

# Chapter 17

## Multinational Corporations and the Circular Economy: How Hewlett Packard Scales Innovation and Technology in Its Global Supply Chain

**Kirstie McIntyre and John A. Ortiz**

**Abstract** Hewlett Packard discusses how companies can move from the conceptual ambiguity of the circular economy to operational reality. The development of the circular economy concept is described, in particular the extension from resource efficiency: the importance of moving from the idea of ‘consumers’ to ‘users’. Transitioning from a linear economy to a circular one will require disruptive innovation. For more than 30 years, HP technologies have led large scale changes in a wide range of markets. We describe how HP is designing products and services which meet and enable circular economy applications. The examples demonstrate how a major multinational company like HP can build on its long-held resource efficiency principles to profitably drive industry forward in the circular economy. It is clear that the ‘new style of IT’ enables many future and current circular economy initiatives, from car sharing; community garden/power tool sharing and developing further connections between networks – i.e. the ‘sharing economy’. The ‘internet of things’ has huge potential to retain and grow control over dispersed resources. Through collaborative technologies and partnerships, and by engaging the innovation potential of others, HP looks to lead the proliferation of full system solutions that can allow inventors and communities to design and innovate surpassing what can be imagined today.

**Keywords** Hewlett Packard • Circular economy • Up-cycling • Closed loop plastic manufacturing • Recycled content plastic • Servicization • 3D printing

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## 1 Circular Economy Introduction

The circular economy is a new buzzword that has caught the attention of a wide variety of actors within the public and private sector – particularly in the last 4 years or so. The circular economy has developed as a result of the contributions from various schools of thought (some inter-related). These include ‘biomimicry’, ‘cradle to cradle’, ‘industrial ecology’, ‘resource efficiency’ and the ‘performance economy’ (Masuda 2014).

Although definitions of circular economy seem to be converging, particularly towards the definition put forward by the Ellen MacArthur Foundation (Ellen MacArthur Foundation & McKinsey Co. 2014), a uniformly accepted definition is yet to be reached. In the past, public and private sector, actors have focused on the idea of resource efficiency – doing more with less. Eco-efficiency measures increase the ratio of units/value of products and services to environmental impact (positive or negative). According to the World Business Council for Sustainable Development (Schmidheiny 1992), ‘eco efficiency is achieved by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life cycle to a level at least in line with the Earth’s estimated carrying capacity. In short, it is concerned with creating more value with less impact’.

Potentially the starting point of the concept of circular economy comes from the 1966 paper, ‘The economics of the coming spaceship earth’ (Boulding 1966), which put forward the idea of circular material flows as a model for the economy. Boulding called for the need to consider the earth as a closed economic system where natural resources are limited. Following this industrial ecology made studies of the material and energy flows in industrial systems, using natural eco-systems as a guide to create sustainable schemes that operate in accordance with local and global ecological boundaries (Allenby 2006). Cradle to cradle thinking seeks to make the further distinction from eco-efficiency to ‘eco-effectiveness’; the creation of ‘cyclical’ flows which allow materials to maintain their quality and status as a resource (up cycling) instead of minimizing cradle to grave material flows (Braungart et al. 2007).

There is some discrepancy between the older version of resource efficiency and the newer concept of circular economy. The understanding of resource efficiency often precludes the important idea of moving from ‘consumers’ to ‘users’ of durable goods in the economy. Conversely, circular economy can miss the elements of ‘cleaner production’ or ‘eco-efficiency’ measures. Currently it appears that the circular economy concept is better defined at the higher conceptual level, but not at the practical, operational level. Circular economy must make the shift from conceptual ambiguity to operational clarity if it is to be widely and uniformly incorporated by industry and governments (Masuda 2014).

What is clear to Hewlett Packard (HP) is the need to innovate in a resource constrained world. The traditional linear economy of ‘take, make, consume, discard’ will not long be viable where planetary resources are being ‘overshot’ earlier and

earlier each year (considered to be August 19th in 2014) (Global Footprint Network 2014). For HP, the Circular Economy encompasses a system that is restorative or regenerative by intention with design that eliminates waste. As an alternative to the linear approach (take, make, use, discard), HP believes that connecting circular economy principles to resource efficiency is the route to success.

Resource efficiency is important to a global scale manufacturer like HP. We cannot abandon our 'design for environment' principles of:

1. Energy efficiency – reducing the energy needed to manufacture and use products
2. Materials innovation – decreasing the amount of materials used and selecting materials with lower environmental impact
3. Design for recyclability – designing equipment that has more value at end-of-life, is easier to upgrade and/or recycle.

(HP 2014a).

However, HP also understands the need for disruptive innovation to break through the limits of linear resource consumption models, irrespective of how efficient we become with the materials, energy, water and other resources we use.

## 2 Why Innovation in Circular Economy Is Important

Three main areas have emerged which have brought this opportunity into sharp focus:

1. Trends furthering the case for resource efficiency include:
  - (a) Risk factors around resource availability and price volatility
  - (b) Increased public opinion and government regulation concerning environmental and social issues
2. The opinion that traditional resource efficiency measures are insufficient to address current resource challenges
3. The alignment of conditions which will allow for the rapid diffusion of the circular economy such as:
  - (a) The introduction of policies and regulations of governments around the world that support and promote the circular economy
  - (b) Changing customer/consumer attitudes and other societal shifts that are essential for the diffusion of circular economy
  - (c) The advancement of information technologies and other technologies which drastically increase the feasibility of circular economy.

Each of these drivers will be discussed in turn:

## ***2.1 Resource Availability***

As of 2015, sharp price increases in commodities since 2000 have erased the real price declines of the twentieth century. At the same time, price volatility levels for metals, food and non-food agricultural output in the first decade of the twenty-first century were higher than in any single decade in the twentieth century (McKinsey Global Institute 2013a). Extended producer responsibility is ever more important to public sector purchasing and individual consumption of durable and food goods. The Guardian Sustainable Business pages list climate change, supply chain responsibility, conflict minerals and factory workers' rights in their top 10 issues of 2014 (Buckingham 2014).

## ***2.2 Resource Efficiency***

In modern manufacturing processes, opportunities to increase efficiency still exist, but the gains are largely incremental and unlikely to generate real competitive advantage or differentiation. The latest IPCC report determined that the global emissions of greenhouse gases have risen to unprecedented levels, despite a growing number of policies to reduce climate change. Emissions grew more quickly between 2000 and 2010 than in each of the three previous decades (IPCC 2014). With three billion new middle class consumers expected to enter the market by 2030, current efficiency measures will not be enough to meet this demand.

## ***2.3 Alignment of Conditions***

Conditions for rapid diffusion are aligning. The IT sector and many other industries see increasing regulation being developed that moves beyond eco-efficiency into new forms of producer responsibility. The early adopters will be the ones to find competitive advantage and exponential growth. The millennial generation are more likely to demand access to services over ownership of products, for example through subscription services like Netflix or mobility access through car leasing (Ross 2014). Big data and data analytics helps companies to drive business growth by moving from 'transactions' to 'relationships' with their customers. This in turn drives increased brand loyalty, a concept which is well understood as valuable to industry via models such as Net Promoter Score (Reichheld 2003).

Having described circular economy principles and why HP thinks it is important for future business success, the remainder of this chapter will examine the real, at-scale programs currently underway at HP. These will demonstrate how a major multinational company like HP can build on its long-held resource efficiency principles to profitably drive industry forward in the circular economy.

### 3 The Shift from Conceptual Ambiguity to Operational Clarity

Scaling circular economy applications to a global level does not come without its complexities. In this section, three current programs at HP are described to demonstrate how circular economy principles are being applied now within a \$130 billion business (Fig. 17.1).

At its core, a circular economy aims to design out waste; products are designed and optimized for a cycle of disassembly and reuse. For technical, durable products (like computers and printers), the circular economy largely replaces the concept of ‘consumer’ with ‘user’. Unlike in today’s buy-and-consume economy, durable products are leased, rented or shared wherever possible (Ellen MacArthur Foundation & McKinsey Co. 2014). In addition, new innovative technologies are required to fundamentally disrupt traditional manufacturing and supply chain models. New technological applications will enable greater collaboration in developing business models, job creation and further innovation.

HP’s first example concerns closed-loop plastic manufacturing. While this may be considered a resource efficient measure, for many companies it is the first step to circular thinking. A report by Ellen MacArthur Foundation & McKinsey Co. for The World Economic Forum (Ellen MacArthur Foundation & McKinsey Co. 2015) has identified polypropylene plastic as a high potential material to demonstrate real change across supply chains. Our example shows the challenges and opportunities with successful scaling at a global level:

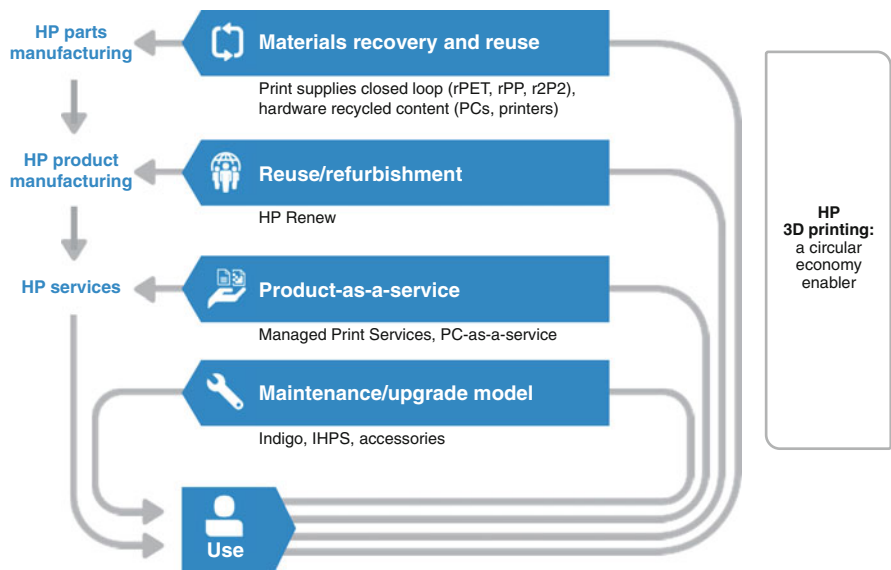


Fig. 17.1 HP circular economy diagram (Hewlett Packard 2015)

## 4 HP R2P2 program

This program highlights Circular Economy innovation of Inkjet Printer cartridges and demonstrates that by leveraging HP's scale, partnerships, customer relationships, materials knowledge and process innovation, we have closed material loops in technical grade polypropylene (PP).

1. Closed loop recycling with cascaded PP streams: HP inkjet cartridges returned by customers are collected, plastic separated, recovered and cleaned. They are combined with different cascaded PP streams (from other post-consumer applications) and plastic additives to create a ready-to-mold, 85 % recycled content plastic (RCP) replacement for virgin plastic resin.
2. Fully closed loop recycling with HP-only streams: HP inkjet cartridges returned by customers are collected, plastic separated, recovered, cleaned, re-pelletized and mixed at 20–30 % with virgin resin. This process allowed HP to accelerate the development cycle, providing a very solid example of developing “pure” material streams and then incorporating these streams into fully scaled manufacturing processes. With this most recent project, HP applied the knowledge and experience of the past 9 years of closed-loop recycling, reverse logistics, materials development, product design and separation technology to reduce the learning cycle from nearly 7 years, to approximately 9 months from project start to manufacturing ramp. This project began its worldwide production ramp on 27 October, 2014.

With the two PP projects fully implemented in manufacturing, HP expects to use nearly 5 million kilos of recycled PP in 2015. Combined with the multiyear effort on Polyethylene Terephthalate (PET), HP now uses approximately 10 million kilos of recycled plastic in inkjet cartridges. By 2014 year end, over 90 % of HP's inkjet cartridges shipped contain recycled plastic from closed loop and cascaded streams (Fig. 17.2).

HP has achieved this through collaborative effort with several key supply chain partners:

- Reverse logistics: HP is using multiple reverse logistics routes (channel partners, bulk enterprise customer shipments and logistics providers) to collect, process and recycle 10 million kgs of plastic material every year.
- Partner development: A collaborative recycling eco-system has been created to utilize the strengths of multiple partner suppliers including recycling, material refining, material development and plastics compounding.
- Recycling process and equipment development: This is a very critical piece of innovation which enables pure material streams to be used without requiring performance trade-offs.
- HP is driving recycling process innovation and recycling equipment development including patented recycling equipment and \$Ms invested in product disassembly tooling.



**Fig. 17.2** Design changes to high volume ink cartridges to allow for increased recycled plastic content (Hewlett Packard 2015)

- Cascading streams and materials development (Up cycling post-consumer materials from other products and industries). Developing up cycling solutions for low value materials (materials from garment industry used in products).
- Together with its suppliers, HP has developed analytical and functional quality tests for incoming RCP (recycled content plastic) feed streams to ensure product quality is not compromised. This is particularly important when considering for cascaded streams to be up-cycled into HP products.

Certain challenges of using RCP have been overcome in the course of this work:

- Impurities – potential impact on ink quality. The ink inside cartridges is a complex chemical formulation designed to perform under specific conditions. HP doesn't consider that it sells ink or cartridges, customers want the printed page. Customers also expect that the output is perfect from the first page to the last.
- Molding and performance – negative impact to production molds and tools can cost millions of dollars in damage and lost manufacturing time.
- Product component dimensional tolerances (reduced flexing in large sheet components), manufacturability (ease of manufacturing), yield (reducing material waste) and supply chain implications.
- The assembly and performance in the customer's hands.
- The qualification of new resin formulations for manufacturing applications can be a slow process. HP has worked to reduce time for internal certification.
- Design teams have been involved in decisions around material properties and color and cosmetics of finished products. These technical discussions have debunked the commonly held belief that recovered/recycled materials are inferior through product and process performance testing and quality analysis. RCP materials have not resulted in any documented customer quality issue/concern.

- There have been significant market challenges to overcome: the main one has been assurance of supply – particularly with regard to consistency and quantity.
- Pricing stability has been found to be key. HP commodity purchasers are closely involved with comparisons to virgin materials to ensure there is no financial impact from using RCP. A real-time example comes from the late 2014 oil price slump which has created new challenges for the adoption of recycled plastic. Virgin resin prices have dropped as much as 30 % per month (HP internal data, 2015).

The economics of recycled plastic are interesting and merit further study. Recycled plastic providers who ‘float’ their prices with the virgin resin demand will most likely feel a ‘pinch’ when petroleum pricing drops. However, HP believes that recycled plastic can be priced independently of virgin resin when operating in a circular model. This makes most sense when long-term collaborative relationships are established within the supply chain.

HP intends to continue this path of increasing recycled content in products and components, wherever possible using its own closed-loop material streams. The next step in this program is to extend into further plastic types and more product families, thus disrupting the perception that closed-loop solutions can only be possible in small volume, localized situations. HP demonstrates that a world-wide solution involving millions of kilograms of material every year is indeed possible.

The next example from HP concerns an inner circle of the circular economy diagram: that of service models. This is where products are leased or rented to customers, either with a service contract or not. The products remain within HP’s control which makes closing material loops, refurbishment, maintenance and repair much simpler and cost-effective.

## 5 HP Device-as-a-Service Program

HP is currently developing business models in all levels of circularity. Market forces and new customer norms are growing and shaping the company’s portfolio of device-as-a-service product offerings to become a larger part of its business portfolio. Current programs are offered to all types of customer, from the home user to the large enterprise such as Government departments or companies like banks or manufacturers.

- *HP Renew* – This program currently remanufactures server, storage and networking products, offering the same reliability, functionality and warranty as new HP products. In 2013, 3.7 million units were processed through HP’s 5 facilities across the world. Returned, loaned or trial units are completely remanufactured so they can be fully utilized and are not unnecessarily wasted. HP Renew is a full-scale worldwide product example of remanufactured and redeployed servers, storage and networking solutions.



- *MPS – Managed Print Services (printers)* – Printing is offered to enterprise and small businesses as a service. Through a variety of financing or lend/lease business offerings, customers can choose their level of involvement with the management of devices. HP today has nearly 1 million devices managed as a service, and the average age of the ‘printer in management’ is 5–7 years. At printer end-of-service, approximately 75 % of those printers are refurbished and remarketed to other customers. The remainder are determined unusable in their whole state, therefore go for recycling by certified providers, thus providing potential feed-stock into other closed loop material streams.
- *HP subscription services (computers)* – Launched in June 2014, this product offering meets the needs of small and medium businesses that need to scale their computing capabilities very quickly and have less desire to own products. A formal program has started now with several HP channel partners (resellers) who will sell bundles of hardware and services under a lease from HP Financial Services. Started in the UK, France and Spain, it is too early to show detailed results, however early feedback from customers and reseller partners is very positive. This is a good example of where business benefits from a circular product service model, customers are satisfied and the profit margins secure the long-term sustainability of the business model.
- *Instant Ink* – Inkjet printer ink supplies are managed for home users to address the recognised ‘pain points’ of (1) Ink availability (running out at the crucial moment), and (2) Ink cost. Through internet-connected printers, HP’s Instant ink service allows customers to pay for only the ink they need to print, on a monthly basis. Ink is re-supplied automatically to the home via the national postal service. There is no contract and no get-out fee. Cartridge recycling is offered as part of the service. There are further opportunities to close material loops from consumer printers, HP will be exploring this in the future. By enabling this business model for users, HP’s product designers can reduce material consumption by 45–65 % over traditional supplies purchase models.

The above programs briefly describe some of the device-as-a-service models that HP currently offers to the market. The success factors in these programs are as follows:

- The service must be what the customer wants.
- Products offered must not be perceived to be of lower value than outright purchased goods.
- The service must be easy (and fun) to use.
- Closing material/product loops to prolong product lives is key.
- The business model must be profitable for the company in order to facilitate further innovation to eliminate waste.

Connected technology is also key to the ease of use and rapid dissemination of such service models for durable goods such as IT products. HP service and repair businesses are using such technology to manage capital assets in customer premises. With ‘Visual Remote Guidance – Integrated with Google Glass <sup>TM</sup>’, HP has

pioneered remote support on its IHPS (Inkjet High-Speed Print Systems) equipment. Customers can diagnose and service their printing systems with the virtual assistance of an HP technician viewing their problems in real time. This technology is intended for capital industrial printing systems now, but has far-reaching implications in the service economy.

In the last example described below, it is shown how innovative technology can be used to disrupt and transform accepted norms in manufacturing and supply chains.

## 6 HP Multijet Fusion 3D Printing

The HP-led digitization of printing revolutionized the industry, turning printing upside down, reducing waste and inefficiency (Hewlett Packard 2014b). It created the ability to print completely unique material with variable data, instead of being constrained by one master with many copies, transforming supply chains and industries as a result. Allowing printing to become personalized, localized, customized, targeted and unique, the results are valued and not ‘thrown away’, reducing waste. One example is grocery store circulars. By enabling one client to customize their magazines by local customer base, their circulars went from being 32 pages to just four, while conversion rates rose dramatically. Digitization has also led the print-on-demand revolution. In publishing, 30–40 % books are unsold. With digital printing, copies can mirror demand, whilst the digital print process prints pristine pages first time round, instead of creating large volumes of waste whilst presses are set up.

3D printing presents HP with another tremendous opportunity to transform supply chains and industries. Identified as one of ‘12 disruptive technologies that will transform life, business and the global economy’ (McKinsey Global Institute 2013b), 3D printing offers the ability to produce – both rapidly and inexpensively – short runs or one-of-a-kind parts. In contrast to traditional manufacturing which typically cuts, grinds or molds raw materials into shape, 3D printing builds to shape.

In addition, 3D printing will revolutionize part manufacturing and the part distribution supply chain by offering local, on-demand production. It is easy to envisage the local car repair garage printing the replacement part for your car, rather than waiting for it to be delivered from inventory held elsewhere. The connection to the circular economy is clear, 3D print technology removes the need to hold large, potentially redundant inventories of spare parts. Maintenance and repair business models become more financially attractive; products are designed to be repaired, upgraded and maintained thus prolonging their lives and eco-effectiveness.

The following paragraphs explain how HP’s version of 3D printing addresses some of the current restrictions and technical difficulties of the existing technology.

In additive manufacturing technology – commonly called “3D printing” – objects are built from selective addition of material rather than by molding or by traditional methods of subtractive machining, where material is removed by cutting and

grinding. Candidates for 3D printing include the functional and aesthetic components of machines, consumer and industrial products that are produced in short runs – typically less than 1000 units, and, in particular, highly customized and high-value products that may be one-of-a-kind. Because 3D printing builds objects from cross-sections, complex parts – previously requiring multiple elements that were welded or assembled together – can now be built either as a monolithic structure or from fewer subcomponents. For example, some types of 3D printing can produce parts with hollow internal structures and complex 3D internal passages (for air or other fluids) that once required several sections to be fitted together with sealing surfaces between them.

HP's vision for 3D printing is the revolution of part manufacturing (how parts are made) and the part distribution supply chain (where and when parts are made). In the near term, affecting the creative process by making far more useful parts available to a much broader audience. And in the longer term, disrupting supply chains with 3D printing technology. In order for that disruption to occur, there must be significant changes in the economics of 3D printing and in the standards for maintaining quality.

Current 3D printing machines could be categorized in two groups, machines that produce smooth parts with good detail, and machines that produce parts with good strength. Because of the materials that are currently used to produce smooth parts with good detail, this group of machines does not make parts with good strength. In contrast, because of point energy needed to produce parts with good strength, this group of machines does not produce smooth parts with detail. Further, many existing processes fuse or cure the materials together at a focused point, for example using a focused laser beam to fuse, or using a single nozzle to extrude. This point-processing limits the build speed of these technologies. In the end, adoption of current technologies may be limited by imperfect parts, and slow productivity.

As with many 3D printing processes, HP Multi Jet Fusion™ technology starts by laying down a thin layer of material in the working area. Next, the carriage containing an HP Thermal Inkjet array passes from left-to-right, printing chemical agents across the full working area. The layering and energy processes are combined in a continuous pass of the second carriage from top-to-bottom. The process continues, layer-by-layer, until a complete part is formed. At each layer, the carriages change direction for optimum productivity.

High productivity can lead to challenges in making quality parts. For parts to work, it's important to ensure that the material has been properly fused and that part edges are smooth and well-defined. To achieve quality at speed, HP invented a proprietary multi-material printing process where the materials are applied by HP Thermal Inkjet arrays. In addition to fusing and detailing agents, HP's technology can employ additional materials to transform properties at each volumetric pixel (or voxel). Color and even different materials can be used in the same print run to produce complex, multi-dimensional parts.

To realize this full potential of 3D printing, HP's vision is to develop a 3D printing platform designed to become an industry standard, and HP is inviting creative collaboration in materials for 3D printing. These breakthroughs in materials and

agent-material interactions can power the widespread adoption of 3D design and hardware innovation resulting in a digital transformation of manufacturing as widespread and profound as the way HP's Thermal Inkjet solutions changed traditional printing. Software to manage the design process is equally important, the current shortcomings of the CAD-based format in terms of processing time and object dimensional precision are a barrier for the production of complex, high-precision parts by new technologies such as HP Multi Jet Fusion technology. Furthermore, this format only allows geometric representation, so it does not allow voxel-by-voxel (volumetric pixel) information to be carried from the CAD software to the printer. To realize the full potential of 3D printing, the roadmaps of 3D printers and 3D CAD software must be aligned, and the roadmaps must be accompanied by a change to a more information-rich file format.

Comparison to commercially available 3D printing technologies has demonstrated clear advantages to HP's technology and its material set to define new levels of part quality, high part functionality, at 10 times the build speed and at much improved economics. A key feature of the technology is the potential to modify material properties to produce controlled variations of the mechanical and physical characteristics within a part, i.e. parts can have different materials built-in during the manufacturing process, instead of being welded or connected later. This can enable many new possibilities in the design and performance of parts built by 3D printing.

## 7 Conclusion

Moving from a linear economy to a circular one will require disruptive innovation. For more than 30 years, HP technologies have disrupted and led printing technologies in a wide range of markets. This chapter has described how HP is designing products and services which meet and enable circular economy applications. HP has a long history of resource efficiency – of doing more with less – this is accepted good business sense. HP also knows that there are good business advantages in extending into the circular economy.

- Saving resources = lower virgin material spend (greater profitability)
- New, convenient business models = happy customers (and repeat business)

The extension of effort does not come without its challenges:

- High grade plastics: consistency – quantity – quality
- Closing our own material loops (from service models)
- Expanding service offerings to more customers

HP is working to overcome internal and industry perceptions of recycled content materials, business model profitability and the need to market new business values to customers. There is further work to align incentives throughout HP's supply

chain; from customers (users) through channel partners (resellers) to manufacturing design teams. Managing across geographies is key to multinational businesses, being able to move products (both new and for refurbishment) across the world is vital to establishing the economies of scale which make circular business models financially viable.

It is clear that the new style of IT enables many future and current circular economy initiatives from car sharing, community garden/power tool sharing and developing further connections between people and manufactured goods. The ‘internet of things’ has huge potential to retain and grow control over dispersed resources. The interconnection of uniquely identifiable embedded computing devices (e.g. sensors) within the existing internet infrastructure is expected to offer advanced connectivity of devices, systems and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains and applications. M2M applications will allow both wireless and wired systems to communicate with other devices, in situations such as industrial automation, logistics, Smart Grids, Smart Cities, health and defence for monitoring and control purposes.

Through collaborative technologies and partnerships, and by engaging the innovation potential of others, HP looks to lead the proliferation of full system solutions that can allow inventors to design and build assemblies that have form and function surpassing what can be imagined and manufactured today.

**About HP** Hewlett Packard (HP) delivers innovation in printing, personal computing, software, services and IT infrastructure. HP offers the industry’s broadest portfolio, most expansive scope and deepest industry expertise to deliver value and improved outcomes for customers in almost every country in the world. The company is at the forefront of technological innovations that advance the way society lives and works, enabling it to play a vital role in enabling sustainable growth.

Operating in more than 170 countries, Hewlett Packard has long been a leader in global citizenship – one of its seven corporate objectives since 1957. With more than seven billion people seeking greater prosperity worldwide, balancing economic growth with environmental sustainability calls for innovation and leadership. Working towards a more sustainable world, HP responds to this challenge by improving the efficiency of products and solutions, supply chain and operations.

By combining the expertise of HP’s 308,000 people, its innovative technology portfolio and collaborative partnerships, the company is working to develop and share solutions that streamline and replace resource-intensive processes. Building on its size and scale, HP believes it is uniquely positioned to advance solutions that improve lives and make the world a better place. The business will move forward by reducing HP’s own environmental footprint, and that of its customers, while helping people prosper and companies thrive.

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