



RE-DISTRIBUTED MANUFACTURING AND CIRCULAR INNOVATION

THE END OF TAKE, MAKE, DISPOSE?



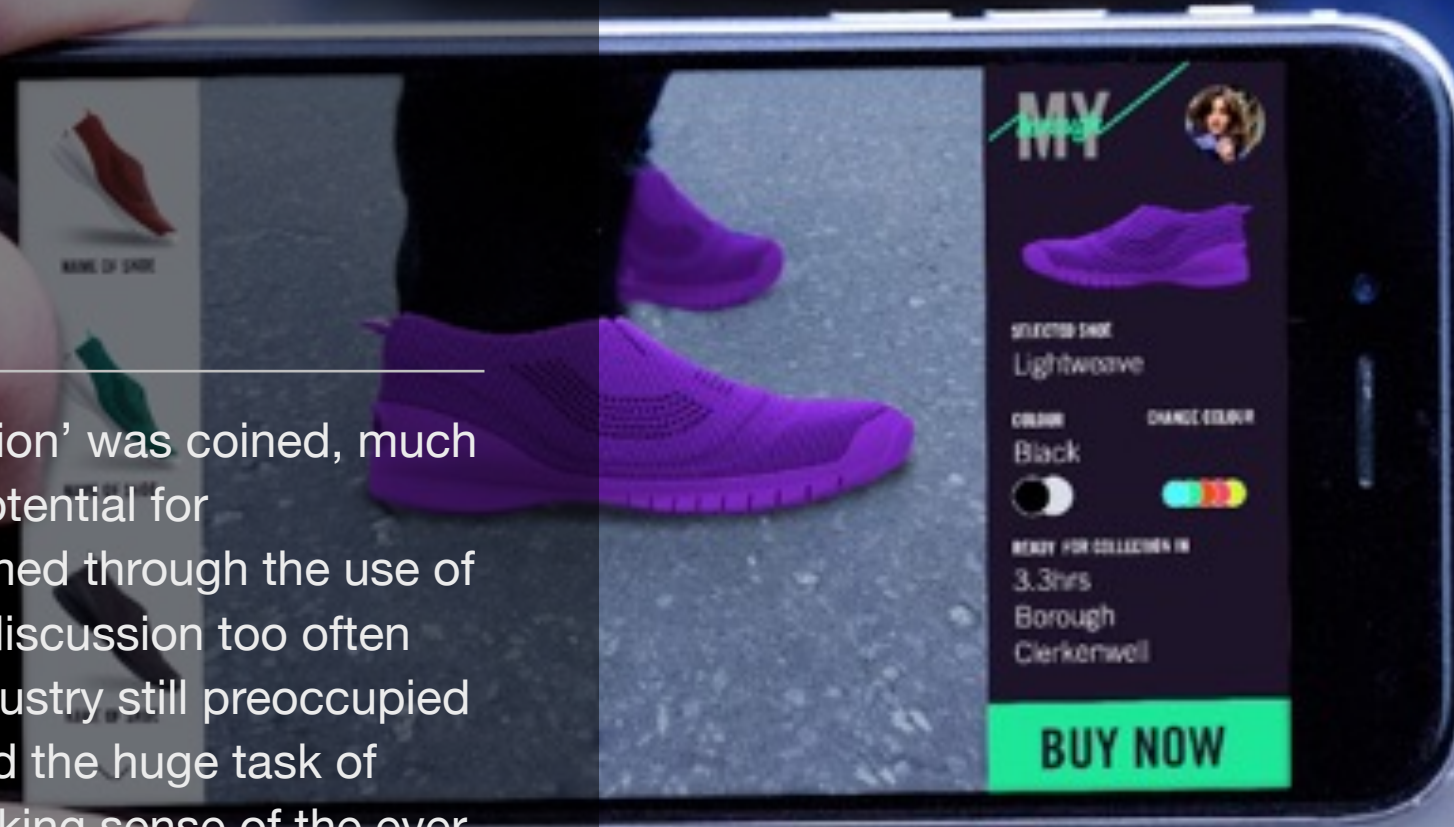
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November 2016

Introduction

Since the term ‘digital disruption’ was coined, much has been written about the potential for manufacturing to be transformed through the use of digital technologies. But the discussion too often remains abstract, with the industry still preoccupied with the Internet of Things and the huge task of connecting machines and making sense of the ever-increasing volumes of big data they generate.

Yet the opportunity for radical innovation is there for the taking, and the perfect storm of rapidly shifting consumer habits, growing supply chain risks and dwindling natural resources only increases the urgency for manufacturing to deliver, before a new player does.



Introduction

SHOE LAB PROJECT

1. Collaboration between Cisco, Cranfield University and brand consultancy The Clearing.
2. Builds on research carried out by RECODE-NETWORK identifying and evaluating the opportunities a re-distributed production model offers to disrupt traditional industry models when combined with big data.
3. Result is clear recommendations for manufacturers to realise potential of RdM to meet changing consumer needs AND help curtail today's disposable culture.

Juggling sourcing headaches, supply chain reliability issues, competition on a global scale, booming mass customisation and a consumer switch to a subscription consumption model, manufacturers today have a lot to contend with... And seriously big data to process.

Big data is already facilitating transformational change across sectors, and holds enormous potential to address many of the challenges manufacturers face. Big data and digital technologies combined offer genuine opportunities to re-think the industry by changing the economics and organisation, particularly of location and scale. But the really big question is 'how'?

Moving beyond the theoretical to the practical, the 'Shoe Lab' project undertaken by Cisco, Cranfield University and The Clearing explored in detail a specific real-world application combining big data and digital technology to drive a new, circular model for production. By exploring the widely popular category of sports shoes as a proof of concept, the results of the collaboration illustrate how re-distributed manufacturing can drive circular innovation to solve existing and imminent business problems.

The findings outline how new models could shift long-established industry dynamics, an example of radical innovation in practice.



Changing Landscape

By 2030, the UK population is expected to reach 70million people. This will see 90% of us living in increasingly cramped cities, helping to drive far-reaching changes to consumer habits.

But it's not just changing consumer habits that industry needs to keep pace with. We look at the economic and technology changes that, when combined, have the potential to change the relationship between consumers, brands and links in the value chain beyond recognition.



Changing Landscape

Space at a premium

We will soon be a nation of over 70 million people – an increase of 11% from 2011- making space the new luxury (source: Eurostat).

For industry, this means less space to sell and store products, and brands having to work much harder to earn a place on the shelves and in our homes. It will spell an end to volume promotions and smaller, slimmer (or no) packaging. Logistics will likely become even more of a headache.

Authenticity

In an evermore crowded Britain, authenticity will become the new exclusivity, meaning:

- The “chain” branded experience as we know it will be dead.
- Customers will expect retail environments to be built out of local materials to reflect local tastes and customs.
- Consumers will continue today’s emerging trend of seeking experiences rather than ‘stuff’ they have little space to store.

For industry, that means finding ways of offering more and more personalisation and a subscription ‘relationship’ model rather than purchasing model.

Dwindling resources

By 2050, demand for resources will outstrip supply:

- Global water demand up 40% (driven by the manufacturing and energy sectors).
- 50% of the world’s population will live in areas of water stress as a result.
- Demand for food will rise 56%, leading to higher prices worldwide.

(Source: Roland Berger)

This will impact on industry beyond cost increases. Consumers will expect action. Regulators will mandate action.

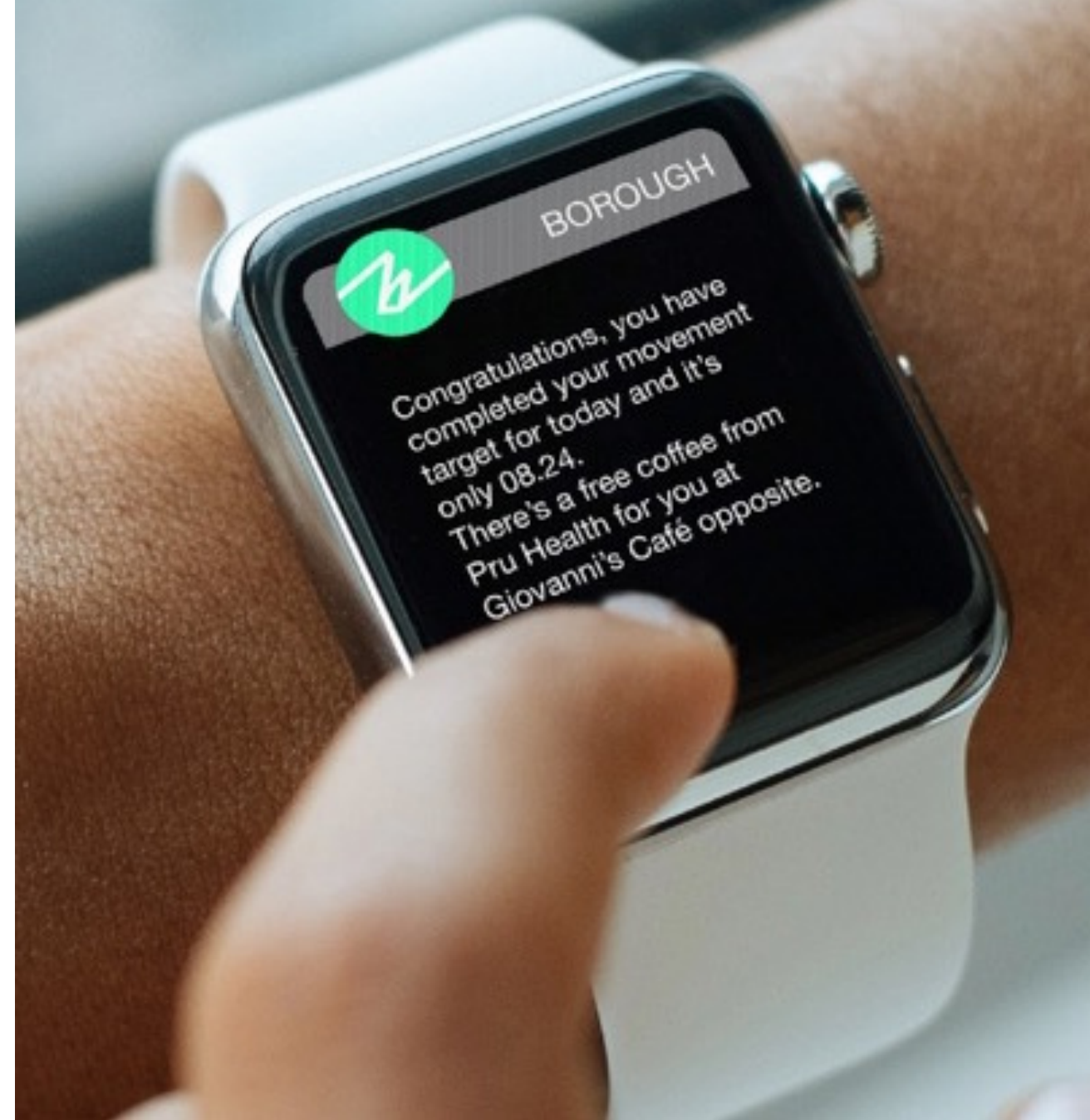
Technology everywhere

Since the first generation iPhone was released on June 29, 2007, technology has become more and more embedded in consumers' day to day lives. Most of us could not live without our smartphone and tablet - there is an app for almost everything now - and we are already seeing wearable technology start to become a fixture.

Smartphones have fundamentally changed how we interact with the world – nearly a third of us do not even use them to make traditional voice calls (source: Deloitte). In summary, the wheels are in motion for the consumer goods industries to change significantly in the near future to keep pace with changes in society and the macro-economy. The challenge is how we adapt.

Data as currency

Data will increasingly be a currency exchanged between businesses and individuals, and products will become smart by default, meaning every aspect of our lives can be managed, monitored and monetised in new ways. This requires a different mindset by industry as we move away from value chains to value networks.



The future may see service industries, such as life assurance providers, tracking customers' activity levels through branded smart products, and offering rewards.

RdM & Circular Innovation

Re-distributed manufacturing (RdM) is the term used to describe the transformational shift from centralised to decentralised (usually smaller-scale) manufacturing, powered by digital technologies. At its core is a production system that can rapidly and flexibly deliver partly or fully customised products on-demand.

The circular economy is the term used to describe sustainable production – a direct contrast to the linear or 'take, make, dispose' economy we are familiar with today. Circular innovation involves designing sustainability in and waste out of the value chain, for example by incorporating modularity, re-use and repair into the product lifecycle, or diverting waste streams as inputs into other supply chains.



RdM & Circular Innovation

What is RdM good for?

The flexibility and speed to market made possible by RdM means it is a particularly good choice for manufacturers who are looking for ways to overcome the following production challenges:

- Offering highly customised products, with personalisation from the design stage through to final finishing: RdM offers almost unlimited opportunities for personalisation in product design and assembly, from choosing the colour, finish or provenance of materials used right through to precision fitting to ensure an exact fit. Applications range from consumer goods through to surgical devices and specialist industrial products.
- Security (both intellectual property and of physical goods): where product design or production is extremely sensitive, due to the need to protect intellectual property or physical products from theft or contamination, RdM can deliver an individualised production process with customised and highly controlled workflows.
- Complex transportation and/or storage requirements: because RdM enables production at a micro-local level (for example via

a mobile production unit), it has the potential to solve logistical issues where products need to be transported under specific conditions which are either difficult to guarantee (for example absolute maintenance of temperature), or are prohibitively expensive (for example requiring a security escort).

- Variable volumes: due to digital production techniques and on-shore production location, RdM offers the ability to scale up or down in line with market conditions, while still maintaining acceptable margins.

RdM in Practice: Jaguar Land Rover

Jaguar Land Rover 3D prints some 55,000 parts a year, ranging from replica radiator grilles for validation models through to more fragile switchgear, key fobs and door-mirror casings for one-off concept cars.

(Source: Car Magazine, July 2016)

Why are RdM and circular innovation important?

While producing products in bulk off-shore can deliver impressive economies of scale, there are significant supply chain costs and risks associated with centralising manufacturing in this way. Customers are demanding ever-greater degrees of flexibility and transparency when purchasing products.

Ethical, especially environmental, considerations increasingly feature in the buying decisions of consumers and businesses alike, with regulators at country and global level ready to step in if self-regulation does not deliver change at a fast enough pace.

That is why manufacturers in industries ranging from life sciences to aerospace and consumer products are looking at ways of making their supply chains more predictive, more flexible and more resilient. Options for locating (or re-locating) production facilities closer to their customers and eliminating waste from the product lifecycle are rising up the agenda.

In parallel, developments in digital technology, including micro-technology, have opened up new possibilities to combine and commercialise RdM and circular innovation.

Chapter 4

Shoe Lab Project

The 'Shoe Lab' proof of concept demonstrates the circular economy in action, using the booming category of sports shoes as an easily identifiable example.

The project demonstrates how to translate innovation into practical business models and provides valuable learnings for consumer goods manufacturers and industry commentators on how the future might look.



Shoe Lab Project



CENTRALISED MANUFACTURE MODEL: SPORTS SHOES

1. Brands plan and design 3-6 months in advance of on-shelf date and contract supplier.
2. Mass off-shore production of full shoe design in standard sizes and limited colourways.
3. Shipped via sea/road to country of sale (possibly via near-shore finishing/packaging hub).
4. Distributed via road to warehouses and then to store/fulfilment to consumer and in reverse in case of returns.
5. Limited influence on after-life of shoes – only via retailer email or through targeted digital engagement with customer.

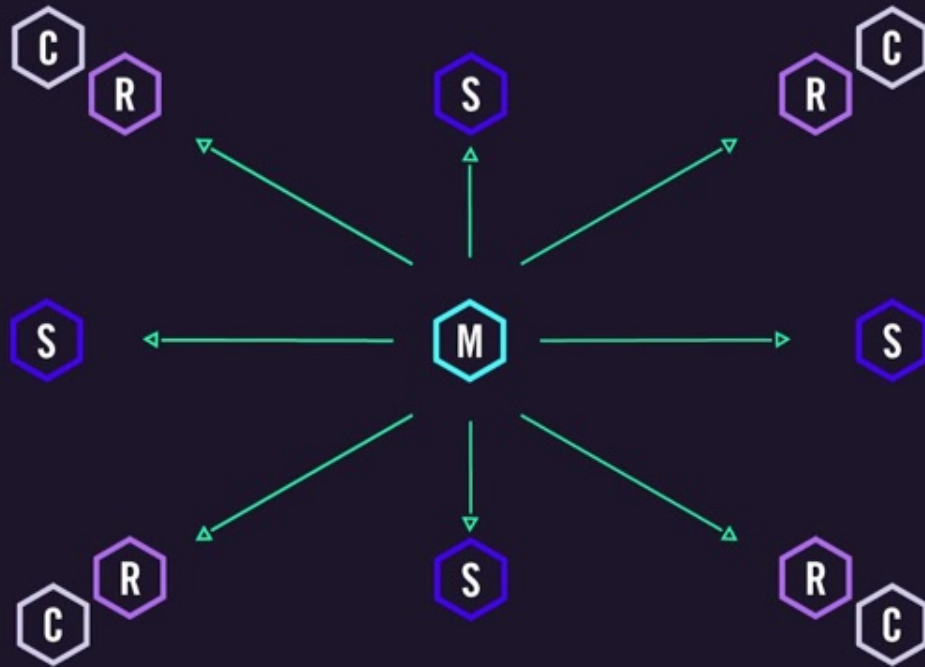
One of the booming segments of the UK footwear market is sports shoes, with athletic styling featuring consistently on the runways since the London Olympics in 2012. The trend has seen high-end fashion designers enter the market, and consumers have a seemingly insatiable appetite for comfortable, fashionable footwear.

Research by Verdict Retail in 2015 found that consumers of both genders not only want more choice, but greater options to customise to their preferences. The study reported a growing expectation by consumers that brands, both fashion and sports, should deliver both inspiration and performance through flagship stores and community engagement.

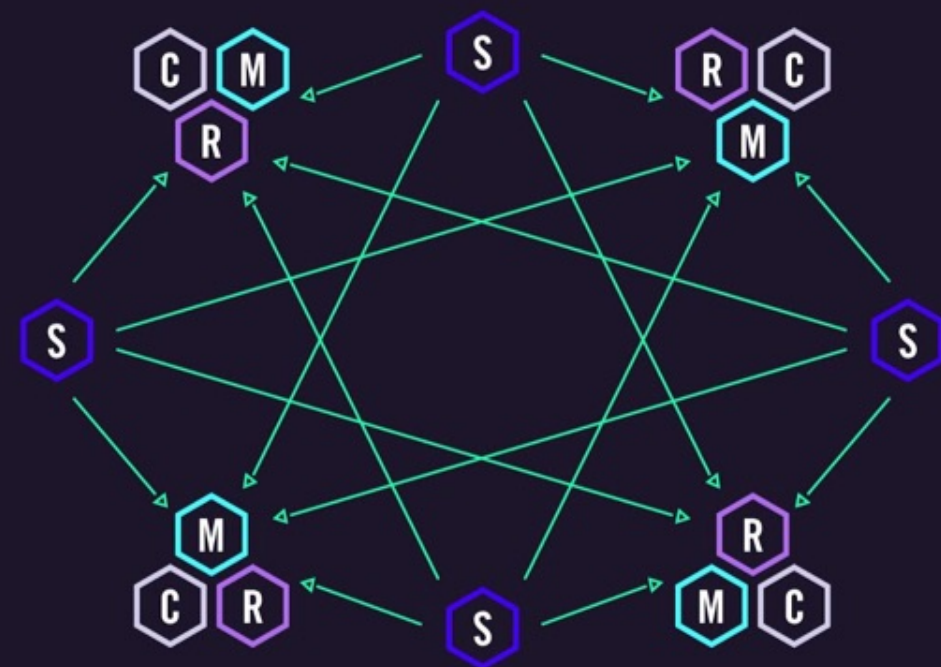
Yet brands cannot seemingly get running shoes to market fast enough to meet consumer demand, and a glance at the standard, centralised supply model for sports footwear explains why.

The centralised model has clear advantages for cost control. But options for customisation are very limited, and it is often almost impossible to adapt to changing fashions once an order has been placed. Brands are also heavily dependent upon the supply chain and the model allows only for a one-way flow of materials and data.

CENTRALISED MANUFACTURE



RE-DISTRIBUTED MANUFACTURE



'TECHNOLOGIES, SYSTEMS AND STRATEGIES THAT CHANGE THE ECONOMICS AND ORGANISATION OF MANUFACTURING, PARTICULARLY WITH REGARD TO LOCATION'

—EPSRC

The model defined by the 'Shoe Lab' project team, however, is quite different. At its core is a smart product with a modular design that maximises the engagement opportunities that lie at the heart of a successful subscription model, while minimising waste. RdM combined with a digital technology led consumer journey enables almost limitless customisation and a rich customer experience from beginning to end

Examples of circular (post-purchase) business models include:

- Brand monitors use of shoe/state of components and interacts with user via social media reminding them to wear/replace or informing of upgrade options and rewards for reviews.
- Health insurer monitors use, provides incentives for regular use.
- Style blogging subscription site prompts user to share images, invites user to a pop-up store or rewards for social media sharing.

This model undoubtedly introduces an additional data security burden, and is impossible to execute without right (digital) technology in place which requires vision and investment.

However, it allows complete personalisation and flexibility of product offering and fulfilment as well as building the opportunity for brand and other parties to build deep relationships with customers. Waste and environmental impact are also minimised.

REDISTRIBUTED MANUFACTURE MODEL: SPORTS SHOES

1. Customers 3D scan their feet at home with an app and then use virtual reality technology to customise their design online based on hundreds of pre-defined options that suit their performance and aesthetic requirements, paying outright or as part of an ongoing subscription.
2. 'Smart' shoes are embedded with sensors that can track location, performance data and shoe condition, with customers selecting who and how this information is shared with.
3. Shoes are 3D printed to the customised design in the wearers specific size. Manufacture (and re-manufacture/upgrade of components) takes place close to where the customer lives, possibly even in the back room of a retail store.
4. Delivered to customer's desired location at preferred time (home/work/local 'retail-tainment' venue), with minimal chance of return.
5. Brand and/or other businesses forge data-driven, emotional relationships with users via the intelligent component, through new business models such as pay-by-performance and subscription and take-back schemes.

Next steps

Are you wondering how your business will be impacted by changes to consumer habits, the economy and technology?

We outline five steps to harnessing these changes and driving circular innovation to create new, profitable business models.

Before somebody else does...



Next Steps

1. Focus on value

It's easy to identify your business with a fixed point on the value chain, but the future will be more dynamic, with both competition and collaboration coming from all sides.

To meet consumer demand for highly customised products, you may need to collaborate on an ecommerce site with a retailer who would usually be your customer. At the same time, you may effectively set up in competition by working with a media outlet to offer products via a subscription model.

Stop thinking in terms of fixed chains and processes and instead put customer value at the heart of dynamic networks that can deliver. When you work backwards from customer wants and needs and harness digital technology to deliver on that, virtually any model is possible.

2. Become hyperaware

To overhaul your business model, you need agile IT architectures and hyperaware analytics that connect your business and beyond. But that's only effective if they are backed up with a willingness to move fast across the business from the top down.

Without both of these, you will simply be unable respond to customers in real time, while ensuring quality and uptime.

3. No features without benefits

Design intelligence into your products to boost the opportunities for circular innovation, consumer interaction and downstream commercial application for businesses in other sectors. With adoption of digital technologies becoming increasingly prevalent, customers will come to expect increasing levels of sophistication from products, even if the core function has not changed.

We already expect cars to tell us when they need servicing, printers to tell us when they run out of ink (or simply re-order it), and that is only the start. The industrial applications and business benefits are practically endless when we stop thinking about products in isolation and consider the service aspect of the product lifecycle.

4. Establish clear rules of engagement

The new model will likely see you dealing with new supply chain partners and/or existing ones on different terms. It's imperative that you define and monetise roles and processes around introduction, referral, production and fulfilment and especially the ongoing customer engagement. This is easier than it sounds when multiple players are involved, many of whom view the consumer as their customer.

You may need to rip up your standard contracts and look to other industries for guidance on how to make the new model commercially viable. It is imperative that the customer journey makes sense and that customers are not bombarded with competing 'noise'. Allowing customers to nominate preferred communications channels (e.g. Twitter) and being up-front about how data is gathered and acted upon.

5. Build in security

The greater the level of customisation, the greater the volume of data which must be captured. With more collaboration comes more opportunities for data and intellectual property to be compromised.

The bigger the data, the bigger the risk. Security must be built-in from the ground up and not as an afterthought or add-on.



The new customer journey developed through the Shoe Lab project shows that RDM isn't just about a new way to manufacture – it has the potential to bring manufacturers closer to their end customers and to revolutionise how people relate to manufactured goods.

The implications stretch far beyond running shoes. And this isn't a future scenario. All the constituent parts are available now. It just takes someone with the vision to pull them together. Shoe Lab illustrates the proof of concept for a very different model that is just around corner.

So, how will your business be impacted?

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For more information about the Shoe Lab project and the RECODE-NETWORK, visit www.recode-network.com. To learn more about Cisco’s digital manufacturing expertise, visit www.cisco.co.uk/digitalmanufacturing.

DOI:10.17862/cranfield.rd.4139856

