Beyond Recycling: Rethinking E-Waste and the Lifecycle of Technology in Higher Education

International E-Waste Day, 14 October 2026

ILLUSTRATION / Technology reuse, lifecycle stewardship and the global e-waste challenge

The continuing digitalisation of higher education has brought considerable benefits. Technology now underpins teaching, research, student services and the day-to-day operation of university campuses. This dependence is likely to deepen as institutions invest further in artificial intelligence, cloud services and digital infrastructure.

However, the environmental consequences of digitalisation extend well beyond the electricity consumed during use. Every laptop, monitor, mobile device, server and piece of network infrastructure has a material lifecycle encompassing raw-material extraction, manufacturing, transportation, use and eventual disposal. International E-Waste Day therefore provides a useful opportunity for higher education to consider whether our approach to digital sustainability gives sufficient attention to that complete lifecycle.

The scale of the challenge is significant. The Global E-waste Monitor 2024 estimates that a record 62 million tonnes of electronic waste were generated globally in 2022, an increase of 82 per cent since 2010. Only 22.3 per cent was documented as formally collected and recycled in an environmentally sound manner, while global e-waste generation is projected to reach 82 million tonnes by 2030 (ITU and UNITAR, 2024). These figures understandably focus attention on recycling, but recycling is only part of the response. By the point at which a laptop enters an electronic waste stream, much of its environmental impact has already occurred. Decisions made much earlier in its lifecycle, including how it was specified and manufactured, how easily it could be repaired or upgraded, how intensively it was used and how long it remained in service, have shaped its overall environmental footprint. Opportunities for reuse and responsible material recovery will determine how much additional value can be retained before final disposal.

For universities, e-waste should therefore not be regarded principally as a waste-management problem. It is also an issue of procurement, asset management, technology strategy and institutional governance. This is particularly relevant given Jisc's research into digital sustainability in UK tertiary education. Among responding higher education institutions, only 14 per cent reported having policies or plans to maximise the lifetime of IT equipment, while 22 per cent reported policies for managing IT at end of life and 24 per cent reported sustainable digital procurement policies. IT lifetime management was also identified as one of the significant challenges facing institutions (Jisc, 2024). The more important question, therefore, is not simply whether universities dispose of electronic equipment responsibly, but whether we are designing technology lifecycles that prevent usable equipment from becoming waste prematurely.

Moving Beyond the Fixed Replacement Cycle

One area deserving greater examination is the conventional technology refresh cycle. Many institutions understandably use standard replacement periods to manage large estates consistently. Predictable cycles support budgeting, simplify support arrangements and reduce the risks associated with ageing equipment. There are also legitimate reasons why technology needs replacing: hardware performance can deteriorate, batteries fail, operating systems cease to be supported, security requirements change and older equipment may no longer provide an acceptable or accessible user experience.

However, administrative convenience and environmental optimisation are not necessarily the same thing. A device reaching its fourth or fifth year does not automatically mean that it has reached the end of its useful life. Its suitability depends upon condition, security, performance, energy consumption and, importantly, the purpose for which it is being used. Jisc guidance, developed with further education institutions in Wales and informed by its wider work across the UK education sector, notes that end-user replacement cycles have historically tended to sit around three to five years, with some institutions extending these periods as hardware has become more reliable. It also highlights relatively straightforward interventions, such as replacing hard drives with solid-state drives or adding memory, that can extend the useful life of equipment (Jisc, 2022).

This is where the sometimes unfashionable concept of "sweating" technology assets deserves reconsideration. In sustainability terms, the objective should not be to retain equipment indefinitely, nor should universities assume that extending the life of every device is environmentally preferable. The more sophisticated objective is to identify an optimum responsible lifecycle: keeping technology productively in service while it remains secure, supportable, economically sensible and fit for purpose, and then finding the highest-value next use available before resorting to material recycling.

Extending device life without considering energy efficiency, security or maintenance can simply move environmental or operational costs elsewhere. Conversely, shortening replacement cycles because newer technology is marginally more efficient can overlook the environmental impacts associated with manufacturing replacement equipment. Good digital sustainability therefore requires lifecycle decisions rather than simplistic rules about either replacement or retention.

From Asset Management to Asset Stewardship

A more circular model requires universities to expand the questions traditionally associated with technology asset management. Knowing what equipment an institution owns, where it is located and when it is due for replacement remains important, but sustainable asset management should also consider condition, use, repairability, opportunities for internal redeployment, residual value and potential for external reuse. This represents a shift from asset administration towards asset stewardship, recognising that a device may have finished its useful life with one user without having finished its useful life altogether.

The University of Edinburgh provides an instructive example. Its IT Reuse Project applies circular-economy principles to university technology, including fixing, cleaning, securely wiping, sourcing, moving and rehoming equipment. The project has operated since 2014 and University reporting indicates that it has repurposed more than 7,000 PCs and 3,000 PC accessories. Refurbished equipment has been redistributed through a range of partners, including schools, community organisations and educational initiatives (University of Edinburgh, 2025). The value of the model lies not simply in the number of computers reused, but in treating reuse as an organised institutional process rather than an occasional activity undertaken when an individual department happens to have surplus equipment.

UCL provides another useful example of the distinction between the end of an institutional use and the end of a device's useful life. In 2025, UCL identified 35 laptops that had originally been scheduled to go to a recycling company for disposal. Working with Enfield Council, the devices were securely erased and repurposed to support Year 11 students, including looked-after children, children missing from education and pupils in alternative provision (UCL, 2025). Thirty-five laptops will not transform the global e-waste problem, but the case illustrates an important decision point. Recycling would have represented a responsible disposal route, yet, in circular-economy terms, reuse represented a higher-value outcome because functional equipment remained in productive use while simultaneously contributing to digital inclusion.

Making Circularity Part of the System

Individual reuse initiatives are valuable, but scale requires systems. If finding another user for an unwanted device depends upon an individual member of staff knowing whom to contact, reuse will inevitably remain inconsistent. Circularity becomes considerably more effective when redistribution is embedded into normal institutional processes.

UCL's wider approach to reuse demonstrates this principle. Its Warpit platform allows staff and researchers to advertise and claim surplus resources rather than automatically purchasing replacements or disposing of usable items. UCL reported in 2026 that more than 7,000 items had been reused through Warpit in a single year, diverting 26 tonnes of material from waste and contributing to cumulative savings approaching £2 million (UCL, 2026). Although this initiative covers resources beyond IT equipment, the underlying principle is directly applicable to digital estates: sustainable behaviour becomes much easier when institutions design systems that make reuse straightforward.

The importance of this should not be underestimated. If purchasing a new monitor is straightforward, while identifying an unused monitor elsewhere in the university requires significant effort, institutional processes are effectively designed in favour of consumption.

A more effective approach would be to embed reuse directly into the technology acquisition process. Rather than expecting

individual staff members to seek out refurbished or surplus equipment, institutions could establish a unified process in which requests are first matched against available, fit-for-purpose equipment within the existing estate. New equipment would be purchased only where no suitable alternative is available.

This would make reuse the default consideration rather than an optional sustainable choice, shifting responsibility from individual behaviour to institutional process design. Digital sustainability would consequently become part of how technology is acquired and allocated, rather than a separate consideration dependent upon individual commitment.

Jisc's work with the education sector provides further practical examples. Its sustainable IT guidance cites Gower College Swansea's use of a disposal provider through which 80 per cent of collected equipment is refurbished or reused. St David's Catholic Sixth Form College retains components from end-of-life equipment for use as spares, while Jisc also highlights practices such as reusing SSDs and RAM from decommissioned devices to extend the life of other equipment (Jisc, 2022). These are relatively straightforward interventions, but collectively they illustrate what a circular technology model means in practice: reuse the whole device where possible, recover useful components where it is not, and move to recycling when higher-value options have been exhausted.

Procurement is Part of the E-Waste Strategy

If universities address e-waste only when technology reaches disposal, they intervene too late. Many of the factors determining whether a product can have a long and circular life are established during procurement. Repairability, availability of replacement components, upgradeability, manufacturer support periods, warranty arrangements and supplier take-back schemes all affect what becomes possible later.

Procurement specifications can therefore become a significant instrument of digital sustainability. Universities can ask not only whether a product meets current functional requirements and price expectations, but how long the manufacturer expects to support it, whether batteries and other components can be replaced, whether parts are readily available, what happens when equipment is returned, what proportion is refurbished rather than recycled and whether suppliers can provide credible evidence of downstream treatment. Jisc similarly recommends looking beyond initial purchase price when procuring equipment, including considering reliability, expected lifespan, warranties and support, alongside the wider costs and benefits of different procurement options (Jisc, 2022).

Collective purchasing power is particularly relevant. Higher education represents a substantial market for technology, and universities acting collectively can potentially exert greater influence over suppliers than institutions acting independently. Requirements relating to repairability, longevity, take-back, refurbishment and lifecycle transparency become more powerful when they move from being optional sustainability considerations to routine expectations within procurement frameworks.

The Measurement Problem

There is, however, a fundamental challenge: universities cannot effectively manage what they do not understand. Most institutions should be able to establish how many laptops or monitors they purchase in a year and how much they cost. It may be considerably harder to determine the average operational life of those devices, the proportion redeployed internally, the proportion refurbished externally, how many are repaired rather than replaced, how much equipment sits unused within departments or what ultimately happens to devices once they leave the institution.

These are not peripheral data points. They determine whether an institution can distinguish genuine circularity from simply transferring its waste elsewhere. A supplier collecting thousands of devices may appear to solve an institutional disposal problem, but the sustainability outcome depends upon whether those devices are reused, refurbished, stripped for components, materially recycled or enter less transparent downstream markets.

This is particularly important given the risks associated with informal and poorly regulated e-waste markets. Equipment transferred through complex downstream supply chains may be exported, resold or processed without adequate transparency about its final destination or treatment. Where devices are not genuinely suitable for reuse, inadequate handling can create environmental and health risks, potentially transferring the consequences of electronic waste to communities with fewer resources to manage them safely (WHO, 2024).

Universities therefore need assurance that their disposal and refurbishment partners operate through transparent, auditable processes, with appropriate evidence of data destruction, legitimate reuse and responsible recycling. Simply transferring ownership of unwanted equipment does not necessarily mean that an institution has fulfilled its wider environmental responsibilities.

A mature digital sustainability strategy therefore needs lifecycle measures alongside traditional IT measures. Average device lifespan, repair rates, internal redeployment, external reuse, percentage of equipment refurbished, material recovery and verified end-of-life routes could begin to provide a richer picture of the environmental performance of the technology estate. Jisc's sector research suggests that measurement remains an area requiring development: only 9 per cent of responding higher education institutions reported measuring their digital carbon footprint, while digital carbon-footprint monitoring and IT lifetime management were both identified among the principal challenges facing institutions (Jisc, 2024).

A Whole-Institution Challenge

None of this can be delivered by an IT department acting alone. Procurement determines many of the conditions under which technology is purchased. Finance influences depreciation and replacement models. Sustainability teams provide expertise on carbon and resource use. Information security establishes requirements for data-bearing equipment. Academic and professional-service departments influence demand. Suppliers determine repairability and end-of-life options, while students and staff ultimately shape how technology is used.

E-waste therefore illustrates a wider lesson about digital sustainability in higher education: environmental impacts frequently sit across organisational boundaries while accountability remains fragmented between them. Addressing the problem effectively requires technology sustainability to become part of institutional governance rather than an additional activity undertaken by environmentally committed individuals or isolated teams.

Universities also occupy a distinctive position because their responsibilities extend beyond their own operations. They are educators, research institutions, anchor organisations within their communities and significant purchasers within global technology markets. Reusing equipment can therefore produce outcomes beyond carbon and waste reduction. The Edinburgh and UCL examples demonstrate how technology that has completed its first institutional use can contribute to education, digital inclusion and community benefit. The challenge is to make those outcomes systematic rather than exceptional.

From E-Waste Management to Digital Lifecycle Management

International E-Waste Day should certainly encourage institutions to examine whether electronic waste is being collected, processed and recycled responsibly. However, recycling should represent the final stages of a much longer strategy, not its starting point. The more ambitious question for higher education is how much electronic waste can be prevented from becoming waste in the first place.

That requires universities to connect decisions that have traditionally been considered separately: procurement, technology architecture, device standards, refresh cycles, repair, asset management, reuse, information security and disposal. It requires better evidence about the environmental consequences of those decisions and greater transparency about what happens to technology after it leaves institutional ownership.

The transition is ultimately from managing electronic waste to managing digital lifecycles. That is a more demanding proposition because it challenges universities to reconsider not only how they dispose of technology, but how they buy it, use it and determine when its useful life has ended. For a sector committed both to digital transformation and environmental sustainability, those two ambitions cannot be pursued independently. The measure of a digitally mature university should not simply be how effectively it adopts new technology; increasingly, it should also include how intelligently and responsibly it manages the technology it already has.

References

International Telecommunication Union (ITU) and United Nations Institute for Training and Research (UNITAR) (2024) The Global E-waste Monitor 2024. Geneva: International Telecommunication Union. Available at: https://www.itu.int/itu-d/reports/statistics/global-e-waste-monitor-2024/ (Accessed: 18 September 2026).

Jisc (2022) Good practice in IT sustainability. 29 July. Available at: https://www.jisc.ac.uk/guides/good-practice-in-it-sustainability (Accessed: 18 September 2026).

Jisc (2024) Digital sustainability in tertiary education: trends, challenges, and sector insights. Available at: https://www.jisc.ac.uk/reports/digital-sustainability-in-tertiary-education-trends-challenges-and-sector-insights (Accessed: 18 September 2026).

UCL (2025) 'UCL and Enfield Council collaborate on reusing IT equipment', Information Services Division, 24 July. Available at: https://www.ucl.ac.uk/isd/news/2025/jul/ucl-and-enfield-council-collaborate-reusing-it-equipment (Accessed: 18 September 2026).

UCL (2026) 'Keeping resources in circulation at UCL', About UCL. Available at: https://www.ucl.ac.uk/about/case-studies/2026/may/keeping-resources-circulation-ucl (Accessed: 18 September 2026).

University of Edinburgh (2025) Sustainable Development Goals: Stories of Impact. Edinburgh: University of Edinburgh. Available at: https://www.pure.ed.ac.uk/ws/portalfiles/portal/562540967/SDGs_-_Stories_of_Impact_Sept_2025.pdf (Accessed: 18 September 2026).

World Health Organization (WHO) (2024) Electronic waste (e-waste). 1 October. Available at: https://www.who.int/news-room/fact-sheets/detail/electronic-waste-(e-waste) (Accessed: 12 October 2026).