WHITEPAPER

WHY CIRCULAR ECONOMY DISCIPLINES ARE DELIVERING SUBSTANTIAL COST SAVINGS IN CLOUD SERVICE DATA CENTERS

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WHY CIRCULAR ECONOMY DISCIPLINES ARE DELIVERING SUBSTANTIAL COST SAVINGS IN CLOUD SERVICE DATA CENTERS

The well-established IT hardware manufacturing brands have long enjoyed the substantial procurement savings derived from recovering valuable parts from customer returned used IT systems. These organizations either developed reverse logistics operations internally or, more likely, outsourced their 'recovery for reuse' operations to specialist services providers. The result is considerable supply-chain cost savings in comparison to newer entrants without such programs.

The same is now occurring in the maturing 'Cloud Services' industry, where well established players have already developed programs. Most other cloud players are in the advanced stages of implementing these programs, this enables them to leverage used IT assets in order to deliver operational and financial benefits including improved return on investment (ROI).

Take the industry benchmark example of Google and their data center case study, published by the Ellen MacArthur Foundation. Their 'Circular Economy' program has already delivered significant IT infrastructure procurement savings whilst reducing future supply chain currency and availability risk.

GOOGLE

52% – In 2015, **52%** of components consumed in the machine upgrades program were **refurbished inventory**

52% – Google custom builds its own servers for data centers using **refurbished parts**

X – There is **no distinction** made between refurbished and new inventory – both are **considered equivalent**

75% – In 2015, **75%** of components consumed in the Google spares program were **refurbished inventory**

19% – In 2015, **19%** of servers Google deployed were **remanufactured machines**

2M – In 2015, Google resold nearly **2 million units** into the secondary market for reuse

When considering the immense scale of Google's global data center operations, the level of financial savings these 'recovery for reuse' processes produce is enormous. However, these benchmark levels for component reuse are somewhat typical for the advanced recovery of IT infrastructure systems. Major IT manufacturers also enjoy similar reuse levels for meeting demand for spares inventories, installed systems upgrades and in remanufacturing systems using both new and used components.

Few Cloud data center operations have the scale of Google to develop such recovery programs. This is why specialist partner organisations have expanded their operations to also support the Cloud services data center industry beyond just their existing IT manufacturing customers. The expenditure savings alone from recovery for reuse processing is a sufficiently compelling reason to embrace circular economy disciplines. Moreover, there are additional key strategic reasons for adopting such a shift in the management of IT assets going forward. This is particularly true of organisations that use IT technology infrastructure as a core tenant of their corporate business model.

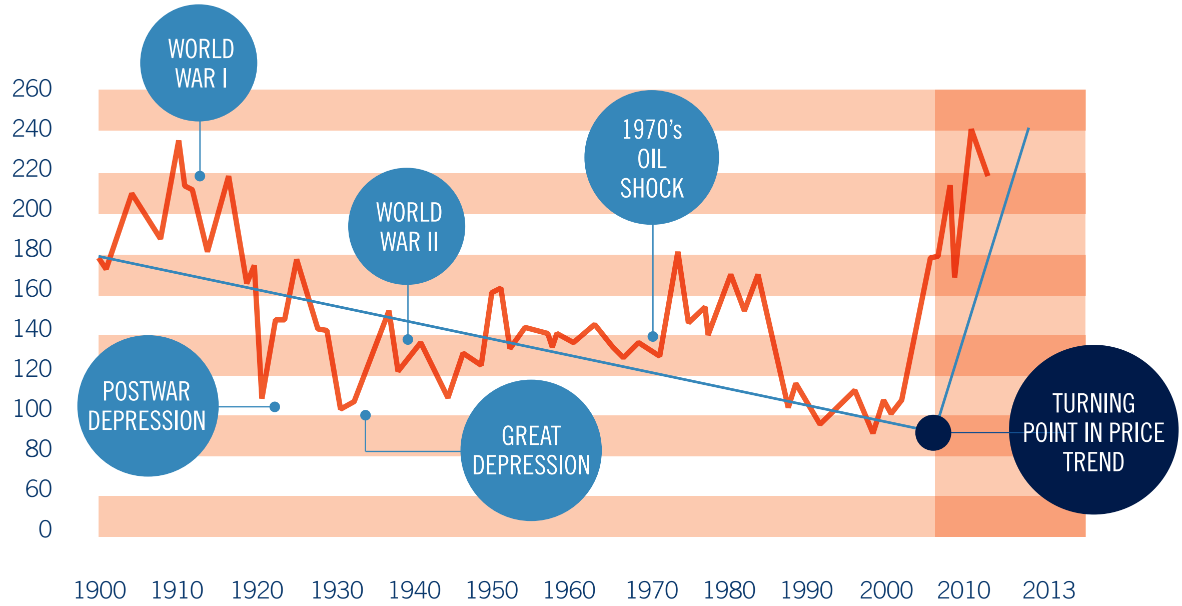
STRATEGIC CONSIDERATIONS

There is a financial reality that the industry's conventional linear economy model of making, using and disposing of products is now becoming economically and operationally unsustainable. This is particularly true of IT infrastructure products where the primary economic lifespan of enterprise IT systems are amongst the shortest of any capital asset. This is clearly the function within Moore's Law, where the affordable processor speeds double very two years. Likewise, capacity densities within data storage technologies increase at a similar economic rate.

The key takeaway of this paper is to achieve the readers understanding that these core technology components within an entire IT infrastructure are subjected to the very short Moore's Law based economic lifecycle. The majority of other equipment components have a considerably greater economic lifespan. So why simply dispose of everything and buy everything new?

RISING MATERIAL COST & AVAILABILITY RISK

A study conducted by McKinsey & Co highlighted the sharp increase in global commodity pricing since the year 2000. This effectively erased all price declines that occurred throughout the entire 20th century including the efficiencies gained in mining, design, production and logistics.



RESOURCE MARKET RISK

According to the United Nations Environment Program (UNEP) 2016 Report, extraction of ores and minerals grew by a factor of 27 over this same twentieth century timescale. Consequently, business as usual is predicted to lead to extensive scarcities of non-renewable materials, especially all metal types. This shift in supply and demand necessitates considerable change in the way we use and produce goods and services in order to cater for the growing world populations

To give a simple example on the future constraints on IT industry resources, three billion new middle-class consumers will drive the digital industry demand by entering the global market by 2030. The shift from the year 2000 was no blip. We are now faced with an exponential demand on resources and reduced availability. This is the reason why the conventional linear model of make, use and dispose is really becoming confined to history.

Using circular economy disciplines, it is imperative to find ways to create loops in linear supply chains in order to retain value. This requires initial feasibility studies into the architecture of IT infrastructures. The idea being to determine where supply chain loops can be created in existing hardware operations.

Circular economy disciplines are especially effective in future Open Compute Project (OCP) operations and should be incorporated into the earliest stage of design and planning. Circular economy disciplines ensure maximum cost efficiencies are achieved when incorporated into the design stage of an OCP based IT infrastructure strategy. Consequently, firms consult early with recovery for reuse partners to both ensure they optimize financial recovery from existing enterprise systems and incorporate reuse into their OCP plans.

INTERNATIONAL MARKET RISK

It is also important to consider the geographic source of raw materials required for future digital operations. Evidence suggests that the current major supply sources are in Asia which involves conventional currency risk. However, there now exists the potential addition of 'Border Adjustment Taxes' or duties payable on the importation of goods, possibly as high as 20%. Consequently, organisations will be paying considerably more for goods on importation. Therefore, it becomes increasingly important to ensure that optimal financial, operational and future utilisation of these product components are achieved within that same jurisdiction.

Ironically, many of the used components that are in highest demand on the global electronics broker markets are extracted from used systems. These are then often resold back into the original manufacturing operations primarily located in Asia. In the future, emerging circular economy operations within each major geographic region will have a positive local economic impact in terms of job creation, supply chain savings and reduced carbon footprint. This will help to balance international trade by retaining these valuable components for further use within the region.

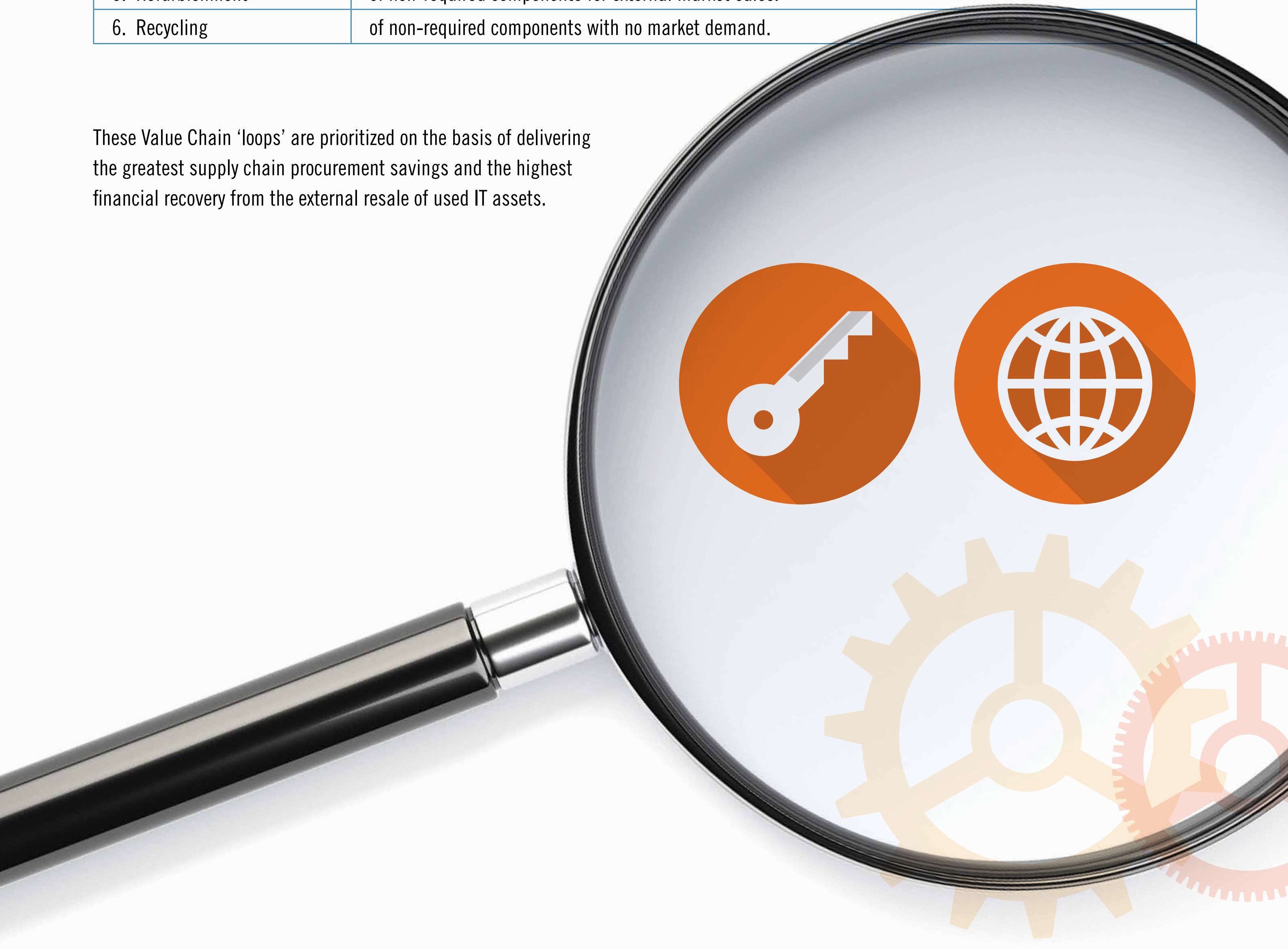
KEY CONSIDERATIONS

According to the McKinsey publication on the Circular Economy (October 2016), the circular economy isn't the latest sustainability fad and shouldn't be thought of as a recycling or green program. It requires top-down management and change across an organisation including re-evaluating product design, business models and the supply chain.

McKinsey has also pointed out a common misconception that the circular economy is not just about recycling.
Recycling is the least value capturing loop in a circular economy because it is only incrementally better than disposal.

The Value chain 'Loops' in order of financial and operational benefit	
1. Remanufacture	of systems to meet specific configuration requirements.
2. Refurbishment	of components to complete systems upgrades.
3. Refurbishment	of components to supply spares inventories.
4. Remanufacture	of non-required systems for external market sales.
5. Refurbishment	of non-required components for external market sales.
6. Recycling	of non-required components with no market demand.

These Value Chain 'loops' are prioritized on the basis of delivering the greatest supply chain procurement savings and the highest financial recovery from the external resale of used IT assets.



THE MIGRATION PATH TO THE CIRCULAR ECONOMY

1. Controls

A key issue for ensuring that optimal financial recovery has been generated from end of life equipment has often been the fact that these assets no longer have any value attributed to them. Therefore, they no longer come under the standard finance department asset management controls.

In a 2016 Wisetek survey, 24 out of 30 participating Chief Information Officers admitted that they did not have full track and trace of downstream reporting in how their used IT assets were being disposed. The only evidence to ensure 'fair' financial recovery for used assets was through competitive bids. A report by the European Academies Science Advisory Council (EASAC) in 2016 considers how effective an organization is in its circular economy disciplines for the finance team to implement material flow accounting controls. This would track the level of remanufacturing, reuse, external resale and recycling outcomes of all used IT infrastructure and end user assets.

The entire control programme would commence with a physical audit of all IT infrastructure asset components by scanning serial numbers into an asset register database. Particular attention must be given to all data carrying devices. These would be logged into a data security chain of custody' register for future reconciliation. This forms a checklist of all data devices to ensure that each one has either been certified erased or evidentially destroyed.

This exercise would also provide the operations team with an accurate bill of materials (BOM) from which a disposition table can be constructed to determine which components are required for reuse processing, to be made available for external resale or responsibly recycled. This information forms the basis of implementing and managing circular economy disciplines. This updated system would enable the operations team to manage all remote site equipment return notices and collections. The supply chain team can also gain early insight into what components are returning from production sites for the inclusion in their inventory planning.

2. Data Security

As previously mentioned, the control system provides a security checklist to account that all used data devices are accounted for and that critical data has either been erased or the devise was evidentially shredded using surveillance cameras with its video file is retained. This is a corporate safeguard to protect against data breaches emanating from used data storage systems, end user systems and all other forms of data carrying devices.

3. Recovery Operations

There used to be a widespread misconception as to the level of operational sophistication required in order to reliably recover optimal value for the reuse of IT infrastructure electronics. By necessity, these operations require a highquality electronics ESD manufacturing facility. Not only this, it is necessary to use Lean Sigma trained teams and management disciplines with all processing controlled using specifically designed ERP systems.

The additional operating challenge is the varied input flow and range of materials received into the recovery process. Every delivery has a unique manifest of system configurations that must be accurately received on arrival at the processing facility and rectified against the client's chain of custody records.

The precise dismantling of all inbound materials to component levels is a highly manual and diligent operator task. It is imperative that at this stage all components are handled with great care to ensure optimal reuse or external sales value is achieved. This reflects the job opportunities that the circular economy provides.

Supply chain team instructions are now controlled by the ERP system for the disposition routing of each component as they are dismantled into one of the following three streams:

a) Recovery for reuse processing internally to meet immediate /near term demand.

b) Recovery for external resale processing.

c) Responsible Recycling and Reporting..

4. Reuse Processing

a) Stream material reuse is inspected, tested, upgraded if applicable, repackaged for shipment into spares inventory. It then enters the remanufacturing assembly line with the possible addition of new technologies incorporate into the new configuration. The entire system then receives final testing prior to being packaged and shipped to site.

b) Stream material external sales is inspected, tested and catalogued for external sales.

c) Stream material recycling is immediately transferred from the pristine recovery for reuse ESD manufacturing facility to the licensed recycling center. Here the material is separated into commodity fractions and bulk shipped to approved refiners and full downstream process tracking and reporting is compiled for sustainability reporting.

4. Sustainability

As per the highlighted case study, Google can now justifiably state that they manage their IT electronics hardware disposal in compliance with the highest global sustainability standards. In developing their 'circularity' strategy they have also commendably achieved the most environmentally efficient disposal of their used IT electronics. Recovering materials and components for further reuse of their originally intended purpose is an exemplar corporate sustainability practice. Moreover, they have gained enormous financial benefit from this.

This case study they developed in conjunction with circular economy evangelists, The Ellen MacArthur foundation makes impressive reading and is available as a download on; https://www.ellenmacarthurfoundation.org/news/google-case-study-demonstrates-circular-economy-approach-atscale

Google quite deservingly highlight this achievement as part of meeting their sustainability and corporate social responsibility (CSR) commitments. Such initiatives make for a positive reading within their annual financial reports where publicly quoted companies are now obliged to report on their CSR and sustainability practices. Likewise, Wisetek's hardware manufacturing clients report similar circular economy practices and are also reported as leaders on the prestigious Dow Jones Sustainability Index, which is very popular amongst the powerful ethical investor community and market analysts alike.

Please note that in developing this paper Wisetek went to great lengths to avoid majoring on the environmental credentials of implementing circular economy disciplines. This was primarily due to the cost reduction of extensive IT operations as a primary focus within IT based services and IT manufacturing industries. Those companies that have implemented circular economy based strategies are not only gaining an immediate competitive cost advantage over competitors, but over the longer term they are prudently reducing future supply chain sourcing and costs risks. Gaining a cost advantage and reducing future supply chain risks are very compelling motives. However, the EASAC 2016 report does clearly identify that linkages exist between the circular economy; human well-being and sustainable economic development. Looking after people and business is the most compelling element of all.

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