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ASSET LIFECYCLE MANAGEMENT

White paper

Circularity is the new IT imperative

Contents

Circularity is the new IT imperative

The circular economy, an economic model of minimizing waste and making the most of resources through reuse and recycling, has gained new relevance in recent years as the impact of climate change, ocean pollution, and the environmental impacts of rampant disposal have become more pronounced.

Many organizations now embrace sustainability as a core corporate social responsibility (CSR) objective. More than 90% of CEOs say sustainability is important to their company's success, according to the Stanford Social Innovation Review. 98% of S&P 500 companies published a sustainability report in 2022, up from just 20% in 2011, according to the Governance & Accountability Institute's 2023 Sustainability Reporting in Focus research.

This issue is particularly applicable for IT executives, whose organizations are major electric power consumers and a growing source of hazardous waste. Electronic waste (e-waste) created by the disposal of end-of-life equipment such as computers, servers, smartphones, and printers is the fastest-growing solid waste stream in the world, according to the World Health Organization. And the issue continues to escalate. Over 61 million metric tons of electronic devices were discarded in 2023, and the annual total is expected to increase to nearly 75 million metric tons by 2030. Less than 18% is currently being recycled.

E-waste is a problem on two levels. Environmentally, it is a ticking time bomb. IT assets contain hazardous materials such as mercury, lead, arsenic, beryllium, and cadmium, which can leach into the environment if disposed of improperly. Heavy metals pollute the soil and groundwater, creating health hazards for people and wildlife, and they are difficult to clean up. A slew of new regulations in the European Union, China, India, and portions of the U.S. impose severe penalties for irresponsible dumping of electronic gear.

There are also privacy and data security hazards. Discarded or recycled devices frequently contain sensitive data such as personally identifiable information and intellectual property. A 2021 Kaspersky audit of second-hand devices in the U.K. found that 90% contained traces of private and business data and 74% held data that could be recovered with special tools. That confirmed a 2019 experiment by the University of Hertfordshire that found that more than two-thirds of second-hand USB drives sold on eBay included sensitive data. Failure to scrub data from discarded devices can result in regulatory fines and reputational damage that can take years to repair.

An economic model for the new world

The linear build-use-discard model of resource usage is a vestige of a time when resources and energy were abundant and "out of sight, out of mind" thinking dominated the approach to disposal. This mindset became so entrenched in the 20th century that a 1955 issue of Life magazine celebrated the virtues of "throwaway living." This model needs to change as the environmental and societal impacts of excessive energy use and reckless dumping have become more compelling in recent years.

The emerging circular economy seeks to keep resources in use for as long as possible, extract the maximum value from them during use, and recover and repurpose products and materials at the end of their service life. For IT asset management, this means reusing, refurbishing, remanufacturing, and recycling assets to minimize waste and resource consumption.

The circular economy model envisions making something that is old new again. As a closed-loop cycle, it pays off in lower capital expenditures, improved resource efficiency, and reduced risk by keeping resources within a managed system.

Even more important for business leaders is that circularity is economically superior to linearity. It avoids the costs of disposing of old equipment and purchasing new supplies. Organizations can also lower their Total Cost of Ownership (TCO) by remarketing end-of-life equipment and components that would otherwise be discarded. Revenue generated from circular economy transactions is expected to more than double from $339 billion in 2022 to nearly $713 billion in 2026. In addition to the economic benefits of extended asset lifecycles and resale, a circular approach to IT asset management can reduce greenhouse gas emissions, generate less e-waste, and lower manufacturing costs.

Several factors have driven the surging popularity of circular principles in IT asset management:

Environmental concerns

There is growing awareness of the environmental impact of e-waste and the adverse impact of hazardous substances on the environment and human health. The circular model reduces e-waste by recovering materials from existing equipment instead of manufacturing or mining them. It maximizes the reuse of existing equipment and promotes the recovery of materials from retired assets. If a piece of hardware cannot be reused for any reason, then it can be demanufactured into parts that can be reused.

Resource extraction

As demand for IT equipment grows (worldwide, the average person now uses 3.6 connected devices and a stunning 13.4 in North America), so does the demand for raw materials required to manufacture it. The circular model reduces the need for some of the 100 billion tons of raw materials that are extracted from the earth each year.

Technological advancements

Innovations in refurbishing, recycling, and materials recovery have made the circular model more practical and reduced barriers to adopting these practices. Numerous businesses have developed profitable models based on electronics recycling.

Regulatory pressure

Governments and regulatory bodies worldwide are implementing policies to reduce e-waste and promote sustainability, giving businesses little choice but to adopt more circular practices. For example, the European Union's new "right to repair" initiative proposal seeks to promote greater sustainability in consumption by simplifying the process of repairing faulty products, decreasing waste, and bolstering the repair industry. The EU's proposed Digital Product Passport regulation would require hardware vendors to be more transparent about raw materials and accelerate circularity efforts. France has introduced a repairability index for electronic products that seeks to boost their useful life by encouraging manufacturers to prioritize repairability during design and informing consumers about repair options at the time of purchase.

Economic benefits

Whereas environmental initiatives are often perceived as involving trade-offs, e-waste reduction is a win-win proposition with both economic and sustainability benefits. Best practices save materials and reduce waste management costs, create new business opportunities in refurbishment and recycling, and enhance the brand reputation benefits of proactive CSR.

Being green is good for business. Management consulting firm McKinsey says customers are willing to pay an average of 5% more for "green" products and estimates that reducing resource costs can improve operating profits by up to 60%. An overwhelming 87% of American consumers say they prefer to buy products with social and environmental benefits. Ernst & Young found that sustainable companies record higher gross earnings than 73% of their less-sustainable industry peers.

Despite broad acceptance of the need for businesses to become more sustainable, IT organizations have mostly lagged in adopting circular principles. A 2021 Capgemini report found that 89% of organizations recycle less than 10% of their IT hardware, 57% of technology executives are unaware of their organization's IT carbon footprint, and nearly half lack the tools or expertise needed to adopt and deploy circular IT solutions.

IT challenges

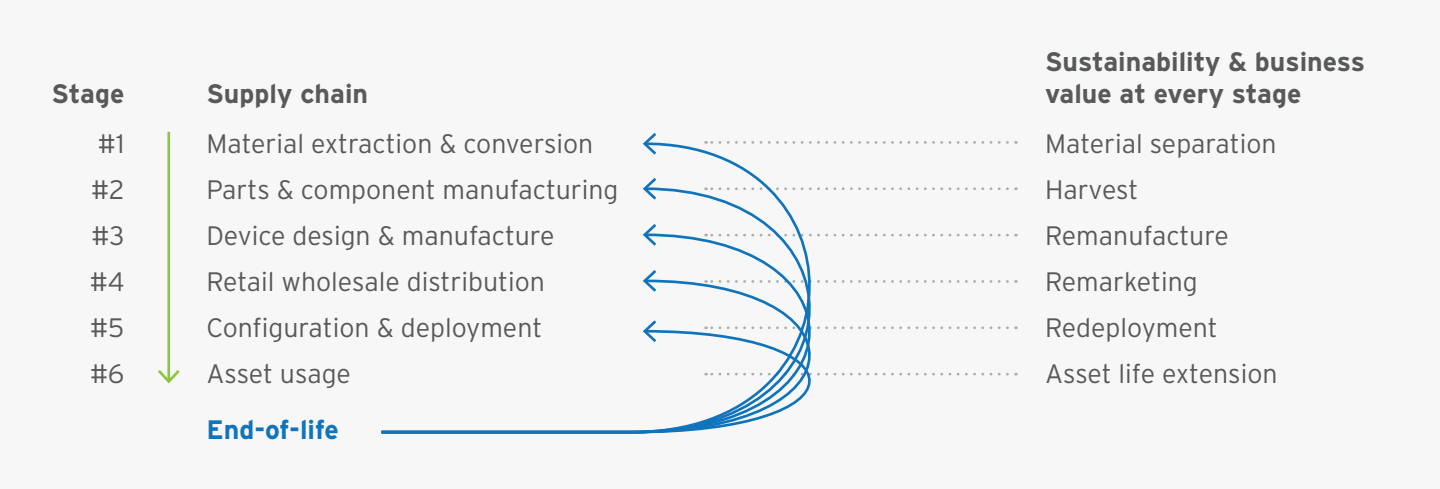
IT executives are under pressure to show progress against CSR goals. In addition to the e-waste problem, data centers consume about 1% of all electricity globally and 2% in the U.S., making them major sources of carbon emissions. The U.S. Department of Energy estimates that a typical data center consumes 10 to 50 times as much energy per square foot as an office building. Data centers and power generation facilities are also major consumers of water, a resource that has grown more precious amid climate change-induced droughts.

The current environment most IT organizations face creates impediments to becoming more sustainable.

- Budget-strapped chief information officers (CIOs) are tempted to put short-term savings ahead of long-term sustainability benefits, causing them to opt for cheaper but less environmentally-friendly products.
- The fast pace of technological advancement causes IT equipment to quickly become outdated. Rapid obsolescence encourages a culture of frequent upgrades and replacements, with recycling and sustainable disposal treated as an afterthought. The value of older equipment falls so quickly that there is little incentive to remarket it.
- The IT industry relies on complex global supply chains that are often opaque and difficult to understand. Verifying that vendors at all stages - from raw material extraction to manufacturing, distribution, and disposal - are embracing sustainable practices can be seen as "nice to have" information that is easily overlooked.
- Chronic skills shortages distract from big-picture initiatives. IT departments do not necessarily prioritize sustainability because it's not top of mind due to the ever-present need to get projects out the door. Sustainability practices have not historically been part of university computer science curricula, although a growing number are now including the topic in their curricula.
- For practical reasons, CIOs prefer to do business with a small number of strategic vendors. This can lock them into long-term contracts that make it prohibitively expensive to switch to vendors with more sustainable practices.

The burden of becoming more sustainable doesn't need to rest on the shoulders of the internal IT group alone. By leveraging partners at every step of the procurement, usage, and retirement process, IT organizations can rapidly advance sustainability practices that reduce costs and recover value from equipment that would otherwise be discarded. Understanding how to do that starts with exploring the circular economy asset lifecycle supply chain.

The supply chain and the circular economy



The IT asset supply chain spans all stages, from raw materials extraction to the usage of finished products. The corresponding assets supply chain is a circular system consisting of six stages that progressively build upon each other as materials are refined, components are assembled, and equipment is purchased, deployed, and ultimately reused or retired. Each stage presents an opportunity to apply practices and levers that foster a circular economy—providing both sustainability and business benefits.

1 Material extraction and conversion

At this first stage, raw materials such as silicon, germanium, gallium arsenide, and precious metals are processed into a form that enables them to be used to manufacture electronic components. Most are extracted through mining, an environmentally harmful process. Recovering materials from existing IT hardware can minimize unnecessary disposal and reduce the need for mining of net new resources.

2 Parts and component manufacturing

Raw materials are refined and formed into finished parts such as transistors, diodes, integrated circuits and microprocessors. These are assembled into the subsystems of computing devices like central processing units, storage devices, power supplies, displays, network interfaces, and specialized adapter cards. Many of these components can be recovered from existing equipment through a "demanufacturing" process that combines extraction, testing, recertification, and redeployment to assembly lines.

3 Device design and manufacture

At this stage, components come together into a finished system like a computer, printer, or display. Many parts in these devices are task-specific and change little over time. They can be often be extracted from existing end-of-life equipment and reused in new devices. A refurbishment process re-images components, tests for compatibility, and deploys them for incorporation into new devices.

Design plays an increasingly important role in sustainability. Electronics manufacturers are stepping up their use of biodegradable or recycled plastics, standardized parts, low-powered hardware, and products designed to be disassembled and reused. IT organizations can contribute to corporate CSR initiatives by choosing to do business with suppliers that adhere to established sustainability best practices and standards.

4 Retail and wholesale distribution

Buying refurbished equipment is a sustainable practice and a smart use of budget dollars. Many IT equipment makers sell used and refurbished hardware at an attractive price point, and often with full warranty coverage. Purchasing a refurbished computer not only extends the asset's lifecycle but also reduces e-waste by keeping equipment in circulation, and avoids the environmental impact of manufacturing new devices. This choice leads to lower greenhouse gas emissions, aligning with the sustainability objectives of many enterprises that prioritize CSR goals.

5 Configuration and deployment

Asset configuration and redeployment ensures that hardware is repurposed within the organization to maximize its value. Maintenance activities keep assets operational and reliable. Refurbishment breathes new life into older hardware, extending its useful life. While this stage holds high potential for sustainability gains due to the asset being redeployed as a whole, it requires ample storage space for those assets that are not currently in use. Organizations must also develop plans to enable smooth transitions during hardware upgrades and logistics in order to move assets between locations.

6 Asset usage

Another area of high business and sustainability impact, this stage applies best practices to ensure that assets are properly managed and tracked throughout their lifecycle, thus minimizing unnecessary purchases of new equipment. It encompasses device maintenance, asset tracking, storage of replacement equipment, imaging, kitting, tracking, logistics, and reporting. Regular maintenance such as cleaning, reformatting, and re-imaging a slow PC or laptop can improve performance dramatically, as can adding system memory or replacing a hard disk with a speedy solid-state drive.

Equipment that is too old to be used in the workplace may be redeployed for less intensive uses as print servers or network firewalls. When internal reuse isn't practical, charities frequently welcome donations of older equipment, provided that the data on these devices has been securely wiped. Some companies even offer end-of-life devices to employees at a discounted rate for use as home file servers, media players, backup devices, and DVRs. In all cases, disposal should be a last resort.

When all options for reuse and refurbishment have been exhausted, end-of-life equipment should be disposed of responsibly in a secure and sustainable manner. Experienced IT asset disposition (ITAD) companies can maximize value out of even old equipment through component remarketing and precious metals recovery. They also ensure sustainability and data security best practices are followed. A certificate of destruction (COD) verifies that the process is complete and provides an audit trail for regulators and auditors.

Pillars of effective IT asset management in a circular economy

A few basic principles should guide IT organizations in thinking about sustainability:

Avoid unnecessary purchases

The best way to avoid contributing to the e-waste problem is to derive the greatest value from what you already have. Actively managing assets maximizes existing resources and minimizes the need to purchase new equipment. Many computing-intensive applications can be moved off desktops and local servers and run more efficiently in the cloud. Old PCs can continue functioning as smart terminals while the bulk of the processing occurs in efficient and sustainable hyperscale data centers. Cloud providers' economies of scale and shared infrastructure make them more efficient at processing data than local data centers and all have ambitious programs to reduce power consumption and carbon emissions.

Cloud computing has reduced the need for powerful desktop devices. One example is virtual desktop infrastructure. It delivers a full, personalized Windows or Mac experience from the cloud to thin clients on the desktop. Performance is comparable to or even better than that of dedicated PCs. Security is enhanced because there is no need for local storage and no risk of viruses infecting endpoint devices. Power needs are dramatically lower. Updates and patches are applied centrally and distributed automatically to all users, freeing IT administrators from that task.

Optimize the IT asset supply chain

An essential tenet of circularity is to reduce moves along the supply chain. The optimal circularity benefits are realized at the bottom of the IT asset supply chain – asset usage and configuration/deployment – because they require the least effort to extend and reuse existing equipment. Reprocessing and remanufacturing create transportation and labor costs that can be avoided if devices can be kept within the company's facilities or the immediate area. If recycling and remarketing services are needed, contract with a single vendor that provides a secure chain of custody, to ensure data security, supports sustainability best practices, and maximizes the value of your assets through recycling and remarketing.

Data destruction is crucial in the 'data security danger zone'

Final disposition of data-bearing IT equipment and electronic media at their end of life carries the greatest risk of exposing sensitive data through a breach. All data on these assets should be destroyed, and a certificate of data destruction should be provided. ITAD specialists have software that can wipe data across very large numbers of machines providing time efficiencies and data destruction documentation to support requirements and mandates. They also have access to specialized destruction equipment, such as shredders, that pulverize hard disks into tiny particles that can be refined and reused downstream. Degaussing is also a reliable method for data destruction.

Simplify IT asset tracking and management

IT asset management (ITAM) asset discovery can scan the organization's network to identify all connected devices and software. This can include servers, workstations, laptops, mobile devices, any network-connected hardware, as well as installed software applications and operating systems. Detailed information can be collected about each asset - such as make, model, serial number, specifications, installed software, and configuration settings.

> "Gartner research finds that about 30% of IT hardware may be missing, lost or "ghosted" at any stage of the life cycle. This contributes to excess e-waste, financial loss, environmental fines and security vulnerabilities."
>
> **Gartner®, Best Practices for Device Sustainability in End-User Computing**

Asset tracking contributes to sustainability by reducing purchases of new equipment to replace devices that have been lost or misplaced. It also enhances data security practices by ensuring that lost or stolen gear can't be used to access corporate networks.

The way forward

Transitioning toward a circular economy within IT organizations is both environmentally responsible and good for the business. As the challenges of e-waste and unsustainable resource consumption intensify, the adoption of circular economy principles offers a viable pathway for IT organizations to mitigate environmental impacts while simultaneously enhancing their operational efficiency and brand reputation.

Sustainability is increasingly recognized as integral to business success, evidenced by the growing commitment of CEOs and the widespread publication of sustainability reports. The journey is complicated by multiple factors, including the rapid pace of technological obsolescence, the complexities of global supply chains, and the need for cultural and organizational change. Despite these challenges, the potential rewards are immense, promising significant reductions in e-waste, greenhouse gas emissions, and energy consumption - as well as economic benefits through cost savings, new business opportunities, and a strengthened brand image.

By embracing the circular economy, IT organizations can lead the way in fostering a more sustainable, resilient, and prosperous future, underscoring the critical role of technology in addressing the pressing environmental challenges we all face.

Gartner, Best Practices for Device Sustainability in End-User Computing, Autumn Stanish, Annette Zimmermann, Katja Rudd, Stuart Downes; 13 March 2024

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