National Audit Office

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

LONDON: The Stationery Office
£13.50

Ordered by the
House of Commons
to be printed on 26 July 2007

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.