National Audit Office

Improving the disposal of public sector Information, Communication and Technology Equipment

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL | HC 531 Session 2006-2007 | 31 July 2007

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This report has been prepared under Section 6 of the National Audit Act 1983 for presentation to the House of Commons in accordance with Section 9 of the Act.

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Comptroller and Auditor General
National Audit Office

26 July 2007

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KEY FACTS

Method of procurement

Public bodies procure their ICT equipment in one of two ways:

In-house: Just under 80 per cent of public sector ICT equipment is procured in-house, although for central government alone, only 50 per cent is procured in this way; or

Through outsourcing, leasing or other related arrangements: Just over one fifth of public ICT equipment is leased often through an outsourced service provider (50 per cent in central government).

Managing disposals

Public bodies typically dispose of their ICT equipment by using either:

Specialist ICT disposal companies, ranging in size from national to single-person operations who collect the equipment and dispose of it as instructed. Three fifths of public bodies dispose of ICT equipment in this way.

Outsourced service providers, storage and charitable donations. The remaining two fifths of public bodies dispose of ICT equipment either through outsourced service providers or charitable donation, or they hold it in long term storage.

The manufacturers of ICT equipment are increasingly establishing facilities for clients to dispose of their end-of-life ICT equipment. While the use of this disposal option is commonplace in the private sector, very little public ICT equipment is as yet disposed of in this way.

Volumes and values procured

In 2005-06, public bodies procured 1.7 million units of ICT equipment at a cost of £2.7 billion, mostly on computer units and monitors (85 per cent of all items). Some £750 million was spent in central government alone on 430,000 units. The procurement of public sector ICT equipment is forecast to increase to £4.1 billion by 2010-11 (an estimated 2.6 million units of equipment).

Operating costs

The cost of procuring ICT equipment typically accounts for only one fifth of the Total Cost of Ownership. Four fifths are accounted for by operating costs such as maintenance and technical support. For computer units and monitors, failure rates increase significantly at around three to three and a half years of age giving rise to rapidly increasing maintenance costs.

Resale costs and revenues

The key factor influencing the potential resale value of ICT equipment disposal is age at disposal. Public sector ICT equipment is on average disposed of at just under five years of age. In 2005-06, just over four fifths of public bodies disposed of ICT equipment at a net cost. Whereas a typical computer unit disposed of at three years of age should, based on commercial best practice, generate net revenue of around £49.

Charitable donation

In 2005-06, around 20 per cent of public ICT equipment was donated.

Terms used in this report

Centralised procurement	ICT equipment either purchased through the central buying unit of Government (the Office of Government Commerce), a central buying unit within the Department or another Department's central contract.
Charitable donations	Passing working ICT equipment to schools, other public bodies or charities within the UK or overseas.
Data wiping or cleansing	The irreversible deleting of data.
GCHQ Communications and Electronics Security Group (CESG) standards	The Communications and Electronics Security Group (CESG) set out a series of standard practices to promote the secure removal of data throughout Government.
'ICT equipment'	Defined as including: ■ Computer units ('Desktop' computers); ■ Monitors; ■ Laptop computers; ■ Servers; ■ Printers; ■ Photocopiers; ■ Fax machines; ■ Telephone equipment, excluding mobile phones.
Employee purchase programmes	Where redundant but working ICT equipment is made available for purchase by employees.
End-of-life status	ICT equipment reaches 'end-of-life' status when it becomes available for reuse, recycling or disposal.
Hazardous Waste	These are the most dangerous wastes. They can cause the greatest environmental damage or are dangerous to human health either immediately or in the longer term. The Hazardous Waste Regulations set out the rules for assessing if a waste is hazardous or not. Some common hazardous wastes are fluorescent tubes, computer monitors containing a cathode ray tube and nickel-cadmium batteries.
Landfill	The burial of waste in regulated disposal facilities.
Mid-range server	Mid-range servers are the most common type of server and are used by the majority of public bodies and private sector companies. They provide the platform for most operating systems including Microsoft windows and Unix. They differ from mainframe servers, usually referred to by manufacturers as 'large' servers, which are typically more extensive and are installed and operated for longer periods (ten years or more as opposed to five years).
Outsourced ICT provider	A firm who are contracted to deliver the full range of ICT services, including the procurement (or, the lease), operational management, replacement and disposal of ICT equipment (some outsourced service providers are also manufacturers of ICT equipment).

Net cost	The cost to the client body after the costs of resale have been deducted from the resale value.
Net Revenue	The revenue earned by the client body after the costs of resale have been deducted from the resale value.
Resale	When no longer required for its original purpose ICT equipment can be resold to other organisations using a number of methods including equipment auctions.
Recycling	The reprocessing of valuable materials or components from scrapped ICT equipment.
Redeployment	Where refurbished ICT equipment is reused within the organisation.
Refurbishment	The repair, checking and cleaning of non-functioning ICT equipment in order to make it available for resale or redeployment.
Specialist ICT disposal company	Firms who provide a range of disposal services. There are a number of different types of firms providing different services include waste management contractors, equipment dismantlers, asset management companies, equipment brokers and charity refurbishers.
Thin client technology	A thin client (sometimes also called a lean client) is a client computer or client software in client-server architecture networks which depends primarily on the central server for processing activities, and mainly focuses on conveying input and output between the user and the remote server.
Total Cost of Ownership	Total Cost of Ownership is defined as the cost of procuring, operating and disposing of an asset. It includes the costs of support services, maintenance and repair costs incurred over the life of an individual unit of ICT equipment.
Waste	Any substance or object which the holder discards or intends or is required to discard. Whether or not a substance is discarded as waste must be determined on the facts of the case and in light of judgements issued by the UK courts or European Court of Justice.
Whole life value	Whole Life Value is a term that describes the various aspects of sustainability in the design, construction, operation, disposal as waste and where appropriate re-use of equipment. It includes three different sets of values: economic value, environmental value and social value.

SUMMARY

1 There are no precise figures for the volume of Information Communication and Technology hardware equipment[1] (hereafter referred to as ICT equipment), currently in use in the UK, or the associated waste this generates. It is, however, clear that significant volumes are involved and these are likely to grow in the future as demand for improved technology increases. When no longer required, for its original purpose and if still in working order, ICT equipment can be redeployed, resold, or donated to charity. If it is not working, it may be suitable for repair or refurbishment, otherwise it will need to be sent for treatment, recycling or destruction. Regardless of the disposal route public ICT equipment needs to be dealt with:

- **Efficiently**, by minimising disposal costs and maximising resale value within the context of a strategy aimed at reducing the Total Cost of Ownership[2] of ICT equipment.
- **Legally**, in line with UK environmental legislation, UK data protection law and public sector security standards, and UK electrical safety law.
- **Responsibly,** particularly in relation to environmental protection and business behaviour. Government has made clear that it expects the public sector to be a leading exponent of sustainable development and to lead the way in adopting best practice.

2 This report is timely. There is growing public concern about the environment and recognition within government of the need to take a wider, longer term, view of the costs and benefits of investment decisions. For example, from April 2007 departmental accounting officers have explicit responsibility for the delivery of the Government's Sustainable Procurement Action Plan.[3] In addition, the Waste Electrical and Electronic Equipment (WEEE) Regulations[4], fully implemented in July 2007, will impact significantly on how public ICT equipment should, in future, be managed by creating new obligations for ICT equipment producers[5] to finance the disposal of ICT equipment and to reduce landfill and increase the reuse and recycling of end-of-life equipment. Public bodies need to understand the Waste Electrical and Electronic Equipment Regulations and use this knowledge when negotiating contracts for new ICT equipment with producers to secure better deals.

3 In addition, the volumes of public ICT equipment that will ultimately need to be disposed of are growing. The procurement of public sector ICT equipment is forecast to increase from a baseline of £2.7 billion in 2005-06 to £4.1 billion by 2010-11 (an increase in volume from 1.7 to 2.6 million units[6]). It is important, therefore, that public bodies understand how they can generate value from their ICT equipment disposals, while at the same time they are clear about their statutory and ethical responsibilities about how their end-of-life ICT equipment is handled and where it, and the data it contains, ultimately ends up.

1 ICT equipment includes, computer units (PCs), laptop computers, monitors, printers, servers, faxes, photocopiers, telephone systems.
2 Total Cost of Ownership is defined as the cost of procuring, operating and disposing of an asset. It includes the costs of support services, maintenance and repair costs incurred over the life of an individual unit of ICT equipment.
3 UK Government (2007) *UK Government Sustainable Procurement Action Plan*, Department for Environment, Food and Rural Affairs.
4 These regulations implement one of a small number of European Directives which establishes the principle of 'extended producer responsibility'. Under this principle, and specifically the parts of the regulations referring to non-household waste electrical and electronic equipment, producers are responsible for meeting the costs of collection, treatment, recovery and environmentally sound disposal of electrical and electronic equipment that becomes waste. The regulations also set standards for treatment and minimum recycling rates.
5 Under the regulations a producer is defined as: a manufacturer of electrical and electronic equipment selling under their own brand in the UK; or a business based in the UK selling under their own brand electrical and electronic equipment manufactured by another person; or a professional importer introducing electrical and electronic equipment to the UK market; or a business based in the UK that places electrical and electronic equipment in other European Member States by means of distance selling.
6 Kable (2005) *Central Government ICT Expenditure Forecast 2004-05 to 2007-08*; National Audit Office analysis (see Appendix 1 for more details on assumptions).

4 Best practice in this area is, however, unclear. This report, therefore, is a first attempt to (1) identify the potential to generate better value from ICT equipment disposals including consideration of wider environmental costs, and (2) gauge the wider risks to public bodies when disposing of end-of-life ICT equipment.

1) Findings on the potential to generate better value from ICT equipment disposals

5 We identified significant scope for public bodies to realise better value in three areas:

- **Reducing the costs of resale and increasing resale revenues.** We found that leading commercial organisations dispose of ICT equipment typically at around three years of age. Although there are exceptions, as a general rule, ICT equipment at this age has residual value and can be resold. However, public sector ICT equipment is on average disposed of at just under five years of age when it has little or no value and has to be disposed of at a cost. We estimate that if public sector organisations reduced the age at which they dispose of end-of-life ICT equipment from five to three years (in line with current best commercial practice), this should increase the financial return from resale by around some £70 million per year.
- **Reducing operating costs.** By disposing of their ICT equipment typically at around three years of age leading commercial organisations are doing so at an age before it starts to incur significantly higher operating costs and reduces business performance. In light of such evidence we consider departments should look carefully at their disposal cycles to identify whether better value can be obtained from changing refresh cycles. On the one hand procurement costs will increase from moving from a five to a three year refresh cycle. Based on 2005-06 figures, we estimate procurement costs would increase by £1.8 billion. On the other hand there is evidence that by adopting a faster refresh cycle there may be significant countervailing savings from, for example, reduced maintenance costs and increased staff productivity. In particular, the advice of our professional advisors and a review of literature indicates that operating cost savings in excess of 40 per cent can be achieved through following best ICT equipment management practices which include faster refresh periods. Whilst it is not possible to determine the proportion of these savings that are related directly to faster refresh periods alone, the scale of the public sector's ICT hardware estate means that, if, for example, only half (20 per cent) of these savings are related to faster refresh periods the net saving (taking into account increased procurement costs) across the public sector would have been £400 million in 2005-06. If three quarters of the potential savings in operating costs (30 per cent) are related directly to faster refresh periods then the savings would have been greater at £1.4 billion in 2005-06. If, however, only one quarter (10 per cent) of the savings are related directly to faster refresh periods then moving to a faster refresh cycle would have resulted in a net cost across the public sector of £700 million in 2005-06.
- **Becoming a more intelligent procurer of ICT equipment and disposal services.** To realise the increased resale revenues outlined above, public bodies need to improve ICT asset management practices and their awareness of commercial market values for used equipment. This would enable them to become smarter players in the ICT disposals market and negotiate better deals with the ICT industry, whether in the purchase of new equipment or where they make use of such organisations' disposal and outsourcing services. For example, in some cases manufacturers offer discounts on the purchase of new equipment to reflect the likely residual value of returned equipment, but we found little evidence that such discounts are taken up by public bodies. Equally, we found no evidence that such discounts are incorporated into public sector ICT outsourcing contracts.

6 In addition, despite most public bodies using the same specialist disposal agents, there is limited evidence of any joined-up disposal activity across the public sector. Aggregating demand and improving the coordination of public sector disposals activity would help to secure better deals (for example, in rationalising and reducing the commission charged by specialist disposal agents), enable wider application of good practice, and assist in realising scale economies to reduce overheads.

7 The absence of comprehensive information from public bodies about their ICT disposal volumes and practices (many simply do not know the volume and method of disposal), means that the savings outlined above can only be indicative. Such savings also need to be seen in the light of increasing concerns about the environment, in this case the huge volume of ICT equipment that is scrapped each year, and the need for organisations to better understand the 'whole life value' of their ICT equipment taking into account wider, and longer term, costs and benefits.

8 As yet, there has been limited progress towards the calculation of 'whole life value' of ICT equipment which requires an informed understanding of the potential trade-offs between securing maximum financial value and delivering on the organisation's wider (and often publicly stated) sustainability ambitions. A key question is whether reducing the refresh period for ICT equipment (for example, from 5 to say 3 years) will lead to a higher net volume of ICT equipment being purchased and the implications of this for the environment; or whether it would simply mean a change of ownership with the disposed of equipment being reused by another organisation. If, however, faster refresh periods lead to increased volumes overall, it is possible that the faster transition to better performing and 'greener' ICT equipment (involving lower energy use and increased use of recyclable components) could outweigh other costs such as depletion of virgin materials and energy consumption during the construction, transportation and disposal of ICT equipment. This remains to be demonstrated, but there are organisations such as the Accounting for Sustainability Group[7] (of which the National Audit Office is a member) that are leading the way in attempting to develop frameworks and methodologies for such calculations.

9 We highlight the importance of establishing an ICT asset management strategy which can act as a starting point for balancing immediate value for money opportunities against wider environmental costs and benefits. However, in public bodies, we found that some of the key building blocks for developing a strategy are missing: asset registers, maintained for public accounting purposes, are not commonly used as a tool to actively manage the life cycle of ICT equipment and in particular the timing of disposals. There is also a general lack of coordination between the (typically) separate ICT equipment procurement and disposal functions within public bodies.

10 In the longer term, as the design of ICT equipment evolves, departments need to shape their strategies towards equipment which uses less raw materials in its manufacture, lasts longer, uses less energy in its operation and is easier to recycle. In addition, organisations need to think about ways in which they work with, and use, ICT equipment (for example, around the balance between central processing and processing capability at each desk and the use of 'thin client'[8] technologies) to reduce the amount of equipment (and components) required at each desk. Under *Transformational Government Enabled by Technology* – the Government's IT Strategy of November 2005 – the Chief Information Officer Council and its technological arm – the Chief Technology Officer Council – have a key role in defining common standards for the future technical "architecture" of Government IT systems (involving issues around the design, interoperability, use, reuse and sharing of IT equipment). One element to this will be the environmental dimension, including looking at the merits of technology such as thin client devices as alternatives to more traditional equipment such as desktops and laptops.

7 The Prince of Wales has established his Accounting for Sustainability Project to develop systems to help organisations to measure more effectively the environmental and social costs of their actions.

8 A thin client (sometimes also called a lean client) is a client computer or client software in client-server architecture networks which depends primarily on the central server for processing activities, and mainly focuses on conveying input and output between the user and the remote server.

2) Findings on the wider risks to public bodies when disposing of end-of-life ICT equipment

11 In addition to the risk to value for money, public bodies face a wider set of risks when disposing of ICT equipment. These risks centre on public bodies, or their disposal agent, adopting inappropriate disposal practices which are illegal or in breach of regulations **(Figure 1 overleaf)**, and/or result in a loss of reputation or public trust. They cut across three areas:

- **Environmental protection:** We found that whilst there were examples of good practice, there was a lack of awareness in many public bodies about the relevant legislation and a lack of oversight of their disposal agents' practices.
- **Data protection and security:** We found a good level of awareness of the legislative requirements in this area. The majority of public bodies, however, had no oversight of the data wiping standards and approaches being used in practice by their disposal agents.
- **Electrical safety:** We also found that most public bodies did not receive any evidence from their disposal agent that safety checks had been undertaken on ICT equipment for resale or donation.

Overall conclusion on value for money

12 As we have discussed earlier, the savings outlined above can only be indicative due to the absence of comprehensive information from public bodies about their ICT disposal volumes and practices. We estimate however that financial savings of around £70 million could have been achieved in 2005-06 from the resale of equipment at an age (typically 3 years) where it retains value.

13 Beyond this there may be additional savings from reducing the age at which the public sector disposes of its ICT equipment (typically 5 years) in the form of reduced operational and maintenance costs and improved staff productivity. Given the scale of the public sector's ICT estate (which continues to grow), even small gains in these areas could have a major impact. While we have indicated that significant additional savings might have been achieved in this way in 2005-06 (Paragraph 5), it can only be a broad indication, and there is a need for better data and more research across Government and industry to establish with greater certainty the total cost of ownership of ICT equipment, including the costs and benefits of moving to the faster refresh cycles that typically exist in the commercial world. Finally, the public sector needs to identify the scope to aggregate demand and improve the coordination of public sector ICT equipment procurement and disposals activity to negotiate better deals with the ICT industry, whether in the purchase of new equipment or where they make use of such organisations' disposal and outsourcing services.

14 Given the increasing emphasis in legislation and Government policy towards reuse and recycling and away from landfill, many public bodies are re-examining how they dispose of ICT equipment. Some have made good progress in starting to resolve these issues and increase the value they obtain from their used ICT equipment. Our analysis of public bodies' performance, however, reveals that for the vast majority there is considerable scope to reduce lifetime costs, such as maintenance, and secure a financial return from their disposals. But changes to procurement and disposal strategies will need to be informed by good analysis of the wider environmental costs and benefits involved. If our recommendations below are implemented public bodies will be in a stronger position to develop effective ICT procurement strategies which reduce lifetime costs, secure better deals for ICT equipment and services, reduce environmental impacts and have greater confidence that their ICT disposal activities are legal and socially responsible, in turn contributing to wider Government objectives on better asset management, efficiency and sustainability.

1 Summary of legislation governing the disposal of ICT equipment

Legislation	Summary
Environmental Protection	
The Environmental Protection Act (1990), Section 34: Duty of care and The Environmental Protection (Duty of Care) Regulations 1991	Section 34 of the Act imposes a duty of care on any person or organisation that imports, produces, carries, keeps, treats or disposes of waste to ensure that there is no unauthorised or harmful deposit, treatment or disposal of the waste.
Hazardous Waste Regulations (2005)	The Regulations define hazardous waste and the procedures to be followed by producers and collectors of hazardous waste. Some ICT equipment (for example monitors containing cathode ray tubes) is classified as hazardous waste when it is discarded and, therefore, is covered by these regulations.
Waste Electrical and Electronic Equipment Regulations (2006)	These regulations implement one of a small number of European Directives which implement the principle of 'extended producer responsibility'. Under this principle, and particularly those parts of the regulations referring to non-household waste electrical and electronic equipment, producers are responsible for meeting the costs of collection, treatment, recovery and environmentally sound disposal of electrical and electronic equipment that becomes waste. The regulations also set standards for treatment and minimum recycling rates.
Data Protection and Security	
Data Protection Act (1998)	The Data Protection Act requires anyone who handles personal information to ensure that the handling of personal information complies with the following eight principles: fairly and lawfully processed; processed for limited purposes; adequate, relevant and not excessive; accurate and up to date; not kept for longer than is necessary; processed in line with your rights; secure; and not transferred to other countries without adequate protection.
Official Secrets Act (1989)	Under the Act it is an offence to disclose certain official information under six specified categories: security and intelligence; defence; international relations; crime and special investigation powers; information resulting from unauthorised disclosures or entrusted in confidence; and information entrusted in confidence to other States or international organisations.
Electrical Safety	
The Electrical Equipment (Safety) Regulations 1994	The Regulations cover the sale of second hand equipment and are therefore relevant for the disposal of ICT equipment. Whilst there is no mandatory requirement for second-hand equipment to undergo any safety testing, a supplier is required to supply only equipment that is safe so as to avoid the committing of an offence under the Regulations.
The Health and Safety at Work Act 1974	The Act is the primary piece of legislation covering occupational health and safety in the United Kingdom. It covers the general duty of employers to their employees (Section 2) and those not in their employment (Section 3) who may be thereby affected.

Source: The Environment Agency; The Department of Trade and Industry; The Department for Environment, Food and Rural Affairs; DEFRA, Waste Management: The Duty of Care – A Code of Practice; DEFRA, Hazardous waste regulations – list of wastes regulations 2005; DTI (2007), WEEE Regulations – Government Guidance Notes; Information Commissioner's Office; The Official Secrets Act (1989); The Health and Safety Executive; The Department of Trade and Industry (2004), Guidance notes on the UK Electrical Equipment (Safety) Regulations 1994 (S.I 1994/3260).

Recommendations

15 There is currently a lack of joined-up thinking and leadership at the centre of Government about how best to secure value from the disposal of used ICT equipment, including the need to take account of this in the acquisition of new equipment. To assist, therefore, those at the centre of government with responsibilities in this area (in particular, the Office of Government Commerce, Department for Environment, Food and Rural Affairs, Department of Trade and Industry, the Environment Agency, and any other key stakeholders) we make the following recommendations. They should:

- **Conduct joint analysis of how best to develop and manage the market and the opportunities, risks and trade offs involved in different options for maximising whole-life value in ICT asset management.** This analysis should involve the ICT industry through, for example, representative bodies such as Intellect and should consider:
  - The opportunities to use new ICT technologies that consume less raw material in manufacture, and energy in operation and that last longer;
  - The opportunities to reduce the volume, and specification, of ICT equipment used at each desk by better understanding the requirements of users, and also exploring the use of new technologies, for example, 'thin client' technologies;
  - The wider environmental costs and benefits of moving to shorter refresh periods and how these may impact upon the achievement of the Government's targets for reducing waste arising and increased recycling by government departments;
  - Whether more second hand and re-useable public ICT equipment should be made available to other sectors (such as schools) either through discounted resale or charitable donation, and if so how this could be best co-ordinated, and;
  - How the public sector can make better use of its purchasing power to bring about changes in the design and manufacture of ICT equipment (taking account of, for example, the EU Framework Directive for the Eco-Design of Energy Using Products[9]) so that it is easier to maintain, uses less energy, retains residual value for longer, and at the end of its useful life, is easier to recycle.
- **Determine how the emerging market place for used public sector ICT equipment can be more closely managed, for example, by establishing a central framework contract for ICT disposal services for use by all public bodies.**
- **Develop improved guidance for public bodies about the key questions that they need to address in developing their own ICT asset management strategies,** drawing on existing good practice, for example the NHS Purchasing and Supply Agency's procurement guidance on the Waste Electrical and Electronic Equipment Regulations[10], to clarify the legal and social responsibilities of public bodies when they dispose of end-of-life ICT equipment.

16 Given the scale of ICT equipment expenditure across the public sector, even small changes in the lifecycle of such equipment can have a major financial impact. To fully understand these impacts, however, requires a significant review to be undertaken of the way in which public sector ICT equipment is managed from procurement through to disposal by the final end user. In such circumstances we suggest that, building on this report, there should be a wider review by a range of parties including the organisations cited in this recommendation, with the support of the National Audit Office, to analyse the totality of costs and benefits involved in changing the way in which public bodies manage their ICT equipment to help better understand the financial and environmental consequences of different decisions.

17 For public bodies we have identified five areas where they need to focus their efforts in generating improved value from their ICT equipment disposals, and improving how they manage the wider risks they face **(Figure 2 overleaf)**.

9 The Framework Directive for the Eco-Design of Energy Using Products (EUP) (Directive 2005/32/EC), which was adopted on 6 July 2005, provides a framework for setting eco-design requirements for energy using products (except transport) before they can be placed on the EU market. The Directive will establish eco-design requirements aimed at reducing the overall environmental impact of strategically important energy using products. The initial fourteen studies are for: Boilers & Combi Boilers; Water Heaters; Personal Computers and Computer Monitors; Imaging Equipment; Televisions; Battery Chargers and External Power Supply Units; Standby Consumption; Office Lighting; Street Lighting; Domestic Air Conditioning; Electric Motors; Commercial Refrigerators and Freezers; Domestic Refrigerators and Freezers; Domestic Dishwashers and Washing Machines.

10 *Guidance on the Procurement of Electrical and Electronic Equipment in the NHS with regard to the Waste Electrical and Electronic Equipment Regulations (2006)*, NHS Purchasing and Supply Agency March 2007.

2 Actions that public bodies need to take to improve their ICT equipment disposal performance

Areas where public bodies need to make more progress

Public bodies need to develop a better understanding of how they can adopt a more holistic approach to the procurement, management and disposal of their ICT equipment having regard to their sustainability objectives. There is a disconnect in the majority of public bodies between the procurement and disposal decision making processes and a lack of appreciation of the opportunity to create sustainable value by adopting an integrated asset management approach and securing improved financial value over the lifecycle of their ICT equipment.

The cost of procuring ICT equipment typically accounts for only 20 per cent of the Total Cost of Ownership (with 80 per cent accounted for by operating costs such as maintenance and energy). Public bodies recording of ICT equipment disposals in their asset inventories or registers is often incomplete or absent. Without this information public bodies cannot effectively manage (and minimise) the Total Cost of Ownership. The general lack of coordination between public bodies' procurement and disposal functions is another barrier to achieving improved value in both procurement and disposal.

Even where public bodies generate revenue this is lower than the rates being achieved by leading commercial organisations. In the public sector, equipment is too often stored for lengthy periods prior to disposal, increasing failure rates and reducing its potential resale value. None of the public bodies we surveyed generated resale revenue from mid-range servers, despite disposing of them at around five years of age (the optimal age for this type of equipment) and the existence of a good server resale market. Of the major suppliers of outsourced services to public bodies that we consulted, none have been asked by a public body to reflect the residual value of returned ICT equipment in the prices charged for new equipment or outsourcing services.

Despite many public bodies using the same specialist disposal firms, there is limited evidence of any joining up to aggregate demand, negotiate better deals and reduce disposal overheads.

Many public bodies have inadequate oversight of the ICT equipment disposal chain. For example, almost two thirds of central government organisations do not know what happens to their ICT equipment once it is handed over to their disposal agent for recycling.

Recommendations

A. Public bodies need to ensure that:

- decisions about ICT equipment disposal are taken with an informed understanding of the potential trade offs between securing good financial value and delivering on the organisation's wider sustainability ambitions (for example, delaying the timeframe for disposal of ICT equipment may adversely affect its residual financial value but reduce the volume of waste ultimately sent to landfill).
- the ICT asset management strategies and practices are consistent with supporting the organisation's corporate objectives and its sustainability policies.

B. Public bodies need to minimise the Total Costs of Ownership by:

- building in considerations of whole life costs about the procurement, management and disposal of ICT products into the procurement process from the outset, by integrating teams separately responsible for procurement and disposal and working closely with the suppliers of ICT equipment, outsourcing and disposal services;
- maintaining and actively using accurate ICT equipment asset registers and inventories, to continually assess the Total Cost of Ownership and the most effective strategies for minimising this;
- ensuring asset registers and inventories cover the organisation's entire ICT equipment holdings (enabling the organisation to understand the total opportunity and to aggregate demand).

C. Identify the optimal age at which end-of-life ICT equipment should be disposed of to maximise its resale value by:

- working closely with manufacturers, outsourced providers and specialist disposal agents to get the best deals by fully recognising the residual value of used ICT equipment and the optimal age to sell (currently around 3 years on average); and
- examining the potential resale market for servers.

D. Aggregate demand and increase joint working wherever possible, within the organisation but also with others, particularly those with existing expertise and contracts, to improve the coordination of public sector disposals.

E. Public bodies should ensure that their ICT equipment is disposed of appropriately by:

- ensuring their practices comply with all relevant environmental protection, data protection and security and electrical safety legislation;
- taking account of any other potential risks to reputation or loss of trust; and
- having active oversight of their entire ICT equipment disposal chain so they can be confident that all third parties are acting appropriately and as instructed.

Source: National Audit Office

Examples of where this has been achieved

The Environment Agency has centralised its management of ICT equipment disposal and embedded this within the function responsible for ICT equipment procurement. As a result, it has greater control over its asset management and is in a stronger position to assess and respond to the opportunities that might arise from, for example, the requirements under the Waste Electrical and Electronic Equipment Regulations that producers must take back redundant end-of-life equipment.

Fujitsu Services, a major IT services company and provider of oursourced ICT management services, sees the potential for lowering the Total Cost of Ownership of both its own and its customers IT equipment through strategic renewal and disposal of old equipment before the potential resale value falls below the cost of disassembly and disposal. Asset registers and inventories are used to monitor the Total Costs of Ownership on an on-going basis.

In 2005-06 HM Revenue & Customs disposed of approximately 43,000 units of equipment generating net revenues of £14.21 per unit. Four fifths of the equipment was resold generating net revenues of £613,000, with the remainder recycled on a cost-neutral basis. Key to this success is a dedicated disposals team that works closely with the departmental procurement function and its specialist disposal agent. A detailed asset register is used to support the disposals process, enabling the disposal agent to position the equipment in the resale market to achieve best value.

The MoD's Disposal Services Agency used its existing disposal contacts to resell 100,000 units of ICT equipment for the Department for Work and Pensions. The Department, which until then had disposed of ICT equipment at a cost, obtained some £170,000 in revenue.

The Environment Agency has set its disposal contractor the challenging target of 'zero waste to landfill'. The contractor and his outlets are audited to ensure that recovery operations are legal and that equipment and material flows are fully documented.

PART ONE

The growing significance of ICT equipment disposals in the public sector

1.1 The disposal of end-of-life ICT equipment is an increasingly important issue for government. The volumes of public ICT equipment in use are increasing each year, mainly due to the high rates of technological change and equipment replacement (with people and businesses buying the latest application before the end-of-life of their current versions); and the fact that individuals are increasingly using more than one computer every day (at work, on the move and at home).

1.2 At the end of its useful life this ICT equipment needs to be disposed of:

- **Efficiently:** ICT equipment can potentially be refurbished and redeployed or donated to charity, or profitably re-sold. The latter must be done in a way that minimises disposal costs and maximises resale value within the context of a strategy aimed at reducing the Total Cost of Ownership[11] of ICT equipment.
- **Legally:** Valuable materials used in the production of ICT equipment such as precious metals and engineered plastic and glass should be recovered and recycled, and the remaining waste disposed of in line with UK environmental legislation. All private and classified data must be removed or destroyed in line with UK data protection law and public sector security standards, and any ICT equipment destined for reuse must comply with UK electrical safety law.
- **Responsibly:** Sustainability issues, particularly in relation to environmental protection and business behaviour, have increased in their importance and profile in recent years, and the Government has made clear it expects the public sector to be a leading exponent of sustainable development and to lead the way in adopting best practice. Given the large amounts of end-of-life ICT equipment generated by public bodies, responsible disposal will clearly have an important impact on realising these aims. Even where public bodies have acted in good faith there is the risk that equipment may be inappropriately handled leading to, for example, environmental pollution and a threat to human health, with the associated adverse publicity and damage to reputation.

1.3 Public bodies, therefore, whether they purchase and manage ICT equipment in-house or outsource these activities to a commercial firm, must have a good understanding of the opportunities to generate value from their end-of-life ICT equipment and to understand and manage effectively their statutory and social responsibilities in relation to a range of environmental, data protection, security and safety issues. Ultimately they must have good oversight of how their end-of-life ICT equipment is handled and where it and the data it contains finally ends up.

1.4 In part two of this report we assess the potential to generate better value from ICT equipment disposals, and the financial savings that can be achieved if best practice ICT equipment disposal could be more widely implemented across the public sector. In part three we examine the wider risks to public bodies from ICT equipment disposal.

1.5 There is limited data on the level of ICT equipment disposal; it is not collected centrally and often it is not recorded at an organisational level. In the absence of such information a key source of evidence for this study, therefore, has been a cross public sector survey conducted into the value, volumes and approaches to ICT equipment procurement and disposal.

11 Total Cost of Ownership is defined as the cost of procuring, operating and disposing of an asset. It includes the costs of support services, maintenance and repair costs incurred over the life of an individual unit of ICT equipment.

1.6 This part of the report sets out:

- The scale and value of public sector ICT equipment procurement and disposal;
- The development of the ICT equipment disposals market place;
- Current responsibilities for public sector ICT equipment disposals, and;
- The National Audit Office's examination.

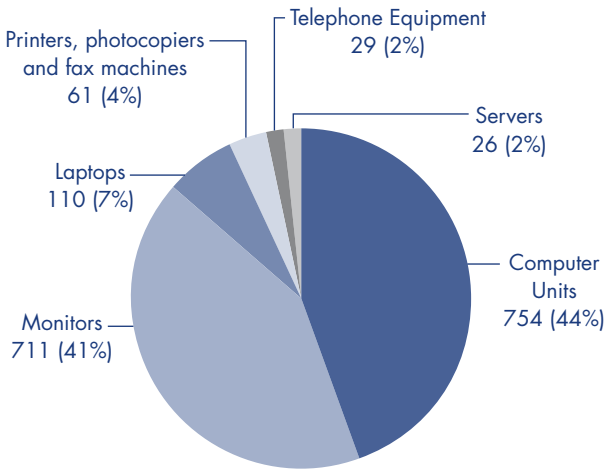
The scale and value of public sector ICT equipment procurement and disposal

1.7 It is for individual public bodies to determine their own ICT equipment disposals strategy and to organise their procurement and disposal functions accordingly, but typically this will involve either:

- **In-house procurement of ICT equipment,** with typically a separate disposal function, often managed and operated on an independent basis. Our survey revealed that just under four fifths of public sector ICT equipment is procured in-house, although in central government only 50 per cent is procured in this way; and
- **Outsourced ICT services,** leasing or other related arrangements: our survey revealed that just over one fifth of public bodies lease their equipment, often through their outsourced service provider (50 per cent in central government).

1.8 Our survey revealed that in 2005-06[12] some £2.7 billion was spent on purchasing 1.7 million items of ICT equipment, mostly computer units and monitors (44 and 41 per cent respectively) **(Figure 3)**. Some £750 million was spent in central government alone on 430,000 units. It is difficult for some departments to provide information on ICT equipment expenditure, for example, where they have outsourced their IT services and hardware and services are bundled together as a single package. However, the £750 million is consistent with figures published by Kable.[13] Of the departments that could provide data on hardware expenditure alone, **Figure 4** shows the top five departments and agencies, in terms of expenditure.

3 Volume of ICT equipment procured in the public sector 2005-06 (millions of units)



n=198 (central government = 98 wider public sector =100)

Source: National Audit Office survey and analysis

4 The main areas of central government expenditure on ICT equipment in 2005-06[1, 2]

Central Government organisation	ICT equipment expenditure (£m)
Ministry of Defence's Defence Communications Services Agency[3]	380
HM Revenue & Customs	45
Department of Trade and Industry	36
Environment Agency	18
Department for Work and Pensions	8[4]

Source: National Audit Office survey and analysis

NOTES

1 Figures for ICT equipment expenditure incurred by central government bodies include both costs incurred directly by bodies, or those incurred on their behalf by outsourced service providers.

2 Our survey represents a one year snap-shop of ICT procurement in the public sector. There may be central government bodies other than those listed above that may, in other years, have spent more or less on ICT procurement (major refreshes and therefore purchases of ICT equipment do not typically occur more frequently than every three years).

3 The Defence Communications Services Agency ceased to be an agency of the MoD on 31 March 2007. It is now part of the MoD's Defence Equipment and Support grouping.

4 The figure of £8 million for the Department for Work and Pensions covers its in-house procurement of ICT equipment, not provided through service contracts.

12 The latest financial year for which information was available.
13 Kable (2005) *Central Government ICT Expenditure Forecast 2004-05 to 2007-08.*

1.9 **Figure 5** shows that expenditure is projected to rise to £4.1 billion by 2010-11, which we estimate means that the volume of equipment purchased will increase from 1.7 million units of ICT equipment in 2005-06, to around 2.6 million units by 2010-11 (of which around 700,000 units would be procured by Central Government).

1.10 Every item of ICT equipment purchased will ultimately require disposal. Our survey revealed that public bodies disposed of around 658,000 units of ICT equipment in 2005-06 **(Figure 6)**, compared to the 1.7 million units purchased. If ICT equipment is largely being purchased to replace old equipment we would expect the volume of disposals to much more closely relate to the volumes purchased. The main reason for the considerable difference between the numbers of items procured and disposed of is that public bodies' recording of ICT equipment disposals in their asset inventories or registers is often incomplete; or in some cases that detailed asset registers and inventories of ICT equipment are absent. It is therefore likely that reported disposal volumes are significantly understated.

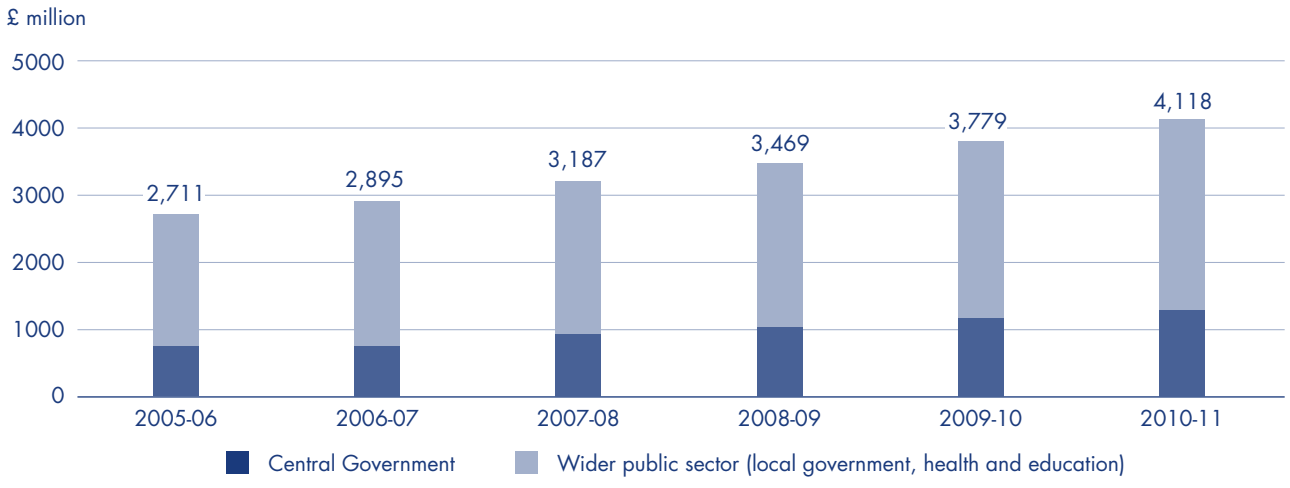
1.11 In the light of this under-reporting of disposals, and for the purposes of this study, we have therefore assumed a 1:1 ratio between procurement and disposal volumes in any given year. In other words we assume that because 1.7 million units of ICT equipment were procured throughout the public sector in 2005-06 that the number of disposals should have been the same, and that this relationship exists for future forecast procurement volumes. **(Figure 7)**.

The development of the ICT equipment disposals market place

1.12 There are six main options for the disposal of ICT equipment **(Figure 8 on page 20)**. One of the key trends in ICT disposals is the increasing pressure on all organisations, in line with the greater emphasis placed by Government on environmental protection, to reduce disposal through landfill and promote alternative options. In turn this has driven the growth of the ICT equipment resale market place. Since 1996 the market for refurbished computers has increased by 500 per cent, although it remains the case that less than one fifth of all discarded UK computers are recycled.[14]

1.13 The resale of end-of-life ICT equipment is the main revenue generating disposal opportunity, as recycling of valuable raw materials will typically be cost-neutral (the value of the recycled materials being used to offset recycling costs). The commercial market place for used ICT equipment is largely based on resale to other businesses, both within the UK and overseas (notably Central and Eastern European Member States, Africa and the Indian sub continent). Equipment resold within the UK is typically directed at schools, private individuals, or businesses in need of back-up equipment whereas equipment sold into overseas markets is mostly used for primary day-to-day purposes.

5 Forecast public sector ICT equipment expenditure 2005-06 to 2010-11



Source: Kable (2005) Central Government ICT Expenditure Forecast 2004-05 to 2007-08; National Audit Office analysis (see Appendix 1 for more details on assumptions)

14 http://www.wasteonline.org.uk/about.aspx. The Wasteonline website is managed by Waste Watch an environmental charity.

1.14 It is possible that the demand for used ICT equipment could decline if the pace of innovation in the ICT market continues to drive down the price of new equipment. Independent market analysis, however, indicates that prices could increase following the introduction of the Waste Electrical and Electronic Equipment Regulations, as manufacturers seek to recover the costs of recycling and environmental disposal by increasing the prices charged for new equipment. The commercial resale value of used ICT equipment is also being maintained by increasing levels of product support, warranties and service level agreements[15] offered by disposal companies and other resale bodies which have increasingly positioned themselves as ICT partners, rather than simply refurbishing and selling used equipment.[16] As such, used equipment has become more attractive for many organisations, particularly where the latest technology and levels of operating performance are not required.[17,18]

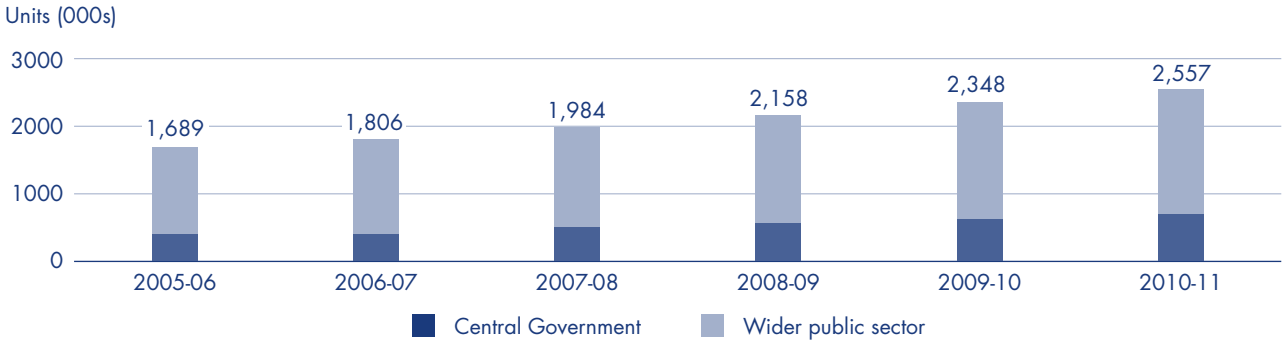
6 Public sector ICT equipment disposals – number of units (2005-06)

	Central government	Wider public sector	Total	
			Number	Percentage
Computer units	122,300	166,400	**288,700**	**44**
Monitors	104,100	143,700	**247,800**	**38**
Laptop computers	22,700	8,100	**30,800**	**5**
Servers	4,100	3,200	**7,300**	**1**
Printers	22,200	34,200	**56,400**	**8**
Photocopiers	1,000	2,000	**3,000**	**0.5**
Fax machines	1,000	2,000	**3,000**	**0.5**
Telephone equipment	10,100	10,900	**21,000**	**3**
Total	**287,500**	**370,500**	**658,000**	**100**

n=198 (central government=98 wider public sector=100)

Source: National Audit Office survey

7 Assumed volumes of public sector ICT equipment disposals 2005-06 to 2010-11



n=198 (central government =98 wider public sector=100)

Source: National Audit Office survey and analysis

15 Warranties and service agreements usually accompany the procurement of new ICT equipment and cover equipment failure over a limited period of time (usually between one and three years from the date of purchase). Shorter warranties and agreements are also available for used equipment re-sold through ICT disposal contractors (typically 3 months).
16 Processor (2006), *What's new in the used and refurbished market – equipment dealers move beyond just selling machines*, Vol. 28, Issue 4, January 2006.
17 ServerWatch (2005), *Hardware Today: second hand server strategies*, October 2005.
18 Gartner (2005), *Thriving secondary PC market puts old PCs to good use*, August 2005.

8 Summary of options available for the disposal of ICT equipment

When ICT equipment is no longer required for its original purpose it can be re-deployed. If an organisation chooses not to re-deploy the equipment it has a number of disposal options

a) Resale: Equipment with a resale value at the time of disposal can be sold under a remarketing agreement. This takes the form of a charge for processing and then a profit sharing arrangement upon sale of equipment to a third party. Key markets include the UK, EU and Eastern Europe, the Middle East, North and West Africa, India and North America.

b) Employee purchase programmes: Employee purchase programmes enable staff to purchase redundant computers at subsidised prices. This generates goodwill with staff and helps to recover a portion of the equipment's residual value. Typically these programmes are managed by third party contractors as they can be time consuming to administer. Contractors will be responsible for processing and packaging old stock to a particular standard and the provision of warranties. The processing will need to cover data security issues and software licensing arrangements.

c) Charitable donations: Working equipment can be donated to schools and charities within the UK or overseas. For example, Computer Aid International[1] is a charitable body that supplies refurbished computers to schools and other end users overseas. In 2005-06, around 20 per cent of public sector ICT equipment was donated.

d) Refurbishment: non-working equipment that is capable of repair can be sent to a 'refurbisher'. These can be charities, social enterprises or private companies. The equipment should be regarded as waste until it has been returned to its original intended use. It will be subject to the Environmental Protection 'Duty of Care' Regulations, which means it can only be transferred to a registered waste carrier or other approved person, it must be accompanied by a written description, and it can only be taken to a regulated site. Some items such as computer monitors are classified as hazardous waste and are subject to more stringent controls. Details of the relevant legislation and requirements are available from the Environment Agency's website (www.environment-agency.gov.uk). Re-manufacture where new electronics are inserted into an old casing is another option (and may help to reduce waste through the re-use of existing materials).

e) Environmental recycling: Equipment that is beyond repair or for which there is unlikely to be a viable market should be regarded as waste and must be managed as such. Various regulated treatment facilities exist where components or materials can be recovered for reuse or recycling. Some end-of-life equipment has a considerable resale value because of the value of components or precious metals that can be extracted from it. The average PC contains about 42 per cent metal all of which can be melted down and resold.[2] Most contain up to 35 different materials, including copper, nickel, silver, zinc, cadmium, selenium, barium beryllium, manganese, mercury, arsenic and cobalt. There are four broad recycling methods:

- equipment dismantling – the manual separation of reusable and recyclable components
- mechanical recycling – the removal of hazardous components followed by granulating and shredding, in order to remove the recyclable raw materials such as plastic and ferrous metal
- incineration and refining – metal can be recovered after the more combustible material has been incinerated
- chemical recycling – precious metals such as gold and silver can be removed from printed circuit boards and components via chemical processes.

f) Landfill: The option of last resort will be disposal to landfill. Restrictions on the disposal of hazardous waste, greater requirements for waste segregation and pre-treatment, and increasing cost have made this a far less attractive option, helping to shift equipment up the waste hierarchy towards more sustainable options such as reuse, refurbishment and recycling.

Source: National Audit Office

NOTES

1 www.computeraid.org.

2 (http://www.brookes.ac.uk/eie/reccom1.htm).

1.15 Our discussion with specialist ICT disposal companies and some public bodies indicated that the long term storage of ICT equipment was used by some public bodies. This finding is supported by an earlier survey of disposal practices in local government bodies conducted by the Industry Council for Electronic Equipment Recycling in 2004[19], which also found that significant volumes of ICT equipment were placed into storage at the end of its useful life. This can be costly because ICT equipment rapidly loses value, and failure rates increase when components are stored and are inactive.[20]

1.16 The disposal of ICT equipment is typically conducted on behalf of public bodies by other parties.[21] **Figure 9 overleaf** summarises the life-cycle of ICT equipment from procurement through to disposal, highlighting the main groups of organisations involved in the disposal market. Public bodies can typically contract with one of three groups of private sector organisations to dispose of ICT equipment:

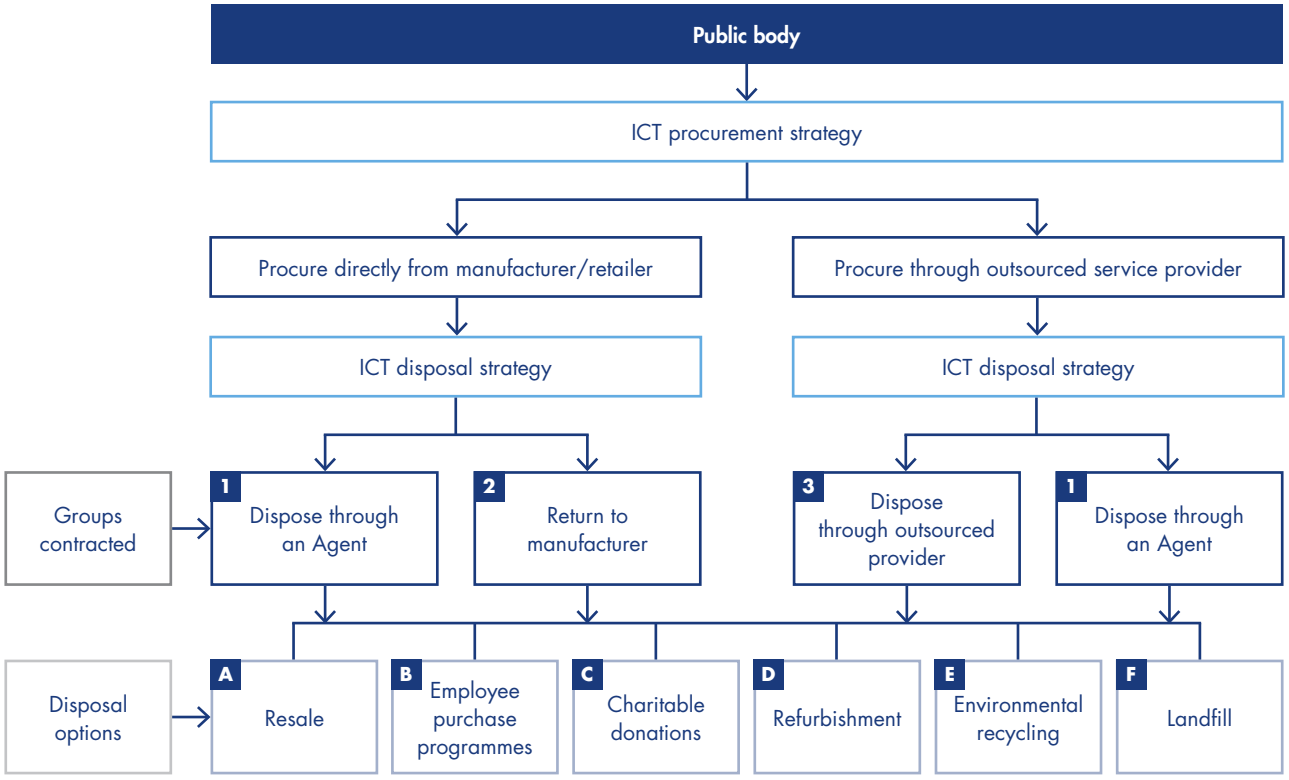
- **Specialist ICT disposal companies** who collect the equipment and dispose of it as instructed. Our survey showed that just over three fifths of public bodies dispose of ICT equipment in this way. It is estimated that at least 200 specialist ICT disposal companies operate in the UK[22], ranging in size from national to single-person operations, and covering a range of different activities including:
  - waste management contractors who are paid to take ICT equipment away as waste;
  - 'dismantlers' or 'shredders' who will either charge to process ICT equipment or give a return, depending on the value of the materials and components it contains;
  - asset management companies, that will test and data cleanse, and where necessary refurbish, equipment for resale, and share the profits with the disposing organisation;
  - equipment brokers or distributors who will pay a price for a job lot and sell on, and who may, for example, have better access to particular overseas markets for which consignments of equipment are destined; and
  - charity or community sector 'refurbishers' who refurbish ICT equipment for use by, for example, low-income households or schools.
- **The manufacturers of ICT equipment**, who have, or are, establishing facilities for clients to dispose of their end-of-life ICT equipment (often by sub-contracting with specialist ICT disposal companies). While the use of this disposal option is commonplace in the private sector, we found very limited evidence of equipment being returned to manufacturers by public sector bodies (unless the manufacturer is also a provider of outsourced services). The full implementation of the Waste Electrical and Electronic Equipment Regulations in the UK from 1 July 2007 will require equipment manufacturers to take responsibility for financing the treatment and recycling of end-of-life equipment.
- **Outsourced service providers.**[23] These providers are contracted to deliver the full range of ICT services, including the procurement (or more typically, the lease), operational management, replacement and disposal of ICT equipment. Our survey found that just under two fifths of public bodies use either an outsourced service provider to dispose of their ICT equipment, use long term storage or make charitable donations.

Current responsibilities for public sector ICT equipment disposals

1.17 Programmes have been put in place to co-ordinate the procurement of ICT equipment across large parts of the public sector, including the common ICT procurement framework established by the Office of Government Commerce, and the '*IT Framework Agreement*' operated by the NHS Purchasing and Supply Agency for the National Health Service. The priority has been on getting best value from the purchasing of ICT equipment (for example, through greater standardisation in public sector equipment specifications), with limited focus on the disposal of ICT equipment which is considered a relatively low priority. A number of departments and agencies do, however, have cross-government responsibility for different aspects of ICT equipment disposal **(Figure 10 on page 23)**.

19 Industry Council for Electronic Equipment Recycling, WEEE – Green List Waste Study (April 2004).
20 Life Cycle Services, *Asset retirement options for organisations*, (March 2005).
21 Following full implementation of the Waste Electrical and Electronic Equipment Regulations on 1 July 2007, producers (manufacturers, importers and rebranders) will have a legal responsibility to accept waste electrical and electronic equipment from non-household end users including public bodies.
22 Industry Council for Electronic Equipment Recycling, WEEE – Green List Waste Study (April 2004).
23 There are two types of outsourced providers; those that only provide outsourced ICT services, for example EDS; and those operating in both the manufacturing and outsourcing markets, providing a 'cradle to grave' service, including Dell, Hewlett-Packard and IBM.

9 ICT equipment life-cycle, from procurement to disposal



Source: National Audit Office

The National Audit Office's examination

1.18 The scope of our examination covered the ICT equipment disposal practices of public bodies in England and Wales, focusing in particular on central government, but also including an assessment of the potential for improved performance across the wider public sector (health, education and local government). Our findings are based on:

- analysis of data from a survey of 198 public bodies (98 central government organisations including departments, executive agencies and non-departmental public bodies, and a further selection of 100 bodies from the local government and higher education sectors);
- detailed case example examinations in two departments and one non-departmental public body (involving interviews with key staff and document reviews);
- interviews with, and analysis of, information on ICT equipment disposals held by the main departments and agencies with cross-government responsibilities for ICT disposals;
- bilateral consultations with nine key suppliers of ICT equipment, outsourcing services and disposal services to the public sector;
- a workshop hosted by the IT industry umbrella body Intellect involving representatives from eight major IT industry firms to test our emerging findings and conclusions, and;
- analysis of ICT disposal practices adopted by overseas public bodies.

(See Appendix 1 for a full description of the methodology, including the survey sample numbers and responses, and the underlying assumptions about the scale and value of public sector ICT equipment procurement and disposals, upon which the analysis is based).

10 Current main responsibilities for public ICT equipment disposals

Department for Environment, Food and Rural Affairs	Holds the main lead for all public sector waste management policy, except producer responsibility Directives, such as the European Commission's Waste Electrical and Electronic Equipment (WEEE) Directive.
The Environment Agency	A Non-departmental pubic body of the Department for Environment, Food and Rural Affairs, it regulates the storage, treatment and disposal of waste including ICT equipment in England and Wales. This includes licensing and monitoring waste/hazardous waste management facilities, registering waste carriers and brokers and registering and monitoring producers of hazardous waste. The Agency also regulates the export of waste from England and Wales.
The Department of Trade and Industry (DTI)	The DTI is responsible for the transposition and implementation of the EC Waste Electrical and Electronic Equipment (WEEE) Directive, and laid the UK Regulations which come into effect in July 2007. It has provided information to producers on the Regulations in the form of a series of road-shows, and has produced non-statutory guidance which gives information on compliance. However, the Environment Agency is responsible for enforcing the producer and waste-management portions of the Regulations.
The Office of Government Commerce (OGC) and OGCbuying.solutions	The OGC is an independent Office of the Treasury reporting to the Financial Secretary to the Treasury. It is responsible for a wide-ranging programme which focuses on improving the efficiency and effectiveness of central civil procurement, including the procurement of ICT equipment. Whilst OGC recognises the importance of ICT equipment disposals as part of the life cycle management of ICT equipment, its initial focus has been on achieving standardisation in the specifications for common ICT equipment. OGC has specified disposals in recent Invitation To Tender's for IT hardware eAuctions and is active with manufacturers on discussing the sustainability agenda. OGCbuying.solutions is an executive agency (and Trading Fund) of the Office of Government Commerce. Its role is to deliver value for money gains for central civil government and the wider public sector through a dedicated, professional procurement service providing central purchasing (framework) contracts and catalogues.
Information Commissioner's Office	Enforcement of the Data Protection Act.
Government Communications Headquarters (GCHQ)	The GCHQ's Communications and Electronic Security Group (CESG) is responsible for establishing procedures which preserve the security and confidentiality of information held by public bodies. As such, the CESG is concerned to ensure that information held on government ICT equipment is removed, using approved processes, prior to disposal. The CESG approves several data removal processes for use by public bodies that preserve the Governments' responsibilities to safeguard information (under the terms of the Data Protection Act).

Source: National Audit Office

PART TWO

The potential to generate better value from public sector ICT equipment disposals

2.1 By optimising the age at which ICT equipment is disposed of there is potential for organisations to generate revenue, and to reduce the operating costs of their ICT equipment. This part of the report, therefore, examines the potential to generate greater value from the disposal of public sector ICT equipment, focusing on:

i) the potential to optimise the age at which ICT equipment is resold, to reduce operating costs and increase resale revenue; and

ii) the scope to aggregate demand and improve the coordination of public sector ICT equipment procurement and disposals activity.

2.2 Considerations of optimal age, however, must take account of not only the impact of changes in procurement and disposal strategies, but also wider environmental costs and benefits. This is particularly important for public bodies because of their need to lead in meeting the Government's objectives for sustainable development. So this part of the report also considers:

iii) the importance of establishing an ICT asset management strategy that takes account of wider environmental costs and benefits; and

iv) finally we make an overall assessment of the financial savings that can be achieved.

i) The potential to optimise the age at which ICT equipment is resold, to reduce operating costs and increase resale revenue

2.3 One of the main ways to achieve improved value is by disposing of ICT equipment at the optimal age; the age at which it has provided good operational service, is incurring minimal maintenance and other operating costs, but retains a commercially attractive resale potential and value. We therefore examined the potential for the public sector to generate improved value by:

A) reducing operating costs, in particular ICT equipment maintenance;

B) reducing the costs of resale and increasing resale revenues; and

C) becoming a more intelligent procurer of ICT equipment and disposal services.

A) Reducing operating costs

2.4 For leading commercial organisations managing (and reducing) the Total Cost of Ownership of ICT equipment is a key driver in determining their procurement and disposal strategies. Over the life of an asset its operating cost is by far the largest single cost and therefore this is where leading commercial organisations focus their attention. The cost of procuring ICT equipment typically accounts for only 20 per cent of the Total Cost of Ownership.[24] Operating costs such as maintenance, energy, technical support and administrative costs are much more significant (almost 80 per cent of the Total Cost of Ownership).[25]

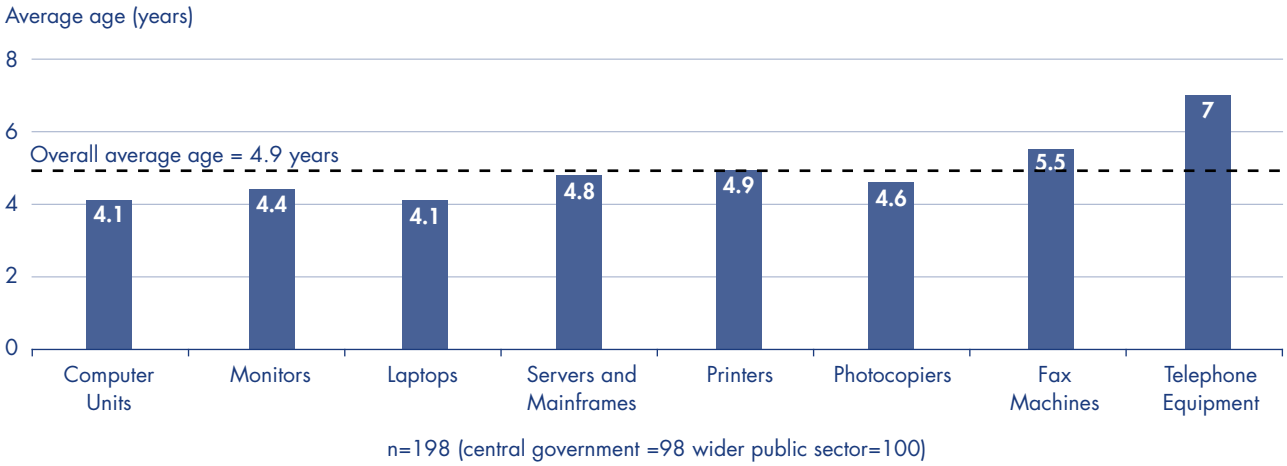
24 Various industry sources.
25 Hawkins M (2001), *Total Cost of Ownership: the Driver for IT Infrastructure Management*, Prentice Hall, State of Colorado (June, 2001), *Information Technology: Total Cost of Ownership*; and IBM (2005), *Application Management Services – helping to reduce the Total Costs of Ownership.*

2.5 As ICT equipment gets older, failure rates increase.[26] Our consultations with leading commercial organisations and disposal agents revealed that, in their experience, and given the current state of ICT technology, for many businesses around three years is the optimal age at which to dispose of ICT equipment to minimise operating costs.[27] We found, however, that public sector ICT equipment is on average disposed of at just under five years of age **(Figure 11)**. At this age, equipment failure rates are significant resulting in increased maintenance costs and reduced staff productivity during the period machines are not in use. Moving to disposal at three years would reduce this failure rate considerably.[28] This will potentially lead to a range of benefits including reduced operating costs (such as maintenance), and improved staff productivity and business performance, partly because of the reduced downtime involved when equipment fails, but also because of the faster transition to better performing technology. It will also give rise to other costs, in particular increased procurement costs.

2.6 We estimate that moving from a five to three year refresh period will increase ICT equipment expenditure by some 67 per cent. Based on the annual expenditure in 2005-06 of £2.7 billion, an additional £1.8 billion of expenditure throughout the public sector would be required (£500 million in central government).

2.7 On the benefits side, on advice from our professional advisors (PricewaterhouseCoopers LLP), and informed by a review of relevant literature, there is potential to reduce operating costs by some 40 per cent or more by following an industry consensus around what constitutes best ICT equipment management practice, including faster refresh cycles. Whilst it is not possible to be precise about costs and benefits because of the complexity involved (for example, the wide range of different equipment in use throughout the whole of the public sector), if only half of the operating cost reductions (20 per cent) were directly related to moving from a five to a three year refresh period then, based on 2005-06 figures, reduced operating costs would be £2.2 billion. Once increased procurement costs are subtracted, net savings in 2005-06 could have been in the region of £400 million (£100 million in central government). This can only be, however, a broad indicator of the scale of potential savings and it would be for public bodies to determine their own business cases for change. For example, if three quarters of the potential savings in operating costs (30 per cent) are related directly to faster refresh periods then the savings would have been greater at £1.4 billion in 2005-06. If, however, only one quarter (10 per cent) of the savings are related directly to faster refresh periods then moving to a faster refresh cycle would have resulted in a net cost across the public sector of £700 million in 2005-06.

11 The average age of public sector ICT equipment at disposal



Source: National Audit Office survey and analysis

26 Oracle (2007), *Total Cost of Ownership Assessment Service: Data Sheet*, www.oracle.com.
27 With the exception of servers, for which the optimal disposal age is around five years.
28 PricewaterhouseCoopers industry and literature review.

B) Reducing the costs of resale and increasing resale revenues

2.8 Reselling used ICT equipment involves a range of costs, including those associated with removing sensitive or confidential data, storage and transport, and the commission charged by third party disposal agents. The potential value of the equipment **(see Figure 12)** at the point of resale depends on a number of factors including the specification and condition of the equipment and its level of completeness (for example, equipment which is missing component parts often has no commercial value).

2.9 Whilst Figure 12 outlines the typical commercial values of used ICT equipment there are examples **(see Case example 1)** where higher values have been achieved.

2.10 The single most important factor determining the potential value of the equipment at the point of resale, however, is its age at disposal. For example, evidence from our survey showed that at four years of age or more computer units, laptop computers and monitors are disposed of on average at a net cost of over £4; whereas equipment disposed of at around three years of age generates on average a net revenue of over £3.

2.11 Our survey revealed that, on average, most public bodies dispose of their equipment at around five years and, as a consequence, 80 per cent of public bodies dispose of their ICT equipment at a cost. Further detailed analysis is difficult between different organisations and sectors, not least because of a lack of information about the specification and condition of equipment at disposal (with some public bodies handling a legacy of older and

12 The typical commercial resale values of used ICT equipment

Our analysis of the resale market values for used ICT equipment revealed that, for example, a typical computer unit disposed of at three years of age should generate net revenue of around £49 (see table below). Some items such as printers and photocopiers command lower values in disposal, while others such as telephone systems hold little or no commercial value at disposal because value is realised through their extended use over longer periods (typically seven years or more).

The typical commercial resale values[1] of used ICT equipment at three years of age (£/unit)

	£/unit
Servers and mainframes[2]	765
Laptop computers	91
Computer units	49
Printers	27
Fax machines	20
Monitors	6
Photocopiers	5
Telephone equipment	-3

Sources: (i) PwC analysis of information provided by industry representatives (ii) EBay (2006) 'Quick cash value guide' (further details on our calculations and assumptions about the typical specifications of public sector end-of-life ICT equipment are contained in Appendix 1)

NOTES

1 Value net of commission charged by ICT disposal agents (typically 20 to 30 per cent of the value of an item at the point of sale). Of this commission, we calculate that 60 per cent is attributed to the costs of refurbishing equipment and removing data to approved standards. In some cases services such as data cleansing can be charged separately to the commission.

2 The typical commercial resale value at five years of age.

CASE EXAMPLE 1

Examples of private sector resale values - Technical Asset Management

Technical Asset Management Limited is a specialist ICT equipment disposal management company established in 1994. It has contracts with a large number of major private sector companies and during 2005-06 handled the disposal of 21,000 laptops, 25,000 personal computers and 3,000 servers. Some 87 per cent of these were re-sold, with 13 per cent stripped for spares and useful materials. Only 1 per cent of the residual weight entered landfill as a non-hazardous slush.

The average return to its customers for laptops and personal computers was £120 and £85 per unit respectively. Two specific examples of rates of return achieved for customers are:

- A major global management consulting, technology services and outsourcing company who refresh 6,000 laptops per annum achieved a net return averaging £275 per laptop (based on an average refresh period of 20 months). Besides the high return, the frequent refresh provides the customer with other benefits including: the ability to negotiate improved purchase prices for new equipment with suppliers due to the increased volume of equipment being purchased; reduced maintenance costs; and higher productivity through, for example, quicker start up and log in times.
- A global confectionery and soft drinks manufacturer who have 6,000 computer users, primarily desktop personal computers, achieved a net return of £84 per personal computer and £121 per laptop (based on an average refresh period of three years).

Source: Technical Asset Management

out of date equipment). There is, however, a considerable shortfall between the potential market resale value of end-of-life ICT equipment, and what is actually being realised across the public sector. 'Mid-range' servers[29] are a good case in point **(Case example 2)**.

2.12 Whilst most public bodies dispose of their ICT equipment at a cost we found some notable exceptions, in particular, HM Revenue & Customs in 2005-06 generated net revenues of over £14[30] per unit, by far the highest achieved by any public body in our survey. It achieved this through a good understanding of the commercial value of end-of-life equipment, integrating their ICT procurement and disposal strategies, and by working closely with a specialist disposal firm to generate maximum value in the resale market **(Case example 3)**.

2.13 Compared with other assets, the value of ICT equipment depreciates relatively quickly (between six and ten per cent per month when in storage).[31] It is important, therefore, to avoid any delay to preserve resale value. The failure rates of inactive equipment can also increase considerably. We found examples of central government departments that routinely store end-of-life ICT equipment until space constraints trigger a call to disposal agents, and all were unable to say how long equipment had actually been held in storage. As a general rule, the failure rate of ICT equipment collected for disposal from such storage typically exceeds 25 per cent, considerably reducing resale values. The removal of hard drives and other data storage components prior to storage, to secure confidential and personal data, can erode any potential residual value entirely. Some public bodies have, however, recognised the benefit of minimising or removing the need for storage prior to disposal **(Case Example 4 overleaf)**.

CASE EXAMPLE 2

Realising value from the resale of mid-range servers

Mid range servers should command resale values of between 5 per cent and 15 per cent of their original purchase cost if disposed of at five years of age.[1] Our survey revealed that the average spend on servers across the public sector (99 per cent of which were mid-range servers) was over £19,000 per unit in 2005-06.

None of the public bodies we surveyed, however, had generated any resale revenue from the disposal of their servers in 2005-06, despite the survey revealing that public bodies were disposing of their servers on average at just under 5 years of age (consistent with private sector best practice).[2] Our consultations with public bodies and specialist ICT disposal firms revealed that the main reason for this is a poor awareness on the part of most public bodies about the market resale values for servers; most simply see end-of-life servers as waste and either store the server or engage an ICT equipment disposal company to collect and dispose of the equipment. This finding illustrates the potential for increasing the value obtained from public ICT equipment disposals and some of the issues such as improved awareness of market values, which need to be addressed.

Source: National Audit Office survey

NOTES

1 Intel (2006), *Building a real-world model to assess virtualisation platforms*; and wider consultations with ICT equipment disposal companies.

2 Microsoft (2006), *Retirement planning – your servers need it too.*

CASE EXAMPLE 3

How HM Revenue & Customs (HMRC) generate revenue from their ICT equipment disposal

HMRC dispose of ICT equipment through the use of a third party disposal provider (Dataserv). In 2005-06 it disposed of approximately 43,000 units of equipment generating net revenues of £14.21 per unit (ranging from £2 for a typical printer, to £47 for a laptop computer). Four fifths of the equipment was resold generating net revenues of £613,000, with the remainder recycled on a cost-neutral basis. This revenue was retained and reinvested by HMRC in new ICT equipment.

HMRC has established a dedicated disposals team to manage the organisation's ICT equipment disposal processes. The disposals team works closely with the departmental procurement function, with ICT disposals arranged to coincide with relevant software refreshes (the typical age of equipment at disposal being five years). A detailed and accurate asset register is used to support the disposals process, allowing visibility in advance both for HMRC and the disposals agent on the specification and volume of equipment to be disposed of, and its condition. This enables Dataserv to position the equipment in the resale market and achieve best value. Disposals are conducted on a revenue share basis, which sees 80 per cent of the resale value returned to HMRC.

Source: National Audit Office examination of HM Revenue & Customs ICT equipment disposals

29 Mid-range servers are the most common type of server and are used by the majority of public bodies and private sector companies. They provide the platform for most operating systems including Microsoft Windows and Unix. They differ from mainframe servers, usually referred to by manufacturers as 'large' servers, which are typically more extensive and are installed and operated for longer periods (ten years or more as opposed to five years). Our consultations with industry reveal that whilst there is a market for mid-range servers, mainframe servers on the other hand hold little re-sale value since they are often procured on a bespoke basis and as such their transferability to other potential users is very limited.

30 The revenue per unit achieved net of disposal costs such as the commission on the re-sale of equipment charged by the disposal agent.

31 Dell Asset Recovery Services, *Remove, Recycle or Re-sell*, Aberdeen Group (November, 2003).

2.14 If all public sector ICT equipment had been disposed of at three years of age and achieved full commercial value, allowing for costs including disposal agents' commission, then we estimate that cost savings of over £70 million could have been made across the public sector in 2005-06 (around £20 million in central government), with just over half coming from the resale of computer units, over one quarter from servers, and 14 per cent from laptop computers **(Figure 13)**. These potential savings are in addition to any revenues already achieved by public bodies. Further details on these calculations are given in the additional note at the end of Appendix 1.

C) Becoming a more intelligent procurer of ICT equipment and disposal services

2.15 For public bodies to become smarter buyers of ICT equipment disposal services and leverage better value from companies offering disposal services they need to improve their awareness of commercial market values through, for example, benchmarking the revenues achieved by comparable bodies through disposal. They also need a better understanding of the disposal options offered by ICT manufacturers, outsourced service providers and ICT disposal companies **(Figure 14)**.

CASE EXAMPLE 4

Working with a disposal agent to reduce storage and maximise revenue

The Environment Agency has had a contract in place with RDC since 1999 to ensure that its redundant ICT equipment is resold, refurbished or recycled. The contract with RDC provides an end-of life asset management service and includes resale, re-deployment and recycling options. The in-house disposals team has built up a clear understanding of disposal responsibilities and worked closely with RDC to ensure that the contract meets their requirements including:

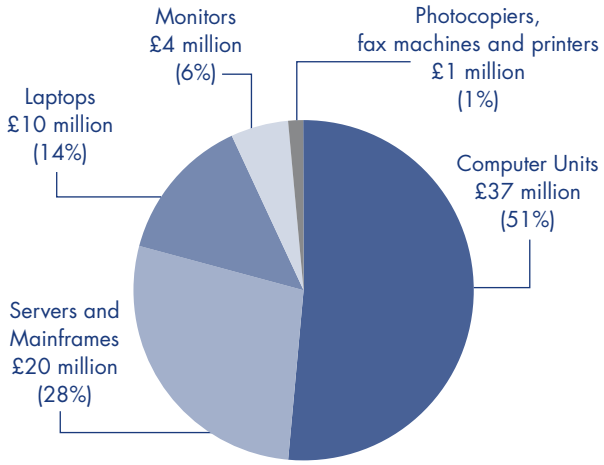
- A good return value on re-sold equipment;
- Compliance with current environmental legislation;
- Appropriate data management;
- Sufficient visibility and an audit trail of equipment at each stage of disposal; and
- Clear demonstration of how the process will meet the requirements of the Waste Electrical and Electronic Equipment Regulations.

Responsibility for organising collections was originally dispersed across several operating units. It became apparent that in some cases equipment was being stored until local capacity constraints meant that a collection was unavoidable. They recognised that this was not an effective way of managing their redundant equipment and that formalised organisation wide disposal processes were needed. The Environment Agency has established clear objectives for the disposal of its end-of-life ICT equipment, one of the explicit aims being to reduce costs whilst not compromising high environmental performance. It put in place a dedicated team to manage the disposal of all old equipment held by the organisation. The first task was to clear equipment held in store and then to substantially reduce storage capacity.

This approach led to over 12,000 pieces of equipment being passed to RDC in 2005-06, 60 per cent of which was resold. The disposal process still incurs an overall annual net cost (around £40,000 in 2006-07) but the Environment Agency considers that as the new arrangements mature, the transfer of redundant ICT equipment will become at least cost neutral. The organisation is also actively investigating the opportunities that may arise from the Waste Electrical and Electronic Equipment Regulations from 1 July 2007.

Source: National Audit Office examination of Environment Agency ICT equipment disposals

13 Potential financial savings in 2005-06 by type of ICT equipment



Source: National Audit Office analysis

14 Typical contractual terms offered by ICT manufacturers, outsource providers and disposal companies to public bodies

'Buy-back' agreements, where the projected value of equipment is agreed with an ICT manufacturer or the outsourced provider in the procurement process, and subject to the equipment being returned in good condition at a pre-agreed age, the residual value of the returned equipment is used to reduce the price of new purchases;

'At cost' or 'zero cost' agreements, where disposal contractors remove equipment for a flat-rate charge, or at no cost, and;

'Revenue sharing' agreements, where the disposal contractor offers to share a proportion of the value generated by the equipment itself. Our discussions with specialist ICT disposal companies, and some public bodies, revealed that contractors typically charge between 20 per cent and 30 per cent of the value achieved through resale as commission.

Source: National Audit Office

2.16 We found that:

- Three fifths of public bodies dispose of ICT equipment by contracting directly with an ICT disposal company, mostly at a financial cost because they are unaware of the residual resale value of the equipment, or they pass it on for disposal at an age when it no longer has any residual value. Equally, public bodies may not know what a competitive rate of commission might be from their disposal agents. We found a wide range of rates of commission being charged (typically between 20 to 30 per cent), in part explained by different levels of service, but more generally a lack of clarity on the part of public bodies about what might constitute a competitive deal.
- There is no evidence of end-of-life ICT equipment being returned directly to manufacturers by public sector organisations. (This does not include examples where the manufacturer also provides outsourced services.) Generally, ICT equipment disposal companies are perceived to offer a better or more convenient deal, involving the collection of equipment on demand and sharing of any resale revenue (with the associated incentive to obtain better value for the client), compared with manufacturers who offer a disposal facility on a flat 'buy-back' rate, or even at a cost. In some cases manufacturers do offer discounts on the purchase of new equipment to reflect the likely residual value of returned equipment, but we found little evidence that such discounts are taken up by public bodies, mainly because of the lack of coordination between procurement and disposal functions.
- Many private sector firms routinely maximise savings by reflecting the residual commercial value of ICT equipment returned to their outsourcing provider in either lower outsourcing costs or reduced prices for new equipment. We found no evidence that such discounts are incorporated into public sector ICT outsourcing contracts. For example, one major provider of outsourced ICT services to both the private and public sectors told us that:

"…our private sector clients typically recognise the relationship between refresh periods and resale values and seek to recover this value through discounts on new ICT equipment or lower contract prices. We have never had this discussion with public sector clients".

2.17 Whilst reducing the age of the equipment at disposal will help achieve the best commercial resale value of equipment, public bodies still need to engage intelligently with ICT disposal companies, outsourced service providers and manufacturers to ensure that this value is realised, either in the form of revenue returned from disposal companies themselves, or in the form of discounts on new equipment or outsourcing costs. Of course, any potential discounts available from a specific supplier need to be compared with the full range of deals available in the marketplace to ensure best value is obtained. Our savings calculations of £70 million from improved resale therefore also assumes that public bodies will strike deals with contractors on terms that reflect good practice; namely that they:

- adopt 'revenue sharing' agreements with disposal contractors and secure a commission rate of 20 per cent (with 80 per cent of the commercial value being returned), or;
- seek discounts on the purchase of new equipment from manufacturers (through buy-back agreements), or if equipment is returned to outsourced service providers, by negotiating discounts on future outsourcing costs. By way of example, should the commercial value of ICT disposals have been captured through discounts on the procurement costs of new equipment, we calculate that these discounts should have amounted to around 2.6 per cent in 2005-06.[32]

ii) Aggregating demand and improving the coordination of public sector disposals activity

2.18 Aggregating demand and improving the coordination of public sector ICT equipment disposals activity can also offer scope to secure better deals and scale economies, and enable wider application of good practice. The purchasing of disposal services is, however, highly fragmented across the public sector. Three fifths of public bodies make independent arrangements with specialist ICT disposal companies despite the fact that, there are only around six main disposal firms, in terms of scale of operations, in the market (excluding ICT manufacturers). Of the remaining two fifths some will dispose of equipment through outsourced ICT service providers who in turn will typically sub-contract disposal to the main disposal companies. Many public bodies will, therefore, be using the same disposal company, either directly, or indirectly. Despite this we found very limited evidence of any joint disposal activity.

32 Public sector ICT procurement expenditure on ICT equipment in 2005-06 was £2.7 billion. Set against this expenditure, we calculate that the commercial value of ICT disposals should have been £72 million (or 2.6 per cent of procurement expenditure).

2.19 Given that ICT equipment disposal is common to almost all public bodies, there is obvious potential for them to aggregate their demand for disposal services (notwithstanding those who may have specific requirements, for example, around data security). The public sector, which is a very large customer disposing of millions of units of ICT equipment each year, could increase its purchasing power, negotiate better deals, reduce overheads, and potentially benefit from the sharing of expertise by adopting a more coordinated approach to ICT equipment disposals. For example, the Ministry of Defence's Disposal Services Agency[33] in 2005 completed a three year project to dispose of 100,000 units of ICT equipment for the Department for Work and Pensions. The Department was able to benefit from using one of the Agency's pre-existing contracts with ICT disposals companies for valuing the equipment, removing all data prior to sale, and reselling. The project ultimately yielded some £170,000 in revenue for the Department, who until then had disposed of ICT equipment at cost.

2.20 We found no examples of where a public body, including those with cross-government responsibility for procurement, has established a framework contract for disposal services that could be accessed by others. OGCbuying.solutions (the trading arm of the Office of Government Commerce), recognising that to provide a full life cycle ICT procurement service they need to provide public sector customers with a safe and legal route for disposal of their ICT equipment, has until recently relied instead on a Memorandum of Understanding established with the MoD's Disposal Services Authority through which it would promote the Authority's existing disposal arrangements to public bodies. The Disposal Services Authority continues to offer disposal services to the wider public sector and currently has agreements with an increasing number of public sector organisations. The Authority will be signing a new Memorandum of Understanding with OGCbuying.solutions to further exploit the "Shared Services" available through the Disposal Services Authority's contracts for disposal and reutilisation service. In addition, the NHS Purchasing and Supply Agency, prior to the recent outsourcing of NHS logistics and supply to the private sector, had not established a disposals framework contract for use by NHS Trusts. It relied on the arrangements established by the Office of Government Commerce for ICT equipment procurement, leaving decisions on disposals to individual NHS Trusts.

2.21 The fragmented approach in the UK contrasts with that adopted in the United States where the General Services Administration is responsible for coordinating and disposing of all federal (central) government ICT equipment.[34] In Canada government departments are required to offer surplus computer equipment to the 'Computers for Schools Program' which is managed by Industry Canada, a government department. If the equipment is accepted by the Computer for Schools Program it is refurbished by non-profit licensees. Equipment that cannot be refurbished is sold by the Crown Assets Distribution Directorate.[35] The benefits that stem from the US and Canadian approaches are largely charitable in nature as most equipment capable of re-use is channelled into education institutions and devolved bodies. This does, however, mean that the procurement costs of equipment that would have had to be purchased by these bodies are much reduced.

2.22 The savings achievable from a more joined-up approach to disposals would to a large extent be covered by the savings we have already identified in adopting commercial best practice. By aggregating demand, however, public bodies should achieve some further savings by getting better deals on disposal commission charged or improved discounts on the procurement of new equipment, and overhead reductions by realising scale economies in the procuring and management of disposal services.

iii) The importance of establishing an ICT asset management strategy that takes account of wider environmental costs and benefits

2.23 Beyond consideration of immediate value, public bodies need also to understand the wider 'life cycle' implications of ICT equipment usage and disposal based on an informed understanding of the potential trade-offs between securing maximum financial value and delivering on the organisation's wider sustainability ambitions. Ultimately, the ICT asset management strategies and practices subsequently adopted must be consistent with the organisation's publicly stated corporate objectives and its sustainability policies. For example, the Department for Environment, Food and Rural Affairs, as part of its

33 The MoD's Disposal Services Agency provides a disposals service to the Ministry of Defence and armed forces and other public bodies. It offers a wide portfolio of disposals services, from advice and consultancy to the disposal and re-sale of a wide range of equipment from military hardware to office supplies and ICT equipment. On 1 April 2007 the Agency became the Disposal Services Authority.

34 In the United States, schools have a 'first call' on all end-of-life federal computer equipment through a 'Computers for Learning' scheme administered by the General Services Administration. The scheme acts to centralise all federal ICT disposals and channel them initially to schools as the primary means of disposal. Thereafter, equipment which is deemed unsuitable for school use is offered to other government organisations until ultimately it is offered for sale to private or public buyers. Overall, the disposal process runs at a cost but is more than offset against the benefits and savings achieved by the schools (Source: United States General Services Administration, 2006).

35 Crown Assets Distribution Directorate disposes of all moveable surplus federal government items and equipment through eight regional Crown Assets Distribution Centres across Canada by various means, including tender and public sales.

contract for outsourced IT services, requires its supplier to not only adhere to the Department's wider sustainability policies, but also to offer innovative solutions that have the potential to improve the Department's achievement of its sustainability objectives. This includes analysing for the Department on how it could make better use of a wider range of low energy and impact devices instead of a more traditional mix of desktop and laptop computers.

2.24 To ensure the ICT asset management strategies and practices are consistent with the organisation's publicly stated corporate objectives and its sustainability policies can be problematic at a practical level, since the decision making and accounting arrangements for assessing the various and often competing trade-offs between wider and longer term value (for example, refreshing regularly with new more energy efficient and more easily recyclable machines) have yet to mature.

2.25 A starting point, however, for an effective understanding of life cycle costs is good information on asset values, operating costs, and disposal. For example, to help them better understand the Total Cost of Ownership of their ICT equipment, organisations such as IBM, Fujitsu Services and Hewlett-Packard actively monitor how asset values, maintenance costs, and disposal costs and revenues change with the age of the equipment, and routinely use this information to refine their procurement, operational and disposal strategies to minimise costs **(Case Example 5)**. Improved asset information, including good information from the providers of outsourced IT services, can help organisations to rationalise the amount of ICT equipment they need, reducing consumption and environmental impacts.

2.26 Currently in the public sector, asset registers, maintained for public accounting purposes, are not commonly used as a tool to actively manage the life cycle of ICT equipment and in particular the timing of disposals. Accounting for the depreciation of assets and planning for their disposal should, however, go hand-in-hand. We consistently found that the active use of a complete and accurate ICT equipment asset register was an important factor at those organisations achieving net disposal revenues. It enables forward planning of disposals for both the disposing organisation and its disposal agent, and facilitates the integration of procurement and disposal strategies (for example, the collection of assets reaching end-of-life status can be coordinated with the delivery of new equipment reducing transport and other overhead costs ultimately borne by the client organisation).

CASE EXAMPLE 5

ICT equipment disposal processes designed to minimise the Total Cost of Ownership

A number of major outsourced ICT providers aim to minimise the Total Cost of Ownership by disposing of equipment (both their own equipment and that of their clients) before the potential resale value falls below the cost of disposal. Key to this is persuading clients to refresh their ICT equipment, in particular computer units and laptop computers, as near as possible to 36 months of age.

One element of this is to offer a buy-back price for the end-of-life equipment they are replacing at the point of first sale (as an incentive to clients to adopt a 36 month refresh period). In essence they deduct the end-of-life ('buy-back') value from the amount they invoice the customer at the point of sale. The resale value is dependent upon condition, functionality and completeness. It is made clear to clients, for example, that returned equipment should be complete, which in the case of laptop computers would include cases, power leads and other related devices. Asset registers and inventories are used to monitor the Total Costs of Ownership on an ongoing basis, and to highlight in advance the disposal requirements of the company so that disposal agents can be instructed in advance and remove the need for storage.

Source: National Audit Office

2.27 Even where good asset information is available, good coordination between ICT procurement and disposal functions is essential if the benefits of whole life asset management approaches are to be realised. Our wider consultations and case study work revealed, however, a general lack of coordination between the (typically) separate ICT equipment procurement and disposal functions within public bodies.

2.28 Focusing directly on the environmental domain, a key question to address is whether reducing the refresh period for ICT equipment, typically from five to three years, will lead to a higher net volume of ICT equipment being purchased across the United Kingdom marketplace and the implications of this for waste and environmental management, and ultimately carbon emissions. While reducing the refresh period for ICT equipment in the public sector will mean that over a given time period more equipment will be bought by public bodies, this does not necessarily mean that overall the life of the product reduces. That is because, where there is a marketplace in used equipment and that equipment has value to potential new owners, it may displace the purchase of new equipment elsewhere. Therefore, the overall net impact on equipment volumes, whether in the UK or globally, is unclear.

2.29 Some of the main issues and externalities that would need to be considered include:

- Whether delaying the timeframe for disposal of ICT equipment will adversely affect its residual financial value but reduce the volume of waste ultimately sent to landfill. On the other hand, passing used equipment more quickly to other organisations, either through resale or donation, might enable them to use the equipment longer and purchase fewer new machines.
- Moving to faster refresh periods could speed the transition to new and more advanced equipment that can enhance business and environmental performance over its operational life (for example, faster, larger capacity, and more energy efficient products that are easier to recycle as identified in the Government's list of sustainable 'Quick Win' products[36]). It is possible that this alone would outweigh any potential negative impacts from a net increase in volumes of equipment. In other words, the depletion of virgin materials and energy consumption during the construction and transportation of ICT equipment, and the possible environmental externalities from its ultimate disposal, might be outweighed by the savings in the energy consumption, and consequent reduced carbon emissions, during its operational use. This, however, remains to be demonstrated.

2.30 The Department for Work and Pensions, for example, operates a 'Desktop Refresh' programme where equipment is replaced after three years. The Department considers that this enables them to achieve a faster transition to new energy efficient equipment reducing both its operating cost and carbon footprint. The new equipment uses significantly less noxious resources such as lead, cadmium and mercury, and more recyclable parts, in its construction and has all plastic parts labelled with recycling codes.

2.31 In the longer term, as the design of ICT equipment evolves, departments need to shape their strategies towards equipment which uses less raw materials in its manufacture, lasts longer, uses less energy in its operation and is easier to recycle. In addition, organisations need to think about ways in which they work with, and use, ICT equipment (for example, around the balance between central processing and processing capability at each desk and the use of 'thin client' technologies) to reduce the amount of equipment (and components) required at each desk.

2.32 While we are unaware of a method or approach that can currently fully answer the question of the wider 'life cycle' implications of ICT equipment usage and disposal, it is an issue that clearly needs to be addressed. It requires a concerted approach across government in conjunction with the use of public purchasing power to encourage producers to work towards these goals, particularly as the levels of public sector procurement on ICT equipment are forecast to significantly rise over the next five years. Any such approach would need to take account of developments in existing standards for product life cycle assessments, for example, under ISO 14000.[37]

iv) Overall assessment of the potential financial savings that could be achieved

2.33 Based on 2005-06 figures, the potential savings of £70 million we have identified from the resale of used ICT equipment and potentially significant operational cost savings are dependent on moving to a more optimal refresh period for public sector ICT equipment. If the environmental effects of this are at least neutral (which remains to be established) then these represent a significant potential saving.

2.34 Achieving these commercial market values for used ICT equipment will require a step-change in the management and disposal of public ICT equipment. Some public bodies will be able to move faster than others in achieving this. For example, many will have to better integrate their procurement and disposal functions and refine their approach to ICT asset management. Most will also need to develop and optimise the use of their asset registers (to assist in valuation, resale planning and timely disposal). Some public bodies may also have entered into longer term ICT outsourcing contracts where much will depend on the flexibility afforded by individual contracts (in some cases the renegotiation of terms may not be immediately possible). The fact that our survey, however, revealed that three fifths of public bodies dispose through independent disposal contractors suggests that much flexibility exists and that financial savings will be readily achievable. Some of the main barriers and costs to improvement are shown in **Figure 15**.

36 Government Approved Product Environmental Standards (Quick Wins 2007), published alongside the Sustainable Procurement Action Plan (and can be found via the following link http://www.sustainable-development.gov.uk/publications/pdf/QuickWins2007vr3.pdf).
37 International Organisations for Standards – Environmental Management Model.

2.35 Public bodies may, with good reason, choose to adopt alternative disposal options to resale such as charitable donation and, therefore, some of the direct financial savings highlighted in this study may not arise **(Case Example 6)**. Nevertheless, charitable donations to public bodies should give rise to reduced procurement costs offsetting and possibly considerably exceeding the loss of direct savings. Charitable donations, therefore, need not undermine the scale of financial savings that could be achieved. The use of charitable donations in the public sector is, however, generally uncoordinated, often motivated by the priorities of individual staff as opposed to any organisational or cross-governmental strategy. In some cases, charitable donations are wholly consistent with broader departmental strategies and objectives. For example, the Department for International Development has a clear policy to donate their second hand ICT equipment to developing countries wherever possible. Recently, it donated 1,500 computer units to a charity for educational re-use in six African countries. Residual equipment not suitable for donation was passed to disposal contractors for environmental recycling.

15 Barriers and costs to achieving improved value from ICT equipment disposal

The main barriers and costs to improvement will be:

- ICT procurement costs will rise across the public sector as equipment is replaced at a younger age, requiring greater volumes of equipment to be purchased over time. We have, however, already accounted for these additional costs in our assessment of potential savings arising from the introduction of integrated asset management strategies;
- ICT support and overhead costs could also rise as equipment is 'refreshed' more regularly and requires additional support costs to install and transition new equipment into everyday use; and
- Achieving savings in maintenance costs through improved whole life asset management might prove difficult to realise if some public bodies do not have the immediate flexibility to re-deploy resources no longer required to maintain and support equipment. Other bodies, including those that have outsourced ICT services, could enjoy greater flexibility.

Source: National Audit Office

CASE EXAMPLE 6

Using disposal firms that operate in the charitable sector

Some disposal firms specifically operate in the charitable sector and, for example, schools sector, donating any working ICT equipment they receive. The Department for Transport, for example, disposes of all its equipment through such a firm (Northern Realisations) which operates from the North West of England. When equipment needs to be disposed of, Northern Realisations collects the equipment from site, processes it in accordance with waste handling regulations and security standards and then passes the good quality and suitable ICT equipment to schools and charities. It provides the Department with a monthly report which sets out:

- The identification details of each unit of equipment processed; and
- The user to which the equipment was passed on to, in the case of donations, along with the associated revenues for sale items.

If equipment is not suitable for donation, then it is sold using a number of sales routes, including ICT auctions, with 61 per cent of the proceeds returned to the Department.

Source: The Department for Transport

PART THREE

The wider risks to public bodies from ICT equipment disposal

3.1 Public bodies have a number of options when their ICT equipment is no longer required for its original purpose. It can be redeployed, resold, or donated to charity if it is still in working order. If it is not working it may be suitable for repair or refurbishment, otherwise it will need to be sent for treatment, recycling or destruction. In addition to the risk that good value is not obtained from re-useable end-of-life ICT equipment, as discussed in Part 2, each of these disposal options exposes public bodies to a wider set of risks.

This part of the report therefore covers:

- the overall policy and legislative context for ICT equipment disposal and the main risks faced by public bodies, and goes on to examine;
- the environmental issues of handling end-of-life ICT equipment;
- the data protection and security issues of handling end-of-life ICT equipment; and
- the electrical safety issues of handling end-of-life ICT equipment.

The overall policy and legislative context for ICT equipment disposal and the main risks faced by public bodies

3.2 Sustainability issues, particularly in relation to environmental protection and business behaviour, have increased in their importance and profile in recent years. Since publication of 'A better quality of life' in 1999[38], Government has regularly reported on the way public sector policy and practice contributes to the aims of sustainable development. The policy was developed further in 'Securing the Future – delivering UK sustainable development strategy' 2005[39], where Government made clear its expectation that public bodies should lead the way in adopting best practice around sustainable development.

3.3 The 2007 UK Government Sustainable Procurement Action Plan[40] provides further support to the overall policy and *'presents a package of actions to deliver the step change we need to ensure that Government supply-chains and public services will be increasingly low carbon, low waste, water efficient, respect biodiversity and deliver our wider sustainable development goals'*. The Action Plan outlines how this will be achieved including: a new set of Public Service Agreements as part of the 2007 Comprehensive Spending Review; making Permanent Secretaries accountable for their Department's overall progress against the Action Plan from April 2007; and building capacity across departments.

3.4 Government's own performance on sustainable development, including waste management, is measured annually by the Sustainable Development Commission's 'Sustainable Development in Government' Report.[41] Government Departments have a series of targets against which their performance is assessed, such as waste minimisation and recycling levels.[42] With the large amounts of ICT equipment being disposed of by public bodies, responsible re-use and disposal will have an important impact on realising these overall policy objectives and in meeting the targets set by Government.

38 UK Government (1999) *A better quality of life – strategy for sustainable development for the United Kingdom*, The Stationery Office, London.
39 UK Government (2005) *Securing the Future – UK Government sustainable development strategy*, The Stationery Office, London.
40 UK Government (2007) *UK Government Sustainable Procurement Action Plan*, Department for Environment, Food and Rural Affairs.
41 The Sustainable Development Commission (2006) *Sustainable Development in Government*, The Stationery Office.
42 Departments to reduce their waste arising by 5 per cent by 2010, relative to 2004-05 levels. Departments to reduce their waste arising by 25 per cent by 2020, relative to 2004-05 levels. Departments to increase their recycling figures to 40 per cent of their waste arising by 2010. Departments to increase their recycling figures to 75 per cent of their waste arising by 2020.

3.5 Complementing this overarching policy is the developing legislative framework which encompasses the disposal of ICT equipment. This framework includes legislation covering environmental protection, data protection and security, and electrical equipment safety.

3.6 Within this context, the main risk that public bodies face on disposal of ICT equipment is that they, or their disposal agents, adopt inappropriate or non-compliant practices. This may arise because of a failure to understand their legal duties and social responsibilities, or because they are unaware of the risks that they are exposed to and the practices that would help mitigate these. The consequences for public bodies of non-compliance include:

- Legal action, including potentially prosecution, from a failure to comply with, for example, the regulations governing the disposal of hazardous waste (which stipulate the procedures that should be followed when disposing of hazardous waste such as the cathode ray tubes used in older computer monitors).
- Adverse publicity from being seen to breach legislation or by not being seen to be at the forefront of responsible asset management. Even if a public body has, at all times, acted legally it could still attract considerable adverse publicity if ICT equipment disposed of (in good faith) is found eventually to have been dumped by a third party, for example, in a developing country with poorly developed infrastructure for dealing with waste ICT equipment, leading to environmental pollution and possible risks to human health.
- The loss of public trust through, for example, leakages of personal or confidential information into the public domain because of inadequate data wiping processes. In many sectors, such as health and social security records, maintaining public trust in the handling of private data is important to the successful delivery of public services. Inadequate data wiping could also give rise to security breaches if classified data is not properly removed or the equipment on which it is held not handled in a secure manner.

3.7 These risks to public bodies manifest themselves in different ways depending upon whether the equipment is disposed of with the intention that it is re-used or re-sold, or treated as waste, and how effectively the disposal chain, involving multiple third parties and potentially overseas markets, are managed. The extent of the risks faced will also depend on whether public bodies own, lease or outsource their ICT equipment. Given that almost all public bodies in one way or another make use of third parties for disposal of ICT equipment they are reliant upon the actions of these third parties – potentially both at home and abroad – to undertake re-use and waste management of this equipment in a legal and appropriate way. **Figure 16 overleaf** outlines the disposal options open to public bodies.

3.8 The rest of this section examines how well public bodies understand their statutory and social responsibilities, the risks they may be exposed to and the extent to which they are adopting good practice in managing these risks in three key areas (1) environmental protection (2) data protection and security and (3) electrical safety.

The environmental protection issues of handling end-of-life ICT equipment

The legislative landscape

3.9 Waste poses a threat to the environment and to human health if it is not managed properly and recovered or disposed of safely (see **Figure 17 on page 37** for a definition of waste and hazardous waste). For example, a computer monitor containing a cathode ray tube will contain heavy metals such as lead, cadmium and mercury which are all hazardous waste. These could contaminate the earth and groundwater if put untreated into a landfill site. In addition, natural resources may be wasted if they are not recycled.

3.10 Against this background UK Government and the European Union have introduced three key pieces of legislation which have direct implications for the handling and disposal of ICT equipment:

- The Environmental Protection (Duty of Care) Regulations (1990).[43] These Regulations place on organisations that produce waste an obligation to ensure it is handled safely. Public bodies disposing of ICT equipment are waste producers and are covered by these regulations;
- The Hazardous Waste Regulations (2005).[44] These Regulations govern the disposal of hazardous waste including ICT equipment that contains hazardous waste; and

43 Section 34, The Environmental Protection Act 1990.
44 SI 2005 No. 894 – The Hazardous Waste (England and Wales) Regulations 2005.

- The Waste Electrical and Electronic Equipment Regulations (2006).[45] These regulations implement one of a small number of European Directives which establishes the principle of 'extended producer responsibility'.[46] Under this principle, and specifically the parts of the regulations referring to non-household waste electrical and electronic equipment, producers are responsible for meeting the costs of collection, treatment, recovery and environmentally sound disposal of electrical and electronic equipment that becomes waste. The regulations also set standards for treatment and minimum recycling rates.

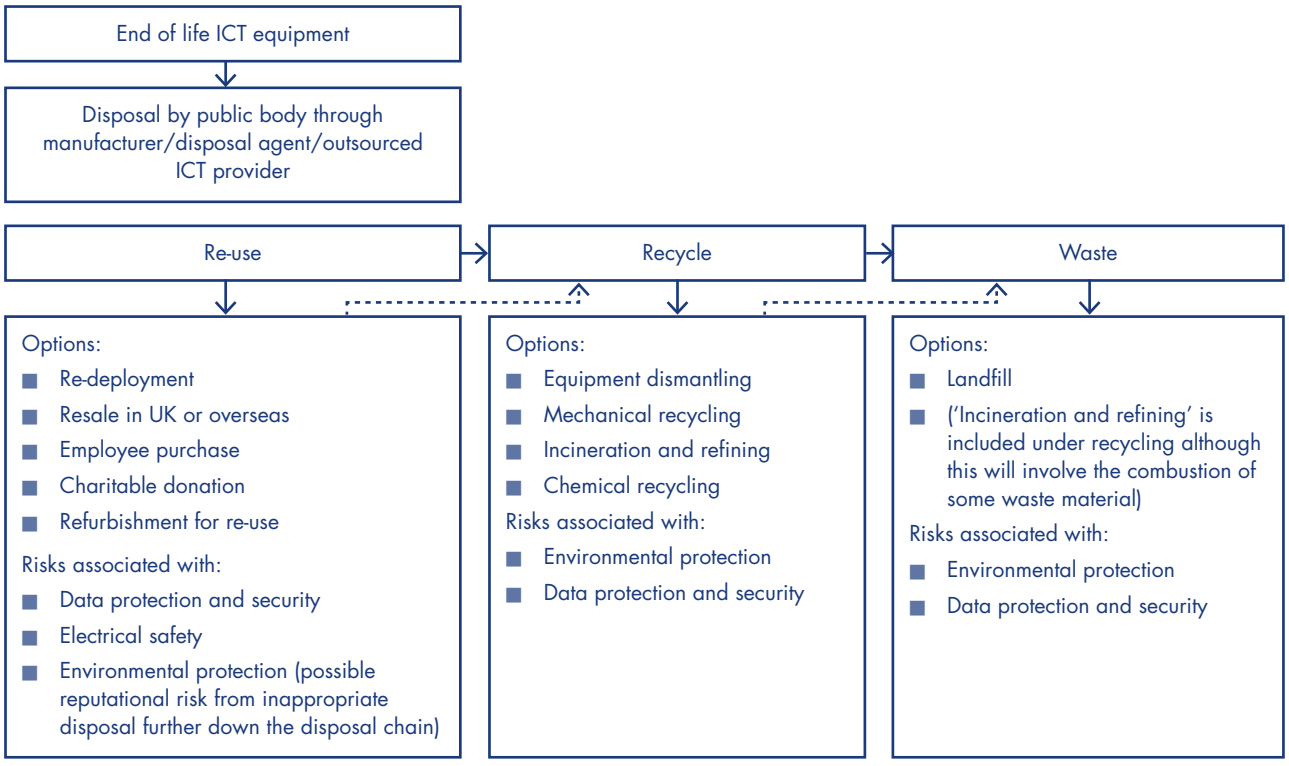
3.11 **Figure 18 on pages 38 and 39** summarises the three key pieces of legislation outlined above, the practical implications for public bodies and the legal consequences of non-compliance. Where public bodies do not own the ICT equipment (for example, where it is owned by their outsourced provider) that becomes waste, they may still be classed as the 'producer' of the waste.[47] For example, a public body could be considered a 'producer' of waste if it stores ICT equipment that has no residual use. Therefore, even where public bodies do not own the ICT equipment that is disposed of as waste, they should assume that they are bound by the obligations under both the Duty of Care Regulations and Hazardous Waste Regulations.

Public bodies' awareness and oversight of their legal and social responsibilities

3.12 Public bodies face clear legal and reputational risks associated with the disposal of ICT equipment. It is, therefore, important that they are aware of both the policy and legislative framework surrounding the disposal of ICT equipment and take appropriate action to minimise these risks.

3.13 Based on our case study examinations, consultations with key suppliers of ICT equipment, a range of interviews with public bodies, and with those departments and agencies with cross-government responsibilities for ICT equipment disposals, a number of common themes emerge about the level of awareness amongst public bodies of their legal and social responsibilities when disposing of ICT equipment:

16 Disposal options for ICT equipment



Source: National Audit Office

45 SI 2006 No. 3289 – The Waste Electrical and Electronic Equipment Regulations 2006.
46 Directive 2002/96/EC of 27 January 2003.
47 The Department for Environment, Food and Rural Affairs are planning to issue new guidance on the Duty of Care Regulations in 2008.

- there is a general lack of awareness amongst public bodies of the duty of care regulations under the Environmental Protection Act (1990) surrounding the disposal of ICT equipment, or what is required under the duty;
- many public bodies do not realise that the legal responsibility for disposal under the Duty of Care Regulations continues to rest with them, even where they have in place a contractor to handle disposal;
- many public bodies are not aware that, when disposing of ICT equipment, they may be required to register with the Environment Agency as a producer of hazardous waste, or the requirement to use hazardous waste consignment notes; and
- there is a range of understanding amongst public bodies about the implications of the Waste Electrical and Electronic Equipment Regulations for disposal practices and how it would affect their organisation.

3.14 These themes support the findings of the Environment, Food and Rural Affairs Committee during its inquiries about the way the Government deals with legislation emerging from Europe relating to waste.[48] For example, a number of the witnesses in those inquiries reported on a lack of guidance and clarity around emerging legislation. In addition, the Better Regulation Taskforce in its 2003 report on Environmental Regulation also reported that, overall, the stakeholders it interviewed did not feel well informed about the Waste Electrical and Electronic Equipment Directive.[49]

17 Definitions of waste and hazardous waste

Waste: Any substance or object which the holder discards or intends or is required to discard. Whether or not a substance is discarded as waste must be determined on the facts of the case and in light of judgements issued by the UK courts or European Court of Justice. Therefore, it is not possible for the Government to produce a definitive list of what is and is not waste.

Hazardous waste: These are the most dangerous wastes. They can cause the greatest environmental damage or are dangerous to human health either immediately or in the longer term. Some wastes are always classified as hazardous whereas others will only be hazardous if they contain harmful substances over prescribed limits. The Hazardous Waste Regulations set out the rules for assessing if a waste is hazardous or not. Some common hazardous wastes are fluorescent tubes, computer monitors containing a cathode ray tube and nickel-cadmium batteries.

Source: Hazardous waste regulations – List of wastes regulations 2005

Whilst, at the time of the Better Regulation Taskforce report in 2003, the Directive was only recently finalised, and it was not introduced into UK law until 2006, our examinations indicate that this early uncertainty remains.

3.15 We found a number of reasons for the general lack of understanding and low awareness amongst many public bodies of their environmental protection responsibilities in relation to ICT equipment disposal:

- Whilst some organisations have a good understanding of the environmental risks from ICT disposal **(see Case Example 7 on page 40)**, most do not. For example, interviews with a number of individuals responsible for ICT equipment disposals highlighted a lack of recognition that ICT equipment contained hazardous waste. That lack of awareness leads, in turn, to an ignorance about the relevant legislation and regulations designed to address those risks.
- Even where organisations are aware of the legislation there remains uncertainty around how it should be interpreted in practice. For example, the point at which ICT equipment becomes waste is open to judgement and may, ultimately, require a legal ruling to determine this in a specific case.
- There is no government-wide guidance specifically covering the disposal of ICT equipment which clearly outlines the risks, legislative framework and practical implications for organisations across environmental protection, data protection/security and electrical safety. There are some examples of practical guidance, particularly at a local level in the education sector and also in the health sector, but this has not been replicated across all sectors. In general, it is left to local managers to decide on what constitutes good practice and to determine their own approach.[50]
- In relation to the Waste Electrical and Electronic Equipment Regulations, a delay in publishing the UK Regulations, resulted in a lack of early Government guidance, and created some uncertainty over the timing and implications of the new requirements.

48 For example, the two most recent inquiries are: *End-of-Life Vehicles Directive and Waste Electrical and Electronic Equipment Directive*, HC103 Session 2003-2004, 11 February 2004 and *Waste policy and the Landfill Directive*, HC102 Session 2004-2005, 9 March 2005. These inquiries have not looked at domestic regulations such as the Environmental Protection Act and Hazardous Waste Regulations.

49 Better Regulation Taskforce (2003) *Environmental Regulation: Getting the message across*, July 2003.

50 The NetRegs website – www.netregs.gov.uk – which the Environment Agency part-funds and operates, provides a free source of web-based guidelines on how to comply with environmental legislation.

18 Environmental legislation

Key legislation

The Environmental Protection Act (1990), Section 34: Duty of Care and The Environmental Protection (Duty of Care) Regulations 1991

Section 34 of the Act imposes a duty of care on any person or organisation that imports, produces, carries, keeps, treats or disposes of waste to ensure that there is no unauthorised or harmful deposit, treatment or disposal of the waste. In this context, the disposal of end-of-life ICT equipment will be governed by these regulations.

The duty of care begins when a substance or object is classified as waste[1] (this will usually be clear but, as discussed in Figure 17 this may very occasionally require a legal judgement) and extends until the waste has either been finally and properly disposed of or fully recovered.

The duty of care code of practice[2] lists four things that those subject to the duty must try to achieve:

a) to prevent any other person committing the offences of depositing, disposing of or recovering controlled waste without a waste management licence;

b) to prevent the escape of waste;

c) to ensure that, if the waste is transferred, it goes only to an 'authorised person';

d) when waste is transferred, to make sure that there is also transferred a written description of the waste (a waste transfer note), a description good enough to enable each person receiving it to avoid committing any of the offences under (a) above; and to comply with the duty at (b).

In addition, the 1991 Regulations require those subject to the duty of care to keep records of the transfer notes and make them available to the Environment Agency or Waste Collection Authorities. These must be kept for two years.

Practical implications for public bodies and legal consequences of non-compliance

Practical implications:

In practice the duty of care means that public bodies need to:

- ensure their waste is only transported by a registered waste carrier or other approved person;[3]
- their waste is accompanied by an accurate written description and waste transfer note;
- satisfy themselves that the waste will be subsequently handled, stored, treated or disposed of legally;
- retain the relevant paperwork for a minimum of two years (a different retention time applies for hazardous waste – see below).

Legal consequences of non-compliance:

The Environment Agency does not have a specific duty to enforce the duty of care. However, they have a major interest in breaches of the duty which might contribute to illegal waste management. They are also equipped with the powers and expertise to prevent or pursue offences and to advise on the legal and environmentally sound management of waste.

Breach of the duty of care is a criminal offence. It is an offence irrespective of whether or not there has been any other breach of the law or any consequent environmental pollutions or harm to human health. The offence is punishable by a fine of up to £5,000 on summary conviction or an unlimited fine on conviction on indictment.

Hazardous Waste Regulations (2005)

These Regulations replaced the Special Waste Regulations (1996) in England and Wales. The 2005 Regulations define hazardous waste and the procedure to be followed by producers and collectors of hazardous waste.[4]

Some ICT equipment (for example, monitors containing a cathode ray tube) is classified as hazardous waste when it is discarded and, therefore, is covered by these regulations.

All the Environmental Protection Act duty of care requirements still apply to producers of hazardous waste. The Hazardous Waste Regulations add some specific additional requirements:

a) hazardous waste producers need to notify premises annually to the Environment Agency;[5]

b) hazardous waste consignment notes are required to be completed and replace the requirement to complete a duty of care transfer note;

c) producers (and consignors) must keep a register of consignment note copies and any schedule of carriers and returns from consignees for three years.

Practical implications:

In practice the Hazardous Waste Regulations mean:

- A producer of hazardous waste will usually need to register their premises with the Environment Agency. This is an annual process.[6]
- A hazardous waste consignment note needs to be completed and must accompany the load.
- The hazardous waste can only be transferred to a registered waste carrier or other approved person.
- Public bodies must retain the relevant paperwork for a minimum of three years.

Legal consequences of non-compliance:

Breach of the Regulations is a criminal offence. If a Magistrates court convicts of not complying with the Regulations, they can impose a fine of up to £5,000 and/or two years in prison. The Environment Agency is also able to issue fixed penalty notices for £300 for some minor offences. More serious offences may be tried in the Crown Court where there is no limit on the level of fines, which can be imposed.

18 Environmental legislation *continued*

Key legislation *continued*

Waste Electrical and Electronic Equipment Regulations (2006)

These regulations implement the majority of the provisions of the European Parliament and Council Directive on Waste Electrical and Electronic Equipment and the subsequent amendments to the Directive. The new treatment and recycling standards and changed financial responsibilities apply from 1 July 2007.

For public bodies disposing of ICT equipment, it is the business-to-business elements of the Regulations that are relevant.

Under the regulations, producers of electrical and electronic equipment are responsible for meeting the costs of collection, treatment, recovery and environmentally sound disposal of equipment that was placed on the UK market after 13 August 2005.[7] When they supply new equipment a producer can also be required to take away pre-August 2005 equipment on a one-for-one, like-for-like basis (regardless of brand).

Where an end user is disposing of equipment, purchased before 13 August 2005, but not purchasing an equivalent replacement, the end user will be responsible for collection, treatment, recovery and environmentally sound disposal.

The regulations also set standards for treatment and minimum recycling rates.

Practical implications for public bodies and legal consequences of non-compliance *continued*

Practical implications:

Public bodies should be considering the impact that the Regulations may have on their ICT equipment disposal practices. In particular, the extent to which producers can be required to finance the treatment and recycling of end-of-life equipment.

End users are free to negotiate alternative arrangements if they wish and to take on the financial obligation to dispose of ICT equipment.

Public bodies therefore need to be aware of the Waste Electrical and Electronic Equipment Regulations when entering into commercial negotiations and procurement decisions concerning electrical and electronic equipment.

Legal consequences of non-compliance:

Public bodies that agree to accept responsibility for financing the treatment and recycling of equipment, or where they are not replacing pre 13 August 2005 equipment, must ensure that the equipment is delivered to an Approved Authorised Treatment Facility.

In addition, the Duty of Care Regulations still apply.

Source: The Environment Agency; The Department of Trade and Industry; The Department for Environment, Food and Rural Affairs; DEFRA, Waste Management: The Duty of Care – A Code of Practice; DEFRA, Hazardous waste regulations – list of wastes regulations 2005; DTI (2007), WEEE Regulations – Government Guidance Notes.

NOTES

1 The Appendix to the 'Environmental Protection Act 1990, Section 34, Waste Management: The duty of care – a code of practice' provides guidance on when a substance or object should be classified as waste and to draw attention to some of the main questions which should be addressed in reaching a view on whether a particular substance or object is waste.

2 Environmental Protection Act 1990, Section 34, Waste management: The duty of care – a code of practice.

3 The public register of registered waste carriers (and the register of producers of hazardous waste) can be checked on-line at http://www2.environment-agency.gov.uk/epr/search.asp?type=register.

4 The Environment Agency's web site contains guidance (www.environment-agency.gov.uk); ranging from simple fact sheets for waste producers to very detailed technical guidance aimed at the waste management industry.

5 There are some exceptions and premises such as offices, shops, farms, schools and colleges, prisons, residential and nursing homes, hospitals, dental, veterinary and other medical practices, premises used by charities and places used for the purposes of collecting waste electrical and electronic equipment do not need to notify if they produce less than 200kg of hazardous waste a year. All other premises do need to be notified, even if they produce less than 200kg of hazardous waste.

6 The register of hazardous waste producers can be searched on-line at http://www2.environment-agency.gov.uk/epr/search.asp?type=register.

7 Under the regulations a producer is defined as: a manufacturer of electrical and electronic equipment selling under their own brand in the UK; or a business based in the UK selling under their own brand electrical and electronic equipment manufactured by another person; or a professional importer introducing electrical and electronic equipment to the UK market; or a business based in the UK that places electrical and electronic equipment in other European Member States by means of distance selling. For business to business transactions, distributors (retailers or wholesalers) have no obligations under the Regulations.

8 In addition to the above legislation which is directly related to the disposal of ICT equipment, the Restriction of Certain Hazardous Substances in Electrical and Electronic Equipment Directive (known as the 'RoHS Directive) has been turned into UK Regulations that came into force in 2006. These regulations restrict the use of various hazardous substances in new electrical and electronic equipment and places obligations on manufacturers and importers. It has indirect implications for public bodies that should require that new ICT equipment is RoHS compliant. There is also forthcoming legislation – Batteries and Accumulators Directive and Electricity Using Products Directive.

3.16 The Department of Trade and Industry which has overall responsibility for providing guidance for the Waste Electrical and Electronic Equipment Regulations has published non-statutory guidance giving information for all groups affected by the Regulations. Communications to date have been focused on parties with obligations under the Regulations, for example producers, distributors, local authorities and the waste management sector. The Department of Trade and Industry plans to target awareness-raising activity on end users of electrical and electronic equipment, including households, businesses and public sector organisations, once the system is in operation after July 2007. It intends to issue a fact sheet aimed at non-household end users, and write to procurement officers in government departments to make them aware of the implications of the Regulations.[51]

3.17 The Environment Agency has responsibility for enforcing certain provisions of the Waste Electrical and Electronic Equipment Regulations, and will also play a part in issuing guidance to end users, particularly where this overlaps with its responsibility for implementing other waste legislation.

3.18 While the general level of awareness amongst public bodies about their legal and social obligations in relation to environmental protection is low, we did identify some examples of good awareness and oversight (Case example 7).

3.19 Our workshop with major ICT companies (both manufacturers and providers of outsourced services) revealed that they adopt a precautionary approach in their handling of end-of-life ICT equipment, as would be expected given the nature of their business. For example, Fujitsu Services treats all used ICT equipment collected from its customers as hazardous waste until otherwise determined, and is registered as a waste carrier. Once the equipment arrives at its premises it is assessed and identified as either re-usable ICT equipment or waste. Recognising that a proportion of the waste will be hazardous Fujitsu Services has also registered as a hazardous waste producer.

CASE EXAMPLE 7

Awareness and oversight of environmental protection issues from the disposal of ICT equipment – the Environment Agency

In 2005-06 the Environment Agency disposed of over 12,000 units of ICT equipment. They contract out their disposals to a third party agent (RDC) who undertake resale, recycling and waste disposal on their behalf.

The Environment Agency has established a dedicated team responsible for the procurement, distribution, collection and disposal of ICT equipment. The team:

- manages the contract with the third party disposal agent which explicitly outlines appropriate levels of diligence and legal compliance and includes clauses on 'the right to audit the agent's premises' and the requirement for 'zero percentage to landfill';
- provides a single point of accountability for 'cradle to grave' procurement, disposal and asset registration of ICT equipment in recognition of the need to manage the legal and reputational risks from ICT disposal; and
- has appropriately registered storage points to manage hazardous waste (cathode ray tubes not for re-marketing).

The Environment Agency receives detailed information from their ICT disposal agent on the volumes and locations for equipment sent for recycling. The agent also reports on how much is re-marketed.

The Environment Agency also performs regular audits of their ICT disposal agent's sites. It takes an informal 'walk through' approach selecting sample paperwork for review including Waste Transfer Notes and Hazardous Waste Notes. In addition to their own audits, the Environment Agency also relies on the BSI ISO 14001[1] and ISO 27001[2] accreditation compliance process to highlight any issues. The Environment Agency also holds quarterly meetings with their ICT disposal agent to review performance, discuss any contract issues and share improvements and best practice ideas.

The Environment Agency currently has a high level of confidence in its disposal agent and internal practice, but does recognise that further improvements are always possible. For example, more frequent audit visits could increase their level of confidence that the disposal agent is dealing with all equipment as stipulated in its contract.

Source: The Environment Agency

NOTES

1 ISO 14001 is an international standard that specifies a process for controlling and improving a company's environmental performance.

2 ISO 27001 is an information security management system (ISMS) standard published in October 2005 by the International Organisation for Standardisation and the International Electrotechnical Commission. Its full name is ISO/IEC 27001:2005.

51 The National Audit Office is planning a value for money study looking at the implementation of the Waste Electrical and Electronic Equipment Regulations for publication in 2008.

3.20 The lack of awareness amongst many public bodies of their legal and social responsibilities is resulting in them taking inadequate action to minimise the risks from handling waste ICT equipment. Whilst the majority of public bodies use a third party to handle the vast majority of their waste ICT equipment, our survey found that public bodies have limited oversight of the disposal chain. For example, just over one third of central government organisations (50 per cent of wider public sector organisations) know what happens to their equipment after it is taken away from their premises for recycling.[52] In addition, over three quarters of both central government and wider public sector organisations have never visited their ICT disposal agent to carry out an inspection of their practices **(Figure 19)**. Reliance is placed largely on the reputation of disposal agents to ensure that equipment is disposed of responsibly. This contrasts with the behaviour of major ICT manufacturing and outsourcing companies who advise that they typically undertake audits of their ICT disposal agents every 18 months to examine:

- the working practices of each of their agents;
- company documentation such as ISO 14001, registrations and relevant licences (for example, to determine whether the agent is permitted to handle hazardous waste), and;
- details of the contractor's own sub-contractors and audit processes.

The data protection and security issues of handling end-of-life ICT equipment

The legislative landscape

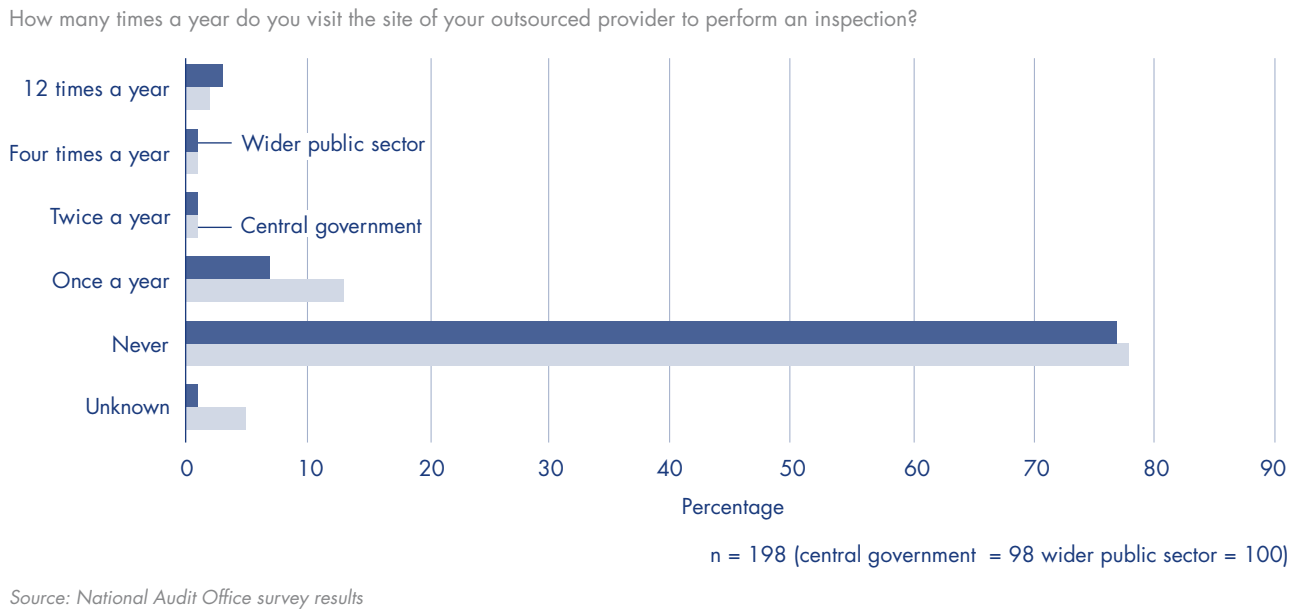
3.21 Public bodies, whether they are reselling or donating working equipment, or disposing of waste equipment must be sure that they have first removed any confidential or personal information. In particular, they must comply with two key pieces of relevant legislation:

- The Data Protection Act (1998), governing the protection of personal information; and
- The Official Secrets Act (1989) to safeguard official information.

3.22 **Figure 20 overleaf** describes this key legislation together with the practical implications and legal consequences of non-compliance for public bodies. These legal obligations are the same whether the public body owns, leases or outsources its ICT equipment.

3.23 The Communications and Electronics Security Group (CESG) of GCHQ have established a set of data removal standards geared to the various different classifications of data across government (i.e. Restricted, Confidential, Secret and Top Secret). These standards are not mandatory.

19 Over three quarters of public bodies do not inspect the site of their ICT disposal agent



Source: National Audit Office survey results

52 In central government organisations, 60 per cent stated that they did not know what happened to their equipment once it was sent away for recycling with 4 per cent unable to answer the question. In wider public sector organisations, 45 per cent stated that they did not know what happened to their equipment once it was sent away for recycling with 5 per cent unable to answer the question.

Public bodies' awareness and oversight of their legal and social responsibilities

3.24 Our interviews with public bodies revealed that they view data protection and security as the greatest risk they face when disposing of ICT equipment. From our survey we found that:

- Around 90 per cent of central government organisations told us that data was wiped from their ICT equipment before it was recycled or re-sold[53]; and
- 70 per cent of central government organisations surveyed said that their data was wiped in accordance with the relevant GCHQ Communications and Electronics Security Group (CESG) standards;
- but, our survey also found that there was a lack of oversight of data wiping processes with around 70 per cent of central government organisations not obtaining any evidence that data wiping had been carried out.

20 Data protection and security legislation

Key legislation	Practical implications for public bodies and legal consequences of non-compliance
Data Protection Act (1998) The Data Protection Act requires anyone who handles personal information to ensure that the handling of personal information complies with 8 princples: ■ Fairly and lawfully processed ■ Processed for limited purposes ■ Adequate, relevant and not excessive ■ Accurate and up to date ■ Not kept for longer than is necessary ■ Processed in line with your rights ■ Secure ■ Not transferred to other countries without adequate protection	Practical implications: In practice this means that all public bodies must ensure that any personal data is completely removed when disposing of ICT equipment. Legal consequences of non-compliance Enforcement of the Data Protection Act is undertaken by the Information Commissioner's Office. Complaints are usually dealt with informally, but the office does have the power to serve an enforcement notice and ultimately to prosecute, which can result in a fine.
Official Secrets Act (1989) Under the 1989 Act it is an offence to disclose certain official information under six specified categories: ■ Security and intelligence ■ Defence ■ International relations ■ Crime and special investigation powers ■ Information resulting from unauthorised disclosures or entrusted in confidence ■ Information entrusted in confidence to other States or international organisations.	Practical implications: Public bodies have a requirement to safeguard certain official information (as do their contractors). In practice, the level of data wiping before equipment disposal will depend on the level of awareness within a public body about what information is held on individual computers. If there is no record, then complete data wiping of all computers due for disposal would be required to ensure any possible official information is safeguarded. Legal consequences of non-compliance There are different levels of offence and resulting consequences with a maximum punishment of two years imprisonment or a fine or both. Any prosecution under the Official Secrets Act would only take place with the consent of the Attorney General, or in some circumstances, the Director of Public Prosecution.

Source: Information Commissioner's Office; The Official Secrets Act (1989)

53 In our survey 11 per cent of central government organisations stated that they did not know whether data wiping took place. This is likely to be due to a combination of who was completing the survey and the structure of the organisation where data wiping activity may be de-centralised.

The electrical safety issues of handling end-of-life ICT equipment

The legislative landscape

3.25 Under the general provisions of the Health and Safety at Work Act (1974) and the specific requirements of the Electrical Equipment (Safety) Regulations (1994), organisations are required to ensure that their ICT equipment is safe for use. The Health and Safety Executive is responsible for enforcement of both regulations whilst the Department of Trade and Industry retains policy responsibility for the Regulations. **Figure 21** provides an overview of these two key pieces of legislation. If a public body gives, or sells, an item of ICT equipment to another user or organisation, it has a duty to ensure the safety of the equipment prior to the transfer of ownership. These legal obligations do not apply if the public body does not own the ICT equipment (for example, if the equipment is owned by their ICT outsourced provider). There is potentially a wider reputational risk for public bodies, if those bodies are seen to have passed on to other users, particularly smaller organisations or charities with limited resources, equipment that is ultimately found to be unsafe.

21 Electrical Safety legislation

Key legislation

The Electrical Equipment (Safety) Regulations (1994)

The Regulations implement into UK law the modified 'Low Voltage Directive'[1].

In addition to new equipment, the Regulations cover the sale of second-hand equipment. Whilst there is no mandatory requirement for second-hand equipment to undergo any safety testing, a supplier is required to supply only equipment that is safe so as to avoid the committing of an offence under the Regulations.

The Regulations define equipment as being safe if it has been designed and manufactured to industry standards and in accordance with good practice. It must also provide protection against both electrical, through the use of suitable insulation and earthing, and non-electrical (mechanical) hazards. As a minimum the equipment should also be subject to a visual inspection by a competent person prior to sale and, if necessary, a more formal inspection and test may be required.

The Health and Safety at Work Act (1974)

The Act is the primary piece of legislation covering occupational health and safety in the United Kingdom. It covers the general duty of employers to their employees (Section 2) and those not in their employment (Section 3) who may be thereby affected. The sale of ICT equipment may be covered under Section 3 of the Act.

Practical implications for public bodies and legal consequences of non-compliance

Practical implications:

There is no obligation under either the Electrical Equipment (Safety) Regulations or the Health and Safety at Work Act for organisations to test any of their equipment to ensure it is safe prior to selling it.

However, there is a duty on organisations to ensure equipment they are selling is safe. Therefore, it is for individual organisations to assess the risks involved and take actions that they deem to be adequate to ensure the safety of any ICT equipment they are selling or donating.

Legal consequences:

The Health and Safety Executive look to take a proportionate approach to enforcement in accordance with its Enforcement Management Model. The Health and Safety Executive provides advice and guidance on both the legal duties of employers and the adoption of best practice. Failure to follow published guidance is often taken into account by courts if failure results in harm.

For more serious cases an inspector may serve an improvement notice or prohibition notice. Failure to comply with the notice is likely to result in prosecution.

Under the Electrical Equipment (Safety) Regulations it is an offence to supply electrical equipment which does not comply with the requirements of the regulations. Any person committing an offence which results in prosecution is liable, under summary conviction, to imprisonment and/or a fine.

Source: The Health and Safety Executive; The Department of Trade and Industry (2004), Guidance notes on the UK Electrical Equipment (Safety) Regulations 1994 (S.I 1994/3260)

NOTE

1 The Low Voltage Directive 2006/95/EC.

Public bodies' awareness and oversight of their legal and social responsibilities

3.26 Evidence from our survey indicates that public bodies have a lack of awareness and oversight of their electrical safety obligations. Our survey showed that only 24 per cent of central government organisations (30 per cent in the wider public sector) stipulate in their contract with their ICT disposal agent that equipment should be safety tested before disposal.[54] In addition, our survey revealed that only 16 per cent of central government organisations (14 per cent in the wider public sector) see evidence from their disposal agent that safety testing had taken place.[55]

3.27 In our interviews with HM Revenue & Customs and the Department for Transport both confirmed they have clauses in the contracts with their disposal agent that stipulate that equipment that is to be donated or sold must be safety tested. HM Revenue & Customs periodically review their disposal agent's processes to ensure they are sufficient to meet their contractual obligations, and also get reports from their disposal agent which include details of the safety checks performed. However, our interviews with public bodies and disposal agents revealed a general lack of oversight by public bodies of their disposal agent's activities.

54 In central government 29 per cent stated they did not stipulate in their contract that equipment should be safety tested with 47 per cent stating they did not know. In the wider public sector, 41 per cent stated that they did not stipulate in their contract that equipment should be safety tested with 29 per cent stating they did not know.

55 60 per cent of central government organisations stated that they do not see evidence of safety testing by their disposal agent with 23 per cent stating that they did not know. 75 per cent of wider public sector organisations stated that they do not see evidence of safety testing by their disposal agent with 11 per cent stating that they did not know.

APPENDIX ONE

Methodology

Our methodology consisted of:

Survey of Central Government organisations

1 We surveyed 105 central government organisations and received responses from 98 organisations (93 per cent) **(Figure 22)**. Seven organisations did not respond due to a number of reasons including they were currently undergoing a major re-organisation or merger. Surveys were conducted using an electronic on-line questionnaire, and invited respondents to provide quantitative and qualitative information on ICT procurement and disposal practices. All central government analysis conducted in this study is based upon the 98 survey responses. The survey included questions on the volume and value of ICT equipment procured in the last year for which full information was available (financial year 2005-06), together with questions asking about the volume of ICT equipment disposed of, how it was disposed of and the costs, or revenues, incurred in the disposal process. It also included a number of questions on the ICT management framework used by each organisation (for example, outsourced to an ICT service provider, or managed in-house); the level of each organisation's awareness of its ICT disposals practices, and the related environment and reputation risks which it might face.

22 Central Government survey responses

	Number of respondents	Percentage of total responses
Central government departments	39	40
Non-departmental public body	22	22
Executive agency	37	38
	98	**100**

Source: National Audit Office survey

We also surveyed wider public sector organisations (using the same survey) **(Figure 23)**.

Case study examinations with central government organisations

2 We held in-depth interviews with seven central government departments and agencies selected on the basis of distinctive features of the survey response, which suggested that more detailed analysis would prove valuable. Of these seven, three yielded examples of good practice in the disposal of ICT equipment meriting further meetings to examine disposal practices, review management information and detailed asset registers of the volumes of ICT equipment procured and disposed of, the costs and revenues that were incurred through disposal, and examination of the practices adopted to manage wider risks.

Case study examinations with private sector companies

3 We also met with nine private sector companies (including major manufacturers, outsourced service providers and disposal firms) to seek their views on what constitutes best commercial practice in the disposal of ICT equipment and, in particular, how disposal practices have been used to generate financial cost savings **(Figure 24 overleaf)**.

23 Wider public sector survey responses

	Number of respondents	Percentage of total responses
Higher education institutions	19	19
Local authorities	81	81
	100	**100**

Source: National Audit Office survey

Workshop with private sector companies

4 We asked Intellect,[56] the ICT high-technology trade association body, to invite its members to a workshop chaired by the NAO to discuss good practice in ICT disposals. In total, eight companies were represented. Discussion topics were designed to:

- understand the approach taken to ICT equipment disposals in the private sector and the financial savings that have been achieved through disposal practices;
- understand the ways through which legal and reputational risks that arise in the disposal process are managed in the private sector; and
- invite views from participants as to how best government could refine its approach to ICT equipment disposals, so as to deliver financial savings whilst effectively managing risks.

5 The findings from the workshop were used to sense check and refine our analysis of best commercial practice, and the extent to which financial cost savings could be made within government.

Literature review and other consultations

6 Our analysis is also supported by evidence gained through a literature review of ICT equipment disposal practices and published research both within the UK and overseas. This revealed several key bodies of literature, particularly within the UK, Europe, the United States, Australia and Canada. The findings were used to position our recommendations for change within a broader context of overseas practices and academic and commercial research. Where the literature suggested elements of good practice in the public sector, we gathered further information by contacting the relevant bodies, including the General Services Administration in the United States, the Government of Victoria in Australia, the Crown Assets Distribution Directorate in Canada, and the European Commission in Brussels.

Calculation of financial cost savings

7 We have made several key assumptions in our assessment of the financial savings in the public sector which could arise through revised ICT equipment disposal practices. These include:

- assumptions which support the generalisation of the results from our survey to infer findings for the public sector as a whole;
- assumptions that have been used to estimate the scale of financial cost savings which could arise throughout the health sector; and
- assumptions relating to the commercial market value of ICT disposals. These are particularly important since they drive our assessment of the improved value for money that could be achieved through disposals.

Generalising our findings across the public sector

8 Our survey represented a comprehensive review of public sector organisations. Amongst central government departments, agencies and non-departmental public bodies of central government, we received responses from 98 organisations, out of a total sample size of 105 (a 93 per cent response rate). In total, however, there are 460 central government departments, agencies and bodies. **Figure 25** shows that our survey results can be applied to this broader population with only a +/- 8.8 per cent likely margin of error (or 'level of precision'). This level of precision is lower amongst our survey of higher education institutions and local authorities, because the survey sample was smaller (81 of 390 local authorities responded).

24 Private sector companies who contributed to this study

Firm	
Accenture	Hewlett-Packard
Dell	IBM
EDS	Remploy
Fujitsu Services	Technical Asset Management Ltd.
RDC Computacenter	

Source: National Audit Office

25 Level of precision in generalising survey results (95 per cent Confidence Interval)

	Number of respondents	Level of precision (%)
Central government	n = 98	+/- 8.8
Higher education institutions	n = 19	+/- 21.3
Local authorities	n = 81	+/- 9.7

Source: National Audit Office

56 www.intellectuk.org.

Interpreting financial cost savings for the health sector

9 Our analysis of the value for money achieved in central government from ICT equipment disposals is extended to the NHS. We did not, however, survey NHS Trusts. Rather, analysis of financial savings that could arise in these Trusts was modelled on the basis of the relationship between ICT procurement volumes (and expenditure) and the costs of ICT equipment disposal as identified by our survey results from central government organisations and the wider public sector. ICT procurement expenditure for NHS trusts was identified from an independent source[57] and from this, the quantity and specification of ICT equipment purchased and disposed of was calculated using the following assumptions **(Figure 26)**:

- that procurement expenditure is divided amongst different categories of ICT equipment (e.g. computer units, servers etc) in the same proportions as found in our survey results from the public sector; and
- procurement costs per unit amongst NHS Trusts are the same as those in the public sector (as drawn from our survey results).

10 The costs of current disposal practices in the health sector were assumed to be the same as the average costs per unit elsewhere in the public sector (identified through our survey). The potential for NHS Trusts to achieve financial cost savings through disposal was calculated by relating projected volumes of ICT equipment disposals to commercial market values.

The commercial market value of used ICT equipment

11 The commercial market values of used ICT equipment have been derived through discussions with ICT disposal companies who dispose of large volumes of ICT equipment, and secondary sources including e-bay[58] and the Orion Blue Book. Market values assume that the equipment is on average, three years of age, with the exception of servers, whereby equipment of five years of age is attributed a value. The specification of equipment is derived from an audit of HMRC's asset register of disposals and is taken to be representative of the specification of all equipment disposed of throughout the public sector **(Figure 27)**.

12 Commercial market values for each item of ICT equipment are presented net of commission charged by disposal companies. Our review of public and private sector disposal practices reveal that on average, typical commission charged to dispose of equipment is 20 per cent of gross value. On this basis, **Figure 28 overleaf** summarises the net commercial value of used ICT equipment to government, on the basis of disposal at three years of age.

26 Apportionment of capital expenditure and procurement costs to derive procurement and disposal volumes across the NHS

	% of procurement expenditure	Procurement cost per unit (£)
Computer units	35.9	849
Monitors	35.0	128
Laptop computers	7.8	1,123
Servers	1.8	8,312
Printers	4.2	906
Photocopiers	0.8	443
Fax machines	0.4	199
Telephone equipment	14.1	1,720

Source: National Audit Office

27 Specification of ICT equipment disposed of by the public sector

ICT equipment	Specification
Computer units	Pentium III, 866 mhZ
Monitors	Cathode Ray Tube 17 inch
Laptop computers	Pentium III, 500 mhZ
Servers	Undefined, transaction specific
Printers	LaserJet 5
Photocopiers	Undefined, transaction specific
Fax machines	Undefined, transaction specific
Telephone equipment	Undefined, transaction specific

Source: National Audit Office review of HMRC asset register

57 Kable (2005).
58 Historical averages derived from e-bay for equipment for sale between January and November 2006.

Additional note

Calculation of the savings from increased resale revenues (Paragraph 2.14, Part 2)

Computer Units

13 753,500 computer units were procured by public bodies in 2005-06. On the basis that these replaced other computer units, which in turn had been managed efficiently and disposed of at three years of age in good working order, the commercial market value of these units through disposal would have been around £49 (net of disposal agent commission). We assume for the purposes of this calculation that the technical specification of these units was the same as the composition of equipment disposed of by HMRC in 2005-06 (Pentium III, 866 mhZ). Their actual net commercial value to public bodies could have been around £37 million.

Servers

14 25,500 mid-range servers were purchased by public bodies in 2005-06. On the basis that these replaced older servers, the older equipment could have generated a commercial value equivalent to five per cent of the purchase price (£950 per unit which IT industry and disposal experts consider to be a conservative estimate). Allowing for deductions and commission (20 per cent), their actual net commercial value would have been £765. Savings from the disposal of servers on commercial terms would therefore amount to £20 million in 2005-06 across the public sector.

Laptop computers

15 Some 110,000 laptop computers were procured by public bodies in 2005-06. On the basis that an equivalent number were also disposed of, with a commercial market resale value of £91 per laptop computer (Pentium III, 500 mhZ), and allowing for commission incurred in the disposal process, the total commercial value of these laptop computers, through disposal, would have been over £10 million. These three main items make up a total of £67 million of savings. In addition, a further £5 million of savings comes from monitors, printers, fax machines and photocopiers.

28 Net commercial market values of used ICT equipment

ICT equipment	Net value (£/unit)
Computer units	49.06
Monitors	6.27
Laptop computers	91.79
Servers	765.60
Printers	27.22
Photocopiers	5.00
Fax machines	20.00
Telephone equipment	(3.00)

Source: (i) PwC analysis of information provided by industry representatives (ii) EBay (2006) 'Quick cash value guide'

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Improving the disposal of public sector Information, Communication and Technology Equipment

A report by the Comptroller and Auditor General

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