The management of teaching and research equipment in Scottish higher education institutions : report / by the Comptroller and Auditor General.

NATIONAL AUDIT OFFICE

REPORT BY THE
COMPTROLLER AND
AUDITOR GENERAL

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John Bourn
Comptroller and Auditor General

National Audit Office
31 May 1996

The Comptroller and Auditor General is the head of the National Audit Office employing some 750 staff. He, and the NAO, are totally independent of Government. He certifies the accounts of all Government departments and a wide range of other public sector bodies; and he has statutory authority to report to Parliament on the economy, efficiency and effectiveness with which departments and other bodies have used their resources.

Contents

Summary and conclusions

1 There are 21 higher education institutions in Scotland which since 1993 have received grants from the Scottish Higher Education Funding Council (the Funding Council) totalling £521 million in the institutions' financial year ending 31 July 1995. They are independent bodies accountable through the Funding Council to the Scottish Office for their expenditure from these grants. They obtain income from a range of other public and non-public sources which in the financial year ending 31 July 1995 totalled about £1,100 million. Within most institutions there is substantial financial delegation of non-pay expenditure to academic departments.

2 The institutions' own teaching and research equipment may be worth up to £500 million. They need it to deliver, for example, scientific and technological teaching and research, and increasingly use information technology across the full range of disciplines. The Funding Council's equipment grant provides around 60 per cent of the funding for equipment which together with funding from other sources amounts to around £55 million a year. This grant may in due course be subsumed into a single income stream covering all types of expenditure. Other earmarked funding for equipment is provided from grants and contracts from the Research Councils, charities and industry. The Funding Council's recurrent grant for teaching and research is also used at some institutions to purchase equipment.

3 Little guidance had been made available to institutions on the management of teaching and research equipment taking account of the whole life-cycle. Shortly after their establishment the officials of the Funding Council became sufficiently concerned about this to propose to the Council that they establish a Working Group with the Committee of Scottish Higher Education Principals. The Funding Council therefore welcomed the National Audit Office's intention to examine equipment management in the context of the financial health of the sector. The Funding Council's Joint Working Group made an important contribution to the National Audit Office's understanding of a novel and complex area. This has been reflected and taken forward by this report and the accompanying good practice checklists (Appendix 5).

4 Against this background the National Audit Office examined how institutions currently managed teaching and research equipment, to identify good practice and to suggest how improved management might be promoted. This focused on the different stages within the equipment life-cycle, as follows:

- planning to meet equipment needs (Part 2);
- acquisition (Part 3); and
- managing equipment through the life-cycle (Part 4).

5 The National Audit Office obtained evidence of existing practice and the scope for applying improved practice by means of detailed examination of eight institutions (Appendix 1), covering 96 items of equipment across 31 departments, supplemented by a postal survey of all institutions. They also examined practice outside higher education and surveyed equipment suppliers to the sector. The National Audit Office provided each institution visited with a management report identifying good and poor practice and recommending where improvements might be made or considered. Each of the eight institutions welcomed the individual management report on its equipment management practices and many of the recommendations have already been acted upon. The Chief Executive of the Funding Council has received assurances from each institution that its senior management is giving careful consideration to the findings of the reports, and he will continue to take an interest in their progress in this regard.

6 The National Audit Office also reviewed the financial health of the Scottish higher education sector and the financial monitoring by the Funding Council. This showed that the Funding Council have a detailed and comprehensive system for financial appraisal and monitoring and that the sector overall is in a sound financial position.

Planning to meet equipment needs

7 Six of the eight institutions examined have a separate central committee responsible for annually allocating Funding Council equipment grant. Few of these examine issues other than allocating this grant or have an overview of equipment expenditure from other funding sources. Nor are they informed of equipment needs generally. Few take a longer term view, although six of the institutions examined have developed or are developing longer term information technology strategies. In consequence these institutions do not have a sound basis for determining how much funding should be provided for equipment to meet changing needs over time and how this should be allocated in a way that secures value for money

8 Teaching and research quality can suffer if the arrangements in place to allocate funds for equipment do not match needs. Seven of the eight institutions examined use a formula to allocate Funding Council equipment grant to departments, after 'top-slicing' to fund specific equipment needs. This approach appeared to be accepted as equitable by staff. The extent to which top-slicing and other measures enable institutions corporately to meet specific needs varies. The Funding Council's quality assessment reviews of teaching identified a particular deficiency in the provision of equipment in computer studies departments which in 1995 the Funding Council helped institutions to address by means of a special grant scheme.

9 The National Audit Office concluded that many institutions need to build on existing good practice in the sector and should in particular:

- develop within existing committee structures an appropriate high level forum to consider broad equipment management issues;

- develop, as an integral part of the strategic planning process, an institution-wide plan for equipment priorities and spending covering a time frame of at least four years; and

- review the balance between formula and top-slice allocation of funding to ensure that sufficient support is given to initiatives to address specific needs identified by the planning or quality review process.

10 The 31 academic departments examined have a methodical approach to deciding how their allocation of Funding Council equipment grant should be spent. Eight of them plan more than one year ahead, in a way which could allow them to prioritise future as well as immediate needs. The need for all but four of the 96 purchases examined appeared justified although there was scope generally for departments to set tighter budgets to encourage staff to negotiate savings. At four of the eight institutions departments are held accountable for the allocated funding by having to provide feedback on how it has been spent. In some cases they also have to demonstrate the effectiveness of the expenditure by reference to the use to which the equipment is being put.

11 The National Audit Office concluded that institutions need to emulate the examples of good practice and ensure that departments in particular:

- develop longer term plans, review underlying needs for equipment and set tighter budgets; and

- obtain feedback on the effectiveness of equipment spending and provide feedback to the central equipment committee or faculty as appropriate.

Acquisition

12 The National Audit Office's 1993 report 'University Purchasing in England' identified 16 action points for institutions to improve the value for money achieved in purchasing, most of which are relevant to equipment purchasing. Although seven cases were noted of equipment being donated to the institutions examined, most of the equipment they acquire has to be purchased. The National Audit Office therefore examined how these purchases were handled, in the general context of the development of the purchasing role since the earlier report.

13 At the eight institutions examined there is a mix of decentralised and centralised purchasing. Departmental purchasers are generally aware of the need to secure value for money in purchasing although there is scope for improving the strategies employed for achieving this. The National Audit Office found many good examples of competition and negotiation and of second hand deals or trade-ins. However, much purchasing practice was not conducive to achieving good value for money.

14 Some staff undertook little or no market search, did not negotiate with suppliers and tended to rely without good reason on favoured suppliers. Others disclosed budgets to suppliers at the start of negotiations or failed to combine orders for common equipment. In only 14 of the 96 purchases examined made by

academic departments was there clear evidence of serious consideration of downstream costs (maintenance, consumables, spare parts etc). Without such consideration there is a risk that equipment which costs more throughout the life-cycle will be selected because of its lower initial costs. However, purchases made by computing services departments generally gave full weight to these costs. There were only a few examples of purchases being combined to improve the institution's negotiating position.

15 The National Audit Office concluded that there is scope for institutions to improve significantly on the standard of purchasing undertaken departmentally, and hence improve value for money, by:

- obtaining a better deal through competitive procurement when there is more than one supplier and negotiating in all cases;
- taking account of down-stream as well as initial costs in choosing equipment;
- seeking to combine orders for common equipment, within and especially between departments; and

16 The rate at which the institutions examined were moving towards a fruitful partnership between the professional purchasing co-ordinator and equipment purchasers in departments was variable. At several institutions co-ordinators have helped secure significant savings, in one case around £57,000 on a single item of equipment. At most their role in relation to equipment was limited to items above the European Union threshold for advertising requirements. The application of professional expertise more generally is important and, if standards are to improve, purchasing co-ordinators need to: provide more advice on the application of professional purchasing techniques to departments; and encourage greater co-ordination of equipment purchasing within institutions. For example, at one institution the purchasing co-ordinator had secured savings of £10,000 (26 per cent) by combining orders from five departments for centrifuges. To have an impact purchasing co-ordinators need good information but progress in developing information systems since the National Audit Office last reported has been very limited.

17 The National Audit Office concluded that institutions need to:

- secure greater influence for the purchasing co-ordinator in departmental equipment purchasing;
- develop competitively tendered framework agreements against which users can call off commonly procured information technology equipment;
- consider establishing a network of departmental purchasers to act as a focal point for the exchange of information and expertise;
- work with the Scottish purchasing consortium for higher education to develop arrangements for the supply of equipment which benefit from the Scottish institutions' combined purchasing power; and

- improve the information available to purchasing co-ordinators on planned equipment purchases by departments.

18 Although most institutions have strengthened the central purchasing function, some needed to do more to encourage professional purchasing practice, including adopting the practices recommended in the earlier National Audit Office report. There were a few lapses in procedures to secure propriety and control. Only one of the eight institutions examined provided purchasing training to a subtantial proportion of departmental purchasers. The need for such training was emphasised by the shortcomings in purchasing practice found within departments at other institutions.

19 The National Audit Office concluded that some or most institutions needed to do more to implement the action points in the earlier Nationl Audit report, and in particular to:

- establish within existing committee structures an appropriate high-level forum for consideration of purchasing policies and procedures and to track the impacts secured from improved arrangements;

- require the submission of an annual strategy and report on purchasing to the senior management group to keep them apprised of progress and future plans;

- assign their internal auditors to scrutinise the purchasing control environment and examine whether value for money has been obtained from purchasing; and

- ensure that staff authorised to make purchases are suitably trained.

Managing equipment through the life-cycle

20 Departments do not routinely measure the extent to which equipment is used. The National Audit Office found that many of the items they examined were used intensively, although in almost a third of cases there was significant spare capacity. There was extensive sharing of equipment within departments and good examples of equipment being shared with outside bodies, but less evidence of sharing among departments.

21 The National Audit Office concluded that most institutions could seek to use equipment more, in particular by:

- formally monitoring equipment use; and

- developing mechanisms to encourage the sharing of spare capacity and ensuring that equipment is not purchased by departments without an appraisal of the scope for sharing with other departments.

22 Most of the academic departments examined undertake as much maintenance as they can in-house. At no institution was the cost of this approach compared with that of using contract maintenance to gauge which provided the most

cost-effective option. Two institutions have sought to improve the value for money from in-house maintenance by establishing pools of technicians. Departments had often not negotiated extended warranties and institution-wide contract maintenance arrangements at the time of purchase when their bargaining position is stronger than after the equipment has been procured.

23 The National Audit Office concluded that institutions should place more emphasis on minimising the costs of maintenance, and in particular need to:

- cost in-house maintenance and encourage departments to use these costs in deciding the maintenance strategy for particular types of equipment;
- consider whether in-house maintenance can more cost-effectively be provided by means of pooling arrangements; and
- more actively consider the merits of taking out extended warranties and institution-wide contract maintenance arrangements.

24 Institutions did not have central registers of equipment but were developing these to help them to comply with the latest accounting standards and the terms of the financial memorandum between them and the Funding Council. At most institutions these registers cover only higher value equipment and departments need to continue to maintain separate records to cover the many items below the capitalisation threshold. The extent of information recorded in these is such that departments do not at present have enough information to inform decisions on replacement, purchase, sharing and maintenance, or even in some cases to maintain effective control. Five of the eight institutions are, however, introducing common systems to provide sufficient information. Not all institutions had established a disposals policy although, in practice, most institutions have sound procedures for disposing of redundant equipment.

25 The National Audit Office concluded that institutions need in particular to:

- establish standards and procedures for departmental equipment recording, including keeping records up to date to ensure completeness and accuracy;
- consider the possibility of using their internal audit, to ensure that departmental records meet these standards and procedures; and
- in a few cases, establish disposal policies.

Overall conclusions

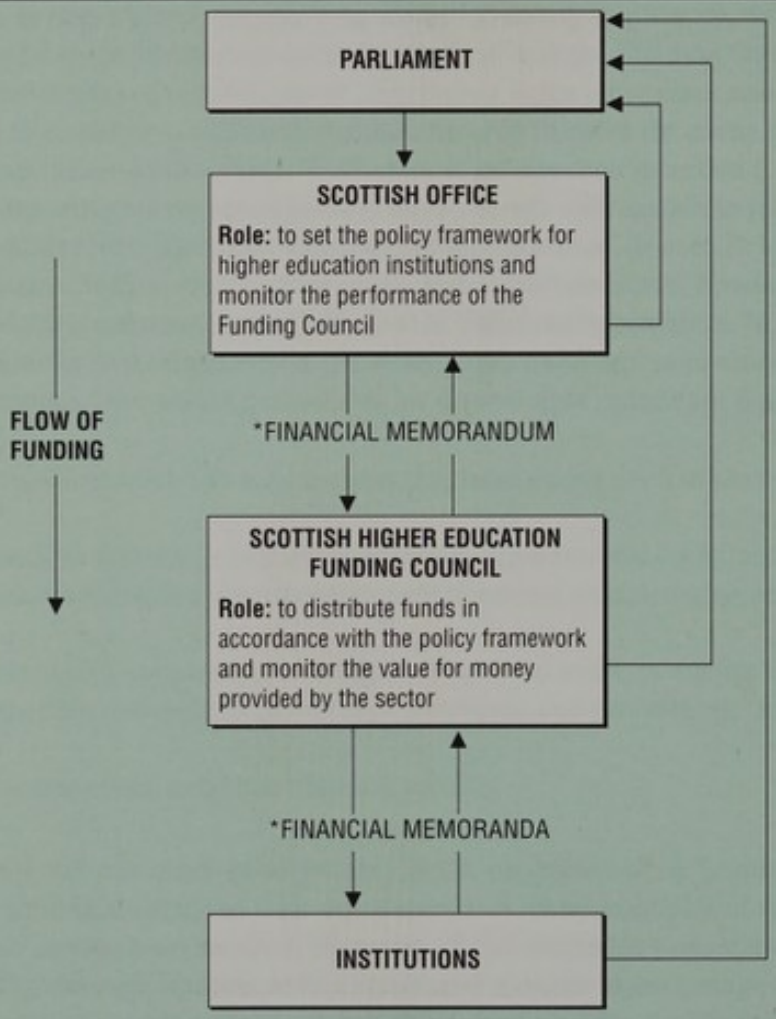
26 Overall, there is much good practice in the management by Scottish higher education institutions of their equipment and many examples of value for money having been secured. However, all the institutions examined could do more to manage equipment in a structured manner at each stage in the life-cycle, to recognise more clearly the linkages within the life-cycle and to improve purchasing practice. The National Audit Office hope that this report will contribute to the achievement of good practice in equipment management in the higher education sector, and that the Joint Working Group on the

Management of Equipment Assets (paragraph 3) will be able to make use of its findings in making its recommendations to the Funding Council and to the Committee of Scottish Higher Education Principals on how good practice in this area might be disseminated to higher education institutions in Scotland.

Part 1: Introduction

1.1 The Further and Higher Education (Scotland) Act 1992 abolished the binary line dividing universities from other higher education institutions, in parallel with similar changes in England and Wales. It established the Scottish Higher Education Funding Council (the Funding Council) to assume from 1 April 1993 responsibilities for funding, oversight and quality assessment in these institutions. The Funding Council are accountable to the Scottish Office for the expenditure of grants they receive under the terms of a financial memorandum between the two bodies. They make grants to institutions in accordance with a financial memorandum with the Governing Body. At each institution the day to day accountability for management is delegated to the designated officer of each institution, commonly the Principal (Figure 1).

Figure 1: Responsibilities and accountabilities in higher education



*** Financial Memoranda**

Govern the financial relationships between the body making the grant and the recipient. They specify the terms and conditions of funding. They require recipients to have in place sound systems of financial control. Each funding body monitors compliance with the memoranda.

Source: National Audit Office

1.2 There are currently 21 Scottish higher education institutions. They are diverse in character, including universities, specialist colleges such as art colleges and secular and denominational colleges of education. They range in size from the University of Edinburgh (income of £223 million in 1994-95) to the Royal Scottish Academy of Music and Drama (income of £5 million in 1994-95). Their total income in the year to 31July 1995 is estimated at around £1,100 million. Figure 2 provides a breakdown of the sources of this income, including the split between Funding Council grants (£521 million), other public funding (£290 million) and other sources.

Figure 2: Income sources: Scottish higher education institutions 1994-95

Source: National Audit Office survey of institutional accounts financial year ending 31 July 1995

Note: Scottish higher education institutions received 69 per cent of their income from public funds.

1.3 Higher education institutions are independent bodies. Their accountability for Government funding is generally prescribed in a financial memorandum with the Funding Council. This places a duty on institutions to ensure proper stewardship and value for money from all public funds and to keep under review the arrangements for managing all the resources under their control. Within most institutions there has been in recent years substantial financial delegation to individual academic departments reflecting their collegiate nature and to make them more accountable and promote efficiency. At larger institutions departments are grouped into units, generically known as faculties, providing a decision making focus for related academic disciplines.

The importance of teaching and research equipment

1.4 The National Audit Office estimate that the teaching and research equipment held by Scottish institutions may be worth up to £500 million. Equipment has always been essential for institutions to deliver high quality teaching and research in science and technology and there is an increasing need for information technology equipment in all disciplines. This demand is being accelerated by the introduction of computer assisted learning techniques.

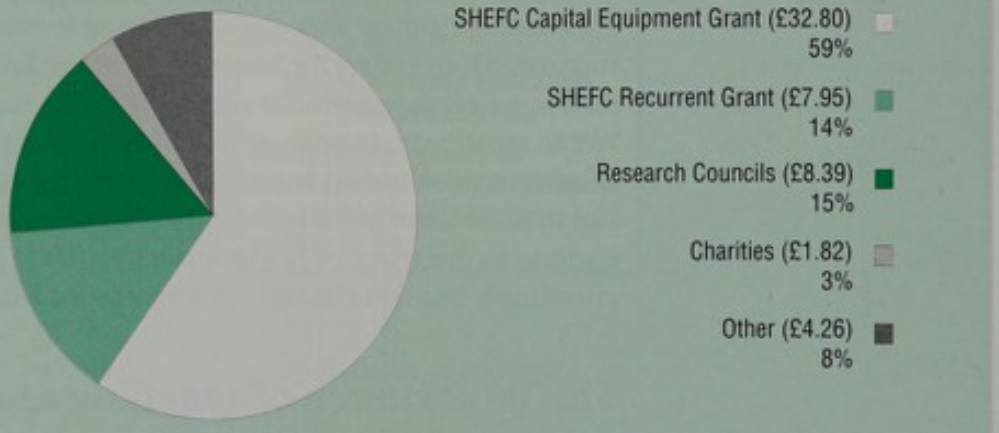
Students need practical experience with up-to-date equipment so that they are qualified to meet the needs of industry and commerce. Without a sound base of teaching equipment institutions could fail to attract students and hence lose income from Funding Council grants and tuition fees.

1.5 Much research is heavily dependent on equipment and such research is a major activity for many higher education institutions which impacts on their academic well-being and financial health. Scottish institutions receive up to 25 per cent of their funding from research grants and contracts. They also receive substantial income from research-related Funding Council grants which reflect the Funding Council's assessment of their research quality which in many cases could not be achieved without high quality equipment.

Equipment funding

1.6 Scottish institutions spent around £55 million on teaching and research equipment in the year to 31 July 1995. Figure 3 illustrates the ways in which this expenditure was financed. The largest element was the £37 million equipment grant provided by the Funding Council. Although this grant can, within limits, also be used to fund minor building works, furniture, and some equipment related running costs, nearly all is spent on procuring equipment. The Funding Council are considering subsuming this grant within a single grant to institutions. (This has already been done by their Welsh counterpart and is being considered in England). Before doing so in Scotland, the Funding Council need to be assured that institutions have in place adequate procedures for managing teaching and research equipment.

Figure 3: Equipment income sources: Scottish higher education institutions (£ millions)



Source: National Audit Office survey of Scottish higher education institutions financial year to 31 July 1995

1.7 The move away from earmarked equipment funding is aimed at giving institutions greater flexibility to determine their own priorities. Some institutions already use Funding Council recurrent grants to support equipment purchase so that 14 per cent of such expenditure (£7.95 million - figure 3) is

funded in this way. It also has to be seen in the context of the Government's expectation that the Private Finance Initiative will be a significant means of meeting equipment needs in the future.

1.8 Funding for equipment is also provided as part of grants for research from the Government funded United Kingdom research councils. These are provided to institutions either in response to bids from individual researchers to fund the cost of specific research activities, which may include an element for equipment generally, or to purchase specified items of equipment. In the case of grants for specific research, institutions can obtain the research council's agreement to spend less or more on the equipment element than specified in the bid. Since 1995-96, equipment specific grants have commonly had to be matched by funding from industry. The amount of funding specifically provided for equipment has been increased in 1996-97 by a Funding Council contribution of £1.5 million towards a joint scheme with the other United Kingdom funding councils and the research councils with matching industry funding. Other equipment funding is provided by charities and industry.

Background to this study

1.9 As the National Audit Office had not previously examined value for money across the Scottish higher education sector, they first examined the financial health of the sector and the financial monitoring by the Funding Council. This showed that the Funding Council have a detailed and comprehensive system for financial appraisal and monitoring and that the sector overall is in a sound financial position. The National Audit Office consider that this reflects well on the Funding Council. However, the Funding Council's monitoring process indicates that the financial statements and strategic plan financial forecasts of seven of the 21 institutions display clear signs of financial weakness, which reflect the current financial climate, including, for example, poor operating results, weak liquidity and low reserves. None of these are such as to place the institutions in jeopardy in the short term and the National Audit Office are satisfied that the Funding Council are working with the institutions to maintain their financial viability and address the underlying causes of their weakness.

1.10 This examination followed a similar review of the English higher education sector reported in 'The Financial Health of Higher Education Institutions in England' (HC13/94-95). Arising from this work it became apparent that the management of teaching and research equipment was a key factor in the financial health of institutions, for the reasons given in paragraphs 1.4-1.5 above, and that this merited National Audit Office examination in detail. The officials of the Funding Council had become concerned from their inception about the paucity of guidance to institutions on the cost-effective management of teaching and research equipment. They therefore proposed to the Council that a Joint Working Group on the Management of Equipment Assets should be established, jointly with the Committee of Scottish Higher Education Principals (COSHEP), the representative body of the heads of the Scottish institutions. The Working Group is chaired by the Funding Council's Director of Funding.

1.11 The Working Group has offered advice to the National Audit Office and it and the Funding Council intend to take forward this report as a foundation for strengthening equipment management in Scotland. However, the findings and conclusions in this report are relevant to higher education institutions elsewhere in the United Kingdom.

Scope and methodology

1.12 The National Audit Office study had the following objectives:

- to examine the institutions' existing policies and practices on equipment;
- to identify good equipment management practice, drawing on practice within the Scottish higher education sector and elsewhere; and
- to suggest ways in which better management of equipment might be promoted.

1.13 The study covered publicly funded equipment used for teaching and research, as opposed to administrative equipment. The primary focus was on items of equipment costing over £5,000 and items of lesser value provided in large numbers such as computers, balances and oscilloscopes which in aggregate represent a substantial investment for institutions. It has not directly concluded on the extent, condition and nature of institutions' teaching and research equipment[1]. The study involved:

- a questionnaire survey of equipment management practice at every Scottish institution;
- the development of evaluative criteria by surveying good practice within and outside Scottish higher education and the comments of some suppliers of equipment; and
- the detailed evaluation of equipment management practice at eight institutions.

1.14 The institutions evaluated in detail were selected to cover the range of different types and sizes of university and a representative specialist college. At each the National Audit Office examined management processes and individual items of equipment, against the criteria established, with a view to identifying what

1 The adequacy of research equipment at United Kingdom universities has been the subject of a recent survey by the Policy Research in Engineering Science & Technology (PREST) team at the University of Manchester sponsored by the Committee of Vice Chancellors and Principals and the British Higher education funding councils. Their report is due for publication in June 1996. The objective of the study is to provide a realistic assessment of the cost of bringing the research equipment and facilities in the higher education sector up to date to enable the sector to maintain the quality of research and to improve international competitiveness.

practices were effective. A comparative analysis of equipment life-cycles is provided at Appendix 2. At the end of each visit the National Audit Office provided the institution with a management report detailing the good and poor practice found and making recommendations for improvements which needed to be made or considered. These are summarised at Appendix 3. Each of the eight institutions welcomed the individual management report on its equipment management practices and many of the recommendations have already been acted upon. The Chief Executive of the Funding Council has received assurances from each institution that its senior management is giving careful consideration to the findings of the reports, and he will continue to take an interest in their progress in this regard.

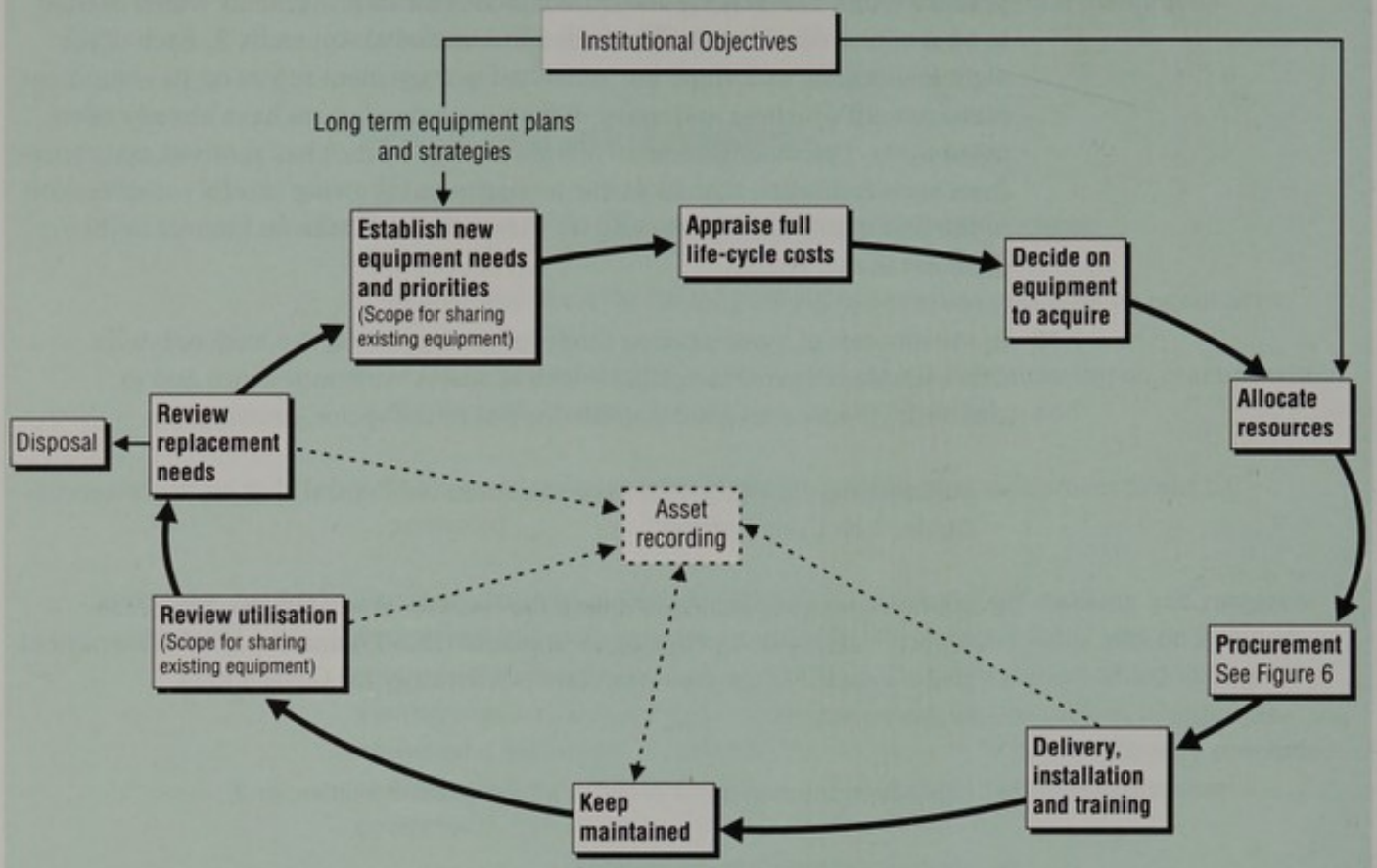
1.15 In the absence of a pre-existing model of good practice, the National Audit Office developed criteria against which to assess current practice and to establish guidance on good practice for use in the sector, drawing on:

- guidance on the equipment cycle set out in the Central Unit on Procurement Guide, 'Life Cycle Costing';
- guidance on purchasing including the National Audit Office's May 1993 report 'University Purchasing in England' (HC635) and the 1995 Government White Paper 'Setting New Standards: A Strategy for Government Procurement';
- equipment management practice at comparator bodies; and
- specialist input from consultants.

1.16 However, the worthwhile practice found at institutions in the Scottish sector itself provided a major element in determining how principles of good practice could be applied at institutions throughout the equipment life-cycle (Figure 4 overleaf) The criteria have been translated into the form of good practice checklists for planning and procurement (Appendix 5). The rest of this report presents the National Audit Office's findings in sections covering planning to meet equipment needs, acquisition and the managing equipment through the life-cycle, with the recognition that each of these phases is inter-dependent.

1.17 The National Audit Office acknowledge the important contribution made to their understanding of a novel and complex area by the Joint Working Group on the Management of Equipment Assets (paragraph 1.10), the specialist consultants engaged (TA Consultancy Limited and Peter Sachs) and the Chief Executive of the Funding Council drawing on his experience of management and accounting issues. They also acknowledge the helpful co-operation of the Scottish higher education institutions, particularly the eight examined in detail, and of the comparator bodies and suppliers visited.

Figure 4: Equipment life-cycle



Source: National Audit Office

Note: This diagram shows the various stages in the life-cycle of an item of equipment with reference to activities covered in this report.

Part 2: Planning to meet equipment needs

2.1 As Figure 4 shows, planning is an integral part of the equipment life-cycle. Without effective planning there is a risk that:

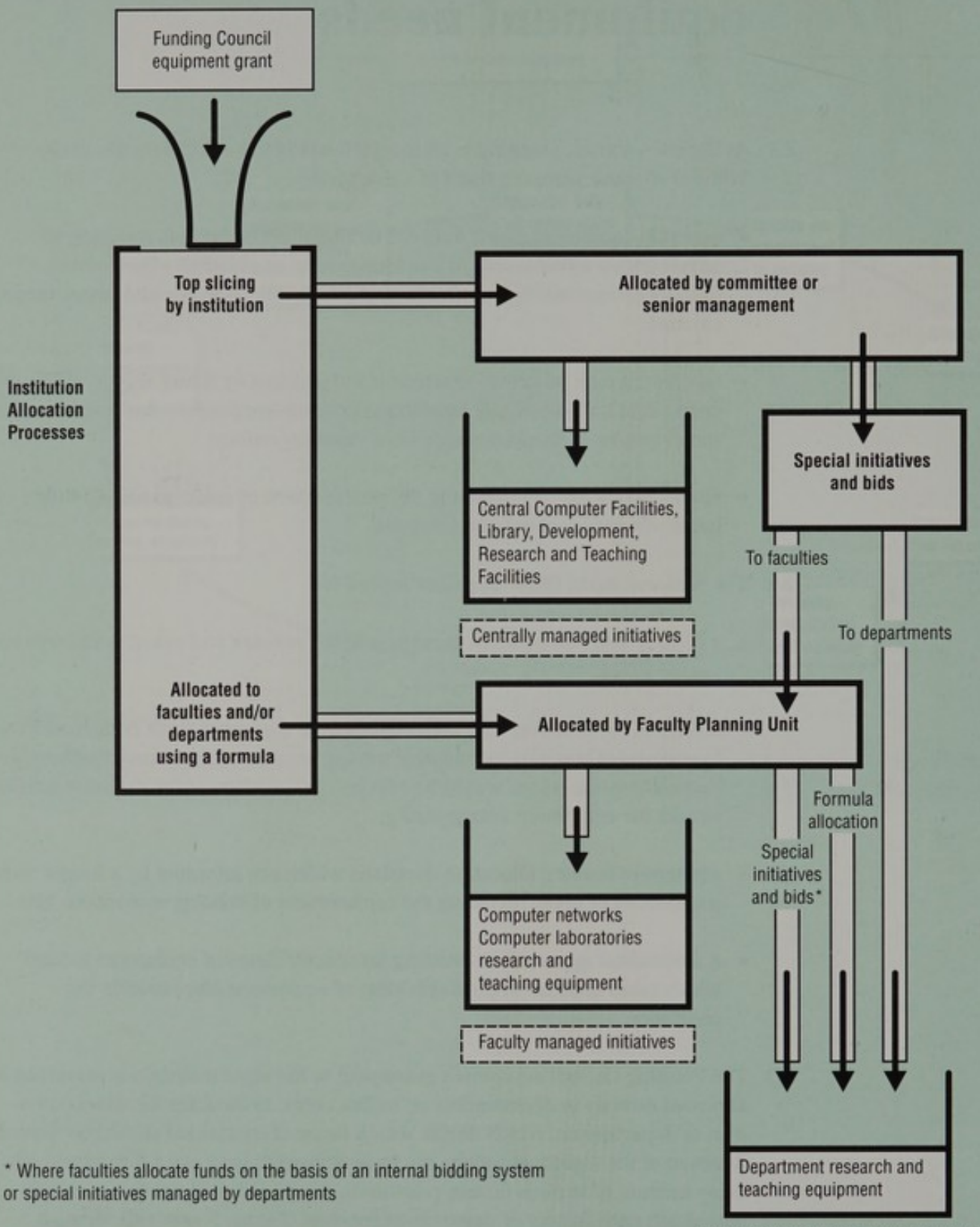
- essential equipment needs may not be identified or funded, resulting in unfavourable assessments of teaching quality or research effectiveness, thereby compromising standards of teaching and research and future income streams;
- equipment may be provided which is not justified by future use or where the need could have been met by sharing existing equipment - the acquisition of such equipment would not represent value for money;
- opportunities for co-ordinating the procurement or maintenance of new items of equipment may be foregone.

2.2 The National Audit Office therefore looked for:

- a central focus on equipment management, policies and practice throughout the life-cycle;
- a process for ensuring that the proportion of the institution's budget allocated to equipment is sufficient and is allocated appropriately to meet teaching and research needs, which would be effective in the event of the separate funding stream for equipment disappearing;
- equipment funding allocation decisions which are informed by a longer term perspective of need, including the replacement of existing equipment; and
- a methodical approach to deciding on specific items of equipment to fund which takes account of the availability of equipment elsewhere in the institution.

2.3 The Funding Council equipment grant paid to the eight institutions examined is allocated directly to departments or, in five cases, to faculties for allocation in turn to departments, which decide which items of equipment should be funded. At seven of the eight institutions the basic approach is to use a formula which takes account of various factors relevant to the need for equipment to decide how much each faculty or department receives (Figure 5 overleaf). In most cases the available grant is 'top-sliced', that is some funds are removed from the funds available for formula allocation. These are then allocated to central

Figure 5: Internal distribution of equipment grant within institutions



* Where faculties allocate funds on the basis of an internal bidding system or special initiatives managed by departments

Source: National Audit Office

Note: This diagram shows the mechanisms for allocating Funding Grant equipment at a typical larger higher education institution in Scotland

departments or to fund special initiatives for individual items of equipment for which bids are sought. Higher level planning and detailed planning and accountability are considered in turn below.

Higher level planning

2.4 Six of the eight institutions examined have a separate central committee with responsibility for determining how Funding Council equipment grant should be allocated, normally chaired by the Principal or a deputy. Such a committee would be well placed to address wider issues of equipment strategy or management, such as the adequacy or condition of the equipment base, longer term equipment needs, the scope for sharing and the management of equipment through its life-cycle. It could help to ensure that equipment issues are fully reflected in the institution's strategic planning process, and in concert with faculties which have an allocation role, could also draw up a strategy for allocating funding, along the lines set out in paragraph 2.2. In practice, at the institutions examined only one committee had adopted a wider role in relation to equipment management through the life-cycle (by reviewing central maintenance and the provision of electron microscopes across the institution, Example 26 in Part 4).

The allocation process

2.5 Allocation of funding by means of a formula and top-slice appeared to be generally accepted as equitable by staff within the institutions. Departments tend to favour formulae because they provide a reasonably guaranteed level of funding each year and give them discretion as to how to spend it. They are also consistent with the devolved budgeting and decision making arrangements in most institutions. By contrast comparator bodies examined by the National Audit Office make more use of bidding systems for larger equipment, which may reflect the corporate rather than collegiate nature of the bodies examined.

2.6 To reflect variations in equipment needs one institution examined allocates funds by a bidding system. Otherwise, it can be done by 'top-slicing'. At the six institutions examined, which did this, the top-slice proportion varied from 20 to 65 per cent. Most institutions examined funded specific needs and central departments in this way. At least four institutions earmark funds, of the order of £25,000 per appointment, either centrally or at faculty level, for new professors and some other new staff to help equip their research programmes.

2.7 In 1995-96 six institutions had central initiatives to support specific teaching or research equipment needs, and another had in recent years 'top-sliced' to modernise teaching laboratories. Seven of 16 faculties examined had such schemes. Examples 1 and 2 overleaf illustrates approaches relevant to teaching and research - further details are given in Appendix 5.

2.8 A consequence of allocating funding by means of a formula is that the annual allocation to departments may be insufficient to meet one-off needs for high-value items of equipment. Two of the eight institutions examined have

Examples 1 and 2: Special equipment funding initiatives and mechanisms

One institution has introduced an initiative to upgrade teaching laboratories using a top-slice of about 10 per cent of the annual equipment grant from the Funding Council. The funds are distributed on the basis of bids in April each year from planning units which are assessed by a small review group drawn from the Equipment Sub-committee membership.

Another institution transfers annually a top-slice of about 13 per cent from the Funding Council equipment grant to a high level research committee within the institution, which includes the Principal and vice-principals. This distributes funding against bids from academic departments and faculties, enabling the institution to, amongst other things, direct equipment funding toward maximising the development of research in support of its overall mission. The bids are judged and prioritised by a sub-committee for each faculty, against agreed criteria, who seek the views of faculty deans. Preference is given to the support of high quality researchers, high quality research rated departments, new staff, new research initiatives and the purchase of high value essential items of equipment which would be difficult to purchase out of departmental or faculty equipment allocations.

sought to resolve these problems by increasing faculty or department allocations through 'loans' in a particular year, with subsequent 're-payment' in subsequent years. They also allow departments to defer spending some of their allocations to 'save up' for future needs (Example 3). Example 4 illustrates the distortions which can be caused in the absence of such arrangements.

Example 3: Flexible funding arrangements

At one institution, departments can augment their funds by borrowing from a central fund and paying back the loan through reduced budgets in subsequent years. Borrowing requests are considered by the convener of the central equipment committee. The institution also allows departments to carry over unspent balances into the next year. For instance, one department was loaned £10,000 towards the purchase of a scintillation counter which could not otherwise have been afforded from the annual departmental allocation of £11,000.

Example 4 - Problems of funding large items of equipment

A department needed to replace a major component in its X-ray machine but identified that a better solution was to replace the machine by an Ultra-sound machine, costing around £30,000. Because this was beyond the department's means the faculty Dean decided to lease the Ultra-sound machine over five years. This decision was taken for funding reasons rather than to secure best value for money, and was not supported by a financial comparison with the option of purchase which a loan to the department would have facilitated. Coincidentally, the faculty was expecting to have to re-equip space released by departments moving into a new building and was therefore saving up money for this by deferring expenditure which could have been loaned to departments with more immediate needs.

Information available for planning

2.9 In support of the initiatives referred to in paragraph 2.7 above, one institution and two faculties had surveyed the adequacy and condition of teaching equipment. Otherwise the extent of information available on underlying equipment needs, depended on whether they received departmental plans. At five of the eight institutions the committee, or faculties where there is no

committee, receive plans for departmental equipment needs although in one case this lists only equipments which they could not fund from within their expected allocation. However, the extent of needs analysis underpinning them varies (paragraph 2.18 below).

2.10 At only two institutions did the overall planning process look more than a year ahead, although a third was planning to seek longer term forecasts and one faculty at a fourth was considering doing so. When there is inadequate information on underlying need, institutions do not have a sound basis for determining how much funding should be provided for equipment and how this should be allocated in a way which secures value for money and ensures that teaching and research standards are maintained. This will become even more important in the event of the separate funding council grant for equipment becoming subsumed into a single grant. Example 5 provides an example of good practice, which also provides a longer term perspective.

Example 5: Equipment planning

One institution requires each department to develop a five year Equipment Operating Plan, updated annually. The plan will specify equipment used and required and give details of expected operational use taking into account student numbers and of potential for inter-departmental sharing of equipment. The Equipment Operating Plan is to be accompanied by a Capital Expenditure Plan from each department which will translate the Operating Plan into monetary values based on quotations and other replacement cost information. Details of other capital and recurrent costs such as building works and on-going maintenance, repair or leasing costs are also to be included. The Plans are to be consistent with the institution's strategic plan and departmental priorities and objectives. They will be submitted to the high level committee responsible for equipment, for consideration and approval.

2.11 Information on shortcomings in the equipment available for teaching can be provided by the Funding Council's assessments of teaching quality which include comments on equipment provision where applicable. The National Audit Office's examination of a sample of these assessments did not disclose any general problems, which had not already been addressed. In 1995 the Funding Council had identified a common weakness in the provision of equipment in computer studies departments. To help institutions to address this the Funding Council instituted a specific one-off grant scheme totalling £2 million across all such departments. Institutions had to plan and budget for this funding outside the annual planning framework because of the timing of the allocations and the short timescale in which institutions were required to spend them.

Longer term planning

2.12 At no institution was there a longer term plan for equipment pulling together the longer term plans of faculties or departments in a way which would allow them to take decisions on the funding for equipment informed by future needs. However, six of the eight institutions examined had developed or were developing a strategy for information technology which provided a longer term perspective of equipment needs in line with the guidelines issued in December 1995 by the Joint Information Systems Committee[2] This is particularly important at a time when the amount of short life-cycle information

technology equipment is growing. The strategies examined were comprehensive documents, which stated clear objectives and timescales both in the short and longer term. For instance, three set targets for the number of full-time equivalent students per computer by a specified date.

2.13 However, at only four of the eight institutions examined did the information technology strategies forecast the cost of funding equipment in support of the strategy. At none of the institutions examined did the information technology strategy apply to equipment not purchased from Funding Council equipment grant, leaving the committee responsible uninformed as to the extent to which it is meeting objectives relating to the provision of such equipment for the institution overall.

2.14 One institution uses information on research grants to inform allocation decisions, to enable it to provide a contribution to the equipment element in bids for research council grants and improve their chances of success. Otherwise departmental or faculty plans provided to central committees or faculties generally covered only expenditure from the Funding Council equipment grant, so that planning takes places with incomplete information. This deficiency will become more pronounced with the growth in equipment funding being channelled though the Research Councils (paragraph 1.8), and possibly the subsuming of equipment grant into a single Funding Council grant from which each institution will have decided how much should be spent on equipment.

Action points

2.15 Many examples of good equipment planning practice were found at a number of the institutions examined. Institutions need to build on these examples if they are to be confident that they can sustain an adequate base of teaching and research equipment throughout its life-cycle. To do this many institutions need to:

- develop within existing committee structures an appropriate high level forum to consider broad equipment management issues, including those raised by this report;
- develop, as an integral part of the strategic planning process, an institution-wide plan for equipment priorities and spending covering a time frame of at least four years;
- review the balance between formula and top-slice allocation of funding to ensure that sufficient support is given to initiatives to address specific needs identified by the planning or quality review process;

2 The Joint Information Systems Committee are funded by the three United Kingdom Higher Education Funding Councils and the Department of Education Northern Ireland to stimulate and enable the cost effective exploitation of information systems and to provide a high quality national network infrastructure for the United Kingdom higher education and research councils community. They established a steering group to examine ways in which the community could be helped to draw up their own information strategies, which produced the guidelines referred to.

- consider introducing funding arrangements such as loans and carry forwards of funds to help to ease peaks and troughs in departmental expenditure; and

- strengthen the links between the central framework for the planning and management of information technology with other equipment planning processes.

Detailed planning and accountability

2.16 Departments are responsible for the detailed specification of equipment needs, and in most cases for deciding on which equipment should be funded. They need to ensure that replacement needs are met in the light of the suitability, condition and utilisation of existing equipment and over a timeframe of several years. There should also be procedures for reporting back on how equipment funding has been spent.

2.17 The extent to which departmental planning is conducted over a longer, four or five year, time frame varies considerably between institutions and between departments within institutions. Nearly all the 31 academic departments examined in detail prepared formal annual plans and eight had extended this planning process beyond one year (Example 6), in a way which would allow them to prioritise future as well as immediate needs.

Example 6: Longer term equipment planning by departments

At one institution a department has developed a five year rolling plan of equipment needs and has a facilities committee which considers bids for expensive equipment annually and prioritises these against the rolling plan. Another department is developing a five year forward look of equipment needs. To inform this the department's chief technician has conducted a condition survey of all equipment worth £5,000 or more.

2.18 At the institutions examined, decisions on how to spend their allocations are usually taken by the department's management group or by the department head acting in consultation with staff, generally based on staff submitting bids at a specified time of year. Many departments focused on a particular need, such as upgrading teaching laboratories or developing information technology provision, although the assessment of needs was in only a few cases explicit. For instance one department had surveyed equipment and its utilisation to identify duplication and gaps in provision, whilst some of the longer term plans focused on replacement needs.

2.19 The National Audit Office examined the cases made for acquiring 96 items of equipment across 31 departments at the institutions examined. Most were justified by reason either of specific teaching or research needs, or the high utilisation, technical obsolescence or unreliability of existing equipment. The justification appeared to be sound in all but four cases, illustrated by Example 7 overleaf.

Example 7: Justification of equipment need

One department purchased a Log Periodic Antenna and Spectrum Analyser. It already had one such Analyser and in 1993 a funding allocation was unexpectedly made for the second. However, this second instrument is too sensitive and picks up many unintended radiations. The Analyser, costing £12,200, has not been used to date and future use depends on the number of third year students and their projects. This case illustrates the importance of considering carefully user needs and ensuring that the equipment specification meets these.

2.20 The National Audit Office's examination of equipment purchases showed that departmental staff tend to spend up to their budget (Example 8). This raises doubts whether value for money is secured when equipment is procured. On the other hand there were several examples of heads of departments deliberately squeezing budgets so as to encourage staff to negotiate harder with suppliers for savings. This money is then put back into the department to purchase more equipment.

Example 8: The impact of budgets on value for money

In one department, for each item of equipment, an indicative budget was set and the department nearly always ended up spending that sum. For example:

- an indicative budget of £16,000 was set for a new Autoclave and a decision made to purchase one for this amount despite three other quotations being lower.
- an indicative budget of £10,000 was set for purchasing new computing equipment and the final purchase price was £9,980.

In these cases the departments disclosed the indicative budget to suppliers at an early stage compromising their negotiating position.

Accountability

2.21 The extent to which institutions appraised the effectiveness of equipment procurement varied. Example 9 illustrates good practice of central monitoring, whilst Example 25 (Part 4) shows how one institution expects departments to make a post-purchase appraisal of equipment acquisitions to gauge whether value for money has been achieved and whether items are being utilised as forecast. There was scope for other institutions to emulate these practices.

Example 9: Accountability arrangements for equipment funds

At one institution where some funding for research equipment is allocated through a bidding process, all recipients of equipment grant must report on the use of it approximately two years after the award of the grant. All grant reports are graded by the Committee as either highly satisfactory, satisfactory or unsatisfactory. The gradings influence the Committee's decisions on future applications from staff.

2.22 Feedback from departments on how they have spent their equipment funding allocations is necessary to inform central and faculty decisions on how best to allocate funding and to confirm that allocations have been spent as planned. Example 10 shows how this can secure accountability for the expenditure. Four of the eight institutions examined required departments to report back in this or similar ways.

Example 10: Departmental accountability

One institution's central equipment committee requires faculties to provide three year rolling equipment plans, supported by departmental plans, as part of its strategic plan for the period, to demonstrate that expenditure from the allocation to faculties is properly justified. The faculty plans are then used to assure accountability for the actual expenditure of the Funding Council equipment grant. Deans of faculties check that orders for equipment are consistent with the approved equipment plans and that the proper authorisation to purchase has been given. Departmental heads can comment on the impact of equipment purchased, or not purchased, in the following year's departmental plan.

2.23 Information technology strategies at five of the eight institutions examined (paragraph 2.12 above) sought to increase the extent of central planning and management of information technology provision or to bring it within a common framework, under the aegis of the computing services department. This was with a view to improving cost-effectiveness through standardisation of computer hardware and software and hence reduced costs throughout the life-cycle. At five institutions, departments or faculties are responsible for planning the provision of such equipment without any reporting line to the information technology committee, leaving it unaware of the effectiveness of the strategy.

Action points

2.24 Departments generally have a methodical approach to planning which often focuses on and/or surveys equipment needs and sometimes looks forward several years. Most equipment acquired as a result of this planning appeared to meet these needs. However, institutions should ensure that departments:

- develop longer term plans and review underlying needs for equipment;
- pay attention to checking the specification and setting a challenging budget for approved items of equipment which provides an incentive to apply good purchasing practice;
- obtain feedback on the effectiveness of equipment spending and provide feedback to the central equipment committee or faculty as appropriate; and
- co-ordinate planning for information technology more closely with the computing services department reporting back on compliance with the institution's information technology strategy.

Part 3: Acquisition

3.1 Institutions buy most teaching and research equipment. However, the National Audit Office found seven cases of industry donating equipment to institutions, often in connection with joint research projects (Example 11). These arose from the close links with industry which, it was evident to the National Audit Office, academics work hard to cultivate and which are consonant with Government initiatives to establish strong links between industry and higher education for their mutual benefit.

Example 11: Donation of equipment

A department at one institution was given a new make of dry etching pump worth £17,000 in return for the department running trials on it. The department indicated that over the years it had secured about £2 million's worth of donated equipment for its sterile semi-conductor processing room.

Principles of good procurement practice

3.2 The 1995 White Paper "Setting New Standards: A Strategy for Government Procurement" states that:

"the Government's strategy for procurement is to achieve continuing improvement in value for money, based on whole life costs and quality, and to enhance the competitiveness of suppliers through the development of world class professional procurement systems and practices".

3.3 The messages in the White Paper are as relevant to equipment as they are to any other area of non-pay expenditure. The Strategy builds on earlier good practice promulgated by Government, most notably through the Central Unit on Procurement and its associated guidance notes.

3.4 The 1993 report on an examination by the National Audit Office of how universities in England ensure proper control of purchasing and the extent to which they achieved demonstrable and other value for money savings and avoided waste ("University Purchasing in England", HC 635/92-93) included 16 action points for institutions to improve purchasing practices and the achievement of value for money. Although not specific to equipment purchasing, these are applicable to the institutional framework within which it takes place and most of them are relevant to the way equipment is purchased. In their report on this subject the Committee of Public Accounts (HC124/93-94) noted that considerable progress had been made in improving purchasing practices at many universities but that many initiatives had yet to be implemented fully and that a sustained effort was needed if the significant savings possible were to be achieved.

3.5 The National Audit Office survey showed that at all but one of the Scottish institutions there is a mixture of decentralised and centralised purchasing, with the majority of equipment items purchased by departments. This reflected devolved budgeting procedures and the widespread view of academics that they are best placed to know in detail about the equipment which fulfils their teaching and research needs, and know the supplier market well. The decentralised approach to equipment purchasing is consistent with experience at the comparator bodies examined by the National Audit Office.

3.6 This section of the report sets out the National Audit Office's findings on the way departments purchased equipment and the scope for the central purchasing function to support this activity. It then reviews the extent to which the purchasing role generally has developed along the lines indicated in the National Audit Office's report on University Purchasing in England. Conclusions relevant to the implementation of the action points in this report are included in paragraphs 3.33 and 3.41 below.

Departmental purchasing

3.7 The National Audit Office examined the procedures for securing value for money in 31 departments at eight institutions. This included detailed examination of the purchase of 96 items of equipment ranging from major items of expensive and sophisticated research equipment such as electron microscopes and mass spectrometers (Appendix 2), through less expensive teaching and research equipments such as autoclaves to various types of computer workstation. They also discussed with six suppliers of equipment to Scottish (and other) institutions the current purchasing arrangements and whether there was scope for these to be improved to the benefit of both parties (Appendix 4).

3.8 From available guidance on effective purchasing, such as that disseminated by purchasing co-ordinators, the National Audit Office looked for:

- a proper market search leading to competitive tenders or quotations, and second round negotiations;
- action to secure value for money where there was only one supplier;
- an evaluation of which supplier provided the best value for money in terms of whole life costs, particularly maintenance and the provision and cost of spares; and
- savings through combining purchases of common items or negotiating advantageous leasing deals.

Competition and negotiations

3.9 It was evident that departmental purchasers are generally aware of the need to secure value for money in purchasing equipment although there is some scope for improving strategies for achieving this. Appendix 2 illustrates how different departments purchased similar major items of equipment, and in most cases exemplifies good practice. The view of the suppliers surveyed was that academic purchasers drove a good deal for the most expensive equipments, say over £100,000. Below this level some negotiated well 'in a high street manner', that is they knew what they wanted to buy and the size of their budget and matched the two. However, often they will tell suppliers their budgets and only ask for discounts under budget pressure (Example 8 in Part 2).

3.10 Departmental purchasers obtained competitive quotations or tenders for 73 of the 96 items examined, and these often provided a starting point for negotiation. Appendix 2 provides examples of this for high value equipment, but they were noted in relation to some low value equipment as well (Example 12). Example 13 shows how quality can be ensured as part of this process.

Example 12: Effective use of competition in purchasing equipment

One department needed to upgrade its undergraduate teaching microscopes to a higher specification. Four suppliers submitted quotations against the department's specification. The best offers were for 19 and 20 microscopes at around the same price. The department used the competitive position to its advantage and was successful in negotiating the purchase of 25 microscopes (without degrading the specification) for 20 per cent less than the original offers for 19-20 microscopes.

Example 13: Taking account of quality in competition

One department purchased a new Fluorescence Activated Cell Sorter. There were two main suppliers of the equipment. The Department sought specifications for the machines and each supplier loaned a machine to the Department for a week to trial it. The Department also examined similar machines in the other departments of the institution. The key criteria used to judge the machines were capability, reliability and user friendliness. During the trial week one machine kept breaking down. The Department negotiated with the other supplier a deal with training for two staff and installation and delivery within the overall price.

3.11 However, in 10 of the 96 cases that the National Audit Office examined there was evidence of departments either paying lip-service to competition by seeking quotations but still going with a favoured supplier without being able to fully justify this, or not seeking competitive quotes or tenders at all even though there was clear scope for doing so(Examples 14 and 15 overleaf). In 15 of the cases examined little effort was made to improve on the tendered deal, in relation either to upfront or through-life costs, and in five cases the scope for negotiation was compromised by notifying the supplier of the available budget at an early stage, Example 8 (Part 2).

Examples 14 and 15: Inadequate competition

One department purchased a new Atomic Absorption Spectrometer. There were no special requirements for the machine and the buyer was aware that there were around six suppliers able to meet the specification but chose instead to buy from the company from which a similar purchase had been made two years before.

Another department purchased a new Autoclave to support a new professorial appointment. This purchase was not subject to any competition even though there are many suppliers of Autoclaves. Instead the supplier favoured by the academic concerned was chosen.

3.12 The process of market search and negotiation resulted in good deals being obtained through procuring second hand equipment in three cases; ex-demonstrator models in seven cases; and trade-ins of old equipment in four cases (Example 16).

Example 16: Savings on ex-demonstrator models and trade-ins

At one institution, different departments obtained discounts of 20, 30 and 40 per cent on three ex-demonstration items of equipment, in the first case even though the item had been demonstrated only at the institution itself. One department achieved a further 20 per cent discount on two computer work-stations by trading in old machines and another department negotiated a 40 per cent discount on a new Network Analyser for the trade-in of old equipment.

Single supplier purchasing

3.13 Because researchers often need equipment which is technologically at the leading edge there can be cases where only one supplier is able to meet the specification. This was less of a problem than expected and one comparator body examined indicated that where the specification is very advanced, several suppliers can be approached competitively to develop their equipment to the level required. Alternatively, obtaining quotations for equipment of a lower specification may provide a lever for negotiations (Example 17). Even where there is only one supplier, there may still be scope for negotiating a better deal, such as by obtaining a price breakdown and negotiating over standard components within the equipment. Of the five items examined where there was only one supplier, a better deal was negotiated in one case.

Example 17: Application of competition despite differences in specification

One department demonstrated the value of competition when purchasing an Atomic Absorption Spectrometer. A substantial discount of £5,406 was secured on the technically superior instrument, so bringing the price to only £1,000 more than the other two tenders offering inferior performance machines.

Life-cycle cost evaluation

3.14 The Central Unit on Procurement estimate that a purchasing decision normally commits the user to over 95 per cent of through-life costs. The recurrent costs of information technology equipment are particularly significant relative to the purchase price, and the purchases made by computing services departments generally gave full weight to the whole life-cycle (Example 18).

Example 18: Comprehensive evaluation of important factors in purchasing decisions

At one institution the computing services department worked with the purchasing co-ordinator to develop an evaluation model to take account of through-life costs, particularly maintenance, and non-quantifiable factors, based on a model developed by the Central Computers and Telecommunications Agency. Tenders were obtained from five firms and the second cheapest chosen because of superior non-price factors.

3.15 For 14 of 96 items examined there was clear evidence of academic departments giving serious consideration to other costs in the equipment life-cycle beyond initial cost. Otherwise the selection of equipment paid little or no attention to minimising the through-life costs of equipment, especially maintenance and the availability and cost of spare parts. The suppliers surveyed believed that institutions could save money by negotiating on delivery, training and post-sales costs, but said that they are never, in their dealings with institutions, asked to quote for downstream maintenance at the purchase negotiation stage nor asked about the lifetime availability of spares. These statements were countered by the practice adopted in only a small number of cases examined.

3.16 A number of the equipment items procured by departments are common to different applications within and between departments. If orders for such equipment can be combined savings can arise through economies of scale and a strengthening of the institution's negotiating position. Whilst five cases were noted of departmental needs being combined, there were few cases of combining orders between departments other than the arrangements for bulk purchase of computer equipment (paragraph 3.24). One exception was the £80,000 (18 per cent) saving on the purchase of two nuclear magnetic resonance spectrometers needed by different departments in the same institution. Another is referred to in Example 20.

3.17 Recent revisions to the Financial Memorandum between the Funding Council and institutions make it clear that they can use equipment grant to fund the lease or hire of equipment. The National Audit Office found only one example of equipment being leased or hired rather than purchased (Example 4 in Part 2). The option of leasing or hiring had not been considered in relation to any of the 96 items of equipment examined in detail and suppliers commented on the absence of any consideration of leasing. Institutions did not believe that leasing or hiring could offer financial benefits, although this view had rarely been tested. Hiring is a common private sector business practice for short-life items such as information technology equipment.

Action points

3.18 Whilst there are many good examples of good purchasing by departments, there is scope for institutions to improve on their performance and hence improve value for money, by:

- obtaining a better deal through competitive procurement where there is more than one supplier, and negotiating in all cases;
- taking account of downstream as well as initial costs in choosing equipment;
- seeking to combine orders for common equipment, within and especially between departments; and
- considering equipment leasing or hiring in line with the flexibility provided by the recent revision of the Funding Council's Financial Memorandum with institutions.

Equipment purchasing co-ordination

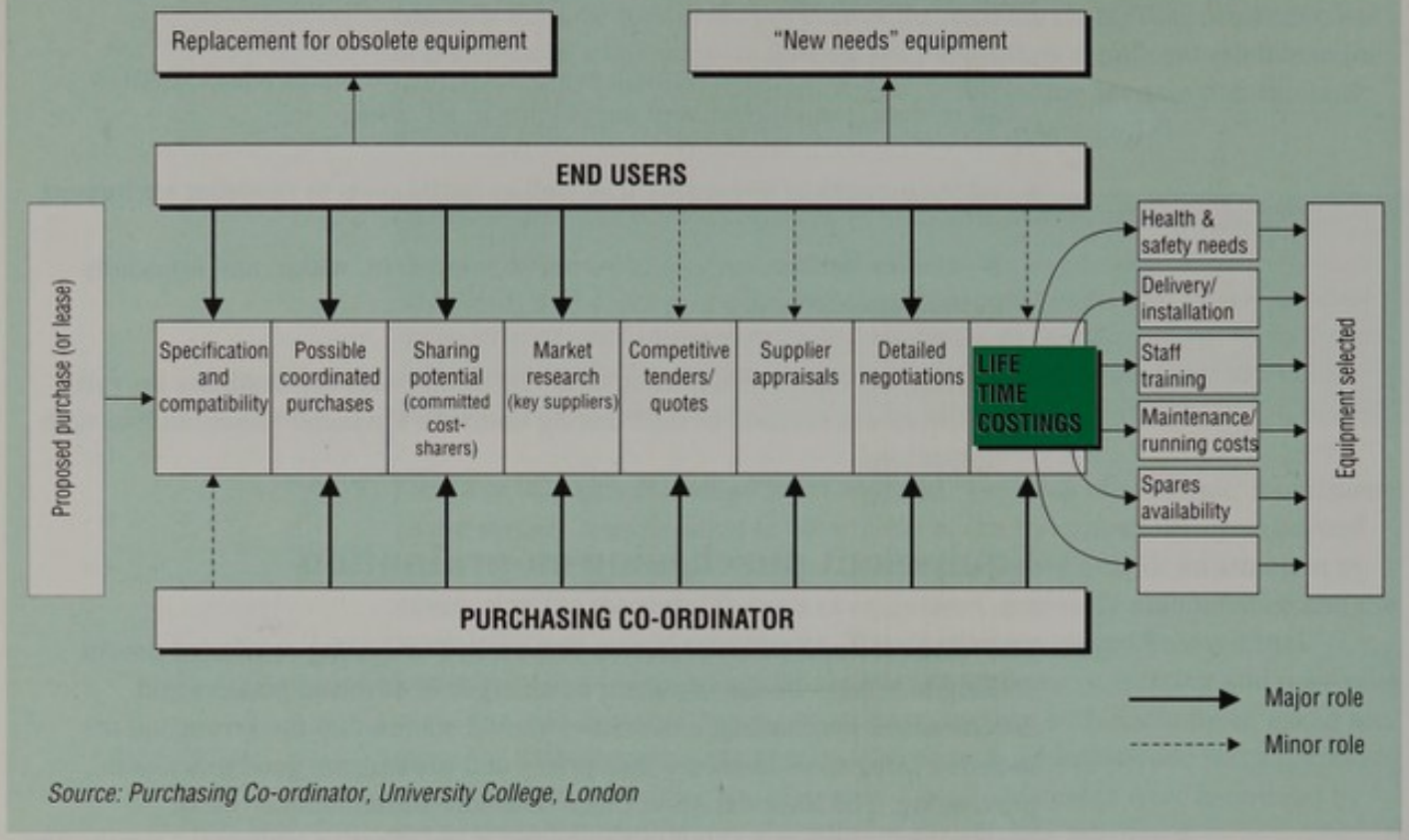
3.19 The National Audit Office report on University Purchasing concluded that in seeking to secure the management advantages of devolved budgets and decentralised purchasing, universities should ensure that the arrangements included safeguards to secure best prices and promulgate good practice in purchasing. The National Audit Office therefore examined the role of professional purchasing staff in promoting more effective equipment purchasing.

3.20 The equipment suppliers surveyed (Appendix 4) believed that fewer and more professional purchasers at institutions would produce savings for the institutions. The current fragmentation of purchasing increases the costs of making sales. The level of discount offered is often left to the salesman and for personal computers in particular central negotiators ask for additional discount and are sometimes successful.

3.21 Purchasing co-ordinators had been involved in only 10 of the 96 purchases of equipment by academic departments examined. Purchasing co-ordinators believe that they could bring professional purchasing skills to bear on equipment purchases, and realise significant savings. However, the need for substantial academic input to the purchasing process probably precludes a significant expansion in a more centralised approach to equipment purchasing. The National Audit Office therefore looked for a partnership between end-users and professional purchasing staff (Figure 6 overleaf).

3.22 The extent to which purchasing co-ordinators have applied their professional skills to equipment purchasing varies. At five of the eight institutions the purchasing co-ordinator is routinely consulted for purchases falling above the threshold (around £150,000) for compliance with the relevant European Union Directive on competition in purchasing. This is important because of the risks that non-expert staff might inadvertently breach the Directive and leave the institution open to a potentially expensive challenge by an aggrieved supplier.

Figure 6: Institutional equipment procurement



Source: Purchasing Co-ordinator, University College, London

These purchases also have the potential for large savings. For example one purchasing co-ordinator helped to save £57,318 on the cost of a DNA sequencer (17.7 per cent of the purchase price) through post-tender negotiations.

3.23 None of the eight institutions examined required equipment purchases below the European Union threshold to be referred to the purchasing co-ordinator. However academic departments at two of them had started to consult the purchasing co-ordinator on such purchases and occasionally consulted him at a third. At a further institution, the purchasing co-ordinator reported that he was being consulted as a result of the National Audit Office management report to his institution.

3.24 Furthermore the computing services departments, at all seven institutions examined where such departments have a significant procurement role, worked closely with purchasing co-ordinators on the purchase of costly central facilities and have developed purchasing expertise. At five institutions they have worked together to negotiate framework agreements for some or all of the three generic types of end-user computers (such as personal computers), which give users a choice of equipment from a small number of suppliers which can be called off at standard competitively tendered rates. These were considered to provide good value for money (Example 19 opposite) except where they had been allowed to become outdated. Given the scale of institutional purchasing of such items, they also help to ensure compliance with the European Union Directive.

Example 19: Framework agreement good practice

At one institution, the purchasing co-ordinator worked with a 'commodity group' (see paragraph 3.26 below) of users and the computing services department to draft a framework agreement for personal computers, which took account of all aspects of value for money, as well as price, including a maintenance contract beyond the warranty period. Reducing the number of suppliers to the institution of such equipment from 40 to six across an annual spend of £1.2 million strengthened its negotiating position and acted as a lever to secure after sales service. All departments are expected to stay within the terms of the agreement and provide monthly reports to the purchasing office on purchases subject to it. Internal audit monitor for compliance.

3.25 There was only one example of comprehensive reporting back of purchases against the framework agreements, although at another institution departments annually report such purchases from Funding Council grant, but not from other sources. The lack of feedback could be of concern because the discounts likely to be offered by suppliers depend on the expected volume of sales. Without feedback, the computing services department cannot readily follow up any problems arising with a particular supplier (as had happened at one institution), is in a weaker position to negotiate revisions to the agreements and cannot act where staff, for no good reason, fail to use the agreements. Monitoring of compliance could be a task for internal audit as part of their review of purchasing practices (paragraph 3.38).

Co-ordination of purchasing

3.26 The partnership model of good practice sought by the National Audit Office has been developed at several institutions across the United Kingdom by the purchasing co-ordinator disseminating good practice and establishing bulk purchasing arrangements through a network or committees of 'lead purchasers' for different commodities, including equipment. The 'lead purchaser' would be an individual within each department that has a major equipment spend who would be an expert focal point for giving advice to others within the department and for the exchange of purchasing information and expertise with other departments and the purchasing co-ordinator.

3.27 Several departments had given one person 'lead purchaser' responsibilities which encompassed equipment and who had developed, with training, some professional skills and competence. One of the eight institutions examined has established a part-time buyers group covering all commodities and another has established specific 'commodity groups' including a group for smaller computers. Otherwise there was no formal co-ordinating mechanism, and no structured opportunity for departments to share market intelligence or combine purchases of common items of equipment.

3.28 Benefits should also arise from institutions combining their purchasing power in sector-wide contracts. Institutions are able to benefit from advantageous arrangements negotiated by the Scottish purchasing consortium for higher education.[3] However, the consortium has not established arrangements covering equipment other than very low value items. The National Audit Office consider that there may be scope for it to fill this gap.

Information on purchasing activity

3.29 For a partnership model to work, purchasing co-ordinators need to have access to information on forthcoming equipment purchases. This would help them to identify opportunities for combining purchases to achieve economies of scale, and cases where the application of their skills could secure significant benefits or compliance with EU Purchasing Directives. It could be achieved using existing procedures, such as departmental equipment plans, copies of approved research council grant applications or equipment bids approved under special initiatives or research committees. The National Audit Office University Purchasing report identified the provision of better information on purchasing as a matter requiring action.

3.30 At none of the eight institutions examined did the purchasing co-ordinator receive systematic advance intelligence of intended equipment purchases, although at one institution he can find out about and influence some forthcoming purchases through committee membership, Example 20. On the other hand two departments at one institution and in the same building independently purchased identical colour photocopiers at the same time, with one paying £2,000 more than the other.

Example 20: Advance warning of intended purchases

At one institution, the purchasing co-ordinators' membership of a faculty equipment committee helped to secure significant cost savings. The co-ordinator identified that five separate departments intended to buy new centrifuges. By combining the orders and conducting a formal tendering process, the institution secured the centrifuges for £10,000 (26 per cent) less than the prices forecast for the individual items.

3.31 Purchasing co-ordinators would also benefit from knowing what equipment has been purchased, to help focus future activity (as at Example 21 opposite). At one institution the purchasing co-ordinator receives copies of purchase orders for this purpose. At most of the eight Scottish higher education institutions examined, new central management information systems were either being implemented or planned which included a purchasing module. These modules had been implemented at only one institution. There the purchasing co-ordinator was able to monitor purchasing activity.

3 Six regional university purchasing consortia covering the whole of the United Kingdom negotiate with suppliers, generally by competitive tender, arrangements that universities and other higher education institutions can use. The consortium covering Scotland and Northern Ireland is titled the 'Joint Consultation and Advisory Committee on Purchasing'.

Example 21: Analysis of purchasing profile

At one institution the purchasing co-ordinator has undertaken an analysis of all equipment expenditure which shows that the £3 million's worth of purchasing his office processes each year is predominantly on large numbers of low-value items required by many departments whereas most of the spend by departments (£42 million per annum) is on small numbers of high value items required by few departments. An analysis of main suppliers (over £100,000) to the institution reveals that the vast majority supply to departments and not to the purchasing office. This type of analysis is important to inform a purchasing strategy which seeks to make a substantial impact on all purchasing.

3.32 For many institutions the absence of management information systems was attributable to delays in the Management and Administrative Computing Initiative. This was launched in July 1988, to establish a systematic approach to the generation, collection and analysis of data of system wide relevance in the management and control of institutions' assets and resources for all British universities. At no institution examined had the Initiative delivered a purchasing system.

Action points

3.33 The rate at which the institutions examined were moving towards the establishment of a partnership between the purchasing co-ordinator and departmental equipment purchasers, was variable, although at several institutions the purchasing co-ordinator had helped secure significant savings. Progress in improving the information available to purchasing co-ordinators since the earlier National Audit Office report has been very limited. Some or most institutions need to:

- secure greater influence for the purchasing co-ordinator in departmental equipment purchasing;
- develop competitively tendered framework agreements against which users can call off commonly procured information technology equipment;
- consider establishing a network of departmental purchasers to act as a focal point for the exchange of information and expertise;
- work with the Scottish purchasing consortium for higher education to develop arrangements for the supply of equipment which benefit from the Scottish institutions' combined purchasing power; and
- improve the information available to purchasing co-ordinators on planned equipment purchases by departments.

Promulgating professional purchasing

3.34 Given the extent to which purchasing is commonly decentralised (Example 21), it is important that there are mechanisms to promulgate professional purchasing practices. The National Audit Office looked for a framework in line

with the accepted principles of good practice, (paragraphs 3.2-3.4 above), particularly those set out in their earlier report on University Purchasing in England. This should include:

- senior management support for the professional purchasing co-ordinator reflected in an appropriately senior line manager and a high level forum in which purchasing policies and procedures and their impact are considered (Example 22);

- a purchasing strategy which sets targets for savings and annual reports on progress against this, including savings realised, made to the senior management or governing body of the institution;

- a purchasing manual which sets rules concerning basic procedures necessary to ensure propriety and gives guidance on purchasing methods conducive to achieving value for money;

- procedures to monitor compliance with good practice in purchasing particularly through the work of internal audit; and

- training for all those involved in purchasing, which to be cost-effective implies some control over who is authorised to purchase.

Example 22: High level purchasing forum

The purchasing forum at one institution is a sub-committee of the Finance Committee and is chaired by a Deputy Principal. Other members are the Secretary, finance officer, purchasing co-ordinator, convener of the Finance Committee, an academic representative from each of the science and engineering faculties, and an external purchasing consultant. Further members are co-opted as and when necessary. Its remit is to:

- formulate a corporate purchasing policy and purchasing strategies and procedures;
- oversee satisfactory implementation and compliance with the above;
- examine all areas of expenditure on goods and services;
- receive from the purchasing co-ordinator reports on purchasing initiatives, savings, targets and performance;
- consider procurement legislation, advise and take action as appropriate; and
- report to the Finance Committee.

3.35 Figure 7 opposite indicates the extent to which the purchasing framework at the eight institutions meets elements of the criteria set out above. All institutions examined were aware of the importance of building on the findings in the National Audit Office report on University Purchasing and guidance on purchasing issued by the Committee of Vice-Chancellors and Principals (CVCP) and others. Five of the institutions had appointed a new purchasing co-ordinator to an enhanced post since 1993. One of these had achieved savings of around £100,000 in two years despite being a part-time appointment.

Figure 7: Extent of application of practices to promote good purchasing at the eight institutions examined

Criteria	Total (out of 8)
Professional approach to purchasing which is overseen by suitably experienced purchasing co-ordinator	7
Purchasing co-ordinator reporting to member of senior management	7
A high level forum in which purchasing policies and procedures and their impact are considered	5
Purchasing strategy developed	5
Targets set for savings	2
Annual report on purchasing produced	3
A purchasing strategy and annual reports on progress against this, including savings realised, presented to senior management or the governing body	3
A purchasing manual which sets rules concerning the procedures necessary for propriety and gives guidance on purchasing methods for achieving value for money	6
Internal Audit monitor compliance with good practice in purchasing	5
Purchasing co-ordinator has a co-ordinating role for development of purchasing expertise and for training of all staff involved in purchasing	2

Source: National Audit Office examinations of Scottish higher education institutions

Purchasing manuals and monitoring

3.36 The absence of mandatory rules on obtaining quotations, taking steps to minimise the use of non-competitive procurement and ensuring a proper relationship with suppliers, can impact on the propriety and value for money secured by decentralised purchasers. It may also make it difficult for an institution to take disciplinary action if impropriety is disclosed. Example 23 sets out good practice in monitoring compliance and shows why one institution made its manual mandatory. There is scope for manuals at most institutions examined to provide more guidance, such as in the form of a checklist on matters which departmental purchasers should consider, in line with Appendix 5.

Example 23: Application of the purchasing manual

At one institution the purchasing co-ordinator each year monitors compliance with the purchasing manual through a questionnaire and visits to departments. The findings from this exercise are included in the annual report on purchasing, highlighting breaches of procedures, such as the absence of segregation of duties. After non-compliances were recorded in the 1993-94 annual report the governing body decided that adherence to the manual should be mandatory except with the prior agreement of the purchasing co-ordinator.

3.37 The National Audit Office looked for the application of controls to secure propriety and control in purchasing, such as those covering ordering, authorisation and separation of duties, about which their University Purchasing report had recommended institutions needed to satisfy themselves. In the 31 departments examined these procedures were largely in place, except that:

- the 10 cases where favoured suppliers were used could have given rise to accusations of improper partiality, although there was no evidence of this;
- separation of duties in raising orders and authorising invoices was missing to some extent in three departments, especially for equipment purchases funded by research grants;
- at one institution purchase orders were often sent to suppliers unpriced and without the terms and conditions printed on them; and
- in three departments insufficient documentation was raised to justify a purchase decision.

3.38 Internal auditors have an important role in ensuring that adequate purchasing controls are in place and are complied with. As Figure 7 shows this is discharged at all but three institutions. Some of their reports noted lapses in controls and recommended corrective action. At two of the eight institutions examined the internal auditors had also reviewed the value for money given by the current purchasing arrangements, as recommended in the report on University Purchasing in England.

Training

3.39 Departmental staff are not purchasing professionals but will often be negotiating with staff well trained in selling techniques. Training is as important for them as for purchasing professionals. One of the eight institutions examined had acted to address this (Example 24). The other seven institutions which relied on externally provided training, had been less successful in arranging training. Figures from the Committee of Vice-Chancellors and Principals' Central Purchasing Co-ordinator show a low take up of the courses on offer. Only 57 individuals from Scottish institutions had signed up for courses in the year ending 31 March 1996, and six of the ten courses for which they applied were cancelled due to lack of support.

Example 24: In-house purchasing training programme

The purchasing co-ordinator at one institution led a series of basic training courses which everyone with authority to purchase has been strongly encouraged to attend. So far 300 people have attended. Because the institution has a system of authorised signatories, to control who can authorise orders, the appropriate staff can readily be identified. The National Audit Office discussed the impact of the courses with some of these staff. They had clearly benefited from the training. Approaches to the purchasing co-ordinator were, for example, increasing. Similarly the trained buyer in one department found an increasing number of academics turning to him for advice.

3.40 The evidence of the benefits from training at Example 24 contrasts with some of the purchasing practices documented above. The cost-effectiveness of training would be increased were the number of people allowed to sign purchase orders restricted, as at the institution referred to at Example 24. At the institutions examined, the total number of staff making purchases was mostly unknown but was considered to be large.The National Audit Office reported adversely on the large number of people who could make purchases in the report on University Purchasing In England.

Action points

3.41 The extent to which institutions have implemented a framework of good practice has been variable. Much has been done to implement the action points in the earlier National Audit Office report on University Purchasing. However, the evidence from this review (including that in paragraphs 3.29-3.33 above) suggests that a number of the institutions examined could do more to improve good practice. For instance, some institutions, at least, need to:

- establish an appropriate high-level forum for consideration of purchasing policies and procedures and to track the impacts secured from improved arrangements;
- require the submission of an annual strategy and report on purchasing to the senior management group to keep them appraised of progress and future plans and targets;
- promulgate a purchasing manual, which is mandatory in its essentials;
- assign their internal auditors to scrutinise the purchasing control environment and to examine on a regular basis whether value for money has been obtained from purchasing; and
- ensure that staff authorised to make purchases are suitably trained.

Part 4: Managing equipment through the life-cycle

4.1 Managing equipment so as to achieve value for money requires the following inter-related processes:

- maximising utilisation, by identifying and sharing any spare capacity within the institution and with outside bodies;
- maintaining the equipment cost-effectively so that it is fully operable when needed;
- keeping adequate records of equipment held to inform the other processes and, by this and other means, deter unauthorised removal; and
- identifying when equipment is not worth retaining and disposing of it accountably at the best price.

4.2 At least as much can be done to ensure the full utilisation and cost-effective maintenance of equipment during planning and acquisition as can be done once it has been acquired. Hence the relevant elements of this part of the report overlap with earlier parts.

Utilisation and sharing

4.3 The National Audit Office looked for institutions to monitor the utilisation of equipment and to promote the sharing of spare capacity.

4.4 Departments do not routinely measure the extent to which equipment is used. Usage logs are maintained for some items of equipment and good evidence is available in the few instances where equipment use is charged to external users. Staff believed that virtually all equipment was well used and that a combination of checks on laboratory use, student feedback and technician awareness provided a general appreciation of utilisation. At most institutions examined departments indicated that constraints on the availability of space discouraged the retention of little used equipment, although at only a few Scottish institutions is there a financial penalty in the form of charges for space.

4.5 However, the absence of formal measures means that there is a risk that cases where recently acquired equipment is little used may not come to light to inform future acquisitions or that spare capacity which could be shared is not identified. One institution has a system which addresses the first of these risks (Example 25 opposite).

Example 25: Post-purchase appraisal system

At one institution a post-purchase appraisal form has to be completed for all orders over £20,000 within six months of purchase and be submitted to the Vice-Principal. The purpose of this is to gauge whether value for money has been achieved and whether the item is being utilised as forecast on a pre-purchase appraisal form used to approve the order. This process is subject to internal audit review.

4.6 The National Audit Office examined the extent of utilisation of 99 items of equipment. Given the absence of objective measures, for the majority of items the available evidence was tested in discussion with users or technicians. Nonetheless it was apparent from their comments that at least 94 of the items were sufficiently necessary for teaching and/or research that they would need to be repaired or replaced if they ceased to function. Some of the items falling outside this category were obsolescent. Only one item less than five years old was not justifying its keep (Example 7 in Part 2).

4.7 However, an item of equipment can be essential for a department whilst running for only a few hours a week, and therefore have plenty of spare capacity. Some 29 of the 99 items examined fell into this category, although some other items were operating up to 24 hours a day and 5-7 days a week. As much of the equipment held by institutions becomes obsolete before it wears out, there is capacity to use it more intensively and often at a relatively low marginal cost.

4.8 Whilst equipment was extensively shared within departments, there was less evidence of sharing between departments. This may be due partly to the absence of a common inventory of equipment (paragraph 4.21 below) or any systematic procedures at all but one of the institutions examined for departments to establish what equipment other departments possess. Example 26 shows how the institutional planning role can meet this need.

Example 26: Cross-institutional equipment reviews

At one institution the central equipment committee has set up a working group on electron microscopes which, amongst other things, considers joint use between departments. One of the faculties at this institution had already monitored electron microscope use, and data collected informed a decision to dispose of one.

4.9 In the absence of mechanisms to facilitate inter-departmental sharing, there is a risk that departments might purchase items of equipment rather than use spare capacity existing elsewhere within the institution. The National Audit Office found two cases of similar items being bought independently at around the same time without consideration of the scope for sharing (Example 27).

Example 27: Simultaneous purchase of similar equipments

At one institution a department purchased a new gas chromatography mass spectrometer for around £28,000 and was later informed by the supplier's engineer that a closely related department had bought a similar machine at about the same time.

4.10 However, at most institutions there was some evidence of equipment, particularly larger items such as nuclear magnetic resonance spectrometers and scanning electron microscopes, being shared across departments (Appendix 4). In the 31 departments examined there were seven examples of equipment capacity being rented to external users and hence generating revenue. Appendix 2 illustrates how one department's nuclear magnetic resonance spectrometer is used by 10 other departments and is hired out to 10 outside bodies. At another institution a protein sequencer was being used 144 hours a week with 70 per cent of the use being external.

Action points

4.11 Although the equipment at institutions generally appears to be essential, institutions could seek to use equipment more intensively, and in particular should:

- formally appraise equipment use, periodically or soon after acquisition, to check that it is meeting its objectives and to identify spare capacity; and
- develop mechanisms to encourage the sharing of spare capacity and to ensure that equipment is not purchased by departments without an appraisal of the scope for sharing with other departments.

Maintenance

4.12 The survey returns from 18 institutions estimated their equipment maintenance costs at around £5 million a year, but as institutions do not generally cost the time spent on maintenance by their staff (paragraph 4.14), this figure is substantially under-estimated. The National Audit Office look for institutions to adopt for each type of equipment a maintenance strategy which is most cost-effective across the life-cycle. They also expect institutions to seek economies of scale in maintenance provision.

4.13 Most of the comparator bodies relied heavily on in-house maintenance, taking the view that as experts in the field their technicians should at least be able to diagnose problems and effect simple repairs, leaving only occasional major repairs to be bought in. However, one comparator, determined the maintenance strategy for each item of equipment prior to purchase comparing the costs of contract maintenance with those of the in-house technician pool, with the latter being often but not invariably the cheaper. Doing this enabled a competitively priced maintenance contract to be negotiated as part of the purchase negotiation and through-life cost comparison processes.

4.14 At the eight institutions examined, departments take the decisions on the balance between in-house and contract maintenance because they are considered to have the clearest view of what is appropriate and the costs fall on their budgets. The policy of most of the academic departments examined was for technicians to undertake maintenance themselves wherever this was within their capability unless it was particularly important to avoid equipment down-time. This was effective in as far as only one of the 99 items of equipment examined (paragraph 4.6) was awaiting repair. Although the main reason cited

for the preference for in-house maintenance was the cost of contract maintenance, at no institution was the cost the technicians undertaking maintenance functions appraised and compared with contract maintenance costs, either at the time of purchase or subsequently.

4.15 There may be scope for improving the cost-effectiveness of in-house maintenance by pooling skills. This occurred at two institutions examined, either across the institution (Example 28), for computer maintenance or as an arrangement between two departments.

Example 28: Pooled equipment expertise

One institution had recently reorganised six workshops into one central workshop with a single manager, thereby pooling expertise previously dedicated to particular faculties or departments. The anticipated benefits were that it freed up space for other uses, maximised the use of maintenance skills, facilitated upgrading of the facilities and provided a better career structure for staff. Furthermore, since the workshop staff complete time-sheets, the institution can cost in-house versus contract maintenance options.

4.16 As indicated in Part 3, negotiators in academic departments rarely negotiated maintenance cover or extended warranties at the time of purchase when the institution has a stronger bargaining position than after the equipment has been procured. However, this was common practice in computing services departments. For instance, at two institutions the computing services department had actively sought to extend the standard one-year warranty by one or two years. Extended warranties were noted in two out of the 31 academic departments examined, with one, including one five year warranty.

4.17 Economies of scale should obtain where a maintenance contract covers the whole institution. These are quite common for IT equipment and are used at some institutions for at least one make of microscope. At two institutions the central purchasing co-ordinator has obtained a better deal by negotiating central maintenance contracts for a much wider range of smaller non-IT equipments (Example 29).

Example 29: Institution-wide maintenance contracts

At one institution the central purchasing office has established central maintenance agreements for microscopes, spectrophotometers, scintillation counters, refrigerators and autoclaves. These appeared to offer worthwhile discounts, for instance the centrifuge contract offers 15 and 20 per cent discounts with two different companies. Analysis of departmental expenditure against the contracts suggests that they were well used although one department still used its technician for centrifuge maintenance.

4.18 Because of the large numbers of similar types of information technology equipment at institutions, there is particular scope for institution-wide contract maintenance, and indeed for the Scottish purchasing consortium (paragraph 3.28) to establish maintenance arrangements. At three of the eight institutions examined, the computing services department had negotiated institution-wide deals. One institution has an institution-wide arrangement whereby an

insurance company reimburses the cost of repairing or maintaining 1,800 items of computing equipment, for an annual premium of around £90,000. However, where bulk maintenance arrangements had been negotiated some departments still preferred to undertake repairs in-house.

Action points

4.19 The National Audit Office concluded that although existing maintenance arrangements may be effective, institutions should place more emphasis on minimising the costs of maintenance, and in particular need to:

- cost in-house maintenance and encourage departments to use these costs in deciding on the maintenance strategy for each type of equipment;
- consider whether in-house maintenance can be provided more cost-effectively by means of pooling arrangements; and
- more actively consider the merits of taking out extended warranties and institution-wide maintenance arrangements.

Equipment recording and control

4.20 Equipment records can be maintained for a number of reasons. At their most basic they can be used to keep track of items of equipment to facilitate control and help deter unauthorised removal. Records are also needed to ensure that statutory health and safety requirements are met. More sophisticated recording could help plan equipment replacement programmes, in which case details of age and purchase or replacement cost are needed. These details are also needed where the institution's accounts have to show depreciation. Records of maintenance history would help assess reliability to inform replacement and purchase decisions. At one comparator body, comprehensive central equipment records had enabled the equipment manager to forecast future equipment replacement needs over a ten year period.

4.21 At all the institutions examined equipment records were maintained on a departmental basis. However, the Statement of Recommended Practice: Accounting in Higher Education Institutions and the Financial Memorandum with the Funding Council requires that institutions capitalise and then depreciate items of equipment above an unspecified threshold from the year ending July 1996. All institutions were therefore implementing central asset registers to help capture the necessary data. Of the seven larger institutions examined, six set a threshold of £10,000, one of £25,000.

4.22 Six of the eight institutions examined had decided that their central register would only cover items over the threshold, so that department asset records will continue to be needed to maintain control of the large majority of equipment items which fall below the threshold. Two institutions had definitely decided to set a threshold of £1,000 or less for inclusion in the central register (Example 30 opposite). In the absence of a central register, or co-ordination of

departmental registers, there is no readily available database to enable staff to establish, when planning equipment acquisition, what items of equipment might be held elsewhere in the institution which could be shared.

Example 30: Establishing a comprehensive asset register

One institution was establishing a register of all assets with a value greater than £250 purchased since April 1994. The manual process of extracting details from purchase orders was to be automated with the implementation of an on-line purchasing system. Each asset has been allocated a unique bar-code to facilitate tracking. Clear guidance has been provided to cost centre managers.

4.23 All but one of the 31 departments examined had departmental equipment registers. At only three of the eight institutions was there any guidance on what should be recorded and even there the National Audit Office found that not all departments examined were following it. In the absence of guidance, registers were maintained in a wide variety of ways within each institution with differences in the system (manual, computer spreadsheet or specialist package) used and the criteria for including items and the level of detail provided. Example 31 shows the position at a typical institution.

Example 31: Variations in departmental equipment registers

At one institution departments had not been issued with central guidance on compiling and maintaining asset registers. A report by the Internal Audit Service found that asset recording was inconsistent and often of poor quality. Departments were operating several different manual and computerised systems for recording assets:

- manual spreadsheets (compiled to meet electrical safety checks), recording asset description, location, date of purchase and last safety check;
- computerised records, recording a detailed asset description, purchase details (supplier, date, cost) and, disposal details;
- specialist asset recording applications, detailing, in addition to the above, warranties, sources of funding, life expectancy and who is responsible for the asset.

4.24 This variability reflects the proliferation of free-standing purchase order processing and recording systems within departments, in the absence of a central system (paragraph 3.31). Five of the eight institutions examined were in the process of or planning to introduce standard departmental purchasing software. Appendix 5 (Checklist 2, Question 25) outlines the main features of an effective purchasing system, based on systems in use in some institutions.

4.25 The equipment records at around a quarter of the 31 departments examined were inadequate as a basis for checking that items had not gone missing. Only a minority of departments actually undertook such checks. At seven of the eight institutions examined internal audit were undertaking periodic checks on the adequacy of equipment registers with a view to ensuring that they were brought up to standard. Whilst the security of equipment was not perceived as

being a significant problem by most institutions examined, smaller items of information technology equipment are particularly attractive and portable and merit regular checking so that security problems can be quickly identified.

4.26 Only eight of the departmental equipment registers examined included sufficient detail to be used for more than monitoring the existence and location of equipment. For instance one computerised register includes purchase dates and expected life-spans to aid replacement decisions. There was little other evidence of registers being used as planning tools.

Action points

4.27 Institutions currently do not maintain enough information on their teaching and research equipment to inform decisions on replacement, purchase, sharing and maintenance, or even in some cases to maintain control. Although they should soon have such information for items above their capitalisation threshold, departments will need to continue maintaining records for items below the threshold, and institutions need to:

- establish standards and procedures for equipment recording, including keeping records up to date to ensure completeness and accuracy of records;
- consider the possibility of using their internal audit, to ensure that departmental records meet these standards and procedures;
- press forward with the introduction of standardised systems for purchase and inventory recording; and
- use departmental asset records to check that equipment is secure.

Replacement and disposal of equipment

4.28 Life-cycle costing assumes that equipment will be replaced when the costs of keeping it running exceed the net present costs of buying and running replacement equipment. This needs to take into account the increasing costs of maintenance as equipment ages and the benefits which are likely to be secured from using more modern replacement equipment. In any case, once the decision has been taken to replace equipment, the old equipment needs to be disposed of in an accountable manner that takes advantage of any residual value or scope for other use.

4.29 The evidence available at institutions suggested that their equipment tends to last much longer than in an industrial application, as research use is much less intensive. For instance, one institution indicated that they can run nuclear magnetic resonance spectrometers, which last around seven years in industry, for 10 to 12 years without difficulty. On the other hand the need for much research equipment to be at or near the state of the art to maintain research quality means that equipment can become obsolescent more quickly. The National Audit Office examined the case for replacing 22 items of equipment and found that maintainability was a factor in 12 cases and obsolescence the main reason in 12 cases.

4.30 Decisions on replacement are therefore more often taken in the context of prioritising the teaching and research needs of departments than appraising trade-offs between retention and replacement. Until information on in-house maintenance costs and equipment reliability becomes readily available investment appraisals may not be worthwhile except where maintenance costs are relatively high or where more modern equipment is known to be significantly cheaper to run, to justify funding the replacement equipment. However, there was evidence of at least one institution disposing of equipment because the maintenance costs were too high.

4.31 Where equipment is no longer suitable for its intended purpose institutions seek where possible to cascade it for other purposes or cannibalise it for spares. For instance, research equipment is used for teaching or scientific computer equipment is transferred to less demanding administrative uses. There were also good examples of equipment with a minimal resale value being traded-in to secure significant reductions on the price of the replacement item, Example 16 (Part 3).

4.32 Six of the eight institutions examined have disposal policies in their financial regulations to ensure that equipment is disposed of in an accountable manner and any resale value is realised. There was no evidence at any of the institutions examined of equipment being disposed of in other than a proper manner.

Action points

4.33 Institutions need to:

- consider arrangements for investment appraisal of, and if necessary, funding for the replacement of equipments with relatively high maintenance costs or where replacement equipment is significantly cheaper to run; and

- in some cases, establish disposal policies.

Glossary

The following items of equipment are referred to in the report.

Atomic Absorption Spectroscope	Solutions of metal ions are mixed with air and then introduced into a flame where the solutions, as they pass through the flame, are broken down to the atomic level. At that point energy is absorbed from a reference source in proportion to the atom concentration. The technique allows small quantities of metals to be accurately measured and quantified.
Autoclave	A pressure vessel where low pressure steam can be admitted to sterilise by moist heat materials/equipment which are pre-loaded into the chamber. Most common sterilising conditions are 15 lb per square inch pressure at 121 degrees C for 15 mins. Commonly used in hospital and biology departments.
DNA Sequencer	The DNA Sequencer is an automated gel scanning system, by which the DNA sequence is captured in real time through continuous laser scanning and excitation of fluorescent dyes enzymatically incorporated into the experimental DNA templates.
Dry Etching Pump	This is a high vacuum pump used to evacuate a work chamber to allow semiconductor fabrication processing to be carried out. it is an essential element in the processing. The pump frequently has a short life span due to the highly corrosive gases used in the operations.
Fluorescence Activated Cell Sorter	An item of equipment that analyses the expression of membrane proteins on cell membranes, can count the number of different cells and analyse them.
Log Periodic Antenna and Spectrum Analyser	Used to measure the frequency response or characteristic of a radiating system or other signal source which is then presented on a display tube, usually with a facility to obtain a printout on a chart recorder. The characteristic is displayed in frequency as opposed to time.
Mass Spectrometer	Molecules are introduced into a vacuum in the spectrometer and bombarded by a variety of different energy sources which cause the molecule to become electrically charged and to break into a wide range of different fragments. The ionised components are then accelerated into a magnetic field and, depending on the mass of the fragment, arrive at the detector at different times. These masses are accurately measured and from the fragmentation pattern structural information can be determined. These instruments are now capable of analysing large biological molecules.

Network Analyser	This is a standard electronic instrument for analysing electrical networks to measure the performance of individual components or of the whole network. The price is heavily dependent on the frequency range to be analysed.
Nuclear Magnetic Resonance Spectrometer	Used for structural studies of molecules by measuring the binding energy between the electrons at the surface of the atom and the nucleus, and the effect of adjacent atoms on this force. This is done by subjecting a solution containing the molecules to a high energy variable magnetic field and measuring the electronic response from stable isotopic forms of the atoms in the molecule.
Protein Sequencer	This equipment determines automatically the sequence of amino acids in a protein.
Scanning Electron Microscope	An imaging instrument where an electron beam is scanned in raster fashion across a specimen to generate, among other signals, secondary electrons which are processed to generate a magnified image of surface topography.
Scintillation counter	Apparatus for quantitative measurement of low energy emissions from radioactive substances containing alpha or soft beta-emitters such as tritium, carbon 14 or sulphur 35 which cannot be detected directly using a conventional Geiger counter. (The term scintillation counter comes from the fact that a radioactive substance is mixed with a 'scintillant' in solution where the scintillant is a chemical which gives off flashes of light which can be measured on a photomultiplier tube when it is excited by the absorbance of radioactive emissions).
Spectro-Photometer	Instrument for measuring the absorbance at specific wavelengths and/or the characteristic spectral properties of chemical substances in the ultra violet, visible and near infra red regions of the spectrum. This is the key item of laboratory equipment in biochemistry and molecular biology - used for determining rates of enzyme reactions and quantitative analysis of a wide variety of biologically important compounds.

Source : Professor A. Allison and T. Wright, University of Glasgow.

Appendix 1

Higher education institutions and comparator organisations visited by the National Audit Office

Scottish higher education institutions

University of Aberdeen

University of Dundee

University of Edinburgh

Edinburgh College of Art

University of Glasgow

Glasgow Caledonian University

Heriot-Watt University

Napier University

Comparator organisations visited to inform criteria for good practice

Addenbrookes Hospital

IBM

The Rowett Research Institute, Aberdeen

Smith-Kline Beecham

Scottish Universities Reactor and Research Institute

Appendix 2

Equipment Management Case Studies

1 This appendix provides two case studies of institutions' equipment management practices with respect to Nuclear Magnetic Resonance (NMR) Spectrometers and Electron Microscopes.

Nuclear Magnetic Resonance (NMR) Spectrometers

2 The National Audit Office examined the acquisition of five Nuclear Magnetic Resonance (NMR) Spectrometers by four Chemistry Departments. It is not possible to make comparisons on the prices paid or overall value for money achieved from the acquisitions because they were for models of varying ages, types and field strengths (ranging from 200 to 600 MHz). However, they do provide a case study of good practice in justifying the need for equipment, illustrating the benefits of different purchasing techniques and, to some extent, realising the scope for sharing and generating income.

3 In summary, each illustrates some aspects of good practice, as follows:

- Example 1 shows savings on purchasing second hand equipment;
- Example 2 demonstrates good practice in justifying the equipment need and how professional purchasing advice and skills can help to improve value for money.
- Example 3 shows how the level at which a budget is set for equipment can play a significant part in securing value for money. It also illustrates the benefits of obtaining competitive quotations, conducting second round negotiations and providing a shared facility.
- Example 4 illustrates good practice in justifying the need for the equipment, drawing up a specification, establishing competition, second round negotiations and sharing between institutions.
- Example 5 shows the value of developing a clear specification for the equipment, conducting second round negotiations and considering down stream costs at the point of purchase. In addition it shows the value of combining the equipment purchase with another departments' purchase of a similar equipment i.e. quantity discount. It also illustrates a sharing arrangement in which a charge for services helps to cover costs and generate income.

Justification	Purchase	Maintenance & sharing
Example 1		
The department's existing two NMRs had only half the field strength of the latest model and the advanced capability was needed for research programmes.	The department secured a 10 year old second hand NMR from a main supplier for a third of the price of a new one. The deal included the rebuilding of the machine's magnet with a six month warranty on it, and two disc drives which could be used for other machines, for a total of £74,000.	Because of the high cost of contract maintenance, in-house maintenance was used.
Example 2		
The department's NMRs were virtually 100 per cent used and two of the oldest were unreliable, having well exceeded their life expectancy, typically 7 years in industrial use, but 10-12 years in University use. This was causing severe backlogs of samples awaiting analysis and was compromising research programmes.	Procurement of the new NMR was subject to the EU Procurement Directives. The department worked closely with the central purchasing office to draw up a detailed specification for the machine and to place an advert in the EU Journal. As only two suppliers responded, the tender evaluation, undertaken by the department and central purchasing, included a price breakdown analysis from which a discount of around £20,000 was expected.	The institution is a recognised centre of excellence for NMR work, and offers an analysis service to other Scottish institutions. Maintenance is carried out in-house as the maintenance contracts offered by the supplier were considered poor value for money, and in-house technicians can fix most problems.
Example 3		
The department reviewed the need for equipment when supporting a research grant application. The work being considered required time on up-to-date facilities which could not be provided from the existing equipment base.	The department received two tenders for the purchase of an NMR at 200 MHZ, with the lower tender marginally lower at £130,000. However, as the Research Council involved would provide only £120,000, the department undertook second round negotiations with the suppliers which led to it securing for £120,000 a higher specification (250 MHz) machine in return for trading-in an old machine which was no longer of use to the department.	A one year warranty was secured following which the department decided to rely on in-house maintenance, given that the new machines are expected to be reliable and the high cost of contract maintenance. The department's NMR facilities are shared within the Faculty and also process samples for other institutions.
Example 4		
The department's existing NMRs were heavily used by several research groups but were unreliable and had significant downtime. There were problems in obtaining spare parts and research groups were submitting samples which were beyond the technical capabilities of the existing equipment.	The department invited three major suppliers to submit quotations for an NMR based on a specification it had drawn up. Through second round negotiations the department secured an up-grade of an existing machine and a new machine, plus an automatic sampling system, all for £140,000, subject to the trade-in of a smaller machine. This compared very favourably with the other suppliers' offers.	A one year warranty was secured and after that in-house maintenance was used because the machines were expected to be very reliable in the first few years. Access to the department's NMR and other analytical services is open to another institution on a quid pro quo basis.

Justification	Purchase	Maintenance & sharing
Example 5		
The department's existing NMR was fully utilised (355 days per year and 24 hours per day). Also the department has sharing agreements with other departments on a payment for use basis. The NMR is necessary to undertake departmental work and attract future Research Council funding, but the current low research rating made Research Council funding unlikely.	Three main suppliers were invited to submit quotations based on a broad specification so that the department could get a feel for prices. Samples were sent to each supplier for testing and the operational specifications of the machines acquired. The specification was then tightened up, on the basis of the test results, so leaving two manufacturers in competition. The negotiations that followed led to one supplier reducing its price from £180,000 to £128,000 whilst the other supplier would not negotiate below £185,000. The Department selected the lower price, taking into account technical capability.	The department negotiated an extended warranty for its new NMR and also obtained an undertaking from the supplier that spare parts would be available for at least seven years. Full technical handbooks, including circuit diagrams, were obtained. In-house maintenance is carried out wherever possible. The department collaborates with 10 other departments within the institution and 10 outside establishments to provide NMR services. The latter pay a service charge which helps to cover maintenance costs. The arrangement ensures virtually 100 per cent utilisation.

Electron microscopes

4 The National Audit Office examined the purchase of three Electron Microscopes. These cases help to illustrate how institutions might improve their equipment purchasing practices so as to increase the scope for achieving value for money. Key points arising are:

- Example 6 illustrates how important it is to identify before purchasing whether the capability of the equipment exceeds expected demands by the institution itself, and to consider options for meeting that excess demand by undertaking formal market research to establish the extent and nature of other academic and industrial user interest. It illustrates the need to establish sound charging mechanisms for outside use and the difficulties of establishing value for money where only one supplier is available.

- Example 7 illustrates how value for money can be secured through second hand equipment deals, the dangers of exposing budgets to suppliers and the benefits of cannibalising old equipment.

- Example 8 illustrates how important it is to ensure that whenever possible effective competition between suppliers is established so as to increase the potential for securing a better deal. It also shows the value of negotiating downstream costs of equipment, especially maintenance, at the point of purchase. It also shows that, even if purchase costs cannot be shared, it is worth searching for other department users to defray running costs.

Justification	Purchase	Maintenance & sharing
Example 6		
The department decided to purchase a new state of the art Scanning Electron Microscope to meet leading edge research requirements. The key criterion was to obtain the very best resolution available since this capability fundamentally affects the type and quality of research that can be undertaken.	The department identified only one supplier able to meet its needs but was then in a very difficult position to know whether or not the price on offer represented value for money. If the department had followed good practice it might have sought quotations for near equivalent equipment from another source. If a single supplier was still unavoidable it might have sought a price breakdown to identify how attractive any special offers were and whether standard components could be sourced at a lower price elsewhere.	The department were aware that the new Microscope would provide a capability beyond that demanded by the institution alone. However, it only had anecdotal evidence to suggest that external users would be interested in such a machine and that external work of the order of £40,000 per annum would be forthcoming. It had not undertaken detail investigations to establish the nature and volume of such work. It had also not developed a formal mechanism for charging for external use so as to help ensure that the returns on investment were optimised.
Example 7		
The department had extensively cannibalised its old Electron Microscope for other users, having scrapped it because of high maintenance charges.	The department replaced it with a second hand, 13 year old, Scanning Electron Microscope for £12,000 plus £3,000 commissioning and installing costs. This would appear to be a good deal, but the department revealed to the supplier how much money they had to spend thereby taking the risk that they did not get the best price, though it is recognised that it is always difficult to judge what is a good price for second hand equipment. Good practice would suggest that a budget should only be exposed as a last resort to squeeze a final offer.	The department carry out maintenance in-house whenever possible. No service contract has been negotiated. The department has encouraged cross faculty use of the Microscope for teaching and research. In addition some £10,000 of externally funded consultancy work has been secured.
Example 8		
The department decided to replace a 16-year old valve technology machine with an electron microscope. The principal requirement was resolution related to high voltage electron rays. The funding of £110,000 included £27,000 from University recurrent funds.	The department undertook a search for manufacturers able to provide a 200 kv Electron Microscope. Four companies were originally identified but two of these were then dropped. One because it could only provide a l00 kv machine the other because it was 50 per cent more expensive than the other two. At this point the institution knew which machine it would buy but kept both suppliers in the picture. However, more could have been done to use the less-favoured supplier as effective competition to try to negotiate a better price and downstream costs such as maintenance.	The department secured only a one year warranty and did not obtain complete maintenance instructions which could subsequently inhibit in-house maintenance, so requiring expensive contracts. Another department obtained a research grant to use time on the machine.

Appendix 3

Summary of recommendations made in the management reports to institutions

1 The National Audit Office provided each institution visited with a management report setting out findings and recommendations. The findings included examples of good and bad practice. The reports recognised that there was much good practice singling out specific initiatives for explicit commendation. They also identified matters where improvements in procedures were necessary or could usefully be considered.

2 The recommendations were tailored to the differing circumstances at each institution. Nonetheless there were a number of common themes. The following list indicates the number of institutions where recommendations of general application were made along the lines indicated, although the precise wording commonly varied between institutions. In each case the institution commented on a draft of the management report and indicated that the recommendations would be implemented or considered. The institutions have since confirmed that action has been taken or is in-hand on many of the recommendations.

Recommendation	Number of institutions concerned (out of 8 visited)
Planning, Funding and Accountability	
1: Institutions should establish an appropriate high level forum for discussing purchasing policies and procedures across the institution which has significant senior management and purchasing co-ordinator involvement, a comprehensive remit and a good reporting structure.	7
2: Institutions should develop an overall three or four year rolling equipment plan, based on faculty or departmental plans.	7
3: A loan facility should be introduced for departments and faculties to help ease peaks and troughs in expenditure.	5
4: Departments should produce equipment plans covering a three year period, based upon equipment needed to support teaching and research, identifying how such equipment is to be funded.	7
5: Institutions should keep under review the balance between top-slice and formula elements of their equipment grant allocation systems.	4
6: Departments should ensure that equipment funding issues are discussed in an appropriate forum.	2
7: Institutions should make it a requirement that departments provide an annual report back to an appropriate forum on equipment expenditure and how it was funded.	7

continued ...

Recommendation	Number of institutions concerned (out of 8 visited)
8: Institutions should request departments to report annually to an appropriate computing sub-committee on all computer purchases, especially those that significantly deviate from the IT strategy, or outside framework agreements.	5
9: Departments should consider carefully the indicative budget set for equipment, with a view to giving purchasers incentives to achieve best value for money.	5
Purchasing	
10: Institutions should establish an appropriate high level forum for the discussion of purchasing policies and procedures.	4
11: The purchasing co-ordinator should make an annual report to an appropriate institutional committee/body on purchasing progress and plans for the future.	5
12: Institutions should consider establishing formal mechanisms through which the purchasing co-ordinator can receive timely information on all equipment purchases, above a specified threshold, planned by departments, so as to secure greater influence for the purchasing co-ordinator in equipment purchasing.	8
13: Institutions should seek to reduce the number of authorised signatories for ordering/approving the purchase of equipment.	3
14: Institutions should produce a purchasing manual.	2
15: Institutions should consider making compliance with much or all of their existing purchasing manuals mandatory.	2
16: Institutions should consider inviting their internal audit service, as part of its routine programme, to conduct checks across departments of the purchasing control environment.	4
17: Departments should avoid disclosing to suppliers the amount of money they have to purchase equipment, except as a last resort to squeeze a final offer.	2
18: Departments should avoid ordering from a favoured supplier without undertaking a market search and obtaining competitive quotations.	4
19: The purchasing manual should highlight the potential benefits of second round negotiations in purchasing.	3
20: The institutions' Purchasing Manual should include a simple checklist of the things that all purchasers should ask for in negotiations with suppliers.	5
21: In purchases where only one supplier can meet the specification, every attempt should made to seek offers of near equivalent equipment from other sources and that where a single supplier is unavoidable, a precise breakdown is sought to identify exact costs and whether there are opportunities for obtaining standard components at a lower price elsewhere.	6

continued...

Recommendation	Number of institutions concerned (out of 8 visited)
22: Departments should give more formal consideration to the through life costs of equipment, especially maintenance and operating costs.	6
23: Institutions should consider establishing a co-ordinating mechanism for the bulk purchase of widely used lower value equipment, such as through a group of lead purchasers, along the lines of the arrangements already existing at some for information technology equipment.	8
24: Institutions should consider establishing a formal network of lead or named purchasers in each department with a large equipment spend, to act as a focal point for exchange information and expertise between departments and with the purchasing co-ordinator and to provide advice within departments.	4
25: Institutions should review the availability and take up of purchasing training for staff with purchasing responsibilities within academic departments.	8
26: Departments should comply with the institution's procurement procedures on obtaining quotations.	4
27: Institutions should develop or review the Framework Agreements for the purchase of personal computers etc.	4
28: Institutions should check for compliance with the Framework Agreements and consider inviting their Internal Audit Service to monitor for breaches in compliance.	3
Managing equipment through the life-cycle	
29: Institutions should consider developing a pricing policy for the use of its equipment by outside bodies, and a policy on what should happen to the revenue raised.	2
30: Institutions should consider whether it would be cost effective to establish maintenance pools to maximise the use of in-house expertise and make the costs of such maintenance, compared with contract maintenance more apparent to users.	6
31: Institutions should investigate the possibility of establishing bulk or site maintenance contracts for equipment.	5
32: Departments should consider calculating the costs of employing in-house expertise to inform decisions on the through-life costs of equipment and the optimum maintenance strategy.	5
33: Institutions should consider making asset registers for all equipment mandatory within departments and consider reviewing and improving central guidance on asset registers, including thresholds for recording and updating procedures, to help to ensure that they are adequate and consistent across departments.	6

Appendix 4

Summary of findings from the survey of equipment suppliers

1 The National Audit Office's consultant, Peter Sachs, interviewed representatives of the following six major suppliers of equipment and consumables to Scottish higher education institutions:

Beckman Instruments
Digital Equipment Company (Hamilton Rentals London)
Hewlett Packard (Hamilton Rentals Scotland)
Pharmacia Biotech
Sun Microsystems
Varian Associates

2 The interviews were conducted on the basis that institutions should be able to negotiate a reduction in the life-cost of the equipment they were buying, that is not just the upfront cost, but prompt payment discounts, free delivery, extended warranty, spares availability, training, handbooks and service arrangements.

3 The suppliers either handle biological/ chemical equipment or computer equipment. The higher education sector is very important to the former, providing up to 85 per cent of their Scottish sales, but less so to the latter. The selling techniques of each class of equipment suppliers were the same, but different from the other class, and they are summarised separately, although many comments were common to all of them. In particular, it was unanimously agreed that the academics' 'high street purchasing technique' did not provide institutions with the best buy in terms of upfront or through-life costs.

Biological/chemical equipment

4 Supplier comments can be summarised as follows:

- purchasing is perceived as fragmented with no 'rhyme or reason' in who places orders and little communication regarding purchases within the institution. This increases the cost to the supplier of making sales. The supplier has to send out more mail-shots and undertake more visits, so that the cost of making a sale is twice that of selling to industry. These costs are presumably passed on to the institutions in higher prices. Clearer and more streamlined purchasing could be financially beneficial to all concerned;

- for large and expensive equipments, that is costing over £100,000, academics know all equipments and their users in the United Kingdom and many abroad, and drive a good deal;

- for smaller equipments, it was acknowledged that some academics negotiated well 'in a high street manner' - that is they knew what they wanted to buy and the size of their budget and negotiated to match the two. They will tell suppliers their budgets and will only ask for discounts under budget pressure. Therefore the tighter the budget, the better the deal;

- in this sector there is no standard educational discount and all sales personnel had discretion to offer discounts. Although they can give discounts for prompt payment, institutions never asked about this. In comparison, industry is given discounts on previous year's sales and call-off contracts. A centralised component in negotiation could secure larger discounts;

- once academics have chosen a piece of equipment on quality grounds, suppliers find it fruitless to try and persuade them to change their minds on price grounds, suggesting limitations on the competitive process;

- suppliers will sell ex-demonstration equipment to institutions at a reduced price; and

- suppliers believe that institutions could save money by negotiating on delivery, training and post-sales costs, but they are never asked to quote for downstream maintenance at the purchase negotiation stage nor are they asked about lifetime availability of spares.

Computer equipment

5 Major computer companies generally appoint Value-Added Re-sellers (VARs) to market their professional products (that is excluding personal computers) to most customers, as in-house costs for sales and service are too high and not sufficiently flexible. These suppliers are expert in their company's products and must provide pre-sales advice and post-sales service, in competition with others appointed by the same company. Their comments can be summarised as follows:

- professional purchasers had appeared in a few institutions, who are cleverer at negotiation, treat suppliers as professionals and in the suppliers' opinion obtain better deals as a result;

- the manufacturers of professional computer equipment have highly structured discounts against their price list for education, for themselves and for value-added re-sellers, who are given more margin than supply-only agents to enable them to provide technical services. Whilst institutions are offered the standard discounts without asking for them, institutions with central negotiators ask for more discount and sometimes get it;

- there are no rules on discounts for personal computers where the discounts obtained depend on the institution's negotiating ability. This suggests that more professional purchasing could secure greater discounts;

- the 'high street purchasing technique' of departmental purchasers of professional equipment contrasts with industry and commerce where the customer wants supplier support before, during and after the sale. Suppliers believe that full pre-negotiation advice will save the institution money, up to 20 per cent of original cost.

- Prompt payment discounts and delivery charges are not negotiated and institutions do not ask about extended warranties or the lifetime availability of spares, although this is relatively short for obsolete equipment, nor about the duration of lifetime support. Institutions do not ask the supplier to bid for training, 'the most over-looked and under-estimated cost';

- framework agreements are being negotiated with some United Kingdom universities for periods of three to five years, where discounts are agreed for call-off contracts;

- institutions take no account of through-life cots at the time of purchase, unlike other public sector vendors which ask for the cost of ownership over five years in the quotation, and maintenance costs are sought only in formal tender documents; and

- work-stations, file servers and network equipment nearly always require maintenance contracts, usually expensive (in one instance the annual charge was higher than the cost of purchasing new and faster equipment).

Lessons for suppliers

6 Whilst suppliers were generally fairly critical of the way institutions procured equipment, there are lessons which it can be inferred they could learn. In particular, suppliers:

- appear hazy about the organisational structures within institutions and could perhaps focus better on who to contact;

- could make more effort to 'sell' prompt payment discounts;

- need to encourage a more sophisticated attitude to through-life costs.

Appendix 5

Checklists for good practice

1 These checklists were prepared as part of the National Audit Office study on the management of teaching and research equipment at Scottish higher education institutions undertaken in 1995. A major objective of the study was to make good the absence of guidance on this subject specific to higher education. It was also necessary to establish criteria against which existing practice could be judged. These checklists set out the criteria developed and questions which institution staff can ask in seeking to improve value for money from planning and procuring equipment, with reference to the whole equipment life-cycle.

2 In the absence of a pre-existing model, the National Audit Office sought out worthwhile practice at a number of comparator bodies outside higher education including research institutes, an NHS hospital and private sector companies. The National Audit Office also drew on the experience of consultants. However, the most important source of guidance was the good practice found at the eight Scottish higher education institutions examined during the course of the study. The checklists draw on the range of experience, some of which is illustrated in the National Audit Office report. They cover:

1. Planning - Equipment Specification and Resource Allocation.

2. Equipment Procurement.

3 The aim of the checklists is to raise questions and stimulate fresh thinking rather than to set out a prescriptive model. The circumstances of different institutions and considerations applying to different equipments vary too much for that. However, some matters may be mandatory where they are required by legislation or institutions' regulations.

4 The National Audit Office look to managers within institutions with the responsibility for equipment management issues to disseminate copies of these checklists to appropriate colleagues. In the case of the procurement checklist it may be most appropriate for the purchasing co-ordinator to handle this.

Acknowledgements

5 The National Audit Office study was undertaken under the guidance of the Joint Working Group on the Management of Equipment Assets of the Scottish Higher Education Funding Council and the Committee of Scottish Higher Education Principals. Assistance was provided by consultants, TA Consulting Limited and Peter Sachs and by the staff of the institutions and comparator bodies listed at Appendix 1. Further assistance in drafting these checklists was provided by the three United Kingdom Funding Councils and, in the case of Checklist 2, a number of purchasing co-ordinators and officers across the United Kingdom including the Purchasing Co-ordinator for the Committee of Vice Chancellors and Principals.

Checklist 1: Planning: Resource allocation and equipment specification

Introduction

1 Planning involves two distinct processes. Specifying the equipment to meet teaching and research needs, and allocating resources to fund this equipment. Within higher education institutions the detailed specification of equipment commonly takes place in academic or computing services departments. The allocation of the largest element of equipment funding, the Funding Council equipment grant occurs centrally, often at faculty (or equivalent) level, and in departments. As well as a central equipment committee, at some institutions there may be other committees covering areas such as information technology or research which have an equipment planning role. Whilst funding from the United Kingdom Research Councils, charities and industry is commonly allocated in response to bids from groups of researchers, the institution is ultimately accountable for the proper expenditure of the money.

2 This checklist is aimed at those staff at higher education institutions who are involved in planning for equipment provision. The first section on 'strategic planning' is most relevant to planning centrally and at faculty (or equivalent) level. The second section on 'deciding which items to fund' is relevant also to heads of department (or equivalent) and other staff involved in planning to meet equipment needs.

Life-cycle implications

3 Other aspects of the equipment life-cycle need to be taken into account during the planning process, as follows:

Procurement	Knowledge of the likely purchase cost of equipment informs decisions on how much funding is needed and how far that funding will stretch. Co-ordination of equipment plans can identify where savings can be made by combining purchases.
Utilisation, sharing and recording	The need for new equipment is influenced by the utilisation of existing equipment, whilst equipment needs may be met by sharing equipment with spare capacity. Records of equipment held may facilitate these processes.
Maintenance and replacement	The downstream costs of different types of equipment, including maintenance and other running costs and the length of equipment cycle vary significantly and affect the longer term costs of equipment. They are therefore relevant to decisions on resource allocation.

Evaluative criteria

4 The National Audit Office adopted the following criteria for evaluating practice at institutions:

- there should be a central focus on equipment management, policies and practice throughout the life-cycle;

- there should be a process for ensuring that the proportion of the institution's budget allocated to equipment is sufficient and is allocated appropriately to meet equipment needs. This process would need to be effective in the event of the separate funding stream for equipment from the Funding Council disappearing;

- decisions on the prioritisation of equipment provision should be informed by a longer term perspective of the equipment needed, including the need to replace existing equipment; and

- there should be a methodical approach to deciding on specific items of equipment to fund which takes account of the availability of equipment elsewhere in the institution.

Strategic planning

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
1. **Is there an appropriate high level forum for allocating equipment funding?** (Paragraph 2.4)	This need not be specifically established for the purpose but could be arranged by adding to the terms of reference of an existing high level committee.	
2. **Does the forum consider wider issues of equipment management including that equipment is properly managed through the life-cycle?** (Paragraph 2.4)	If not, how does the institution plan to ensure that value for money is secured at each stage in the equipment life-cycle?	
3. **Do faculties (or equivalent) have a role in equipment planning?** (Paragraphs 2.3 and 2.4)	By having oversight of a number of cognate areas, faculties (or equivalent) are uniquely placed to encourage longer term planning for equipment, to identify needs and to direct resources to meet them. They are also well placed to identify the scope for sharing and inter-departmental initiatives.	
4. **Do academic departments and others directly responsible for the use of equipment provide costed plans showing what their most pressing needs for equipment are?** (Paragraphs 2.9 and 2.18)	This should help the institution to: • gauge the overall level of resources needed for equipment; • identify pressing needs which can be met by faculty or institution wide initiatives; • facilitate consideration of inter-departmental 'loans' (see question 9); • identify needs for equipment common to more than one department, to facilitate sharing or to combine the purchase; and • provide a base against which the actual expenditure of departments can be evaluated at the end of the year.	
5. **Are plans prepared by academic departments and others on a longer-term, say four or five year, timescale?** (Paragraphs 2.10, 2.17-2.18)	This can help the institution to plan ahead to cope with peaks and troughs in the need to replace equipment, particularly short life-cycle equipment such as for information technology and to meet one-off demands such as equipping a new building or facility. It should assist the institution in considering the scope for inter-departmental loans (see 4 above) and special initiatives.	
6. **Are exercises periodically undertaken to assess the replacement needs for equipment across the institution?** (Paragraph 2.9 and 2.18)	This can either be done at departmental level or across the institution. At one comparator body examined, the planning and allocation process specifically differentiates between replacement equipment and new requirements and limits the latter to the amount affordable after replacement needs have been taken into account. This body makes an assumption on the expected equipment life based on past experience of each type of equipment and forecasts the costs across the next 10 years or so of replacing life-expired equipment on this basis	

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
	One institution's central equipment committee identified the need for a two year programme to replace obsolescent teaching equipment and so bring it up to standard. The initiative was financed from the Funding Council equipment grant and distributed to departments on the basis of bids that had received approval from the Committee.	
7. **Are resource allocation decisions at a central and faculty (or equivalent) level taken within the context of a strategy for the level of funding to be provided and the way this is to be allocated over the next few years?** (Paragraph 2.5)	A strategy can bring together information on future needs and expectations of future resources, prioritised in accordance with the institution's corporate objectives.	
8. **Do the allocation processes have an overview of the total resources available for equipment provision from all sources?** (Paragraph 2.14)	This is important given the increasing proportion of equipment funding provided by research grants and the provision at some institutions of equipment funding from Funding Council recurrent grants. Such funding needs to be taken into account in planning the allocation of Funding Council equipment grant.	
9. **Is there a facility within the formula allocation process to enable departments to finance large items of equipment, for instance by means of inter-departmental loans?** (Paragraph 2.8)	In a 'loans' scheme a department receives a larger allocation than suggested by the allocation formula in one year to be repaid later. For example, at one institution, departments can augment their funds by borrowing from a central fund and paying back the loan through reduced budgets in subsequent years. Borrowing requests are considered by the convener of the central equipment committee. The institution also allows departments to carry over unspent balances into the next year.	
10. **Is there an information technology strategy with clear objectives and which identifies and costs the equipment needed to meet these objectives?** (Paragraphs 2.12-2.13)	Some of the means by which institutions plan to achieve their IT objectives are as follows. • Providing an extensive network to which all teaching and research buildings are connected. • Establishing open access computing laboratories or workshops centrally and within faculties and departments. Some of these are open 24 hours, seven days a week. • Developing faculty and departmental local area networks especially to provide specialist research computing facilities. • Developing clusters of workstations in library and information centres to support computer centred learning. • Providing clusters of personal computers in student halls of residence. • Encouraging student ownership of computers.	

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
	More detailed guidance is provided in the Guidelines on information strategies issued in December 1995 by the Joint Information Systems Committee	
11. **Do recipients of funding allocations have to report back on how they have spent the money, ?** (Paragraphs 2.21-2.22)	This should help to ensure that plans are treated seriously and deviated from only with good reason and to give a feel for the value which the institution can derive from future equipment allocations to the recipients. At least one institution gives departments an opportunity to report also on the impact of met and unmet equipment needs.	
12. **Is there a direct reporting line from the committee or person responsible for information technology planning to the central equipment committee?** (Paragraph 2.23)	One institution's Director of IT services is a member of the central equipment committee thereby providing an explicit link through to the information technology committee. To provide accountability for the funds top-sliced for information technology he has to: • report annually to the Equipment Sub-committee on how the IT equipment funds have been spent; • produce an annual, costed development plans to complement the IT strategy and report annually to the IT Service Committee on progress against the strategy and the development plan.	

Deciding on which items to fund

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
13. **Are bids for equipment submitted in a common and sufficiently informative format?** (Paragraph 2.16 and 2.18)	In some departments bids are submitted on a standard proforma; in others a one or two page supporting case has to be made. Bids in some departments are categorised into teaching, research and information technology. The detail of information provided to support the bids varies, with standardisation most assured where a proforma approach is used.	
14. **Is the equipment really needed at all?** (Paragraphs 2.18 and 4.5)	There may be equipment in the department to meet the need; or existing equipment could be upgraded; or equipment in another department or institution could be shared. In any case, for any item of equipment of a substantial value there should be a statement of need, and maybe even an investment appraisal. This should include the objectives to be met and the expected benefits, in the context of the equipment already available. For instance, one institution requires a pre-purchase appraisal form to be completed for all items over £20,000.	

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
15. **Are there competitive quotations for each item of equipment?** (Paragraph 2.20)	The National Audit Office found that setting a tight budget for individual equipment items encouraged keen negotiating at the purchase stage. One way of doing this is to obtain competitive quotations in advance of the budget being set. Departmental heads may nonetheless wish to squeeze the budgets, say by 10 per cent, in the expectation of further negotiated reductions in price. If the amount saved is kept as a contingency it can always be released if savings do not accrue and used for other purposes later in the year if they do. For research grants such an approach could provide additional funds to be used for consumables and maintenance.	
16. **Are the downstream costs of equipment acquisition taken into account?**	Institutions need to be aware of the implications of equipment acquisition for their future recurrent expenditure budgets, to ensure that they are affordable. For instance equipment which is donated can have significant downstream cost implications, as can equipment funded from research grants after the expiry of the grant period. New equipment is likely to increase costs more than replacement of existing equipment.	

Checklist 2: Equipment procurement

Introduction

1 Most equipment is purchased by the user departments. They are best placed to draw up the often highly complex user specification. Users can also have a good appreciation of the capability of different types of equipment. However, the representatives of the suppliers are trained in sales techniques, an expertise not considered in appointing academic and technical staff, but which should be familiar to professional purchasing staff. In the National Audit Office's experience there is relatively little recourse to the specialist skills which the institution's purchasing co-ordinator (also termed purchasing officer, purchasing manager, Director of Procurement etc) can bring.

2 This checklist is therefore aimed at departmental purchasers, to supply an aide memoire of the types of issues which may need to be considered. It should be applicable to all types of teaching and research equipment regardless of funding source; not least because the downstream costs of equipment funded from research grants and contracts are liable to be borne by the institution itself at the end of the relevant grant or contract. In any case, even where a granting body has specified the cost of an item of equipment, there is still scope for obtaining more for that price. The checklist starts with matters for consideration by all departmental staff involved in equipment purchasing and then moves on to questions aimed particularly at staff who authorise equipment purchases such as heads of department.

3 There is little in this checklist that is new. The Committee of Vice Chancellors and Principals have issued a report and action plan on purchasing which includes checklists for improving purchasing in universities. Their Procurement Advisory Group are also developing guidance for purchasing co-ordinators on equipment purchases. The Central Unit on Procurement has issued extensive guidance on a wide range of purchasing issues. This checklist brings together in one place the available guidance relevant to equipment, coupled with the National Audit Office's experience. It cannot replicate the expertise accumulated by an institution's professional purchasing staff, which should be drawn on wherever appropriate.

Life-cycle implications

4 Purchasing should be seen within the context of the equipment life-cycle and the inter-relationships with other elements in the equipment life-cycle. The following may be particularly relevant:

Planning — Information on likely purchase costs are needed to plan for equipment acquisition whilst the budget set at the planning stage can affect the value for money secured from purchasing activity.

Utilisation, sharing and recording — There may be scope for sharing existing equipment, or for combining requirements for similar equipment within the institution so as to reduce the amount of equipment required or the costs of purchasing it . The extent to which the equipment is expected to be used, for instance whether it is to run

unsupervised overnight etc, may impact on the specification. If information is recorded on the reliability of different types of equipment, this can inform judgements on downstream maintenance costs.

Maintenance and other running costs

The approach to maintenance adopted will significantly affect the life-cycle costs of equipment, and needs to be taken into account in evaluating options and negotiating with suppliers. Even where maintenance is to be carried out in-house at the expiry of the warranty period, savings can be achieved by negotiating on training, manuals and spare parts. In evaluating equipment and negotiating purchases it is important also to take account of the consumption of energy, chemicals, lifed components and other 'consumables'.

Obsolescence and disposal

The expected life of equipment can have a significant bearing on the costs of the item across the life-cycle, in terms of the need to incur the cost of replacing the item when it becomes uneconomic to maintain or obsolescent. Hence a more modern item of equipment may be justified on overall cost grounds despite a higher initial cost. These decisions can be informed by assurances from suppliers on how long they plan to support the equipment and have spares available. For some types of equipment the cost of disposal may be a relevant factor to consider.

Evaluative criteria

5 The National Audit Office adopted the following criteria for evaluating practice at institutions:

- there should be a proper market search leading to competitive tenders or quotations, and second round negotiations;
- action should be taken to secure value for money even where there is only one supplier;
- there should be an evaluation of which supplier provides the best value for money in terms of whole life costs, taking account of all relevant downstream costs particularly maintenance, consumables and the provision and cost of spares;
- savings should be sought through combining purchases of common items or negotiating advantageous leasing deals; and
- there should be appropriate application of professional purchasing skills, with the institution's purchasing co-ordinator being involved in all high value expenditure.

Checklist 2: Equipment procurement

Alternatives to purchasing

There can be significant savings from purchasing equipment more effectively. However, the most money can be saved by not buying at all.

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
1. **Is there scope for sharing equipment with others?** (Paragraphs 4.8-4.10)	There may be scope for using an item of equipment held by another department within the institution, or even by an outside body, where there is spare capacity sufficient to meet the needs identified. The problem may be finding out about such items, although the development of institution-wide asset registers should make this easier for more expensive items. The other department or outside body may raise a charge for using this equipment, but it is unlikely that paying the charge will be more expensive over the equipment life than procurement.	
2. **Is there scope for purchasing an item of equipment jointly with another user?** (Paragraphs 3.16 and 3.30)	The National Audit Office found two instances of similar items of equipment being purchased by departments in the same building without either purchaser knowing of the other. Where someone else needs the same item there may be scope for purchasing jointly, with a financial saving and possibly enhanced specification. A good way of facilitating aggregation of needs would be to notify the purchasing co-ordinator of all higher value purchases in prospect.	
3. **Would it be worth hiring the equipment ?** (Paragraph 3.17)	Hiring equipment, say for a three year period, solves maintenance problems, avoids downstream staff costs and ensures that equipment is kept up to date. Equipment suppliers have told the National Audit Office that hiring for a three year period can be considerably cheaper than buying, particularly for IT equipment.	
4. **Would it be worth procuring equipment by means of a finance lease or hire purchase agreement?** (Paragraph 3.17)	Equipment leasing or hire purchase provides a means of spreading the costs of ownership over a period of years. In this way these costs can be more clearly known from the outset and some of the risks of ownership can be transferred to the vendor. This comes at a price and it is important that the costs are compared with those of outright purchase across the life of the agreement to determine whether leasing or hire purchase is more expensive and whether this additional expense is justifiable. Leasing should not simply be considered as a means of augmenting a departmental funding allocation, as it will probably be cheaper to 'borrow' the necessary funds from within the institution. One institution has found that a fixed term hire purchase agreement has more to offer than a lease, where the agreement has no restriction on alterations or modifications to the equipment.	

Application of good practice in purchasing

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
5. **Has the purchaser been trained in basic purchasing techniques?** (Paragraphs 3.39-3.40)	The Committee of Vice Chancellors and Principals provide a range of training courses, details of which should be available from the institution's purchasing co-ordinator. It may be most cost-effective for the department to train up one member of staff, such as the departmental superintendent who can advise other purchasers.	
6. **How has the specification been developed?**	Where equipment is specified at or near the leading edge of technology it is common for the specification to developed in conjunction with one or more suppliers. It is important that this process does not result in a specification which is so detailed as to eliminate any effective competition. The focus should be on delivering what the Department or research project needs rather than specifying what a supplier can supply. One possible approach is to specify performance (that is the required outcomes) rather than technical details (how it works). In the latter case there is the risk that the final product will be technically superb but does not do what is required. In discussing specifications with suppliers it is essential that no commitment is entered into prior to seeking tenders or quotations. Doing so can seriously weaken the subsequent negotiating position.	
7. **Has there been a proper market search?** (Paragraph 3.12)	Information on potential suppliers can be obtained from a wide range of sources, such as existing suppliers, personal contacts, trade directories, exhibitions, conferences and consultants. The Official Journal of the European Union may help source a new market as the adverts are often copied into other magazines and journals at no cost. Once a wide range of suppliers has been identified, the purchaser can short-list those suppliers with the best reputation or specification. However, previously unknown suppliers may bring new ideas or could give an extra edge to the competition. Sticking to a small number of suppliers which have been used in the past may not result in the best value for money. A thorough market search may also identify opportunities to procure second-hand and ex-demonstration equipment	
8. **Have proper procedures been followed where purchases fall within the scope of the European Union Supplies Directive?** (Paragraph 3.22)	The United Kingdom Public Sector Contracts Regulations embody the European Union Supplies Directive into United Kingdom law. The Government's interpretation is that they apply to all purchases by higher education institutions, regardless of funding source, in excess of a specified threshold, currently (1996) £158,018. Breaching them is an offence and leaves the institution liable to challenge by an aggrieved supplier which would have the effect of halting the purchase and could prove costly. The Regulations require public purchasers in most cases to advertise in the Official Journal of the European Union. They also circumscribe, but do not necessarily forbid, pre and post tender negotiation and can have a bearing on the drafting of the specification.	

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
	The application of professional purchasing expertise, and hence the involvement of the purchasing co-ordinator, at every stage of the procurement is vital if the regulations are not inadvertently to be broken. It should be noted that the procedures required by the regulations will lengthen the time taken to make the procurement, and this should be allowed for. These timescales have their positive side as they can encourage thorough planning and may identify new sources of supply.	
9. **Has the purchaser consulted the institution's purchasing co-ordinator on the conduct of the procurement?** (Paragraphs 3.21 and 3.23)	As well as being vital where the purchase price may exceed the threshold for the United Kingdom Public Sector Contracts Regulations, the purchasing co-ordinator's involvement can be important for less expensive equipment. The co-ordinator can obtain a better deal by applying expertise to the specification, negotiating for better overall value, or by arranging for purchases to be combined with someone else's requirements. The earlier the purchasing co-ordinator is involved the better, as savings may be achievable by modifying the wording of the specification as well as in post-tender negotiations. The model advanced by the Committee of Vice Chancellors and Principals is that of purchasing being undertaken by a cross-functional team with the professional purchaser and end-user contributing their skills and knowledge as appropriate at each stage in the procurement.	
10. **Has the purchaser used call-off contracts, such as framework agreements for commonly procured equipment, where they exist. Alternatively, is there a good case for not using these?** (Paragraphs 3.24 and 3.25)	Such arrangements have been negotiated using the purchasing power of the whole institution and taking account of through-life costs, and should, for small purchases at least, be better than anything that can be negotiated elsewhere. (The Universities' Regional Purchasing Consortia are also working on developing agreements.) Breaking from the agreements may impact adversely on the institution's negotiating power when the agreements are renewed. If purchasers really think they can improve on the central agreement they should consult the purchasing co-ordinator to see whether this is really the case and to encourage them seek improvements to existing arrangements. Any supplier can under-cut contract prices on a short-term basis as it is its aim to take business from the contractual supplier, which may have beaten it in the original tender process. For large purchases it may be possible to obtain value-added concessions beyond those in the contract, and the purchasing co-ordinator should be able to advise on this.	

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
11. **Has the purchaser set up a competition?** (Paragraphs 3.10-3.11)	Competition is important . Without it the institution has less purchasing power. The National Audit Office found few equipments for which no competition was possible. Competition may secure savings even where one supplier's equipment is strongly preferred on technical grounds. Equipment suppliers met by the National Audit Office indicated that they assumed that they were in a genuinely competitive environment when asked to tender, and behaved accordingly. The purchaser should therefore seek to draft a specification which is expressed in generic terms rather than in terms of what a particular supplier can offer. It should then evaluate non-price factors such as technical capability, compatibility, reliability, potential obsolescence and downstream costs, once the bids are in.	
12. **Have steps been taken to assess the quality of the equipment being considered?** (Paragraph 3.10)	It is worth contacting other users of the equipment within and outside the institution for their views on quality or to arrange a trial. (This may also identify opportunities for sharing - see Question 1 above.) Details of other users may be provided by the supplier, or, within the institution, from the asset register, once established.	
13. **Has the purchaser asked for information on all relevant life-cycle costs in seeking competitive quotes or tenders?** (Paragraphs 3.14-3.15)	The purchaser should consider specifying what is wanted on the basis that everything is negotiable. The specification could include: • provision for on-site tests, and pre-negotiation trials if these are desirable; • a price which is fixed and firm, irrespective of inflation, exchange rate fluctuations etc (although it may help in subsequent negotiations if suppliers are asked to quote on more than one basis, say at a particular exchange rate, as well as on a fixed rate basis); • free delivery, installation and commissioning; • maintenance cover for however long the department needs it (this is always negotiable downwards); • the cost of consumables; • details of spare parts availability for the life of the equipment (seven years is a usual minimum) together with contractual notification before the supplier ceases manufacture of spare parts; • handbooks with full maintenance instructions, including circuit diagrams; • training (some suppliers provide this free).	
14. **Is there an objective appraisal methodology?** (Paragraphs 3.11 and 3.14)	The complexity of methodology applicable will depend on the cost of equipment and relative importance of different factors and therefore the benefits to be derived from spending time on using it.	

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
	To compare financial factors throughout the equipment life the standard approach is to undertake a discounted cashflow analysis which estimates the expected costs (and any income) throughout the equipment's life, (including replacement costs where the forecast replacement dates of the equipments being appraised vary). In addition to the issues referred to at Question 13 above, it may be necessary to consider associated building costs, staff costs the costs of energy, water and waste disposal and eventual disposal costs. Future costs etc are discounted by a standard factor on which the finance or purchasing departments can advise. A scoring system can be derived for non-financial benefits and drawbacks, such as devised by the Central Computers and Telecommunications Agency for information technology equipment. Factors may include performance, compatability, ease of modification or upgrade and environmental impacts. Where the financially most favourable option does not score well on non-financial factors, efforts should be made to place a value on the latter. For instance, sub-optimal reliability could be translated into enhanced maintenance costs and a greater risk of obsolescence could bring the replacement date forward.	
15. **Has the purchaser and/or the institution checked up on the strength and qualifications of the potential suppliers? Is the supplier on the institution's approved supplier list (where one exists)?**	The purchaser or the purchasing co-ordinator needs to consider whether: • the suppliers have a reliable trading status (in one case the supplier went bankrupt a few weeks after a major purchase by an institution); • the supplier is technically capable (previous customers may give references on the basis of their experience); • the supplier has adequate quality controls and complies with the institution's environmental policy so far as this is relevant; • the supplier can provide satisfactory after-sales service (they should advise on service arrangements, technical information and the availability of spares); • the supplier will comply with the institution's terms and conditions of purchase. Much of this routine work can be obviated by having a credible approved suppliers list at the institution which the purchasing co-ordinator would be well placed to maintain.	

Negotiating for better value

Negotiation is a specific skill, grounded in experience, which most suppliers expect. It usually results in achieving better value for money, by exploring ways in which both parties can benefit at a reduced overall cost to the purchaser. The following check list pre-supposes that the purchaser has chosen a short list of suppliers who have already quoted. In arriving at this short list, the purchaser may well have discussed the requirements with the supplier both before and after the supplier's quotation. Such discussions can in themselves provide major cost benefits, by identifying possibilities such as using an ex-demonstrator or last year's model, etc.

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
16. **Does the purchaser feel confident enough to negotiate?**	If not, enrol the services of the purchasing co-ordinator, who would look to challenge the costs of each element in the supplier's offer and may find this easier if consulted at the specification stage.	
17. **How should the purchaser negotiate?** (Paragraphs 3.11-3.12)	The following methodology may be of use. Firstly the purchaser should tell the supplier that its prices are too high. The supplier may well ask what the budget is. **Do not tell them.** Where another supplier is offering a better deal, say so without being specific. In the case of the supplier tendering the lowest price the focus should be on aspects within tender which are not so competitive. Then invite each (selected) supplier to come and discuss the bid, and suggest ways of lowering the price. The supplier may suggest, among many possibilities: • a straight-forward discount, which should be accepted as a starting point; • extra equipment or training in place of a discount; • a different but acceptable equipment (ex-demonstrator, etc); • changing the specification to reduce the price; • including more "free" maintenance; • varying the payment terms in exchange for a discount or to the purchaser's advantage; At this stage the purchaser can consider which specification changes would be acceptable and go through these one by one requesting price reductions for each. The purchaser then decides on the final supplier (but does not tell them) and should consider inviting the supplier in for a final round of negotiation.	
18. **Has the purchaser negotiated for:** • **additional accessories for the equipment? or** • **the reduction of the downstream maintenance costs for the equipment?** (Paragraph 3.14)	Equipment suppliers are often more willing to negotiate on add-ons and downstream costs than the initial price, and may be willing to offer extended warranties, free spares or consumables and staff training.	

Matters for consideration by staff with purchasing authority

Delegated responsibility for purchasing places a responsibility on heads of department or equivalent to ensure that purchasing complies with the institution's rules and regulations, keeps within budget and obtains value for money in terms both of initial and downstream costs, bearing in mind that the latter will ultimately come from departmental budgets even if the former is funded from specific grants. Many of the questions in the earlier sections of the checklist will be relevant to discharging this responsibility, as may the following specific questions.

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
19. **Has the purchaser negotiated over unsuitable contract conditions?**	The aim should be to impose the institution's standard contract conditions. To be avoided are conditions which demand payment on order or delivery rather than on the outcome of a satisfactory acceptance test. Paying on order could result in the institution becoming a creditor due to receivership.	
20. **Does the head of department authorise all equipment orders?**	This function may be delegated, say to the departmental superintendent, for orders below a specified threshold. At some institutions orders over a specified threshold may need to be authorised at a higher level. The authorisation process should enable the head of department to discharge the institution's accountability for regularity, propriety and value for money. This includes checking that funds are available, that there is a documented case supporting the procurement and that the institution's and Government regulations have been complied with.	
21. **Is the specification for the equipment appropriate to the user's needs?**	Some equipment suppliers interviewed by the National Audit Office were convinced that some purchasers over-specify their requirements. A good discipline is for a statement of need to be prepared for each substantial item of equipment at the planning stage setting out the objectives to be met and the benefits expected, (see Checklist 1, Question 15). The specification can then be tested against the statement of need.	
22. **Is there a documented case supporting the procurement of the particular item of equipment?** (Paragraph 3.37)	The minimum standards of documentation may be specified in the institution's purchasing manual or financial regulations. The extent of documentation is likely to vary according to the cost of the item concerned. Good practice would be for details to be provided of the quotations or tenders received with an evaluation of life-cycle costs and relevant non-financial factors, including improvements negotiated after the quotations or tenders were received. It is important that these details are retained in one place so that queries about the contract conditions can be readily resolved in future years.	
23. **Is there appropriate segregation of duties?** (Paragraph 3.37)	Institutions commonly specify requirements for segregating duties in their financial regulations or purchasing manuals. The fundamental principle is that the member of staff who places orders should be different to the person who authorises the consequent invoices for payment. In the case of research grants at least this could be re-stated as separating the authority to spend money from the grant budget from the authority to place orders in the name of the institution.	

Question (with reference to main report where relevant)	**Notes**	**Yes/No (and Comments)**
24. **Have the maintenance and other running cost implications of the equipment been considered?** (Paragraph 4.16)	The institution is better placed to negotiate maintenance cover with the supplier before the item has been procured than subsequently, and hence the best time to decide on the maintenance approach is prior to the time of purchase. Departments commonly decide against external maintenance for equipment preferring to use their own technicians, except where the equipment is very complex or where 'down-time' must be minimised. In many cases this may be a cost-effective approach but it would be worth checking that this is indeed the case. There may also be scope for negotiating favourable rates for specialist consumable items, such as lifed components or chemicals. In any case, downstream costs should be identified, especially where they vary between different equipment options.	
25. **Is there an appropriate purchase ordering system?** (Paragraph 3.31)	The National Audit Office found that the departments examined operated a wide variety of different systems for processing and recording purchase orders. Some of the most effective were commercially produced packages specific to higher education. Features to look for in such a system are: • it should generate standard pre-numbered order forms which comply with the institution's regulations on the content of such forms including having terms and conditions printed on them; • it should show expenditure and commitments (that is the value of orders placed but not paid for) against each budget or grant so that over-spending can be prevented before an order is placed. This may require orders being charged to more than one budget or grant. • it should record the value of orders as they are placed and be used to check invoiced amounts against order (and what has been delivered), with the flexibility to cope with invoices which differ for good reason from the order. • it should be regularly reconciled against information held on the institution's central accounting system; • ideally, it should communicate electronically with the central accounting system, to reduce time spent inputting data and reduce the incidence of error; • it should include an inventory module which is automatically updated when equipment is delivered with, as a minimum, details of price, date, location and serial number. Ideally this module could be turned into a more useful tool by including information necessary for electrical testing purposes and information on length of warranty, maintenance costs and estimated replacement cost.	
26. **Are there arrangements for appraising the performance of equipment some time after it has been procured?** (Paragraph 4.5)	At one institution this is formalised for items above a specified threshold. The user has to complete a post-purchase appraisal six months after installation to compare the use and performance of the equipment against that which was specified in the appraisal of need submitted to justify purchase.	

Reports by the Comptroller and Auditor General Session 1995-96

The Comptroller and Auditor General has to date, in Session 1995-96, presented to the House of Commons the following reports under Section 9 of the National Audit Act, 1983:

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