitted between computers and between computers and terminals in a network.

Software

A set of programs, procedures and associated documentation concerned with the operation of a data processing system.

Specification

(i) For programming a precise definition of the records and programs needed to carry out a particular processing function.

(ii) As an equipment concept, a technical or engineering description of the hardware.

(iii) A job specification defining the tasks to be carried out.

System

The term"system" appears many times in this report. Unfortunately it cannot be avoided without circumlocution. It is also unfortunate that the word has several meanings. It will therefore be necessary for the reader to interpret the word in its context. The following definitions are adapted from the British Civil Service Department's "Handbook on Developing Computer Systems in Government Departments".[55]

1. A common meaning is that used in the term "system design" or "application system", in those contexts the word implies the totality of input, processing, storage, output, procedures and organisation of a computer-based system. In that sense the word may frequently be regarded as independent of particular hardware.

2. At other times the word is used to describe a particular arrangement including particular hardware, as in the term "computer system". In that

context the word includes what is sometimes called a configuration of hardware, but also implies something about the use of the configuration. In a contractual sense the term "computer system" includes hardware and software.

3. However, the word is also used in a very wide context. A computer-based system is itself seldom self-contained because it is an integral part of a much larger executive process.

4. The same word is also used commonly in the term "operating system" to cover the control programs selected from the series made available by the manufacturers without which the application program could not be run.

Terminal — A point at which information can enter or leave a communication network. An input/output device designed to receive data in an environment associated with the job to be performed, and capable of transmitting data to, and obtaining data from, the system of which it is a part.

Third-Party Maintenance — The efficiency of a computer installation is dependent on the effective maintenance of both hardware and software. Whereas in the past ADP equipment was maintained in most cases by the supplier of the equipment, there are organizations who make a business of providing maintenance regardless of who supplied the equipment. This maintenance is referred to as third-party maintenance.

Unbundling — The term refers to the practice by suppliers of pricing major items of software separately from the hardware, rather than as a total package.

Visual Display Unit (VDU) — A display unit which consists of a cathode ray tube which is used to display characters or graphs

representing data read from the main memory of a computer. A visual display unit also incorporates facilities to key in inquiries so that computer files can be interrogated and sometimes altered from remote locations.

THE VIEWS OF SUPPLIERS

Nineteen major suppliers of computing equipment and/or services were invited to comment on matters relevant to the terms of references of the Committee's ADP inquiry and to answer a number of specific questions. Of the nineteen invited to comment, fourteen replied and of these, six were interviewed.

A summary of the written responses follows. Answers which could identify the respondent or tended to be special pleading have been omitted. The Public Accounts Committee does not agree with all the opinions expressed.

Question 1

Are you aware of any instance in which Government purchasing procedures, or the way in which they had been administered, have been unnecessarily costly to the Government; e.g. where the machinery of purchasing caused avoidable delays to the detriment of the user department? If so, please give details.

Answers

Supplier A: Existing Government purchasing procedures are unnecessarily time consuming and costly. A major procurement can take three years or more from initial identification of requirements through tender issue and evaluation to installation of equipment. It can cost the four or five serious suppliers several hundreds of thousands of dollars each to tender for a major order for which there can only be one winner. Likewise this process of preparing and evaluating tenders is costly for the Government, with consequential delays in achieving the benefits on which the procurement is being justified. This results in higher overall market prices for computing equipment to cover heavy Government marketing overheads.

Delays in the procurement process are costly to the Government due to the deferrment of benefits.

The Bureau of Statistics procurement is an extreme example of the above but all major Government tenders in recent years have been unnecessarily costly and protracted.

Supplier B: The delayed procurement for the Australian Bureau of Statistics has resulted in costly delays to the Commonwealth Statistician and to the taxpayer and greatly increased cost of sales to all industry participants.

Supplier C: Not infrequently the cost to the Government of formulating tenders and evaluating their responses is out of all proportion to the estimated value of the contract to be awarded under the tender.

Supplier D: The time taken for Government procurement considerably exceeds that in the private sector resulting in direct and indirect costs. A comparison of the typical Government procurement cycle with the equivalent private sector process might identify a reduction in the cycle stages and allow the Government to set time standards against which delays could be costed and brought into account.

Supplier E: The purchasing procedure is unnecessarily lengthy in some cases.

Lengthy procedures and commitment to purchase mean a costly cycle of procurement and an inflexible solution to equipment needs as well as long term commitment to a single vendor.

Supplier F: The Government's computer procurements and the way in which they are administered are almost always unnecessarily costly to the Government and its suppliers.

The tender pricing procedures do not allow the Government sufficient flexibility to match computer hardware/software/pricing and achieve the optimum cost to the Government.

This is compounded by the current necessity for exaggerated arms length secrecy in dealing between Government and suppliers.

The time taken for evaluation of tenders and letting of the contract is excessive (typically three times that of a conservative commercial organization such as a bank). This causes costs to the Government in deferred benefits.

Supplier G: The prolonged delays in the procurement for the Australian Bureau of Statistics and the Department of Trade and Resources have been and will continue to be costly to the Government and detrimental to both departments.

The extended time taken in the procurement process in general impacts directly on the costs incurred by all computer manufacturers and these costs inevitably come through in the pricing.

In the case of the ABS-DTR procurement the industry-incurred costs will be of the order of ten million dollars by the time procurement occurs. Costs incurred by Government are estimated at three million dollars giving a total outlay of between ten and fifteen million dollars on an eighteen million dollar contract. Taken together with the indirect costs the total costs of the procurement process are in excess of the contract value.

In general the full scale tender process is far too time consuming leading to costly delays.

Supplier H: The current procedures used for the purchase of small computers, say under two-hundred thousand dollars, are unnecessarily complicated.

Government departments negotiate individual and unique contracts with each successful supplier for low priced items. These tenders often involve nearly as much work by both parties as major contracts of a million dollars or more.

The Government purchasing authority should, on an annual basis, through a series of individual negotiations with the various potential suppliers of small computers draw up and publish a list of qualified suppliers. User departments who desire computer equipment could call for tenders from these qualified suppliers during the currency of the annual contract and decide on the technical basis alone what is best for them.

Question 2

Are you aware of any abuses of the use of certificates of inexpediency (Treasury Regulation 52AA)? If so, please give details.

Answers

Supplier B: We are not aware of the misuse of this regulation. Certificates of inexpediency should be used where a proper cost/benefit analysis reveals a clear advantage for its adoption compared with the alternative of open tender. The cost/benefit analysis should recognize all relevant benefits and costs of the tendering procedure (e.g. likely savings in capital costs, losses in time, additional training, etc.).

Supplier C: The department concerned could publish in a conspicuous advertisement in the national newspapers their intentions to issue a certificate of inexpediency and the reasons therefor. This would afford manufacturers who felt that they had an alternative to offer Government, the opportunity to lodge notice of their interest.

Supplier D: Certificates of inexpediency are an appropriate mechanism for enhancing an initial installation with compatible additional equipment to cater for growth in volume and application developments, except in cases where the enhancements can reliably be procured from several sources (e.g. plug compatible units).

However, periodically ("once the natural life-cycle has elapsed") Government departments should go back to the open marketplace. An approach which locks a department into a particular style of processing for several decades is not in the best interests of Government, while being prejudicial also to the maintenance of an open innovative multi-choice marketplace.

Supplier E: Properly administered, the use of certificates of inexpediency saves both the Government and supplier time and money. We are not aware of any abuses which can be substantiated.

We suggest the sending of a circular to manufacturers advising of the Government's intention to make use of the certificate of inexpediency in a given situation and inviting comments or alternative tenders within say fourteen days. This could provide a fair and reasonable means of awarding additional business without favouritism.

Supplier G: We are not aware of any specific instances of abuse but alternative sources should be openly investigated whenever inexpediency is present.

Supplier H: The onus should be firmly on the requesting body to prove that a certificate is the best purchase option available. To ensure that justice is seen to be done by the reviewing authority, its reasons for granting the Certificate should be public knowledge, except where national security would be at risk.

Five other suppliers knew of no instances of abuse of certificates of inexpediency.

Question 3

The Committee has been told that in the Government administration there is a tendency to specify hardware in computer procurement rather than to write functional specifications. Do you agree? Which approach do you believe is in the best interests of the Government?

Answers

Supplier A: Yes, hardware in the past has often been the major part of the specification. It should not necessarily be reduced but the functional part of the specification should be enlarged. Tenderers should be given the opportunity to propose solutions to the functional specifications and be told that the hardware specifications do not automatically preclude such proposals if they do not fully meet the hardware specifications. This is because the computer industry is so fast moving in terms of rapid continuous product innovations, price reductions, etc. that the Government may be missing out on these advantages by being unnecessarily restrictive at the specification stage, given the time scale of the tendering process.

Supplier B: For maximum benefit to the Government computer users, specifications for data processing systems should define the function and throughput required rather than hardware and software design features.

Computer systems vary greatly in their architecture and approaches to data management; where software/hardware features are specified, more advanced design innovative solutions may be excluded.

A functional specification

(i) gives each supplier an opportunity to modify the application system so as to utilize his hardware and software capability to its best advantage;

(ii) allows sufficient freedom for a computer supplier to present a new approach to application system design which may not have been considered; such new approaches should in fact be encouraged by the specification.

The benefits which will accrue from a functional specification are many, the most significant being:

(i) Greater opportunity to introduce new technological developments.

(ii) Greater competition for Government contracts.

(iii) An incentive for computer suppliers to contribute innovative ideas as well as their standard hardware and software.

Supplier C: The tendency is to specify hardware. If functional specifications were written rather than hardware specifications, the Government would have a greater choice of equipment, including the opportunity to buy plug-compatible equipment. Often and certainly in particular instances plug-compatible equipment can be more reliable and considerably cheaper.

Supplier D: Functionally, or what the user sees and can do with the computer is more important than the hardware used to provide this functionality.

There is a tendancy to require an excessive level of detail about computer hardware required by Government (e.g. Australian Bureau of Statistics tender, 1977). In the early 1960's this approach was an important and necessary part of computer evaluation. The development of high level languages and modern operating systems has obviated much of the need to delve deeply into hardware in order to ascertain computer system performance.

Tenders concentrating on hardware might exhibit the following problems:

(i) Possible abuse via a specification for one manufacturer's hardware (whether consciously or unconsciously);

(ii) The assumption that those writing the techninical specifications are infallible in computer technology.

Supplier F: The process of specification production assumes that departmental officers know all solutions available in the marketplace and have selected the most suitable as a desirable goal. It is unlikely that this is so. The best interest of the Government, indeed of all users, is to specify the requirements in functional terms and to evaluate the advice of the experts obtained in the responses. This will necessitate more time being spent after tenders are received but will mean less prior to specification being issued.

Supplier G: Where a department is installing systems for the first time functional specifications would appear to be appropriate. The two circumstances do not allow ab absolute decision one way or the other

Supplier H: The majority of Government tender specifications over the years have certainly been hardware "shopping lists" rather than functional specifications. While possibly making tender evaluations easier this approach is by no means guaranteed to produce the most cost-effective solution, particularly when the more recent industry developments have facilitated a wide spectrum of centralized, decentralized and/or distributed approaches to data processing problems.

Supplier I: With few exceptions hardware is emphasized far more than functional specifications. This has the following effect:

a) Vast amounts of time are wasted answering irrelevant questions. Many tenders ask the same questions and are obviously based on previous requests.

b) In times of rapidly changing technology many questions specific to hardware become quickly outdated. Questions are therefore directly related to the knowledge and experience of those framing the tender. Therefore it is possible that such questions can put a given supplier at a disadvantage because the supplier has taken a different, but still efficient, approach to computing.

c) The corollary of b) above is that such questionnaires give little scope for a supplier to suggest alternatives which may be aligned to state-of-the-art computing.

d) Tenders calling for hardware responses, in specific questionnaire form, are almost impossible to evaluate sensibly without detailed knowledge of the architecture of the equipment to which they relate.

Functional specifications, leaving latitude to the best approach, would in most instances achieve a better result. Hardware should still be included by indicating the scale of equipment required since knowledge of the jobs, environment and productivity of staff are important in this assessment of requirements. We are suggesting a change of emphasis rather than deleting hardware entirely.

Supplier J: The tendency to specify hardware in computer procurement rather than adopt a functional specification, has been too prevalent in the past. This has tended to limit a supplier in his ability to provide an optimum solution. There is also some evidence that this results in difficulties in implementation in some cases. Some examples of hardware-oriented specifications where such difficulties have arising include:

(i) Communications network specifications such as that issued by Social Security/Medibank which required "hardware to be supplied" in accordance with very rigid Government "standards" and standard protocols.

(ii) The tendency to specify a Government "standard VDU" terminal to interface with computers and network components.

We strongly support the functional specifications as the best means of providing the most effective solutions.

Supplier K: For Government administration, the specification of hardware is the approach in the best interests of the Government on most occasions because of the complexity and size of the applications systems to be processed. From experience, functional specifications almost always require more time in preparation and in evaluation of responses. Therefore the more generalised approach, that of devising functional specifications, should be reserved for those rare occasions when the equipment to be procured is clearly in aid of a unique application or one which is developmental in nature.

Supplier L: Hardware specifications ranging from the very specific to the general are the most common form used in Government computer procurement. This reduces the time taken in the procurement process and hence minimizes both direct and indirect costs.

Hardware-oriented specifications are almost invariably directly related to the ability of the hardware to support the software the department wishes to use.

Since 1975 it has become increasingly viable to base the procurement on the user's software needs, from which it is possible to specify the hardware required and hence shorten the procurement process.

The Federal Government is sufficiently competent to be aware of the hardware and software alternatives available in the marketplace.

The flexibility to choose from a range of alternative solutions put forward by suppliers should be preserved whenever possible provided it does not open up a whole raft of alternatives with the resultant time consuming and costly evaluation exercise.

Question 4

Are you aware of any instances of procurement in which the specification was worded in such a way as to limit unduly the range of ideas or solutions to the functional problem that might otherwise be put by tenderers to the Government for consideration? If so, please give details.

Answers

Supplier A: It is inevitable and in many cases even desirable to limit the range of solutions. Factors supporting this relate to timing of evaluation and selection and, more importantly, to the implementation of future data processing plans for extending the systems to be used by the Government authority.

Supplier H: Unfortunately there is no easy solution. Government must set the parameters in terms of time (when the new system is to be operational) and money (how much money is invested in XYZ, how many man-years effort to convert from XYZ software to ABC software and how much additional equipment is required during the transition). With such a definition of basic ground rules as a starting point, then the specification of hardware versus functions can be more intelligently resolved.

Supplier I: Specifications based too closely on hardware rather than functional requirements unduly restrict the ability of the tenderer to present ideas and solutions.

There is also the tendency for ADP Departments representing themselves as the buyer to forbid or unduly restrict contact between the supplier and the user departments, thereby limiting the ability of the supplier to propose what the user actually requires rather than what the ADP Department thinks the user ought to have.

Supplier J: Hardware questionnaires in tenders rarely encourage expression of ideas and solutions which may not fulfil specifications as presented but which may be good solutions.

Supplier K: Instances which fall under the heading of this question could be avoided if functional specifications were adopted and the tendency to demand specific hardware characteristics or "standards" avoided.

NOTE: Most suppliers regarded Question 4 as an extension of Question 3 and replied to both questions in the one answer.

Question 5

Are you aware of any instances in the procurement of new systems; additional peripherals, memory, mainframes, software or services to expand an existing installation; and maintenance services where suppliers who could have satisfied the functional requirements of the system or could have met the requirements of the specifications were not given an opportunity to tender? If so, please give details.

Supplier F: Government tenders or requests for proposals almost always ask for or demand a single vendor for the supply of the required equipment. This makes it impossible to offer alternative peripherals to the Government.

The Commonwealth Government is denying itself advantages in higher performance and lower cost if it continues with this single vendor policy. Future tenders should allow suppliers to bid all or part of the required equipment.

Where the equipment of more than one supplier is installed on a site the Government should consider the advantages (lower cost and better communication with suppliers) or dealing directly with suppliers rather than through a "prime" vendor.

Supplier H: We believe that there is considerable incidence of this practice and in particular where tenders are prepared for the joint supply and maintenance of computer equipment. All maintenance tenders should be separated from equipment supply tenders, whether the equipment is to be purchased outright, hired, leased or rented.

Supplier I: Existing procedures are sufficient to ensure that all suppliers have the opportunity to tender if they are followed.

Supplier K: Not to our knowledge. Once again the publication of intent to acquire additional peripherals, mainframes, etc., in conspicuously displayed advertisements in the national press would obviate this contingency. Suppliers have an obligation to perform the marketing effort. Government is entitled to receive that effort; all that is really necessary is that the supplier marketplace is aware of a forthcoming requirement.

Seven other suppliers knew of no instances of the situation of Question 5.

Question 6

Are you aware of any instances of the situation described in Question 5 where tenderers were given the opportunity to tender but were excluded or restricted in reality by onerous or unusual requirements of the specification? If so, give details.

Supplier A: The Retirement Benefits Office tender (9/78) precluded contact for discussion purposes with officers of the fund. Since a hardware type tender gives little opportunity to detail conceptual advantages or approaches as applied to the problem, we would assume that such a restriction meant that a short list was under consideration. Under these circumstances producing a response is little more than a formality.

Supplier D: Onerous or unusual requirements of the specifications can be avoided by a more open and analytic approach to tender evaluation. By allocating values to desirable features and products and by a rigorous approach to cost benefit analysis which takes into account all relevant costs and benefits, onerous and unusual requirement statements can be avoided and suspicion allayed.

Supplier E: If the Government is going to get value for money, senior public servants must be prepared to give third party maintenance an unbiased and substantial chance at some Government contracts.

Supplier L: No. In cases of unusual requirements, discussions with officers of the Public Service have always led to their resolution.

Five other suppliers knew of no instance of the situation of Question 6.

Question 7

Do you know of any other instances of procurement of new computer systems, extensions to existing systems, and services in which the best interests of the Government were not served? If so, please give details.

Supplier A: Yes, the recent aborted procurement by the Australian Bureau of Statistics. The equipment systems required were sufficiently extensive to permit some work to proceed even while other parts of the procurement were being reworked.

Supplier L: Problems for Government occur when systems are procured that require conversion of software. Conversion is a difficult, time consuming and expensive exercise, the realization of which is behind the rapid move world-wide to compatible software systems.

Question 8

Are there any other issues which you might see as relevant to the Inquiry?

Supplier D:

A. Government Standards: Communication protocols established as Government standards are different from industry standards. The effect of this difference is an increase in cost to the Government of equipment conforming to these standards.

B. Acceptance Tests: Tenders generally specify acceptance testing of an exhaustive nature. Such acceptance testing can only increase the costs of the equipment to the Government. Users other than in Government generally undertake function testing in that they accept manufacturers' guarantees of performance and all that it legally entails, and proof that the equipment and software perform the required functions by actual installation.

   The costs of acceptance testing are an unnecessary addition that the Government bears and that hardly any other user is prepared to bear. In some cases due to contractual obligations, failure to accept systems has not even prevented the Government from paying a large proportion of the equipment cost. In these cases the acceptance tests prove nothing.

C. High Cost of Tendering: Servicing the Australian Government is one of this Company's least profitable areas of business. Tender schedules often don't illicit the real solutions. Tenders seeking functional solutions will solicit more meaningful responses and therefore will be less costly in the longer term.

D. Formal Contracts: Government contracts often have conditions which are oppressive. Provision must be made in pricing of equipment and services to allow for the risk of invocation of any of these oppressive conditions. The cost to the Government is increased accordingly.

Supplier E: All Government purchases are unnecessarily costly to the Government and the suppliers. The cost to us of responding to a Government tender can be as high as one million dollars and is rarely less than a hundred thousand dollars on much smaller procurements. These costs are eventually passed on to the consumer by all suppliers whether they are successful or not.

Government tenders could be effectively and responsibly handled if tenderers were kept fully informed, negotiations were open and continuous, the arms length secrecy was dropped and the tender itself simply a written confirmation of the proposal already open and negotiated. Open negotiations would lead to better matched hardware/software/price and therefore would achieve procurement at optimum cost to the Government.

The major cost component in tendering to Government is the benchmark. Benchmarks should be included only where necessary and only be required of the "shortlist" of tenderers. Consideration should be given to alternatives to benchmarking, such as the supplier being required to lodge a considerable bond as a warranty against price/performance and capacity claims made in his tender response.

Historically and in the 1960's necessarily so, the ADP Branch (of the Public Service Board) has been the font of computing knowledge in Government departments. However, the modern computer system is accessible to the user and conversely, the user department is now more aware of and capable of using the computer.

Supplier F: The Australian Computer Equipment Suppliers Association could be useful as an easy method of obtaining a concensus of opinion in relation to such questions as are posed above.

Supplier G: An issue which might be addressed by the Inquiry is that of the timing of hardware acquisitions in relation to the preparedness of the receiving authority to use the equipment effectively when it is delivered. Hardware may stand idle or may not be incorporated into the installation due to the lack of staff or expertise.

Supplier I: . There are weaknesses in open tender benchmarking, including:

- job mix may not be representative of future applications;
- frequently not sufficient time to prepare benchmark programs;
- not sufficient time to prepare optimum configuration of equipment;
- compromises made with different vendors make comparison of results invalid;
- may be a bias, conscious or unconscious, towards a specific architecture in the algorithms used so that they perform badly when run on a computer with different architecture;
- very costly (up to half a million dollars in extreme cases) for winning and losing vendor alike and such costs are ultimately passed back to buyers in the system prices.

Supplier J: There appears to be a vagueness about the Government tendering process and no official guidance is given to suppliers as a basis for planning and implementing their response. On no occasion have we been officially notified as to the most likely date of issue of specifications or the procurement timetable and even unofficial advice is vague and uncertain.

There is no apparent alternative to either a certificate of inexpediency or a full scale tender. This is highly disadvantageous to the Government since it has no way to use advanced and cheaper technology without going through a lengthy tender process.

Supplier K: In overall terms we see a need to streamline existing procurement procedures, with less voluminous, more functional tender specifications and less onerous benchmark requirements. We believe departments should have more autonomy in determining their future requirements within overall guidelines, while remaining subject to a well qualified central audit.

Supplier L: Often the time taken by departments in the evaluation of tenders is inordinately prolonged.

APPENDIX 3

SOME NOTES ON PROCUREMENT PRACTICE IN U.S.A. AND CANADA

CANADA

The Treasury Board

The Treasury Board of the Government of Canada has published a guide[15] to data processing administration within Government. This document sets out an overall policy for development and co-ordination of ADP. Although the predominant philosophy is "let the managers manage" with its implication of minimal Treasury Board intervention, the Treasury Board monitors ADP activities more closely in most instances than the mainstream activities which they support. This is because there is evidence that EDP proposals placed before department management for decision have not had the same informed scrutiny as proposals related directly to mainstream activities.

Secondly, ADP expenditure has been growing at 20 per cent to 25 per cent per year so that some measure of central co-ordination can prevent unnecessary duplication. Moreover, it is claimed that ADP is becoming increasingly interdepartmental in nature and that therefore some central activity is desirable to help encourage a co-ordinated approach. Part of the policy of the Government (issued in 1972) is to have an ADP master plan, the long range strategy being to organise all government ADP services into a structure consisting of departmental centres, service-wide application centres and functional centres. Consideration was to be given to a centre of government expertise for research, development and testing of computing techniques, devices and standards.

Information Systems Division

There is an Information Systems Division (ISD) of the Treasury Board, whose role appears to be analagous in many respects to that of the ADP branch of the Public Service Board.

The Information Systems Division revises the ADP master plan annually to reflect current departmental and centre plans.

The role of the ISD was visualised more as a catalyst than as a regulatory mechanism. Although the Division processes submissions to the Treasury Board relating to ADP acquisitions, the Guide provides for approval in principle of most acquisitions through the annual ADP report and plan, subject to the safeguards provided by procedures documented in a Procurement Memorandum.

Private Sector

It is Canadian Government policy to meet the Government's ADP equipment and services needs from the private sector except when it is in the public interest or would be more economical to provide them internally.

U.S.A.

The Brookes Act[68] was enacted in 1965 "to provide for the economic and efficient purchase, lease, maintenance, operation and utilization of automatic data processing equipment by Federal departments and agencies".

The Act authorised and directed the General Services Administration to co-ordinate and provide for the economic and efficient purchase, lease, and maintenance of automatic data processing equipment by Federal agencies.

It explicitly prohibited the Administration from interfering with or attempting to control in any way the use made of automatic data processing equipment or components thereof by any agency.

The General Services Administration has prepared a number of procurement guides. One of these[25] states that

1. Guidelines are to be given to tenderers to achieve a practicable and useful degree of uniformity.

2. Dollar values should be stated for desirable features.

3. The evaluation criteria are to be clearly stated.

4. The basis for award including the basis for evaluating desirable features is to be clearly stated.

5. The preferred method for specification is to set out the objectives which the system is intended to accomplish and the data processing requirements underlying that accomplishment.

6. Benchmarks are for performance validation.

7. Benchmarks should be capable of being processed during a single half day benchmark demonstration.

8. The expected system's life should be stipulated in the specification document.

9. For discounting values, the figure of ten per cent is to be used representing approximately the long run opportunity cost of capital in the private sector.

10. Accrued lease credits are transferrable to GSA so that GSA can find another user.

11. The specification document should clearly state how the purchase option in lease contracts will be evaluated for purpose of award.

12. The specification document shall identify all the evaluation factors. The Comptroller-General has held that it is improper to use evaluation factors which are not revealed to all offerors.

13. The technical staff will evaluate each proposal in strict conformity with the evaluation criteria of the RFP.

14. The Government should inform the offeror when it is apparent that an offeror can reduce the cost of his proposal.

15. In no event during the evaluation period shall any offeror be told the number of proposals received, prices, cost ranges or the Government's cost estimate.

16. At an unsuccessful offeror's request, he shall be provided with an oral debriefing and a copy of the contract that was let.

THE STATE OF CALIFORNIA

The Intergovernmental Board on Electronic Data Processing has the charter, among other things, to establish goals and objectives, general policies and priorities for development and implementation of intergovernmental information systems. It has a permanent technical advisory committee comprised of electronic data processing professionals who advise the Board in its policy deliberations and undertake much of the work done under the auspices of the Board.

The Board has published a number of guides to agencies for computer procurement. One of these[27] emphasises the need for a procurement plan of action to be developed outlining all the requirements for each step. The guidelines are then to be used as a checklist to ensure that everything has been covered.

The guidelines make many valuable points such as

> careful consideration should be given to whether there is sufficient knowledge of the goals and objectives of the agency and how they relate to data processing prior to instigating any procurement..... If such a(comprehensive long range plan of action) does not exist, it is wise to develop one and have it approved before

making any significant procurement decisions.

The document could well be used to assist in developing a set of procurement and contracting guidelines for the Australian Government.

APPENDIX 4

COST OF DELAY IN IMPLEMENTATION

A. Method of Estimating

(1) Calculate the net present value (NPV) of next year's annual incremental spending on ADP. Treat this as a notional project with a ten year life-span, using a 10 per cent per annum discount rate.

(The NPV of a proposed future project is the amount by which the present value of all future benefits of the project exceeds the present value of all future costs of the project).

(2) Calculate the additional benefit of obtaining that NPV one month earlier.

(3) Result is the annual benefit of shortening the average (NPV dollar-weighted average) procurement cycle duration by one month.

B. Example

1. Assumptions:

(i) Increase in spending on ADP staff and equipment in 1978/79 over 1977/78 = $20 million[56]

(ii) Average benefit/cost ratio over all ADP projects = 1.5

(i.e. $\frac{\text{present value of all future benefits}}{\text{present value of all future costs}} = 1.5$

(iii) Discount rate = 10 per cent, equivalent to a monthly discount rate of 0.797 per cent.

2. Calculation:

Net present value of a stream of ten equal annual sums each of $10 million, beginning in one year's time, at 10 per cent per annum discount rate.

$$\approx \sum_{N=1}^{10} \frac{10}{1.1^N}$$

≈ $61.45 million

Whence, the saving from advancing the project by one month (i.e. the increase in NPV)

$$= 0.00797 \times 61.45$$

$$\cong \$490,000$$

C. Results for Different Assumptions

Benefit/cost Ratio	Annual Incremental Spending 1977/78 to 1978/79 $ millions	Long Term Annual Saving/Month's Reduction in average Procurement Cycle $ thousands
1.2	15	147
1.2	20	196
1.2	25	245
1.5	15	367
1.5	20	490
1.5	25	612
2.0	15	735
2.0	20	979
2.0	25	1224

Note: $20 million is the estimate by the Public Service Board[56] for the increase in spending on staff and equipment in 1978/79 over that in 1977/78.

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