WhichPLM Limited
Company No. 7055021
1 Jeremy's Barn, Lily Lanes, Ashton-under-Lyne,
Lancashire, England OL6 9AE
For press and syndication enquiries contact:
info@whichplm.com
www.whichplm.com
Tel: 0161 330 5077

THE WHICHPLM REPORT \ 7TH EDITION

whichPLM

VENDOR PROFILES
Listings of the key PLM vendors who are influencing today's market

USER PERSPECTIVES
Our comprehensive survey of real projects, with suggestions from big-name brands and retailers who have implemented PLM

MARKET ANALYSIS
Up to the minute intelligence on worldwide adoption, trends, and market performance for fashion PLM

EDITORIAL FEATURES
A real PLM case study, and an extensive special focus on A.I. and the next generation of data-driven design, development, and retail

FUTURES
Expert predictions for the future of fashion technology

THE WhichPLM Report

7TH EDITION

THE INTELLIGENCE ISSUE

Welcome

TO THE WHICHPLM REPORT 7TH EDITION.

In these pages you'll find the most accurate snapshot of the PLM and extended-PLM technology market for retail, footwear, and apparel for the financial year 2016/17.

As well as our exclusive, up-to-the minute market intelligence, this publication also includes PLM insights from the latest generation of customers and end users, exhaustive vendor and consultant profiles and thought leadership articles, and the latest in our series of editorial examinations of the industry's hottest technology topics.

Although we only began numbering these reports with 2015's 5th Edition (prior publications were named after the years they were released), I want to take this opportunity to look back at how far our industry, and WhichPLM itself, has come in the seven years since our first print-exclusive content was released.

We began producing these reports, in 2010, on a much smaller scale. With the help of a few friendly brands, retailers, and PLM vendors, that year saw us release the WhichPLM Customer Survey report. It was, by our own admission, a simpler publication; it carried WhichPLM's old logo, and was confined to assessing overall customer satisfaction with what was then the cutting edge of PLM technology through the lens of a select few implementations.

Our first detailed examination of the broader PLM market came in 2013, when, to counter claims put out by less-informed analysts, we assessed the total size of the RFA PLM industry to date. That year, we estimated that the market as a whole (from the inception of modern PLM) was made up of around 800 sales to named customers, who were concentrated in proven international markets. To put that number into context, just four years on the industry has grown by 266 new sales in the last twelve months alone, with software, services, and maintenance revenues making it a market worth close to $114 million US dollars in the same period.

In 2010, our first publication painted a picture of an industry where small numbers of big businesses were buying – and extensively customising – expensive solutions, largely in established markets like the United States and Europe, and installing them on their own servers.

Today, more than a third of PLM sales are on the cloud (which covers managed services, SaaS, and other off-premise implementation methods), and a huge majority of the same sales are to small businesses in a range of different global markets. (For further insights into the market in 2016/17, or to understand the method behind our calculations, please turn to the Market Analysis section of this publication.) And the composition of the market has not been the only major change in the last seven years. WhichPLM itself is now busier than ever; our website is host to more visitors than ever, our wide range of expert contributors, and our scientific software and supplier evaluations now cover most of the major PLM vendors. I am also prouder than ever of the number of participants our print publications now engage: every key technology vendor, senior figures within the world's biggest brands and retailers, CEOs of exciting startups, and the brains behind some of fashion's most innovative technology and service businesses.

Most importantly, over the past year I have personally been asked to travel the world on a series of trips we called WhichPLM On Tour, taking the apparel technology message to audiences on every continent. On those trips, my message was consistent: the world is changing at an incredible pace, and the fashion industry must change just as quickly. And like our 5th and 6th Editions, this publication opens with a series of special editorial features designed to bring readers up to speed on the most significant change facing fashion today: its transformation into a digital industry, driven by digital intelligence.

In our 6th Edition, we wrote that the Internet of Things (or IoT) was "undoubtedly going to change the world," and while that remains the case, a year on few truly compelling use cases have emerged. Like a lot of world-changing technology, tangible results from the IoT – including the holy grail of fully connected, smart, automated production and distribution – will take time to realise.

But while this year's special subject is every bit as all-encompassing as the IoT, the role of information, data, and digital intelligence in transforming design, development, and marketing is much easier to visualise – because it's already taking place.

At the time I write this introduction, I believe that every brand and retailer that expects to remain in business in the near future has a well-established digital strategy. I believe, too, that every brand, retailer, or manufacturer will come, sooner rather than later, to rely on digital intelligence for most of its day-to-day decision making. Whether it's aggregating and interpreting information on trends and buying behaviours to make better-informed style predictions, or connecting their supply chains to achieve greater transparency and operational efficiency, data – and the intelligence that we can glean from it – is already essential to the short and long-term visions of the world's leading apparel businesses.

> **"I believe that every brand, retailer, and manufacturer will come, sooner rather than later, to rely on digital intelligence for most of its day-to-day decision making."**

There's a difference, of course, between information (raw data) and intelligence, and our opening editorials are dedicated to examining how far human beings are capable of translating one into the other, and how soon machine learning and artificial intelligence (AI) are likely to become essential for generating meaningful, actionable insights from a tsunami of raw relational and transactional data.

Unlike the IoT, which remains slightly abstract (at least in fashion), our move to the intelligence era is already well underway. Whether we realise it or not, deep learning algorithms, neural networks and conversational interfaces already underpin the product recommendations we see when we shop online, and the interactions we have with first-line consumer support. It may be tempting to dismiss the AI acronym as science fiction, but as our opening editorials explain, it has current, compelling applications that anchor its longer-term transformative power in real world results.

To deliver these results, though, businesses must have technologies and processes that support an end-to-end digital workflow, otherwise the intelligence they will be able to obtain will be limited. Practically speaking, this means connecting and integrating software and hardware from headquarters to overseas offices – and this is something WhichPLM has advocated for far longer than the seven years we have produced print publications.

In a world where products have long digital lives, and where brands cannot afford to be out of touch, even momentarily, with consumers, satellite offices, and supply chain partners, I believe the true potential of PLM will soon be realised. The industry's so-called "digital transformation," will hinge on brands and retailers having a single, centralised location where raw information from every stage of the product lifecycle can be captured, consolidated, and analysed. And while many prospective customers of PLM today still see its primary utility as a better way of generating and managing tech packs, its value as the backbone of a modern, data-driven enterprise is about to become even more obvious.

This is, of course, wonderful news for me, since I have dedicated my entire career to explaining the value of PLM as an ideology – an umbrella to integrate and support new technology and best practices throughout the product lifecycle.

Fortunately, as our latest customer survey results demonstrate, PLM's place in the data-driven future seems secure. Even with an ongoing move to cloud and subscription-based solutions (and the introduction of even more integrated solutions and sources of raw information) this year was the second in which brands, retailers, and manufacturers using PLM reported total satisfaction with their solutions.

I'm also thrilled that we are able to close this year's editorial features with a PLM story that captures that potential. Following on from last year's exclusive interview with UK-based SRG Apparel, this year WhichPLM spoke with a close friend of mine, Pam Buckingham, to discover how essential PLM was to delivering her business's total transformation.

As always, our editorials are followed by the latest customer survey – which contains detailed insights beyond the industry's steady move towards the cloud, and includes real, inspirational quotes from businesses of all shapes and sizes who have successfully embarked on a PLM project. From there, our largest-ever list of PLM vendors appears next, with exclusive insights into the customer bases, resource pools, and priorities of all the market's major players. Finally, our industry-leading market analysis looks at PLM's latest banner year – with further growth at both the top and bottom ends of the customer spectrum – and examines the geopolitical and technological trends that are influencing the future of our industry.

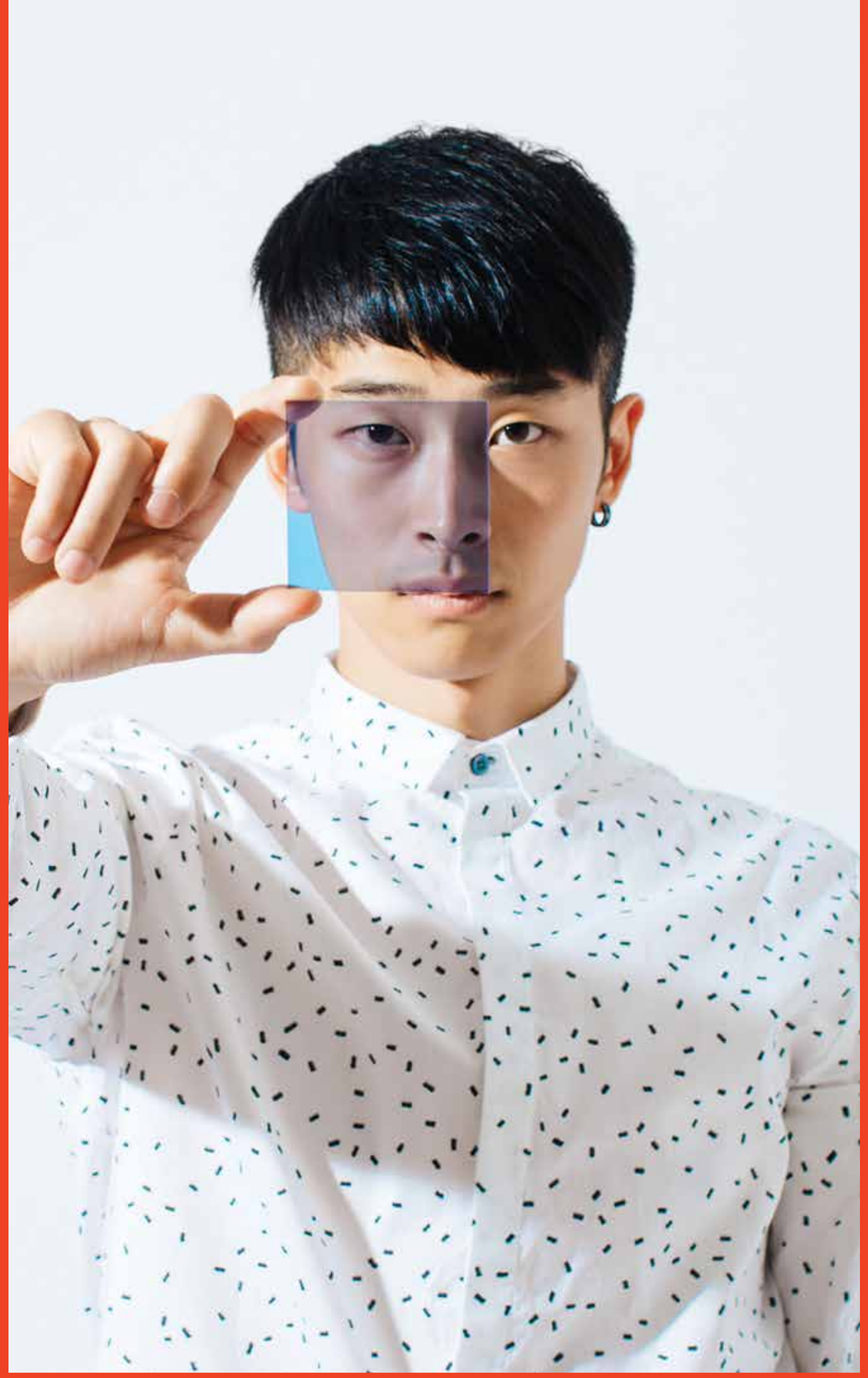
It might have become cliché for me to say that I'm excited for the future of the RFA PLM market and the fashion business in general – it's something I've said in all six previous publications – but the truth is that both keep finding ways to surprise me. Even as I've flown around Europe, the USA, and Asia for WhichPLM On Tour, I have found myself constantly having to update my presentation to take account of new innovations. In one case it was improvements in consumer-grade body scanning; in another it was the migration of blockchain technology into our industry, where the applications for transparency, tracking, smart contract execution, and counterfeit protection are almost limitless.

So while I began this introduction by looking backwards, it was more than just an arbitrary history lesson. With each passing week I become more convinced than ever that we live in a dramatically different world than we did less than a decade ago, and while "disruptive" is the word that's deployed most often to label new technologies like machine learning, I prefer a more positive slant. I'm thankful every day that I get the chance to live through such a significant change in our industry and society as a whole, and I'm thrilled that PLM remains such an essential part of fashion's future.

I invite you to turn the page and begin learning about that future from academics, technology leaders, brand and retail executives, and our own team of expert analysts and writers. From PLM to AI and predictive analytics, the tools are there to help you take confident next steps into the era of intelligence.

Thanks for reading.

CEO Highlights



Contents

HEAD ABOVE WATER

Human capacity, and coping in the information age

Fashion has always been a complicated industry to pin down in the moment.

From modest frocks to miniskirts, bowler hats to Snapbacks, the big shifts are obvious in hindsight, while micro-trends that occur in-season can take a team of experts to spot.

From cottage craftsmanship to mass offshore manufacture, the way our clothing, footwear, and textiles are made has clearly changed in the last century. But keeping track of the year-on-year swings in the socio-political landscape of sourcing hotspots is now a full-time job for armies of on-the-ground manufacturing coordinators and agents.

From a concrete seasonal calendar of durable key pieces, to regular "drops" that see fast fashion and skatewear devotees snaking around the block, persuaded into line by rapid product refreshes and planned scarcity. Everyone agrees that consumer demand for new styles is quickening, but the right path from catwalk to sidewalk is still the subject of fierce debate.

From regional success stories to cutthroat competition in a single borderless, seasonless, global mega-market. From bricks and mortar to multi-channel. From print and outdoor advertising, to billions of dollars spent on digital and social media every year. The retail, footwear, and apparel industry has transcended almost every boundary that was once imposed on it. In the process, though, the volume of information (the raw data output of simply doing business) it generates and consumes has increased exponentially – to the extent that, in 2017, keeping tabs on it all has become impossible using traditional means.

First, let's consider our audience in the information age. Facebook, by its own admission, has more than 2 billion users[1], and a conservative in-house estimate from four years ago suggested that upwards of 5 billion pieces of content are shared via the social network every day. With user acquisition having accelerated since then, that figure is likely much higher today. For an apparel brand or retailer, understanding their target market is vital, and Facebook is a key anchor in almost every market leader's intelligence-gathering and customer outreach strategies. If we assume that even 1% of the total content volume on Facebook is directly relevant to the apparel industry, and that only 1% of that falls under the umbrella of a particular brand's target demographic, that company would still have to sift through 500,000 posts every single day in order to remain current.

> **“Anyone who feels, at this point, as though he or she is drowning in an ocean of data need only look at their neighbours to realise that this is a common challenge.”**

We then have the other pillars of social media and online advertising: YouTube (1.5 billion users,) Instagram (around 700 million,) Twitter (roughly 330 million), and Snapchat (255 million). Some blend of these platforms – along with region-specific services like WeChat in Asia, and WhatsApp in the UK and Europe - will also be essential for capturing the voice of the consumer, adding further complexity to the challenge of understanding the market as a whole in anything approaching real-time.

And it’s not just receiving information, of course: brands and retailers use some or all of these channels to push their messages out, conduct targeted campaigns, or provide secondary (or even primary) touchpoints for customer support.

This, of course, is also only one side of the equation. A smaller but no less complex volume of information can be generated by the average design, development, production and distribution process.

First, we may have put a pin in social media, but for trend analysis purposes we must also add information skimmed from physical fashion shows, street style websites, online communities, dedicated prediction services and, of course, ongoing analysis of the competition.

With that information in-hand, we have some idea of what we want to make (and who for,) and merchandising and planning give way to design, development and production. Suddenly every style and every SKU across a sprawling range of product categories is being talked about, collaborated on, sourced, and then tracked through the supply chain. And there’s likely to be a different system for every step of the journey.

In WhichPLM’s experience, it is not uncommon for a large, multinational brand to have between 50 and 100 different software solutions and data streams covering its product design and development processes - each with their own stores of vital information. Mood boards, materials characteristics, supplier scorecards, sample and fit approvals, design sketches, points of measure, line plans – the list goes on. And this is before we even consider the data output of the connected hardware and smart products that will arrive with further roll-out of the Internet of Things.

Anyone who feels, at this point, as though he or she is drowning in an ocean of data need only look at their neighbours to realise that this is a common challenge – and not just in the RFA market. The need for businesses in every sector to make sense of their flows of information is the reason the so-called “big data” industry is predicted to be worth more than $200 billion in the next three years, according to IDC[2].

To be blunt, there’s big money to be made in helping brands and retailers generate meaningful insights and actionable intelligence from raw data. Joint research conducted by venerable UK publication Drapers and Apptus (providers of automated, predictive merchandising solutions) reveals that, unsurprisingly, most fashion businesses want to make better use of the data available to them for a range of common purposes. The majority, for instance, would like to take these two tributaries of information – between themselves and the consumer, and between themselves and their supply chains – and use the intelligence gleaned from them to improve their approach to merchandising[3].

But desire is not equal to delivery. By turning to partners who deal in big data solutions, predictive analytics, and similar tools, businesses are acknowledging a fundamental change in the relationship that fashion has with its own data – namely that brands, retailers, and manufacturers cannot make effective use of this volume and variety of information without external help.

This is what I will refer to throughout the features that follow as the gap between information and intelligence. Broadly speaking, brands and retailers understand that there are things they should know – about their customers, their competition, and their own internal processes - but recognise that they are not capable of uncovering these things within a meaningful timeframe.

No brand or retail representative reading this should feel inadequate, though. In light of the sheer quantity of information coursing through the veins of today’s fashion business, it is fundamentally impossible for any human being – or even the best-paid, best-qualified group of human beings – to derive all the right intelligence in anything approaching real-time.

This is where Artificial Intelligence, or A.I., comes in.

A loaded, umbrella term that encompasses machine learning, deep learning, neural networks, computer vision, natural language processing, and other subsets of research and technology, A.I. has already transformed other industries that faced similar challenges around the scope and scale of information. It may sound like science fiction, but A.I. of some kind is already managing hedge funds, underwriting insurance, identifying pets and people in your family photos, beating world champions at complex games, and serving up the perfect product recommendations when we shop online.

In other sectors, big data or predictive analytics providers – the kind who help businesses overcome the information to intelligence gap - are almost invariably using some sort of machine learning or A.I. in their solutions and services. And in apparel the underlying technologies are now beginning to take the leap from scientific interest into real-world applications. In fact, readers may already have been approached by someone looking to sell them A.I. in one form or another.

As the industry marketing machine begins to spin up its latest acronym, the special editorial features that make up the remainder of this section are designed as a detailed executive briefing on the state of A.I. in the retail, footwear and apparel industry. Just as WhichPLM has done for 3D and the Internet of Things previously, these features were commissioned to make readers familiar with the nature and history of A.I., to help them to understand the technologies that drive it, and to encourage them to visualise how it might be used to help their businesses stay afloat in an ocean of information.

To assemble these features, WhichPLM and I spent months interviewing the following: academics who are tackling the high-concept problems of specific and general intelligence, and how a non-human intellect might perceive abstract concepts like fashionability; technology leaders who spend their days elbow-deep in the algorithms that will drive tomorrow’s shopping experiences; senior representatives of leaders in cross-industry A.I. research like IBM and Microsoft; and retailers who are already making use of A.I. umbrella technologies to measurably improve their performance and bridge the intelligence gap.

These exclusive interviews – around thirty in number – inform the four extensive features that follow this page:

What We Talk About When We Talk About Intelligence,” examines the difference between science fiction and fact, and looks at what A.I. is and, approximately, how it works.

“Intelligence, Applied,” talks about how A.I. is already being used in fashion and retail today, and how it is likely to be used in the near and longer-term future.

“Trust, and the Science of Subjectivity” explores the difficulties inherent in teaching machines to recognise subjective concepts like style, and tackles the question of how an industry that is often sceptical of new technologies can learn to trust A.I.

“Get Smart: From Theory to Practice, to the Future of A.I.” provides practical examples and food for thought for businesses looking to embrace A.I. sooner rather than later.

At the close of the publication, our latest **“Future of PLM”** feature explores the ‘blockchain’ buzzword, introducing the concept of integrity of information, and exploring how a distributed ledger might just transform the way we think about transparency.

For now, though, you are invited to turn the page to find a detailed primer on some of the core concepts of A.I., and an introduction to how the technology is poised to deliver on the promise of real intelligence in the information age.

1. https://newsroom.fb.com/news/2017/06/two-billion-people-coming-together-on-facebook/
2. https://www.idc.com/getdoc.jsp?containerId=prUS41826116
3. https://www.drapersonline.com/business-operations/special-reports/unleash-the-power-of-artificial-intelligence/7023540.article

WHAT WE TALK ABOUT WHEN WE TALK ABOUT INTELLIGENCE

BY
BEN HANSON

Ask someone to name a science fiction concept, and the odds are good that they will come back with either domestic and industrial robots that are indistinguishable from humans, or a benevolent (or malevolent) supercomputer that comes to rule the world. These themes have recurred in future-set tales for more than a hundred years. They are popular because, as with all good speculative storytelling, they ask us to consider what our place, as thinking, breathing humans, is likely to be in a world where either our physical or mental capacities have been outmatched by machines.

The upshot of having such a body of sci-fi dedicated to these subjects is that some of the smartest people in the world have spent a great deal of time considering their implications. Some putting pen to paper; others toiling away in laboratories and research centres to bring the ideas to life; each spurring the other on with fresh ideas.

Given how well the workings of our bodies are understood, compared to the almost complete opacity that shrouds the way we think, you might expect science to have made the most progress on the physical robots. In practice, the opposite is true.

There is a name for this subversion of expectations: Moravec's Paradox. Outlined by roboticist and futurist Hans Moravec in the 1980s, the paradox is expressed like this: "it is comparatively easy to make computers exhibit adult-level performance on intelligence tests or playing checkers, and difficult or impossible to give them the skills of a one-year-old when it comes to perception and mobility." In brief, what Moravec meant is that our mental processes and actions – the results of a consciousness, individualism, and autonomism that generations of scientists and faith scholars have been unable to adequately define – have proved far easier to replicate

FOR THE 99% OF US WHO ARE NOT INTELLIGENCE PROGRAMMERS OR PHILOSOPHERS OF MIND, A CATCHY ACRONYM IS NEEDED TO CAPTURE THE POTENTIAL OF A RAFT OF DIFFERENT TECHNOLOGIES.

than the coordinated motions of our bones, tendons and muscles, which entry-level biology has long since explained away.

The mobility side of Moravec's paradox is still a challenge. Even the best contemporary attempts at having robots mimic human face and body movements come off as unsettling, and companies have, by and large, paused – if not abandoned – their attempts to make robots that look and move the way we do. While people might make good models for thinking and problem-solving, it transpires that there are far more practical examples to follow for picking things up and moving them, navigating through warzones, or conducting fine-grain assembly tasks.

We have, however, made considerable progress on having machines pass common (and even complex) intelligence tests, as well as on introducing techniques that allow for computers to perceive and recognise the world around them. These advances all fall under the broader umbrella of Artificial Intelligence (A.I). And that's an umbrella you have more than likely seen pop up in the news a lot lately.

"Japanese company replaces office workers with artificial intelligence," reads a typical A.I. headline from The Guardian at the beginning of 2017[1]. In isolation, it may sound alarmist or unbelievable, but it is accurate: Fukoku Mutual Life Insurance in Japan made 30 experienced staff redundant because their jobs, calculating policy payouts, could be done cheaper and better by an A.I. Fukoku expects this to increase productivity by 30%, and to become a profitable investment in less than two years.

Maybe it's because automation and the resulting mass layoffs are happening on a much grander and more pressing scale in manufacturing, but I find it remarkable how unremarkable these kinds of stories have become. They hit the headlines and fade quickly, inspiring fear in other insurance workers, perhaps, but not registering on the tectonic scale you might expect given that A.I. programs are now putting even white collars out of work. To put this into context, Moravec's Paradox talks about the likelihood of replicating the intelligence of a one-year-old; I have a baby in the house as I write this, and I'm not expecting him to be performing any insurance calculations or underwriting policies for a while yet. Seems as though we've moved rather rapidly from crawl to walk to run there, doesn't it?

Perhaps that aforementioned wealth of sci-fi literature has made these kinds of things feel mundane. Or perhaps it's because we all already interact with A.I. of one form or another almost every day – whether we realise it or not.

Self-driving cars are, of course, the most obvious example. Hugely complex arrays of hardware sensors and interpretation and analysis algorithms, autonomous vehicles are a sci-fi trope writ large, and will soon be hitting streets near you if they haven't already. Less obvious but no less valid as applications of A.I. are chatbots (that initial gateway of interaction you sometimes encounter on a company's support or sales channels before reaching a human advisor) and visual recognition platforms like Google Photos, which uses algorithms to tag your photographs with their locations, subjects, settings, and a host of other information so you can later search for a sunset or a smile.

Each of these examples, however, has something in common. All, to my mind and the minds of many actual experts, fall short of the definition of intelligence. In fact, these and other examples like them are only really categorised as A.I. because, for the 99% of us who are not intelligence programmers or philosophers of mind, a catchy acronym is needed to capture the potential of a raft of different technologies.

"When I'm talking to a business audience, I use A.I. as an umbrella term, and under that umbrella are specific applications of AI like cognitive services, machine learning, deep learning, neural networks and so on," said ShiSh Shridhar, Director of Business Development, Data, Analytics and IoT for Microsoft, during our interview in the summer of 2017. "For a business audience, that's a confusing set of terms, and to complicate things even further, a lot of people use them interchangeably. As a result, I stick to the top-level term rather than having a brand or retailer worrying about the small nuances that separate individual components like neural networks and deep learning. I realise it's a big umbrella, but it's an appropriate one."

While ShiSh's advice is sound, we are, however, going to have to talk about these components individually at least to begin with, as foundations for the visible outcomes of A.I. It is only by understanding the essential building blocks of machine intelligence that we can assess where and why it exceeds, equals, or falls short

of human intelligence - and why, in many cases, a machine not being truly smart does not necessarily matter in the open market.

"I think machine learning is the preferable term for what we're talking about today," said Julian McAuley, an Assistant Professor at University College San Diego, who has spoken about A.I. in fashion previously, and whose research into behavioural models and visual recognition caught my attention as I and WhichPLM were gathering material for these features. "The research I do would probably be called A.I. by the public, and even by our department here at the University, but I think that term is overused. We are not specifically trying to build up a general intelligence; we're taking a data-driven approach to solving a specific problem – nothing more. When people shop online and are shown product recommendations or adverts that they feel are uncanny, they tend to assume that an A.I. recommendation system is truly intelligent and knows something intimate about them. The truth is less exciting: all the typical algorithm needs to know to do its job is that one person performed an action that was similar to another person's action, like buying a product, and it can recommend them both similar other products as a consequence."

McAuley's example, as well as the others I referred to before – photo categorisation, self-driving vehicles, and chatbots – are good examples of the state of commercial A.I. today. They seem intelligent at first glance, but their smarts are actually confined to very small, very specific areas. To choose the right pre-canned responses, a chatbot need only concern itself with the customer's immediate concerns. To recognise a mountain range in a photograph, Google Photos will look for indicators that a mountain is present, but it cannot be said to actually know what a mountain is, and neither does it need this additional context to achieve its purpose. Generally intelligent these things are not.

Let us shed a little more light on why this is the case, and why the distinction matters. To recognise that mountain, Google Photos (or an equivalent, although Google leads the pack in this area) uses neural networks, which are algorithms arranged in an approximation of the way we believe our brains work, designed to allow machines to look at things, and then to remember and learn from them. These are arranged in a way that permits what is called deep learning, which means that the results the end user receives are arrived at from the separate or sequential input of several – or hundreds – of layers of hyper-focused neural networks. One such network layer might detect naturally-occurring edges and nothing else; one might look for the texture of a rock face; another might scan the top portion of every image for sky, and the portions below that for peaks and snow. At the top level, yet another neural network will take the composite output of the nets below it and conclude, with 90% certainty, that there is a mountain in the photograph at hand. If the algorithm has a library of other mountain images to compare this one to, perhaps it will also go away and try to match its peaks and valleys to other photographs, before inferring that this picture was taken in Yosemite.

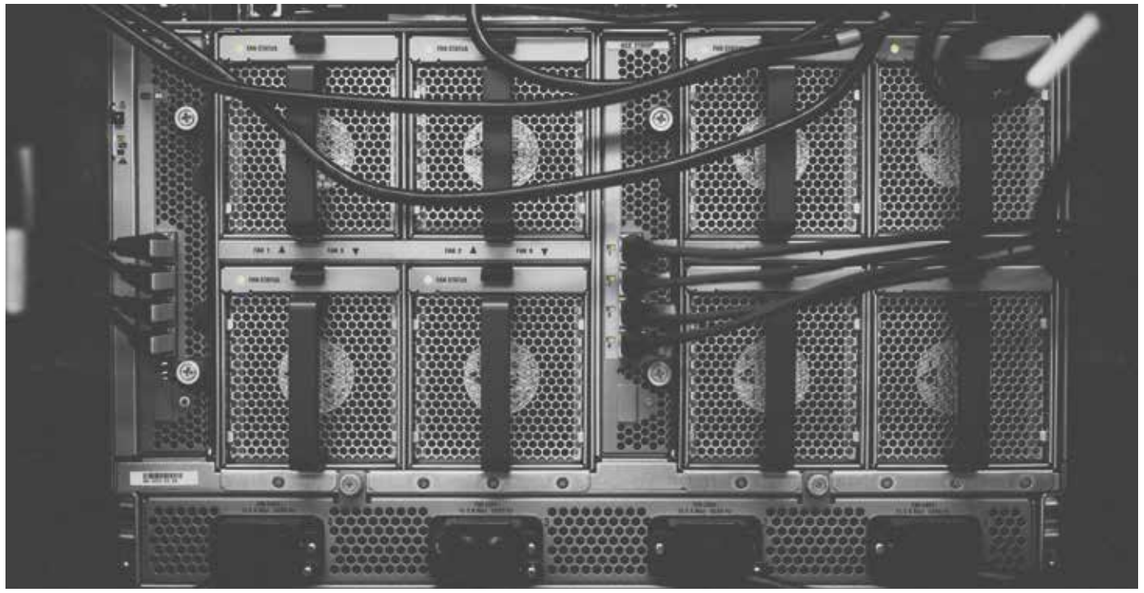
Make no mistake, this is an exciting, road-tested application of a class of technologies with massive potential to change the way we live our lives – particularly when we realise that its use need not be confined to static photographs. Recently, Microsoft unveiled a research project it calls "Seeing AI," which uses the same principles as other photo recognition software, but applies them to both pre-recorded and real-time moving video as well as still images. In use, a deep learning solution evaluates the real world through a smartphone camera, and turns this hugely complex data feed into synthesised voice narration designed to help blind and partially-sighted people to navigate their environment, recognise people, read mail, and discover products.

Let me be unambiguous about this: I find the Seeing AI application incredibly impressive. I am only 35 years old, but this is one of several occasions where I have been reminded of just how much has been achieved in my lifetime. Using a handheld computer more powerful than the mainframe that used to occupy almost the entirety of my father's business premises, and a camera sensor the size of a fingernail, a partially-sighted person can now have an A.I. in the cloud on the other side of the planet describe the world to them in real-time.

AS THE NAME SUGGESTS, MACHINE LEARNING SYSTEMS ARE NOT CREATED WITH INTELLIGENCE AND UNDERSTANDING BUILT IN, BUT RATHER ACQUIRE IT THROUGH THE SAME PROCESSES THAT HUMAN BEINGS DO.

But while machine learning systems like these are terrific at the tasks they are assigned – looking for recognisable things in pictures or moving video – a significant amount of work has gone into achieving this level of recognition. As the name suggests, machine learning systems are not created with intelligence and understanding built in, but rather acquire it through the same processes that human beings do.

"To understand how machine learning works, we only have to look at the way humans learn," explains Ganesh Subramanian, Founder & CEO of real-time fashion analytics platform Stylumia. "Point to a chair and ask a young child to identify it, and unless they have previously been told what it is, they will not instinctively know its name. If a parent or guardian reinforces the label the next few times the child sees a chair, the child will very quickly pick up that this object remains a chair every time he or she sees it, and that when they see similar-looking objects, they are also likely to be chairs. Machine learning is very similar, because the machine does not inherently know what a dress, a top, or a pair of jeans looks like – we have to keep throwing example images at the computer vision portion to train it. We steadily reinforce that this is what a dress looks like, for instance, and then the program will later be able to infer that other styles and shapes like it are also probably dresses. The major difference is that machines find things easy that humans do not, and vice versa. Ask a person to add up twenty different, twelve-digit numbers, for instance, and you can expect to wait a while for an answer. A machine can perform that calculation in nanoseconds. But point to a red curtain and ask a person what that object is and what colour it is, and you will get a quick answer; a computer that hasn't been properly trained will not be able to respond at all."



While the rest of this feature series is given over to the applications and impact of A.I. on the retail, footwear, and apparel industry, the differences in the inherent capabilities of humans and machines raise an issue that no real examination of artificial intelligence can overlook: is there something that makes us special? More specifically, for our purposes, is there a natural aptitude for context and creativity that makes humans capable of recognising and responding to art or style? And if so, can that, too, be taught to a machine?

To briefly address this thorny philosophical line of thinking, we're going to revert to Google Photos as a case study. In the interests of building an image recognition engine that can spot a mountain in a photograph, Google's engineers will have focused on only what counts: the visual elements of a mountain. Given access to Google's vast repositories of data, the machine may also be able to call up the temperature at the mountain's peak, or list the mineral composition of its rocks. What it will not – and some will say cannot - have access to are the feelings that a photograph of a mountain can conjure up in the mind of a human being: freedom, exploration, openness, vertigo. All of these contain an element of what philosophers call 'qualia' – discrete instances of subjective experience that, arguably, serve as evidence that humans, and only humans, are conscious and self-aware.

As an example, were I to look at a photograph of a mountain, I could imagine myself on its slopes, free from responsibility. I could, also, picture myself at its peak, gazing at the vista spread out below, and considering my life choices. I could pretend I was on the edge of that mountain, worried about my mortality if I should fall.

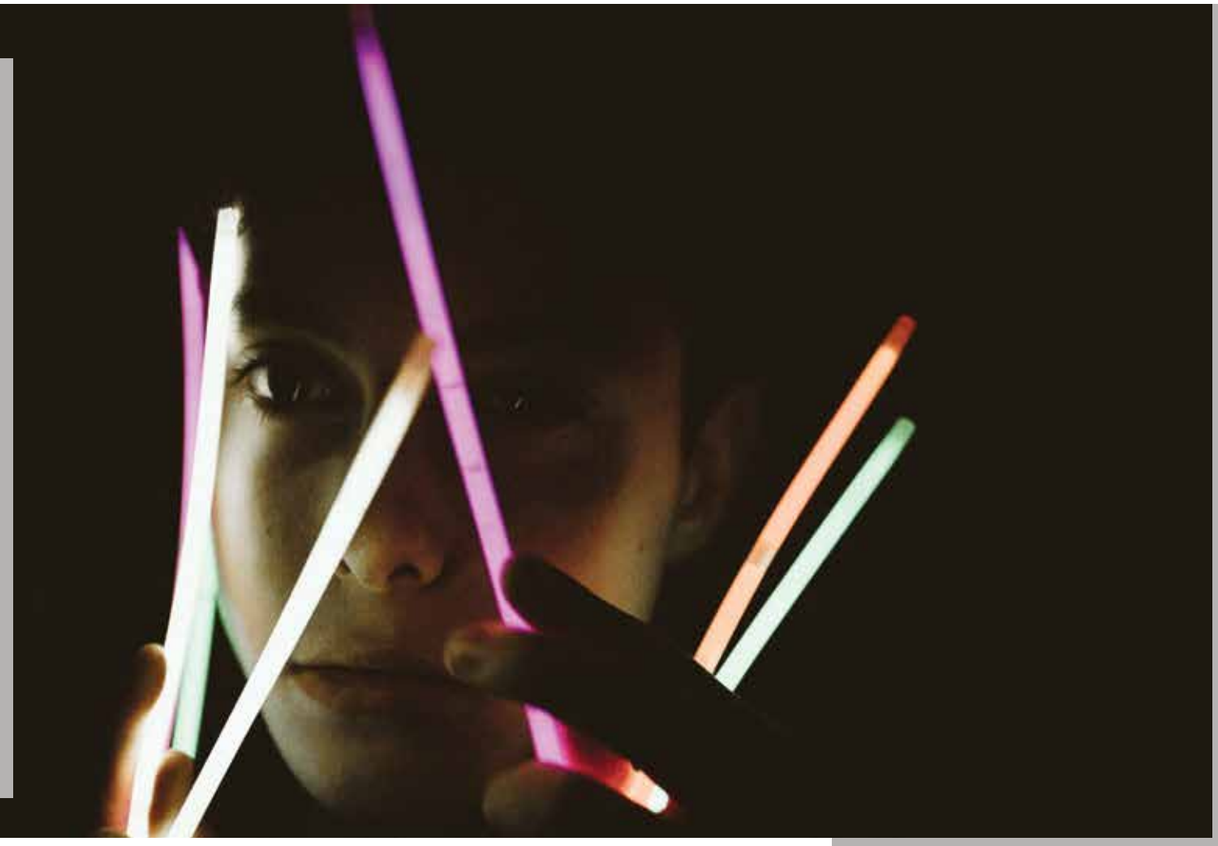
These thoughts and experiences all come naturally to you and I, and almost everyone would agree that they are what separates people from machines. And while not everyone will know the philosophical term for their stance, most people would equally argue that a machine could not have that kind of conscious experience and understanding, no matter how good it becomes at performing outwardly visible tasks like recognising shapes.

IS THERE A NATURAL APTITUDE FOR CONTEXT AND CREATIVITY THAT MAKES HUMANS CAPABLE OF RECOGNISING AND RESPONDING TO ART OR STYLE. AND IF SO, CAN THAT, TOO, BE TAUGHT TO A MACHINE?

Entire careers have been dedicated to tackling this issue, so I cannot hope to address it here. I did, however, reach out to Susan Schneider, an author, TED Talk alumnus, and Associate Professor in the Department of Philosophy at the University of Connecticut, for her expert perspective.

"For me the mark of the mental is conscious experience, and I care an awful lot about whether an artificial system can be said to have an actual experience", Schneider told me. "From that point of view, I think we can eventually have a super smart A.I. that outthinks us and outperforms us, but without it being what I'd define as conscious. There are reasons why I don't think information processing and consciousness necessarily go hand in hand. For example, consciousness in humans is recognised through our ability to perform novel learning tasks, reasoning and so on – things that an artificial intelligence could theoretically replicate. So building a machine that can also reason would get us to the point where that A.I. would technically qualify as intelligent, without the need to have the same kind of conscious experience that we have. I think in the long run it's likely to be an empirical matter: what kind of architecture a machine has will determine whether or not it's conscious. Our biology has given rise to consciousness and information processing, but other substrates may not be able to host consciousness even though they're as good as we are at information processing – or better."

MORE OFTEN THAN NOT, THOUGH, THE PROCESS OF SPECIALISING AN A.I. IS ACTUALLY A HUMAN-LED ONE, WHETHER THE HUMANS ARE AWARE THEY ARE PARTICIPATING IN A LEARNING ACTIVITY, OR WHETHER IT IS TACKED ON AS A BY-PRODUCT OF ANOTHER PRODUCT OR SERVICE.



This does not mean, though, that there is a hard limit on the capabilities of machine learning, or that A.I. programs are forever constrained to following rules - with no chance to translate their unique way of learning into some kind of creativity - as Schneider explained:

"I think A.I. is already more than up to the tasks of visual recognition, logic, and even extremely complex games, where an A.I. has already exhibited the ability to think outside the box to some extent. The team behind AlphaGo, [a recent milestone in A.I. research, where a machine beat a grandmaster at the ancient, incredibly complex game of Go,] specifically chose the game because it's extremely combinatorically difficult and is therefore a great proving ground for whether an A.I. can break its boundaries, so to speak. And if you look at the transcripts of the people who are analysing the A.I.'s moves, they do describe some of them as creative and intuitive. And that's mind-blowing even to the people who developed the program. One move was even referred to as the "bathroom move" because the opponent disappeared into the bathroom for fifteen minutes because of how perplexing it was. The same goes for IBM's Watson A.I. playing Jeopardy; in a way you can say that the rules of that game are known, but what the A.I. did with natural language processing involved making what I would call novel judgments. And as A.I. gets more sophisticated and goes from being intelligent in only specific domains – like Go or Jeopardy – to being intelligent in a variety of ways, we're going to potentially see genuine artificial creativity emerge, with or without consciousness to go along with it."

The key word in Schneider's second answer is "specific". Today, there is an accepted delineation between two kinds of A.I. and intelligence research: general A.I., which is an attempt to either replicate total human intelligence or create an entirely new kind of supreme machine intelligence, and specific or "narrow" AI, which is also referred to as Artificial Narrow Intelligence, or ANI.

As you may have guessed from the autonomous vehicles, chatbots, and visual recognition examples I referred to earlier, we already live in a world of narrow A.I. Today, algorithmic traders deal in more than half of all equity shares traded in the US, while game-playing ANI programs hold the world champion titles in chess, checkers, Scrabble, Backgammon and more. Everything else from email spam filters to machine translation services is yet another manifestation of ANI – and more and more products and services are being optimised or revitalised through the use of narrow A.I. by the day. As grandmaster Gary Kasparov, who famously lost his chess rematch against an A.I., puts it in his book Deep Thinking: Where Machine Intelligence Ends and Human Creativity Begins, "Artificial Intelligence is on a path to transforming every part of our lives in a way not seen since the creation of the Internet, perhaps even since we harnessed electricity."

A key point to understand here is that narrow A.I. is not to be considered a poor version of general intelligence. It is, rather, a way of translating the fundamental principles of machine intelligence into manageable use cases. And after all, in an industry like fashion, where craftsmanship and experience count for a great deal, since when was specialisation considered a bad thing?

"All the current applications of A.I. in our industry are narrow," I was told by Courtney Connell, Marketing Manager for lingerie brand and retailer Cosabella, which recently used an A.I. platform to completely redefine the way it markets and sells its products online. "I wrote a piece for Womenswear Daily about A.I. in general, and afterwards someone contacted me to say that I was wrong to be discussing limitations, because an A.I. had recently beaten a professional poker player by bluffing, so that meant the sky was the limit. The person who contacted me wasn't technically incorrect, but he was repeating a widely-held misunderstanding about the value of specialisation. If an A.I. can read facial micro-movements and tone of voice more accurately than any human being can, then of course it's going to beat people at poker. The problem is that people look at these narrow applications and conclude that results from a single hyper-focused program mean that every A.I. everywhere is now able to achieve the same results. It's important to remember that commercial A.I. is a tool, built for a particular purpose, and is not necessarily all that useful outside its particular focus."

While specialisation is valuable in its own right, where extensive domain expertise counts the most is in specialist markets. In these industries – and fashion is unquestionably one - the ability to understand minor variations between thousands or millions of different products is essential.

"Take the automotive industry," explained Eric Brassard, a former executive at Saks Fifth Avenue, and now CEO of Propulse Analytics, which is using deep learning to reinvent product recommendations. "When it first started, 120 years or so ago, any vehicle with four wheels and a steering wheel was a car. Today there's a significant difference between an SUV, a Ferrari, and a regular sedan in most people's eyes. In fact, there's an equally significant difference between a sports sedan and a comfort sedan. As any industry evolves, specialism breeds complexity and subjectivity, and making sense of those, at scale, requires the appropriate, specialised solution. We started from the belief that A.I. is the right solution to the problems of complexity and subjectivity in highly specific industries, and our position has not changed since. Right now no A.I. is omnipotent, and the ones that are highly potent are only potent in their highly specialised fields."

Specialisation in A.I. also has compounded benefits. As an algorithm becomes better able to spot micro-scale variations in fit, component placement, hem length, grading rules and so on, it gains the ability to plot these changes as trends over time, and to then refer back to its own research and conclusions in order to draw further conclusions. "True AI systems are self-learning, which goes a step beyond machine learning," explained Andy Narayanan, VP of Intelligent Commerce at Silicon Valley A.I. company Sentient. "Looking at it computer vision exclusively as a way of using an algorithm to conclude that this is a blouse, that's a belt, and so on, is limiting its potential. Being self-learning means that the algorithms should be capable of adding another dimension, taking a view of how blouses and belts are changing over time, and determining what kinds of each are likely to be in fashion today - and why. This is where I think the true promise of A.I. is: understanding what features, facets, colours and textures a product category has now that it didn't have before, and adapting its recommendations to that evolution in real-time, with no human intervention."

Another corollary benefit of specialisation, of course, is trustworthiness. Generally speaking, we tend to put our confidence in people who we believe know what they are talking about. This is, of course, also particularly true in specialised industries, where a new entrant has little choice but to rely on the experience and expertise of long-serving specialists. And just as we have faith in human beings who exhibit that kind of specialisation, the same is already proving to be the case in other industries like financial technology (or "fintech") where account holders in WhichPLM's native UK are trusting consumer-facing A.I. platforms to analyse and advise on their monthly spending.

The most interesting of these platforms is Cleo (currently available in the UK only at www.meetcleo.com), which marries a friendly conversational interface with deep learning that identifies spending patterns, trend lines, savings opportunities and other insights that the account holder would be either unlikely to research on their own, or would perhaps not even be capable of analysing. I road-tested Cleo as part of the research that went into this publication, and that test revealed two insights that surprised even me: first, I am willing to accept a lot more intrusion from an A.I. than I would a human; second, I trust what Cleo says implicitly. The application may not have the best user experience in the world, but when it shows me a trend line of my savings over the last quarter, my instinct is not to argue, like I might with a person providing the same information, but to accept that her (for Cleo is a she) specialist knowledge trumps my own arms-length acquaintance with my own income and expenditure.

Drawing these kinds of parallels between A.I. and human experts does, however, raise the question of how – and how transparently and reliably - both acquire their experience and expertise. After all, conclusions reached on the basis of inaccurate data, however intelligent the analysis, are still incorrect conclusions.

We are all familiar with the way this process works in humans – we work diligently to build a career, collecting experience as we progress, and eventually narrowing down our specialisms until our knowledge of a chosen domain is deeper than others'. For a machine, the spirit is similar, but the speed and the method differ dramatically. For some purposes, specialism to the requisite degree can be achieved by letting one or more algorithms loose on a large data pool, or presenting them with regularly-repeated images on a similar theme until they demonstrate the ability to distinguish their contents.

THE MESSAGE IS CLEAR: AFTER SEVERAL GENERATIONS OF BEING CONFINED TO STORIES AND RESEARCH LABS, A.I. CAN NO LONGER BE IGNORED.

More often than not, though, the process of specialising an A.I. is actually a human-led one, whether the humans are aware they are participating in a learning activity, or whether it is tacked on as a by-product of another product or service. Google's recent changes to its CAPTCHA system (the gatekeeper of comment forms and login screens everywhere) have seen users asked to identify squares of images, clicking all those that contain taxis, or churches, or street signs. And while the search giant has not exactly admitted this, the results are all but guaranteed to be going towards the specialisation of algorithms designed to recognise these things.

But this wide-net approach is not viable in situations where the luxury of testing at scale on an audience that's ignorant of your intentions does not exist, or where guesswork or incorrect answers on behalf of the human training pool are unacceptable. "We provide training data as a service, helping companies developing A.I.s or implementing machine learning to get their data into the right shape to train those systems," explains Daryn Nakhuda, Founder and CTO of Seattle-based Mighty AI, which prides itself on being able to educate A.I.s through both public, vetted, training exercises and domain-specific data collection and training for fashion, retail, and autonomous vehicles. "Everyone talks about big data, and how much of it they have, but not a lot of it actually ends up being used. To get around this, we identify particular attributes that a client wants to be able to search or perform recognition on, and figure out how it can be categorised and organised into some kind of taxonomy. In a lot of cases, the data that contains those attributes is unstructured, coming from social media or other similar sources, and isn't provided in a form that an A.I. can easily use. To that end we also have a dedicated web application, Spare5, that allows real people to perform different micro-tasks that help train these A.I.s. For fashion that might be identifying the individual garments in a photo, characterising the fit of an outfit, or distinguishing between formal and informal wear – things that businesses have never been able to model at scale before. We're using humans to make judgments that machines are not able to make, because, with the right people making the right kind of subjective decisions or identifications, the machines will eventually learn to make those decisions themselves, and will begin to identify patterns that no human would be able to pick out."

As Nakhuda's answer suggests, experience on the part of the training pool is essential. In short, we cannot expect to create a specialist A.I. without specialist educators. While the general public, for example, may be able to successfully pick out certain elements of an outfit, their ability to distinguish between different fits, different weaves, different materials, and other metrics will be limited. And, equally importantly, their ability to correctly identify key criteria will be based on how closely they align with the retailer or brand's customer demographic.

"We're not necessarily looking for fashion expertise in our trainers, but rather an alignment with the retailer or designer's target audience," added Nakhuda. "We can certainly qualify people by asking them to recognise the difference between an Oxford collar and a spread collar, but it's equally important that we qualify them on the basis of cultural fit. A retailer needs to know that if their A.I. is going to describe an outfit as appropriate for work, it's appropriate for work in their target market. What we wear to the office here in Seattle, for example, is pretty different to the way people dress for work in Miami or Europe. And the same goes for women's clothing, where styles vary dramatically depending on climate and culture. You don't want your AI to be a one-size-fits-all system; you want one that will share perspectives and experience with the people who will interact with it".

So where now for A.I., specialised, trained with appropriate human knowledge, and capable of bending the rules from time to time? A common thread among all the interviewees that I and WhichPLM solicited for this publication is that general intelligence remains a pipe dream – and that the quintessential human experience may never be transferred to a machine. This does not, however, preclude the development of significantly advanced A.I.s who do not require consciousness in order to exceed our every limitation, or put a limit on the potential of the best ANI solutions to achieve mass adoption in their specialist markets – whether they are in mass market fashion, media or the military.

Indeed, outside our industry, A.I. is already being pegged as the next international arms race. Just a week before going to print, Russian leader Vladimir Putin, asked about the future of A.I. went on record as saying that "the one who becomes the leader in this sphere will be the ruler of the world". As endorsements come, this is perhaps an uncomfortable one, but the message is clear: after several generations of being confined to stories and research labs, A.I. can no longer be ignored.

It is unlikely, though, that you, the reader of WhichPLM's 7th Edition Report has world domination in mind. More likely, you are wondering just how the dawn of the intelligence era will impact your business. And while this primer has been far-ranging, let me assure you that everything contained in these pages should be considered grounding for understanding a technology that I guarantee will transform your day to day life at work and at home far sooner than you may expect.

"At this point in time general A.I. is very far out, and I honestly think it still resides in the world of fiction," added Andy Narayanan of Sentient. "Mass extinction of jobs because of the creation of a super intelligence just isn't likely to happen any time soon - and any general A.I. might prove to be too broad to actually solve immediate problems. A better application of A.I. is instead to solve a very thin slice of problems at a much deeper level - that's where the applications are today. There are a variety of areas in the apparel business alone where human decision making is sub-optimal, which we are now handing off to A.I., because we know that A.I. can do them better and faster, and can do them at scale. Instead, humans are going to work on something more creative. Personally, I feel like this is the best way to make A.I. successful. Rather than having these high expectations of a general or super intelligence that we might not be able to meet in even the long term, we're better off setting narrow goals that have a big business impact. The best thing we can do is use A.I. to augment human capacity in ways that deliver hundreds of millions of dollars of value for retailers and brands here and now."

Turn the page to our next feature, "Intelligence, Applied", and discover where A.I. is already delivering these kinds of dollar values to customers in the RFA industry.

1. https://www.theguardian.com/technology/2017/jan/05/japanese-company-replaces-office-workers-artificial-intelligence-ai-fukoku-mutual-life-insurance

BY
BEN HANSON

Out of the hands of research scientists, ready to start delivering new revenue streams and optimising existing ones, A.I. is currently in a tricky transitional phase between promise and proven deployment. Much like the Internet of Things (which was the subject of WhichPLM's 6th Edition publication,) A.I. is not widely understood – even by some less-than-scrupulous companies who are trying to package and sell it. As a result, with limited grasp of what this class of technologies can do and even how it all works, the market at large is unlikely to unite behind the promise of A.I. until it sees demonstrable, repeatable results. This leaves software companies and their early-adopter clients to forge ahead alone, anchoring the sheer, world-changing clout of A.I. to smaller, more specific, more achievable aims. No small task.

INTELLIGENCE, APPLIED

Already, though, real-world applications of A.I. in the retail, footwear, and apparel industry are beginning to coalesce around two major themes: a cycle of heightened customer insight leading to an improved customer experience and back again; and a better-informed (or even partly-automated) design and development process that increases the likelihood of the best possible products, perfectly positioned, reaching the market and selling at their target price.

Building on the A.I. primer of the previous feature, the following pages will examine different subdivisions of these top-level themes, looking for concrete examples of where retailers, brands, and technology suppliers have been able to translate theory into results.

Before analysing those specifics, however, I want to build a better picture of how A.I. – in the umbrella sense – is currently treated from a commercial and investment perspective at the highest possible level: the global economy.

While much of the potential of A.I. technologies remains unproven (but no longer speculative) leading nations have already begun to stake their claims to being either A.I. hubs, with strong startup cultures and tax incentives, or sources of the next generation of technology talent. Or both. These are not investments to be made lightly, so as you might expect, these countries are banking on the emergence of multi-million-dollar industries (at the very least) centred around A.I. in the very near future. As an example, The Vector Institute is an initiative part-funded by the Canadian government and backed by big names like Google, Accenture, Uber, Deloitte and Shopify. Its stated aim is to make its native country (and its home city of Toronto) the de facto destination for A.I. leadership. The Vector Institute is already operational, working to retain homegrown talent in-country, and to attract international assets away from the constant tech-drain of Silicon Valley, in the hope that the next big A.I. company will be Canadian.

Interestingly, though, countries may not have to actively participate in creating a welcoming home for A.I. for the technology to have a net positive impact on their futures. By dint of its ability to automate both repetitive and complex manual and mental tasks, Accenture predicts that A.I. will add up to two full percentage points to the economic growth rates of the USA, UK, China, the Nordic countries and many more by 2035[1]. The report containing this research also estimates that labour productivity across these countries' entire economies could rise by anywhere from 25% to 37% when compared to non-A.I. baselines.

From a sovereign perspective, then, the case for investing in A.I. and the culture that surrounds it seems cut and dry. A.I. applications are all but guaranteed to be a part of your country's future. But is the same also true for businesses? Among the biggest and brightest, who is betting big on artificial intelligence, and why? The answer is essentially every internet company above a certain size, irrespective of industry, and for a huge range of different reasons. We have already established that Google Photos serves as a strong example of slightly secretive, narrow A.I. at work, but attached to this is the larger idea that Google is now, for all intents and purposes, an A.I. company. As well as its Photos application, the company's entire search and advertising business relies on deep learning in very narrow niches. At the same time, its marquee mobile messaging client, Allo, is actively advertised on the fact that it invites an A.I. assistant into your chats – one who can translate messages on the fly, recommend places to eat, locate your friends on a map, and even auto-suggest replies for when you need to send a snappy rejoinder on the go.

And it certainly is not just Google betting the farm on A.I. So too are Apple and Amazon, who, together with Google, occupy the top three spots in Internet market capitalization, with a combined value of almost $2 trillion in early 2017. Tellingly, as well as their core online services and applications, these companies all sell devices that serve as Trojan horses to carry their A.I. assistants into our daily lives. On the surface, Siri, Alexa and Google Assistant want to get better acquainted with us in order to serve us better, but in a world where simple CAPTCHA forms are already being used to collect training data, it is naïve to expect these assistants' parent companies to have totally altruistic motives. Is it a coincidence that Amazon, arguably the world's biggest retailer, with a vested interested in knowing as much about us as possible, now has an ANI interface sat on the kitchen countertops and nightstands of more than 10 million homes in the US alone, according to a report on the Amazon Echo installed base issued in May of this year[2]?

But interest in A.I. is not exclusively coming from big businesses; deep learning and other umbrella technologies are also the driving forces behind one of the technology industry's most feverish startup races in recent memory. In WhichPLM's home country of the UK, where government funding to the tune of almost £300 million ($395 million) was just announced to fund new research into disruptive technologies, the two-year period from 2014 to 2016 saw a new A.I. company founded every single week, according to research conducted by MMC Ventures[3]. These startups are all working to develop real-world use cases for A.I. that run the gamut from the predictable to the outlandish, and while some – maybe many – will fail, a single successful idea, pitched at the proper market, is often all it takes for a new technology to suddenly become elevated to the next big thing.

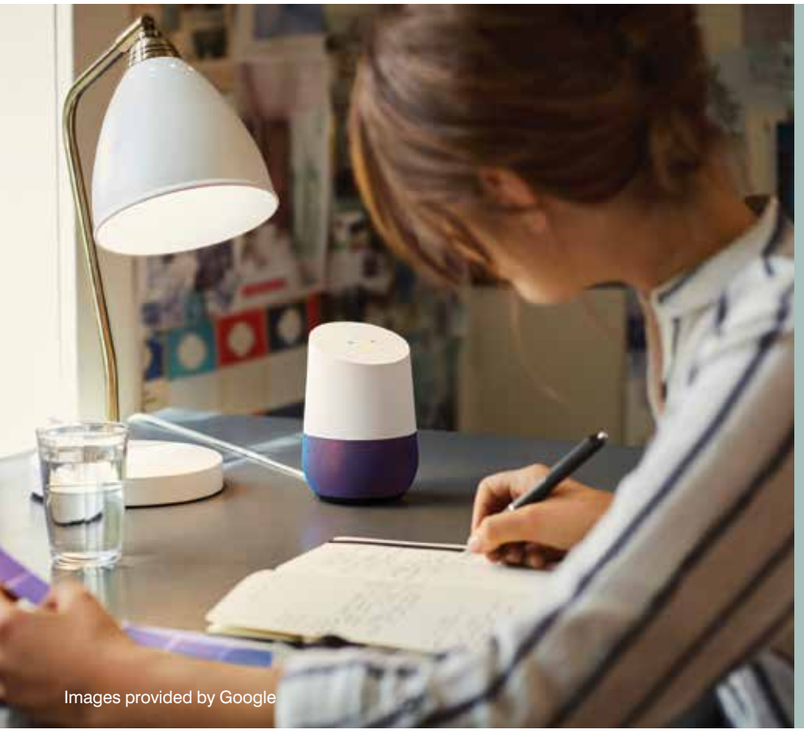
Of these A.I.-focused startups, the same research shows that nine out of every ten were serving a B2B audience, which should come as little surprise given the money and mindshare needed to launch a B2C product. While large, pre-existing technology companies have been able to overcome these hurdles, most also established their A.I. capabilities through acquisitions. Google's parent group, Alphabet, acquired DeepMind in 2014; Apple bought Siri in 2010; and Amazon has just this summer announced the acquisition of Graphiq Inc., whose A.I. products will be used to improve Alexa's data analysis capabilities.

The B2B nature of the A.I. market should also seem logical when we stop thinking of the technology as an intellectual curio or wild invention, and instead begin to consider it – correctly – as a new and extremely powerful entrant into the enterprise technology market.

As with PLM, ERP, and other big business solutions that began their lives in the aerospace, defence, and automotive industries, the bulk of the B2B A.I. market will not be retail to begin with. But this is likely to change – just as it did with PLM, where fashion and consumer packaged goods are now considered key verticals for most vendors – in very short order. Recent research by UK institution Drapers and A.I.-powered eSales platform Apptus[4] revealed that more than 90% of retailers – from a panel of 80 senior executives surveyed - are already excited about the potential of A.I. solutions to deliver real, measurable value in merchandising, customer acquisition and engagement, supply chain efficiency, and a raft of other business functions.

As readers of a PLM publication will know, though, an appetite for new technology does not always translate into adoption – particularly where that technology is industry-agnostic rather than being designed from the ground up to meet the demands of fashion and retail. Like any other enterprise solution, prospective customers of A.I. products and services will be looking at the market through their own unique lenses. First, they will want to identify the broad areas of their business that an A.I. initiative could impact, looking for a technology partner who understands the industry. Only then will they further filter the solutions and services on offer with shortlists of functionality and expectations of results calibrated by the most pressing challenges their businesses face.

Just like any other category of solutions, to succeed, A.I. products must be designed to fulfil both general market needs, and to pass through these smaller funnels of more specific demand. So, before we delve too deeply into how A.I. vendors are addressing those narrower business challenges, let us examine how a technology with virtually limitless cross-vertical potential is being tailored to address the top-level concerns common to essentially every retailer.



Images provided by Google

IF MACHINE LEARNING CAN DELIVER CRITICAL MARKET INSIGHTS MORE QUICKLY, IT HAS THE POTENTIAL TO MAKE A SIGNIFICANT DIFFERENCE NOT ONLY TO INITIAL MERCHANDISING, PLANNING, AND DESIGN PROCESSES, BUT EVERY OTHER SUBSEQUENT STAGE OF THE PRODUCT LIFECYCLE.

Recapture the essence of retail, and go real-time

AS A STORE MANAGER TODAY, I STILL WANT TO BE ABLE TO MAKE PERSONALISED, RELEVANT OFFERS TO YOU, BUT THE DIFFERENCE IS THAT NOW I'M DOING IT BECAUSE I HAVE A WEALTH OF DATA ABOUT YOU BEHIND THE SCENES, AND A MACHINE LEARNING PROGRAM HAS ANALYSED THAT DATA.

"A hundred years ago, retail was a neighbourhood business, where the retailer typically owned his or her own store, knew their customers by name, and could make very personalised recommendations," explained ShiSh Shridhar from Microsoft, when I asked where that particular technology giant saw the primary value of A.I. for our industry. "Because of the scale at which many retailers are now running, though, it's anything but a neighbourhood business today, and they realise that they can't possibly know their customers with that level of intimacy any more. To reclaim it, retailers need to work with data analytics and machine learning to identify the patterns that people are not capable of spotting in today's sea of data, and use that to bring back the personal relationships that defined the old-fashioned village store – scaled to meet the needs of a much larger-scale, modern operation."

"As a store manager today," ShiSh continued, "I still want to be able to make personalised, relevant offers to you, but the difference is that now I'm doing it because I have a wealth of data about you behind the scenes, and a machine learning program has analysed that data. So while I don't know you first-hand, I know from my intelligence that, based on your demographic and segmentation, buying patterns, and purchase history, I can recommend something that's uniquely tailored to your personal tastes, and that will be relevant to you in the moment."

This desire to reclaim the insight enjoyed by the single-destination retailers of old is not a new one. WhichPLM wrote about it as a key theme of the NRF Retail Show several years ago, and it has likely been on the mind of every retailer ever since the combination of offshore production and online retail and marketing made the bulk of apparel production, sales, and marketing happen at arm's length, out of direct sight. Until recently, however, it has been difficult to conceive of a practical way to recapture what was lost in the shift to international manufacturing and eCommerce. The critical data required were either scattered between different, disconnected silos, or were simply too overwhelming in volume or velocity to begin to make sense of – particularly in the case of larger retailers operating across different continents and channels.

"The opportunity for brands to collect the right consumer data, incorporate it into their decision-making processes, and then to act on it has, until recently, simply not existed at the scale we needed," said Matt Field, Founder and President of MakerSights, a machine-learning platform that provides what the company calls 'actionable product intelligence' to brands like True Religion and Ralph Lauren. "Before machine learning and A.I., businesses would instead have had to rely on much limited and time-consuming exercises like focus groups or in-store testing to gather that kind of insight. Using these approaches, they may have been able to engage with tens or hundreds of customers at most, over a period of several weeks. From that limited sample size, they would then have tried to form conclusions about why things were trending, and what customers thought about key products and lines. Today, brands and retailers can leverage machine learning to do the same things, but on a much larger scale, and in a window of time that actually fits with their production cycles."

This, I believe, is where the potential of A.I. for fashion at a broad level really begins to crystallise. Time to market remains one of the major challenges for brands and retailers who need to capture consumer demand and react to it with almost no margin of error. This problem is by no means unique to fashion, but it is perhaps at its most acute in our industry; in the process of creating footwear, accessories, and clothing that consumers want to buy, when they want to buy it, every minute counts. If machine learning can deliver critical market insights more quickly, it has the potential to make a significant difference not only to initial merchandising, planning, and design processes, but every other subsequent stage of the product lifecycle – culminating in a measurable improvement to a business's bottom line.

"Retailers now have the chance to engage with thousands of customers in a matter of hours, on channels like social media that they already use on a regular basis," continued Field. "With the help of A.I., they are then presented with a far more detailed, far more representative of their chosen market segment on the same day, and they can then incorporate those insights into their decision-making without delay."

With this critical common element in place – the ability to move quickly and comprehensively understand a complex market – A.I. has, for me and likely many others, passed that initial barrier of fashion suitability, and concrete results will follow. From here, brands and retailers will begin to turn to more specific applications and specialist A.I. suppliers. The remainder of this feature is given over to examining a selection of these individual use cases – beginning with initial market research and trend analysis, and proceeding through to transforming the customer experience at the point of sale and beyond.

Map the market, track trends, and seize strategic opportunities

Identifying looming trends or anticipating entire new ones is something the industry tends to think of as being instinctive. Good buyers and merchandisers are able to distil the essence of catwalk and trade shows into perfectly-pitched collections, and good designers can create styles that just seem to naturally tap into the zeitgeist. Over time, though, as the volume of information involved in identifying and tracking trends has ballooned, businesses have begun to recognise the importance of marrying the art of these processes with the science of data analysis.

In this sense, market analysis and strategic trend service EDITED is an exemplar of the new face of fashion technology, employing experts from both sides of that art / science divide to tackle broad and specific industry challenges.

"Our company is unique in that we have world-class computer scientists working side by side with industry-experience retail professionals to build a powerful piece of technology, which solves fashion retail problems in intuitive ways," said Julia Fowler, EDITED's Co-Founder, and a regular fixture in WhichPLM interviews. "To accomplish what we've set out to do – help retailers see every product launch, price shift, and market event online as it happens – you need both sets of experts working together. There's no way around it."

As an established business, EDITED already boasts an imposing client base comprised of

brands and retailers who otherwise may not have a defined A.I. strategy, meaning its solutions and services will be among the earliest experiences that many companies will have with the power of machine learning. "Using machine learning, A.I., and image recognition technologies built into our software, retailers can take advantage of customer's shifts in interests to stock and sell the right products at the right time," added Fowler. "For example, we saw huge success in the massively popular activewear category, where our technology is helping global retailers quantify the importance of trend and offer the exact activewear products that their customers want. By providing that degree of accuracy, we see A.I. as the winning ingredient that will allow our clients to gain a competitive advantage in a crowded retail space."

EDITED also provides what might be termed a soft introduction to A.I. There is nothing, technologically-speaking, that prevents another algorithm from taking that quantified trend actually creating the beginnings of an activewear category by itself, but advertising this kind of functionality at an early stage of A.I. adoption may be ill-advised. While Fowler is keen to talk about the technology that underpins its recommendations, EDITED is not overtly an A.I. company, and its solution leaves critical decision-making firmly in the hands of the retailer or brand. This is understandable because, for many customers, trusting an A.I. to actually make automated decisions during what remains a creatively-led process is currently a step too far – and may remain so for some time.

This is not, however, an opinion that every business shares, and Cosabella's Courtney Connell believes that delegating at least some limited decision-making to A.I. will be essential to truly carving out a competitive advantage in the longer term. "Working with A.I. is going to require a shift in mindset from many people," she explained. "Today, when you mention A.I., someone will inevitably say "that's going to give me so much more information that I can use to make better decisions," and while that's true, they're overlooking the fact that A.I. can, and in some cases should, be making those decisions on their behalf. To put it bluntly, if you keep thinking of A.I. as just a really awesome analytics platform, you haven't understood its full potential yet."

Collaborate with your customers and lock in loyalty

A big part of having the right product in the right place at the right time is starting from a strong impression of what that product should be. Obviously, broad trend prediction and market analysis are critical, but A.I. technologies also present the opportunity for retailers and brands to go beyond the broad strokes and engage with their customers, collecting invaluable information that will directly inform design and development.

On the surface, though, this seems to run counter to what we're often told are the defining characteristics of today's shoppers: fickle, disloyal, difficult to please, and willing to drop their passion for your brand in a heartbeat when a better price exists elsewhere. You could be forgiven for thinking that these were not sensible targets for any kind of collaboration, but Matt Field of MakerSights disagreed, calling this a misrepresentation of what loyalty actually means in 2017. Where previously a retailer could expect to create loyal customers by having great products and good service, he said, today they must seek active engagement with the customers or risk losing them to competitors who make them feel more valued.

"Analysts who talk about disloyal consumers aren't necessarily incorrect, but they are talking about a world where brands are either incapable of differentiating themselves on engagement and experience, or are choosing not to do so," Field said. "In that situation, customers will indeed go where they find the most obvious points of differentiation, and apart from in the luxury industry, the first and most prominent point is generally price. Where I'd strongly disagree with those analysts, though, is that I believe there is a significant opportunity, with A.I., for brands to re-engage customers in new ways that re-engender loyalty. It's not that customers are inherently non-loyal; they just have not been engaged in a way that influences their behaviour away from price sensitivity. Our research shows that more than 50% of millennials – and even more from older generations – do actively want to co-create with brands if the opportunity is presented to them."

Like the desire to achieve a more intimate knowledge of a customer base, this kind of co-creation also has some strong historical analogues. "To see this ethos in action, look back to the early 2000s, when Nike ran their Nike ID program, asking consumers to create their own versions of shoes," adds Field. "It was wildly successful, and people lined up around the block to participate. That's an example from more than fifteen years ago of how to thoughtfully engage customers in a loyalty-building exercise, and the tools we have today in machine learning and A.I. are so much more capable than the ones Nike had at their disposal then. And what's maybe even more important is that Nike didn't just attract new customers and strengthen their relationship with existing ones; they also collected millions of data points on customers' preferences at very specific item levels like material, colour, print design and so on. That has no doubt proven incredibly useful for powering broader design activities in their standard categories in the years since."

Better data for buyers, designers, and merchandisers

Where customers are not invited into the design and development process, the major influence on what products brands and retailers actually bring to market remains in-house merchandising processes. As Ganesh Subramanian from Stylumia explained, though, these are often informed more by intuition than by true intelligence, with merchandising teams working from small pools of historical information, making them a prime candidate for A.I.-driven improvement.

"Most design and buying decisions in fashion are largely based on a very small amount of data about what the brand or retailer has done in the past, and what parts of that worked or did not work," Subramanian told me. "That's the intelligence base that most businesses have to work from, which they supplement by either recruiting or contracting third party experts whose job it is to help them make better bets on the future, based on a combination of that small data pool and their own experience and intuition. That always seemed to me like a very speculative way to run a business, and when we looked at what proportion of those brands' and retailers' products sell at full price, we discovered that figure has held at around 50% for decades. There are obviously exceptions, but across the overall industry, that means one out of every two products is sold at a discount. So, designing and merchandising the traditional way, what's the chance of any individual fashion product selling without a markdown? It's very close to a coin toss."

Like many of the other solution vendors we interviewed for this Report, Stylumia was founded on the principle that both a wider data collection net and a more intelligent approach to analysis were the keys to improving on processes that had historically been something of a bottleneck in the product lifecycle – not replacing them. "We recognise that forecasting remains an important part of the apparel business, and we are certainly not saying that intuition is a bad thing," Subramanian clarified. "A decade ago, small data pools like these were all retailers and brands had; it was difficult to get to know your customer and understand their preferences. Today, though,

customers are easier than ever to track online. They leave their likes and dislikes lying around the Internet in structured and unstructured form, and A.I. technologies allow us to consume and use all of that information in something approaching real-time. Deep learning lets us listen to what customers are saying and learn from it; computer vision lets us see what they are seeing; and A.I.-created knowledge graphs can help us drive insights from those signals. Combining traditional intuition with A.I. really presents a totally new way to understand what your customer wants."

Pricing, on point

As Subramanian points out, one of the primary criteria used to judge product success in retail is full-priced sell-through. Achieving this demands the right products in the right assortments at the right time, but it also hinges on a keen, up-to-the-minute understanding of customers' price sensitivities, as well as the pricing and promotional structures being used by the competition.

Talking to Cheryl Sullivan, Chief Marketing and Strategy Officer for Revionics, she revealed that pricing is not something businesses can leave to assumptions or guesswork. Sullivan's company suggests that 93% of shoppers use a digital device to browse and research while shopping, 90% leave stores to go and buy elsewhere, and approximately 70% of promotions do not achieve their objectives. In this context, it is little wonder that machine learning has the potential to redefine the way we think about price, and Revionics' solutions promise to leverage machine intelligence to optimise customers' initial pricing, markdown schedules, and promotions.

Interestingly, Revionics offers different levels of A.I. engagement, with data science and automation employed to varying degrees depending on how far the business at hand is willing to part with their traditional financial planning methods – with the deepest level doing essentially everything but changing the price tags itself.

"The simplest form of what we do would be classed as analytical insight," Sullivan explained. "We capture real-time inventory, pricing, and assortment information on a retailer's competitors, and provide our clients with the ability to search and query it through intelligent dashboards. From there, we move to the level that I call predictive, which means taking that data, testing it based on different hypothetical scenarios, and being able to predict the outcome in terms of margin, revenue, customer loyalty and other metrics. Finally, we have the prescriptive level, and this is where machine learning really enters the picture and the science goes into overdrive. Rather than just providing a retailer with insights and predictions and allowing them to take whatever action they think best, the solution will instead tell them what to do in detail, instructing them on the exact promotional offers to make, and even suggesting dynamic pricing, where a price point changes in real-time according to demand."

Stand out from the crowd

In an extremely competitive market, some companies may be able to differentiate themselves from the competition purely through price, but for many brands and retailers, razor-thin margins afford little wiggle room. Instead, the search is already on for other ways in which A.I. can be used to help businesses stand out from the crowd.

"Today's retail environment creates the need to be a rapid innovator, in products and experiences," explained Steve Laughlin, General Manager for IBM's Global Consumer Industries, when we spoke. "Companies need to be constantly monitoring what the marketplace and their consumers expect, and quickly coming up with ideas – not just for new products, but for changes to their services and business models. And they need to be able to test those ideas rapidly, and gauge their impact through a range of different channels."

Needless to say, given his position, Laughlin understands retail, and he is acutely aware of the challenges that come with any attempt to do truly

new things in a digital age. "Creating standout experiences also creates an explosion of what we call unstructured data. While structured data fits into spreadsheet columns and rows, unstructured data is more like a mass of images, video, text, social media entries and so on. Now, that data is filled with valuable insight and information, but you have to be able to unlock it. That's why investing in A.I. – our version of it being cognitive computing and Watson – is so important. A.I. can digest that unstructured data, make sense of it, and create use cases that can really transform the way brands and retailers interact with their consumers, helping them to stand out from the competition."

"If I put myself in a brand's shoes," Laughlin continued, "I can now have customers query my product catalogue using natural language – asking the A.I. to suggest a red dress for a summer cocktail party. Or I can even allow them to upload a photo they snapped from a magazine with a smartphone, and the A.I. can then suggest the closest match from my complete catalogue."

What I found especially interesting from my conversation with Laughlin and other senior technology figures was that A.I. is credited with being simultaneously responsible for improving existing processes and experiences, as well as creating entirely new, hitherto impossible, ones. This, I believe, will make technologies like machine learning especially attractive to fashion retailers. The market has become so homogenised, and so cutthroat, that when it comes to responding to competition, retailers often have to choose one or the other – and doing existing things more efficiently usually wins out.

This is a view shared by Raj De Datta, CEO of BloomReach, which has created what it calls "the first open and intelligent Digital Experience Platform" targeted at improving customer experiences and personalisation, and which counts names like Neiman Marcus, Nordstrom, Williams-Sonoma, and Forever 21 among its clients. "I've sat with a lot of large retailers, and I believe that most of them are still struggling to identify the true source of their competitive advantage," De Datta told me. "Because how can they not ask that question when Amazon sells many of the same products they do, delivers them faster, with a great shopping experience, and isn't saddled with the same costly real estate footprint that they are?"

"Realistically," De Datta went on, "I think there are only a couple of possible answers to that question. Either these retailers create a product selection that nobody else in the world has, which is easier for speciality retailers. Or they try to create customer experiences that are fundamentally unique. The difficulty is that neither of those differentiators is easy to deliver at scale; retailers simply cannot hire enough human beings to achieve them, so much of the customer journey is fragmented across mobile apps, websites, stores, and social media, while retailers typically also have disconnected technologies, different data silos, and different teams working in isolation."

"This is where machine learning and data science come in," De Datta concluded. "A digital experience platform can power every interaction between a brand or retailer and their customer – from informing merchandising , to building marketing campaigns, to supporting the experience a shopper has in-store. For us and our clients, A.I. is going to be absolutely essential to delivering competitive advantage in a crowded market."

Chase conversions

With all of the preceding elements taken care of – on-trend product, perfectly mixed and properly priced, with a shopper experience that catches people's attentions – we can begin to look at far more measurable metrics.

"A lot of retailers' attitudes to eCommerce have focused on driving more people to their websites, rather than actually improving conversion rates," Andy Narayana of Sentient told me, referring to the proportion of website visitors who actually go on to engage with the company or make a purchase. "The biggest barrier to converting a visitor into a buyer is that people are often not able to find the products they actually want; their experience is being constrained by the database-centric way we built web applications in the late 1990s and early 2000s. We believe one of the best ways that A.I. can deliver additional revenue for retailers and brands is to improve the experience of online storefronts with a paradigm shift; instead of the retailers dropping products into their channels and hoping that someone will click on and buy them, we want shoppers to interact with the A.I., and for the A.I. to pull the products it knows they're likely to want, with context taken into account. We know from experience that conversion rates among shoppers who engaged with the A.I. in Sentient Aware and Sentient Ascend are around 30% higher, and that average dollar values of shoppers who interact with the A.I. are up to 15% higher."

A.I. IS CREDITED WITH BEING SIMULTANEOUSLY RESPONSIBLE FOR IMPROVING EXISTING PROCESSES AND EXPERIENCES, AS WELL AS CREATING ENTIRELY NEW, HITHERTO IMPOSSIBLE, ONES.

CONVERSION RATES AMONG SHOPPERS WHO ENGAGED WITH THE A.I. ARE AROUND 30% HIGHER, AND AVERAGE DOLLAR VALUES OF SHOPPERS WHO INTERACT WITH THE A.I. ARE UP TO 15% HIGHER.

Another noteworthy change, powered by improvements to online shopping experiences and the deployment of Internet of Things technologies like beacons and trackers into physical stores, is the ability for retailers to see a blended view of past customer behaviour, and for an A.I. to recommend – and even take – actions based on that intelligence.

"There is a huge amount of data that businesses have only recently gained access to because of beacons and other IoT technologies," explained ShiSh Shridhar from Microsoft. "We can now collect behavioural patterns and traffic information to see where people dwell in physical stores as well as online storefronts. And on the opposite side, we can also achieve some level of insight into abandoned baskets – what was picked but never made it to the point of sale – in bricks and mortar locations."

"Machine learning is what will allow us to find patterns that cross the barriers between the two, and allow us to actually make use of that information to try and influence behaviours," Shridhar added. "With the right insights, how can we, the retailer, convince you, the shopper, to revisit the display you dwelled at? How can we get you to the next stage of the customer journey? In both cases, A.I. can help suggest or take action. For instance, our purchase history data tells us that you bought a certain product a few weeks ago, and our in-store sensors are now telling us you're standing in front of a product that matches it. Machine learning can infer from that that you're likely looking for a matching product – consciously or subconsciously – and our recommendation engine knows that the product you're now near ranks highly on the list of possible matches. Based on those patterns, the A.I. tells us that you have a 90% affinity to buy that product, so we can push you an offer for 20% off and see if you'll convert."

Cross-sell and up-sell

Of course, convincing customers to buy something they are already considering is only the beginning. In a market suffused by collections, complementary pieces, and even more capsule collections, the RFA industry thrives on cross-selling and up-selling. Unfortunately, both of these promotional methods are most effective when a retailer has a large, diverse, product range to draw related recommendations from – which places them firmly in the category of things Amazon is able to do better by sheer brute force.

Unable to compete by having product catalogues anywhere near as large, though, apparel retailers have a chance to do things differently and more personally, using machine learning and computer vision to examine behavioural patterns and product characteristics, and then making recommendations that are informed by current context.

"There have been many different approaches to create the perfect eCommerce recommendations systems, but historically they have all started with hard-coded algorithms that simply identified similar products based on their colour, fit or material – or they have simply looked up where previous customers have bought one product and then another," explained Daryn Nakhuda of Mighty AI. "With machine learning, though, you're able to pull in so much more signal, and take advantage of a much fuller range of data and context. For example, a simpler recommendation system might serve up a few tops that match a particular black skirt, but it will not take account of the context in which the customer is shopping. Has she just finished browsing blazers and other workwear? If so, then the top you recommend should not be a summer tank; it should be something more formal, recommended within the context of the customer's current browsing experience."

"There's a classic cautionary example from the consumer electronics industry that works equally well in fashion," continued Nakhuda, expanding on the reasons that traditional recommendations systems have fallen short. "A customer has previously bought some batteries, so the next time they visit, a simple system recommends more batteries for them. An A.I. system, on the other hand, would understand that

those previous batteries were bought to support a toy or some other device, and would be able to identify an appropriate direction to steer recommendations towards as a result. And context also extends to appropriate price: if a customer has only previously bought some $5 socks from your web shop, you're unlikely to get an up-sell to a $2,000 suit that just happens to go with the socks."

This is an approach that Eric Brassard of Propulse endorses, but he places greater emphasis on the distinction between archival data and real-time information – the latter of which he believes is the key to making automated product recommendations that align with personal taste, not just purchase history.

"Product recommendation engines are not new," Brassard explained. "But until now they have all worked on the same simple premise: that by analysing big data we can see patterns of purchase and, from them, make predictions about what someone is likely to buy in the future. The fundamental assumption here is that past behaviour is all you need to predict the future. We set out to build a different kind of recommendation engine, because we believe that the past is not enough of a base from which to make appropriate recommendations in the present – certainly not when it comes to visual products like fashion, furniture, art, and accessories."

At this point, Brassard's model for better product recommendations begins to sound very familiar, relying as it does on replicating the role of a real human being with on-the-ground knowledge of their customers and products. "Instead of purely historical data, we use A.I. to try and mimic the performance of outstanding salespeople – the kind who intimately understand what you want even as you're picking clothes off the rack," he added. "Our approach is to use visual recognition to build a model of personal taste informed by history, but not totally reliant on it. Rather than looking for exact matches between products, our AI looks for common elements that suggest an appeal to certain tastes. That's what you might call a human-like aspect to A.I., or a soft skill, which is only possible to deliver at this scale with the help of A.I."

IF A CUSTOMER HAS ONLY PREVIOUSLY BOUGHT SOME $5 SOCKS FROM YOUR WEB SHOP, YOU'RE UNLIKELY TO GET AN UP-SELL TO A $2,000 SUIT THAT JUST HAPPENS TO GO WITH THE SOCKS.

Marketing, mastered

Even with the best possible products, in the optimum mix, priced according to bulletproof machine intelligence, and recommended to the most relevant market segments, a final hurdle remains before a collection can really capture consumers' attentions: marketing. Easily the equal of its impact on actual shopping behaviours, the rise of eCommerce has had a tremendous effect on the way that brands and retailers advertise. According to the Wall Street Journal, luxury brands increased their online marketing budgets by more than 60% in the three years from 2013 to 2016[5], and a similar shift in promotional spend was also likely to apply to other market segments.

Like other key stages of the product lifecycle, however, much of modern marketing – even cutting-edge digital content creation – is still directed by human intuition. To improve on the performance of their online marketing, lingerie brand Cosabella turned to Albert. Billed as "the first Artificial intelligence marketing platform for the enterprise," Albert (formerly known as Adgorithms) was given access to Cosabella's existing campaigns, and was, according to Courtney Connell, able to deliver results in social media that far exceeded those the company had been able to achieve through traditional methods.

"Now we have Albert, I'm not sure I'll ever have another human manage my Google AdWords or Facebook campaigns again," Connell told me. "Give it access to your campaigns and the A.I. ingests everything you've done to date, spends some time optimising that, and once he's finished fixing your current content, he begins to create his own campaigns – adding keywords, taking keywords away, creating new micro-segments and so on. And then, with even more time, Albert starts making real recommendations like "your competitors are running promotions and you aren't," or "social ads are fatiguing at a rate of two weeks, so we need to produce new content every fortnight." Every piece of this is new, actionable insight, and it's had a dramatic impact on our KPIs."

Find fit and reduce returns

As important a metric as full-price sell-through is, understanding retail performance and consumer satisfaction does not end at the point of sale – at least not the first time. Every sector of the RFA industry is plagued by returns, with online customers routinely ordering multiple sizes of a single product and returning the ones that do not fit. Similarly, consumers also have clear expectations of consistency in fit, and one of the holy grails of consumer satisfaction is a shopper with total confidence that whatever he or she buys, it will fit the same way as the last product they bought from the same company.

Footwear fit may seem, on the surface, to be less subjective than apparel fit. Shoe sizes are clearly graded for different markets, and none of the vagaries of small, medium, and large apply. Nevertheless, as Timo Steitz, CEO and Co-Founder of ShoeSize.Me explained, machine learning has the potential to permanently solve what has become a major problem – with return rates higher than fashion in many cases - in his native Germany and beyond.

"Worldwide, we see footwear return rates from 10% up to 70%," Steitz told me. "In German-speaking countries, returns for both fashion and footwear average out at 50%, and our research tells us that the latter is a lot higher. A recent survey revealed that as many as 80% of all Germans are wearing the wrong shoe size if foot length is used as the sole measurement. We also know that between different styles and different brands, actual sizes can vary by as much as three full sizes for the same kind of product. Footwear sizing also differs dramatically from country to country, brand to brand, and style to style, and the combination of all those variances can be extreme. We call the result 'sizing and fit chaos', and we believe that data holds the key to solving it forever."

As for how ShoeSize.Me uses machine learning? "We collect data from three fields: product data, user data, and production and sales data," said Steitz. "Product data encompasses material, form, category and so on. User data refers to information about the customer, such as their age, gender, body metrics, and whether they consider their foot to be small, medium, or wide. Then we look at how people buy: what articles they purchase, what they keep, what they return, and why. By uniting those three worlds into a single dataset and allowing our algorithms to run on it, we can really begin to make sense of how shoes fit, give customers the confidence to shop, and provide brands with the insight they need to create better products."

ONLY RARELY DO RETAILERS HAVE THE LEVEL OF INSIGHT AND SEGMENTATION REQUIRED TO PRESENT CONSUMERS WITH OFFERS OR REWARDS BASED ON THEIR OWN PERSONAL SPENDING OR BEHAVIOUR PATTERNS.

Build better relationships

Today, as we have seen from previous examples, shoppers can be convinced to look beyond pure value if they leave a retail experience feeling as though they have been personally valued. The majority of retailers currently try to create this feeling of reciprocity by offering incentives for repeat spending (the loyalty card model), but these can often feel impersonal. Only rarely do retailers have the level of insight and segmentation required to present consumers with offers or rewards based on their own personal spending or behaviour patterns. But with the help of A.I. technologies, this level of personalisation could be readily achievable, helping retailers to increase their chances of retaining customers without resorting to bulk discounting.

"With A.I. and cognitive computing, the opportunity exists to personalise relationships with consumers – not through a points card, but through relevance," explained Steve Laughlin of IBM. "Because you, as a brand or retailer, better understand your customers, you understand their past interactions with you, you understand their personalities, and you can therefore shape your communications in a way that's going to resonate the most with small groups of people – or even individuals. That sort of relationship is sticky, and it fosters a different kind of loyalty that should endure."

Retailers and brands who do obtain that level of insight into individual customers will also have the opportunity to use it in other areas, to deliver a consistent level of personalisation (or at least familiarity) across channels, as Daryn Nakhuda from Mighty AI explained. "Fashion and retail are the perfect stages for conversational bots and A.I. assistants, equipped with real insights into consumer behaviours, to flourish. In real life, a personal shopper is only as good as how well they know you; the same will go for an A.I. assistant, but with the key difference that they can get to know you a lot faster and a lot better if you give it access to the right personal information."

While one of the major applications for chatbots is in customer support, Nakhuda also pictures a near future where – just as IBM and The North Face have done with Watson – conversational interfaces come to the foreground of eCommerce. "I think this will completely change the entire online shopping experience," he said. "Rather than going to a retailers web store and browsing for evening gowns or a wedding outfit, we'll simply tell the chatbot our names, and it will know enough about our personal preferences to ask a few situational questions before recommending a product based entirely on what it thinks we – as individuals, not as a market segment – will want. In the future, our calendars may even be linked, so the underlying A.I. will already know that the wedding is in Dallas, in August, so it's going to be hot – or that the couple's wedding website has some suggested colours. Either way, the A.I. can then apply that information against a retailer's product catalogue and make recommendations that will be so much more compelling than just showing a sidebar ad for something that's similar to things we've looked at before."

Turn the page to read a short feature discussing some of the potential concerns that might arise from using A.I. to evaluate abstract concepts like style, followed by the conclusion of our exclusive A.I. coverage setting out suggestions for how readers might begin embarking on an A.I. initiative of their own today, and the outlook for umbrella technologies in the longer term.

1. https://www.accenture.com/gb-en/insight-artificial-intelligence-future-growth
2. http://files.constantcontact.com/150f9af2201/ac5db202-a413-42da-ab8b-fee61f1acc6e.pdf
3. medium.com/mmc-writes/artificial-intelligence-in-the-uk-landscape-and-learnings-from-226-startups-70b9551f3e4c
4. https://www.drapersonline.com/business-operations/special-reports/unleash-the-power-of-artificial-intelligence/7023540.article
5. https://www.wsj.com/articles/fashion-ads-a-last-bastion-of-print-are-going-digital-1497000602

TRUST, AND THE SCIENCE OF SUBJECTIVITY

BY
BEN HANSON

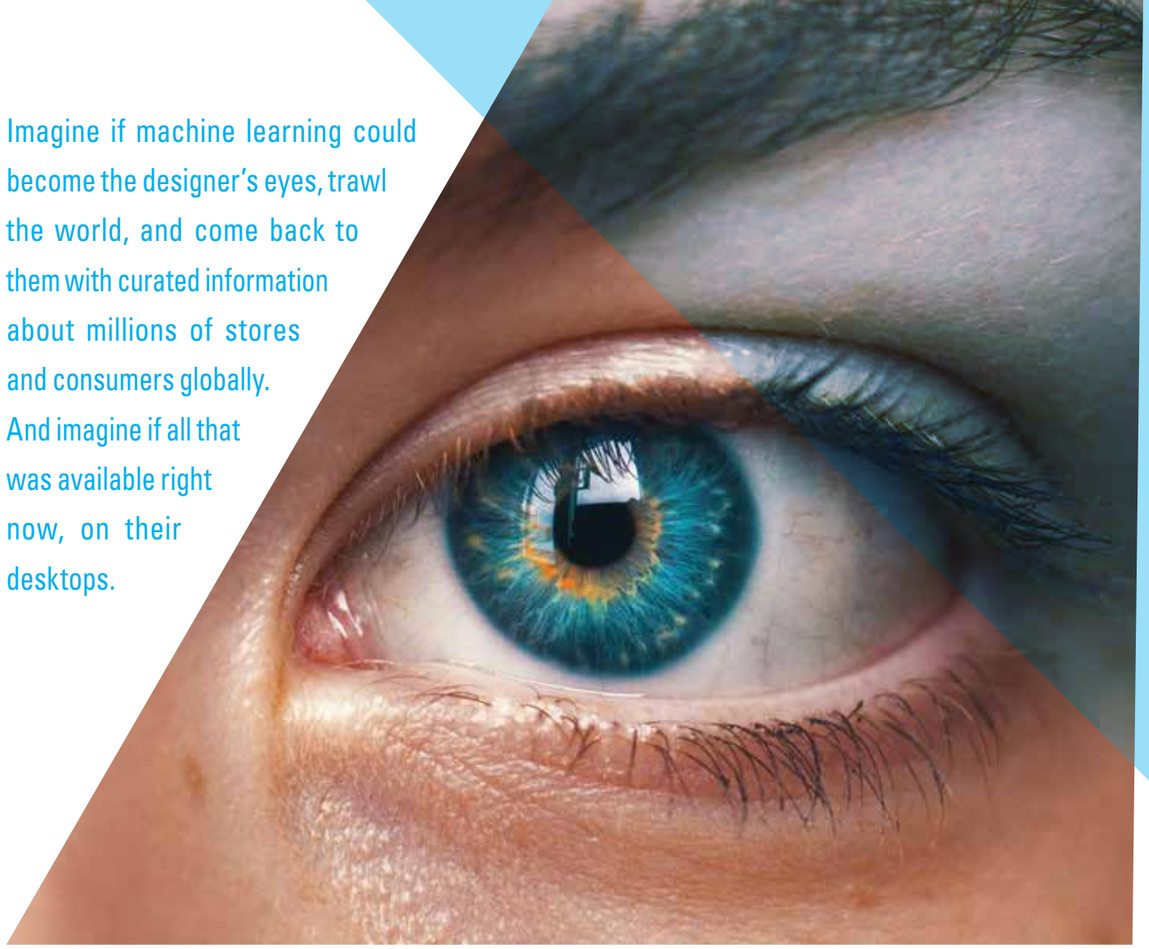
Most of the applications of A.I. we have examined so far deal in concrete, measurable results. While deep learning systems can analyse hyper-granular instances of consumer behaviour, for example, the outcomes they predict are essentially binary. A shopper either buys the product or doesn't; a shoe either fits or does not, no matter how many data points are used to arrive at that answer; and even loyalty, which sounds ephemeral, manifests itself in clear and measurable hooks like continued engagement and repeat purchases, or the absence thereof.

But what happens when we want an A.I. to start evaluating things that are less easy to pin down, and potentially difficult for us to even describe? Things like style, that influence all the aforementioned outcomes in indirect, potentially uncertain ways. In data science parlance, these are what we might refer to as soft factors, or subjective elements, as Timo Steitz from ShoeSize.Me explained.

"I think the fashion industry's biggest challenge right now is fully understanding human behaviour and taking account of that element of subjectivity," Steitz said. "This is the biggest pain point the industry has to solve because, unlike other industries, where influences are far more concrete, fashion runs on trends and opinions. Calling them soft factors makes them sound insignificant, but they really influence the way that consumers reach a decision on whether or not to buy. Popular colours can change week by week depending on weather, celebrities, and a host of other factors that, when they combine, can be extremely difficult to understand."

To be clear, trend analysis services already thrive on tackling precisely these kinds of uncertainties. Not only do they weigh up huge volumes of market indicators to identify trends or determine whether a product will appeal to a certain demographic, but they also take into account soft, social variables that are likely to influence or disrupt those predictions. More often than not, though, these subjective elements are being analysed by human beings who have built their careers on judging and predicting the actions of other, slightly unpredictable, human beings. To arrive at their conclusions and edits, they rely to at least some degree on their own subjective tastes, honed over time spent immersed in a particular category.

What happens when we want an A.I. to start evaluating things that are less easy to pin down, and potentially difficult for us to even describe?



Imagine if machine learning could become the designer's eyes, trawl the world, and come back to them with curated information about millions of stores and consumers globally. And imagine if all that was available right now, on their desktops.

So how important is that personal touch? If we let an A.I. – even a specialised one – loose on a similar trend analysis task, alone, we may receive the same broad answers on a bigger scale, but might we be missing some nuance? After all, people wear and define their outward identities through clothes, while machines confine themselves to inference from past performance and real-time data streams. A human will say "I personally like this and it elicits these feelings in me, so I believe it will sell," while an A.I.'s decision-making is more accurately characterised as "my dataset tells me that these characteristics of this garment make it likely to sell to this target demographic."

Whether either approach is any more valid than the other is not a question this publication can answer – at least not without dragging it even further into the philosophical quagmire – but what matters is perception.

As an industry in the midst of a digital transformation, the frontier of art and science is forever shifting in fashion. Today, entire PLM projects succeed or fail on the strength of the solution's integration to Adobe Illustrator, which allows designers and other database-phobic creatives to work where they're comfortable – on a knife edge between subjective artistry and cold commercial reality. And as compelling as the results demonstrated by A.I. solutions are becoming – creating real value from merchandising to marketing – what sways the C-Suite will not necessarily do the same for team members who prefer to deal with soft factors day in and day out.

"At a business level, there is a real receptiveness to the general idea that if we, as brands and retailers, look at and listen to more data, this will allow us to get smart and to serve our customers better," said Daryn Nakhuda from Mighty AI. "The challenge is now to incorporate those insights into existing processes, and make sure that new intelligence does not stay on the other side of a vacuum, away from the merchandising and product teams who are actually making the critical decisions about what to bring to market."

PARTNERS IN PRODUCT

Fortunately, a strong case study already exists of a company that has successfully overcome what appears, in hindsight, to have been a false divide.

Stitch Fix, headquartered in San Francisco, is, in my opinion, one of the greatest success stories in fashion technology. The company offers a personal stylist service, online only, to men and women, which behind the scenes is run by a close partnership of around 3,000 human stylists and hundreds of different machine learning algorithms to deliver a successful, subjective service at scale.

From an A.I. perspective Stitch Fix employs machine learning for a wide range of different purposes. The most obvious is matching

products to clients, but the company also uses A.I. to match clients to stylists, gauge customer satisfaction, make recommendations for the company's buyers on what inventory to acquire, and so on. Pointedly, Stitch Fix even has a dedicated algorithm for examining a customers' Pinterest boards to supplement the sense of style that he or she describes at the time they sign up for the service.

Widely tipped to go public in the very near future, and with a turnover of around $500 million in 2017, Stitch Fix is quietly redefining not just the way that people shop, but the way that in-house creative teams can work in concert with A.I. technologies to everyone's benefit. Talking to the magazine Computer World[1], a lead Stitch Fix stylist summed up the relationship that she has with the company's various algorithms.

"I quickly realised the tool was my new BFF [best friend forever]," she explained. "It gives me confidence when my creative eye is saying this is a match and the science is saying the same thing. How they come together is the magic. When a client fills out a profile and is ready to be styled, we are able to see what the algorithm is suggesting based on the data collected from her profile – everything from sizing to location, geography, body type, fabric preferences, colours, and pattern preferences. It helps to not have to worry about the broad strokes of what the client does not want. Then we can make creative decisions about what will fit her body and her lifestyle."

So while creative teams may be concerned that A.I. solutions are being primed to overtake their essential creativity, the reality is that a more symbiotic relationship, with algorithms working as assistants to designers who are now freed to be truly creative, is far more likely. And unlike a human assistant, an algorithm is unlikely to complain about being tasked with repetitive work, or assigned to areas where human capacity is far more of a bottleneck than human creativity.

"Today, how does a designer collect inspiration and decide what to make for next year's range?" challenged Ganesh Subramanian of Stylumia. "Ask one, and they will likely tell you that they travel once or twice a year, look up other brands, visit a few stores or shows to buy products and take photographs. This is because their time is limited, but in the grand scheme of data collection and analysis, how much have they actually contributed by working this way? Compared to the sheer volume of data that is available across the entire market, that one designer has managed to find a few spare days to research online and at key destinations. From there, the business will then place their bets, hoping that potentially hundreds of thousands of customers in the EU and USA will buy the products informed by that research."

"There is nothing wrong with this approach," Subramanian adds, "but imagine if machine learning could become the designer's eyes, trawl the world, and come back to them with curated information about millions of stores and consumers globally. If all of that was available right now, on their desktops, would that not help designers – and entire businesses for that matter – make better products and better decisions?"

BETTER DATA IS IN THE EYE OF THE BEHOLDER

Implicit in Stitch Fix's use of A.I. to extrapolate and elaborate on the information provided by new customers is the fact that, while we human beings have very strong subjective opinions about what we like and dislike, we are not good at putting those feelings into words. Quite often, we will struggle to express what we want and why, and groups of people – even quite homogeneous ones – will regularly disagree about things that raw data tells us they should share a common view of.

It may be surprising, but this is considered a major problem by A.I. researchers – one that requires a different approach and a different class of technology to overcome.

"Fashion is a unique industry in several ways," explained Edgar Simo-Serra, a researcher at Waseda University in Tokyo, who I spoke to after reading his paper on tackling abstract concepts like fashionability in machine learning models. "First, you have a lot of potential data for a machine to work with, but it's noisy data, without clear annotations. Machine learning works far better with sets of clear, supervised data, where you're training the machine to do a specific task that everyone agrees on. Fashion, on the other hand, is extremely subjective. Designers, customers, and suppliers may all see and label different things in the same style, so it's difficult to arrive at any consensus. You're talking about high-level concepts that humans struggle to agree on."

Both Simo-Serra and his fellow researcher Julian McAuley (Assistant Professor at UC San Diego) are advocates of using computer vision to supplement subjective information provided by customers and users. Indeed, McAuley's research centres on creating behavioural models that can predict what a person will do in various situations, using data that is primarily visual.

"There's a critical difference between recommendation systems like the ones Netflix or Spotify employ and ones that involve a strong visual component," McAuley told me. "Our goal was to understand and build predictive models of people's behaviour when the thing being predicted is visual, as is the case in fashion. As you know, this is complicated by the fact that the semantics of why someone likes a certain thing being incredibly difficult to describe. Consider the vocabulary of clothing – the number of variables of materials, components, and stylistic elements a shopper could possible like or dislike – and how much broader and deeper it is than the vocabulary of movie genres, for instance. We think the best way to make predictions in these situations is to use computer vision to learn which visual characteristics attract which people, track changes in those characteristics over time, and then use these insights to predict purchasing patterns for the future."

CREATING WITH COMPUTER VISION

Taken even further, the collaboration between human creatives and computer vision has the potential to introduce an entirely new kind of product development – one that uses cutting-edge data science to provide a jumping-off point for a designer's innovation.

"If we think ahead, instead of just predicting what items, out of the body of existing items, a person might want to buy, we could begin to predict what hypothetical item that person would purchase," said McAuley. "This is something that computer vision can already support; we're no longer just saying that you, the shopper, might like something that had these features, the model is actually synthesising images of what that product would look like. So, if you want a pair of pants to match a particular shirt, but the retailer doesn't currently offer one, a generative image model could present that customer with a view of a matching pair that is being created on the fly, not drawn from an existing catalogue."

In fact, this kind of generative image work is already being used by analysts to distil all the concepts presented at a single runway show into one average product. That product did not exist and was not shown at the event; the image model produced a picture of it based on different configurations and components of the garments that did appear on the catwalk.

And even more than that, collaborative designs created by humans and machines working together have already reached store shelves[2].

Stitch Fix recently launched a private label called Hybrid Designs, where each product is born from a series of algorithms: one that selects several existing garments to use as a base; another that presents different attributes and components that compliment the style of the base garment; and another that introduces more randomised elements, with a potential thirty trillion permutations of components, materials, trims.

From these nine suggestions, Stitch Fix's in-house product teams have developed around 20 different products – several of which have sold as well as even the hottest traditionally-designed products in the company's inventory.

TRUST THROUGH TRANSPARENCY AND TRAINING

Finally, the spectre of subjectivity can be addressed by providing customers and creative partners with full visibility into the workings of an A.I. solution and the data that were used to train it. And unlike other categories of solutions, where database structures and other internal information are almost completely impenetrable for non-technical teams, it is straightforward to explain to a designer, for example, how a cross-section of her target demographic were involved in training the visual recognition portion of her algorithm-assistant.

"We believe strongly that A.I. cannot be a black box, and that you have to be transparent about how you're training it and why," explains Steve Laughlin of IBM. "From a client's point of view, the data being used have to be well-known and understood, whether they're coming from new or existing sources. And related to that, AI projects should always be piloted in-house first, giving actual users the chance to teach and tune them further, and giving both the chance to learn from experience. The purpose here is to establish familiarity with how the A.I. functions, and instil confidence that it's chief purpose is to help make every employee as good as the best employee – creating partnerships, not replacing people."

With these caveats considered, the final feature in this exclusive series now looks at how retailers and brands can take their first steps into the world of A.I.

Images provided by Stitch Fix

1. https://www.computerworld.com/article/3067264/artificial-intelligence/at-stitch-fix-data-scientists-and-ai-become-personal-stylists.html
2. https://qz.com/1028624/stitch-fix-let-an-algorithm-design-a-new-blouse-and-they-flew-off-the-digital-racks/

By now, assuming you read the four features that precede this one, you have what I hope is a balanced view of A.I. We have examined how some of the different technologies that fall under the umbrella work and what their current limitations are; we have outlined some of the most prominent applications of the technologies today; and we have tackled the tricky subject of subjectivity, mapping out how machines and humans can work together to blend the best of deep learning with our own innate creativity.

GET SMART:

FROM THEORY, TO PRACTICE, TO THE FUTURE OF A.I.

Just as WhichPLM has done for both of our previous special editorial examinations (covering 3D in 2015, and the Internet of Things in 2016) this last exclusive feature is the final piece of the puzzle, collecting guidance, food for thought, and practical recommendations for retailers and brands who may be looking to lay the long-term groundwork for their own A.I. initiatives, or to embark on a particular, more pressing project.

Immediate intelligence?

The clearest question for prospective customers of A.I. solutions: are these viable products, with clear return on investment potential? Broadly speaking, the answer is yes. While general intelligence – a single machine to run everything, with mental capacities far in excess of our own, across essentially all of human endeavour – remains a pipe dream, more focused applications of narrow, specialised A.I. are limited only by customers' ability to find the right technology partner and to gain access to their own information and broader market data in sufficient volume to deliver results.

But even if A.I. was more limited – its capabilities confined to being a better analytics platform or Business Intelligence tool, for instance – I believe it would still rank as an essential investment for many retailers and brands. As the first feature in this publication explains, the volume of information now available to us is rapidly beginning to exceed our ability to comprehend even its outlines – let alone the sheer volume of raw, real-time data that makes up its specifics. Indeed, many experts believe that we have already passed the tipping point after which human capacity will never regain the ability to interpret the international, cross-channel flow of information without A.I. assistance.

"We have already passed that point, absolutely," said Julia Fowler of EDITED, whose solution is expressly designed to shrink large sets of current information down to more digestible chunks of market insight and competitive analysis. "Bear in mind that retailers like Zappos and Saks Fifth Avenue are bringing around 1,800 to 2,500 new products to market each week, and I'd go as far as to say it's impossible for a human to keep track of. The purpose of our software is to whittle that information down into targeted, real-time insights in seconds – as opposed to having retailers' buying and merchandising teams browsing websites fruitlessly, then periodically visiting competitor's stores. Working that way, retailers would have a lot of people spending a lot of time not accomplishing very much, while EDITED would instead provide more structured, objective information – as much as they could gather in an entire month otherwise."

Fowler's perspective on the explosion of data is also supported by IDC forecasts, which suggest that, by 2025, the aggregate total of data generated by all industries will reach 163 trillion gigabytes – a tenfold increase on the most recent available figure, for 2016[1]. Among that data, close to 30% is expected to be classified as "critical" or "hypercritical" to our daily lives, and while the RFA industry does not deal in life-or-death outcomes the way the medical sector does, we can nevertheless see the vital importance of having the right information at hand, and the ability to effectively analyse it within a meaningful timeframe.

As you will have gathered from the previous features, however, A.I. is much, much more than a new iteration of analytics or BI. From machine learning serving as a designer's information-gathering assistant, to a computer vision model generating images of entirely new products before they physically exist. From algorithms powering dynamically-adjusted pricing, responding in real-time to changes in demand, to A.I. technologies revolutionising recommendations, personalisation, and other customer capture and engagement initiatives.

It is no wonder, then, that one major school of thought – and it's one that I subscribe to, with the likes of Vladimir Putin as company – hold that A.I. is a revolution on the scale we have not seen since the invention of the Internet. In that light, A.I. proponents argue, it is absolute folly to wait to take action - particularly when we consider that many retailers' business models are already balanced on a knife edge, and every individual competitive advantage counts.

"Since retail is typically low-margin, it requires even more focus on efficiencies than other industries," said Alexander Grey, who serves as Head of A.I. Research at Infosys (formerly Skytree,) which offers 'turnkey predictive insights' at fixed rates, using machine learning. "On the positive side, that means that the impact of business improvements brought about by machine learning (marketing, personalisation, customer loyalty, inventory allocation, hiring, fraud prevention and more) is probably larger than it is for other industries. In other words, adopting machine learning seems especially urgent and critical for retail – and that is in the context that I don't believe any industry can afford to wait."

Then there is the counterpoint – and it's a valid one, depending on your perspective and business objectives – that if it has taken me, a researcher and writer whose job it is to cover new technologies in fashion, 15,000 words and a raft of expert interviews just to articulate what it all means, maybe the smarter money waits until more concrete ROIs are established, or until more accessible A.I. solutions reach the market.

"A.I. is the latest buzzword, and that's led many retailers to explore the different ways that the technologies can benefit their businesses," continued Julia Fowler of EDITED. "However, only a few actually have the capacity to take advantage of all the available data and use them to their full potential by themselves. A.I. algorithms require large curated datasets, top notch servers and infrastructure, and a team of experienced data scientists – all of which can become extremely costly. Not to mention the complications of managing something so different from a retailer's core business. Having said that, if applied effectively, technology can bring many positive transformations to fashion businesses."

Despite my optimism around A.I. in general, I agree with the contention that A.I. is so fundamentally different from any retailer or brand's business that asking them to refocus and really understand all the umbrella technologies would be like asking them to quit making blouses and go into running backend banking systems tomorrow.

This has been a difficult subject to analyse and present. Far more so than 3D working, or even the Internet of Things, which at least have agreed definitions. When it comes to A.I., tenured professors and technology experts alike are prone to coming up short in truly explaining core concepts. Even the famous Turing test – named after British mathematician, hero codebreaker, and father of modern computing Alan Turing – stops short of deciding whether a machine can think, and instead gauges how well it can fool a human into believing it is thinking the way they are.

If these experts cannot readily define what intelligence is, I do not believe a brand or retailer should have to concern themselves with how their A.I. assistant reached the conclusions it did from the information it was fed. And neither do I believe that they should blanket-hire programmers and data scientists out of a blind need to understand and adopt the latest technology. Because, like most enterprise technology before it, A.I. vendors are already working out how to take the sting out of its tail.

"Most businesses are not currently staffed to actually implement machine learning in-house, so they will need to use third party service companies to realise their vision," continues Alexander Grey of Infosys, who, among others, offer machine learning as a service, with the need for customers to invest in infrastructure and large numbers of in-house resources. "There are roughly three kinds of human activity needed in projects like these: starting with translation of the business problem to machine learning and evaluating the results, moving on to core data science work like modelling, and finally the usual I.T. issues associated with bringing in any new software. We focus on providing the first two pieces, with our expert data scientists, but this also has the effect of minimising the human time and skill needed for the actual execution."

And while governments are clearly investing in pushing the envelope of A.I. and fostering this kind of talent, some are also interested in setting down regulations that will provide brands and retailers with a better understanding of A.I. processes without having to investigate them in-house. From summer 2018[2], the European Union may begin to ask companies that create automated decision-making systems to provide end users with an explanation for how those decisions were made.

As for the deeper philosophical questions, for now we can leave those to the philosophers, while we instead ponder how to put theory into practice.

Start behind the scenes

Like many other technology trends, the most immediately compelling applications of A.I. are the ones that promise to reshape the retail experience for consumers. But while there may be clear ROI potential in the likes of personalised in-store advertising, perhaps the most practical place for many businesses to begin is with more mundane use cases that nevertheless offer similar, if not greater, monetary value.

"The opportunity to make sense of unstructured data and build use cases from it is tremendous, but you need to understand which of those use cases is going to move the needle in your particular business," said Steve Laughlin of IBM. "The customer-facing side of A.I. is the shiny object with the most obvious appeal, but there's a lot going on in other parts of our clients businesses. They can use A.I. to track attributes like local events, local weather forecasts, and the actions of local competitors to accurately preduce demand for hyper-local markets. Then, if they know that the retail performance of a particular SKU is highly affected by temperature and precipitation, they can better plan their inventory allocation for different stores based on accurate forecasting. And for businesses that have a lot of inventory tied up in supply chains and distribution, that can represent a significant financial improvement."

Address the industry you have, not the industry you want

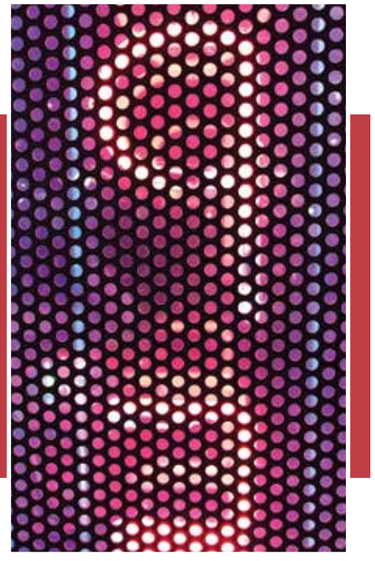
An important thing to remember with any emerging technology is to remain anchored in realism, rather than getting too carried away by less concrete possibilities. As thrilling as the idea of A.I.-led design no doubt is, at the brass tacks level shoppers still pay retailers' salaries, and the solutions the latter implement should therefore be targeted at improving the value they can obtain from that relationship.

"Today's shopper is price-sensitive and technologically savvy," said Cheryl Sullivan of Revionics. "It's an entirely different generation, accustomed to instant gratification, and a recent PWC survey revealed that 50% of shoppers will even buy outside their country if they can obtain a better price. In that context, it's a huge challenge for a retailer to know what price to begin with for a given product, or to properly plan when to take an initial markdown, how significant to make it, and how many more should follow. We use

machine learning to make optimal price recommendations that give retailers a good chance of reclaiming that 50% and more, but what it comes down to is them accepting that retail has been redefined and is now about art and science, rather than just art. I believe the retailers who will remain relevant in the face of Amazon and other disruptors will be the ones who embrace the potential of machine learning and use it to their advantage in the current retail market."

Supplement your work-force, but keep them safe

One of the most prominent reasons that businesses turn to technology is to avoid increases in overhead and headcounts as consumer demand and market pressures place greater stress on processes and individuals. But A.I. is a different beast: we know it hits the headlines when it makes factory workers and financial analysts alike redundant, and in theory it has the potential to do the same for an alarming number of job functions in the not-too-distant future.



Before we tackle that issue head-on, though, let's look at an instance where A.I. is being used to add expert-level capacity to an area of business where resource constraints can have a direct and material impact on international success and profitability.

"In most teams, the work of merchandising is done by a handful of people for a global audience," said Andy Narayanan of Sentient. "We all know, though, that people in New York don't dress the same way as people in Singapore, but there's an element of limitations on human decision-making there. Without increasing our headcount, we, as brands and retailers, have had to accept that we simply cannot make localised merchandising decisions for all our markets at once. With A.I., though, we're eliminating that bottleneck and letting the A.I. make decisions, engage with that shopper in New York, and understand what they want. Here, A.I. isn't replacing the job of merchandisers, but it is decentralising decision-making in the moment – the same way a local store manager or business associate would. I think that's the huge potential of A.I. in the future – the idea that we can do this at scale for merchandising, assortment planning, product recommendations, returns management and son on. I believe that every one of these common business challenges can become an A.I. problem with an A.I. solution."

As a senior figure within an A.I. business, Narayanan is bound to be optimistic. The reverse side, however, of solving so many business problems with A.I. is the possibility that human problem-solvers in these areas may become obsolete.

We have already discussed the sudden possibility for white collar workers and assembly line staff alike to be replaced by A.I. and robotics, but how far is this egalitarian approach to automation present in the RFA industry?

While the morbidly curious can investigate for themselves by visiting the appropriately-named www.willrobotstakemyjob.com (which pulls its data from a University of Oxford research publication written in 2013[3],) we can say with some confidence that key creative roles are currently considered extremely safe occupations. Indeed, fabric and apparel patternmakers are predicted to be more in demand than ever by 2024, while roles in apparel and footwear manufacturing threaten to go the way of electronics assembly work conducted by Foxconn, the world's largest consumer electronics contractor, which plans to replace 60,000 of its workers with automation and A.I. within the next three years.

For people who work on non-routine, cognitive tasks (which is to say ones that engage our brains and creative faculties), however, I can only see A.I. as good news for themselves and their businesses. Because far from replacing them, A.I. solutions will instead work to take weight off their shoulders, and provide them with the best possible starting point for more creative work.

Unchain creativity

When it comes to repetitive work, humans – fallible and expensive - are easily replaced by flawless A.I.s that demand nothing more than electricity and maintenance. For what we'll refer to as "higher order" tasks, though, the evidence seems to suggest that we will retain our edge for the foreseeable future.

Until the time (which may remain distant until the emphasis of commercial research and development shifts to a more general approach) that creative tasks like design fall under the umbrella of A.I., then, the best applications will be those that support human beings by taking on the time-sapping, innovation-light portions of their jobs, and allowing them to focus on more creative work. This, in turn, will allow businesses to do more – and be more creative, on balance – without dramatically expanding their creative teams.

A strong example of this approach in action comes from a Harvard Business Review feature titled "How Companies Are Already Using A.I.[4]" Here, the author sets out the case of the centuries-old Associated Press, whose team of just 65 business reporters were struggling to provide coverage of even a small percentage of the quarterly earnings stories their audience demanded. In 2013, the company contracted an A.I. provider, and began training the program to be able to write short earnings stories from data provided by financial research systems, without any human intervention. Two years later, of around 5,300 public companies in the USA, the Associated Press's A.I. was covering the earnings of 3,700 on a quarterly basis. As a result, the company's existing reporters were able to focus on producing detailed coverage of more complex stories, and not a single person lost their job.

This is a perfect case study of A.I. in use, because the program was trained by people who understood the business at hand, before being set loose to work on repetitive, low-value tasks that would otherwise have occupied huge amounts of human time. As a direct result, that same pool of human time is now spent on generating unique value for the business and its customers. And while the parallels between the worlds of publishing and apparel are limited, the same principles already do apply to cases where A.I. has been used in a similar way in our industry.

"I've seen this happen first-hand," Raj De Datta from BloomReach told me. "Our insights product is used by visual merchants to lay out their product assortments on their websites, and before machine learning they would have to dig through sales data and Excel sheets to figure out where, for instance, a particular evening gown should appear on a page. That involved a considerable amount of work. Now, they work from actionable intelligence that tells them what kind of evening gowns are trending right now, and it's then up to the merchandiser to decide whether to promote something that's already selling well, or to take action with something new that may capitalise on a trend. These are the sorts of decisions that only humans can make, so machine learning and A.I. here are shifting the time humans spend away from basic work – which computers can accomplish far more quickly – and towards higher order tasks that actually harness their creativity."

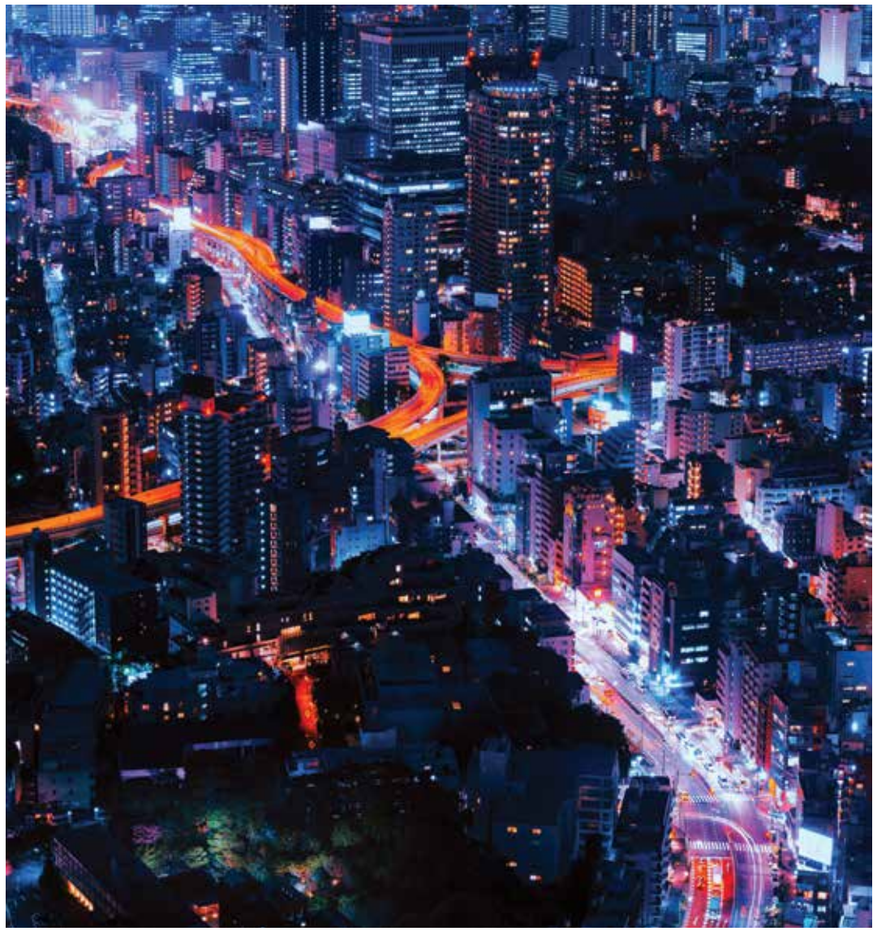
This drive for process transformation and efficiency in time-consuming manual processes will be familiar to readers of previous WhichPLM publications, where, even when they are tempted by exciting innovations like 3D working, most customers want PLM to get better at removing repetitive manual work like data re-entry.

Of course, actually designing or merchandising products is not the only kind of creativity occurring within a typical apparel business. The industry is waking up to the importance of connecting marketing departments to PLM – sharing common asset libraries and empowering advertising teams to better articulate the value of a product – and A.I. has already begun to support heightened creativity in this area as well.

"Working with A.I., my team is smarter, more efficient, and they're able to spend more time doing what they love doing," said Courtney Connell of Cosabella, whose A.I. marketing initiative delivered more than just improved KPIs. "When I hire someone out of college, I'm not burying them in busywork the way I would have done before. Instead, I can use their brains to their full capacity. I think everyone's terrified about A.I. coming in and taking their jobs, but for me it's a complete industrial revolution, so it's obviously going to free up people's time and challenge them to find better ways to use it, but I can only see that as a positive thing for society. I think that, as humans, we've become very machine-like over the past decade or so. There have always been repetitive tasks, sure, but we just were not meant to sit in front of a computer and do those tasks all day. That should be machine work."

Even with this relationship whereby A.I. solutions support humans in their creative endeavours, it seems inevitable that some roles will still either disappear or become impossible for their current occupants to hold as they change. But this should not mean the overall workforce will shrink; rather the onus will be on governments and corporations to ensure that enough people are trained and hired to fit into a greater range and diversity of new higher-order careers.

"As many other technologies have done in the past, A.I. is going to take over jobs," said Alexander Grey of Infosys. "But it's equally going to create



new ones – some that we can't even conceive of today. The only real risk with A.I. is that it might progress more quickly than we're able to diversify the workforce. As a comparison, robots came into car manufacturing and took over, but a lot of other job roles – car design, car sales, and industrial robotics – came into play. And although robotic automation is not pretty ubiquitous in a lot of industries, we now have more people on earth than ever before, and more of them are working than ever before. I'm not worried about A.I. itself, rather that our industries and governments may not be preparing fast enough to fill the new jobs that it will create."

Track down talent

Assuming they do exist in your local market, you may very soon find yourself needing to hire precisely the kind of talent that Grey talks about. And while I remain convinced that hiring data scientists en masse is not the right direction for most brands and retailers, tracking down the right talent may be a harder-fought battle than many businesses realise.

In essence, what it means to work in fashion is changing. A decade ago, a design, marketing, patternmaking, or similar course would be the logical on-ramp to a career in RFA; today it is an equally viable path to study advanced mathematics and to then specialise after graduation.

"If we take a step back and think about what we and other businesses are doing in this space, we're using a new class of technology to reinvent the entire value chain in retail," concluded Raj De Datta from BloomReach. "For us the specific applications are focused on the digital experience; for others it might be supply chain optimisation, store layouts, or trend prediction. Wherever machine learning and A.I. technologies are applicable, there are just so many ways for business processes to be completely transformed. At the moment there's a very clear shortage of technical resources who have fashion industry experience – and in fact specialised data scientists are sought-after in every industry. The net effect is that, if you're coming out a good university with a PHD in machine learning, you may have a guaranteed job in retail, but you also have a guaranteed job at the best tech companies in Silicon Valley, and the best hedge funds in New York City. That makes machine learning a very competitive labour market, and retailers are going to need to partner as much as will need to recruit their own talent."

From time saved to total transformation

Fittingly, for a subject that tackles what it means to be creative and to be human, there are no easy answers when it comes to A.I. There are, however, two cardinal rules that I feel prospective customers should attempt to abide by.

First, biding your time to make an investment in A.I. is perfectly valid, but businesses should take care not to underestimate the amount of progress that has already been made in this area. Anyone waiting for advanced general A.I. before jumping in is likely to be disappointed, either because AGI is eventually proven to be impossible, or because the value of a broad intelligence will be considerably less than the specialised systems we already have today.

Second, while it is possible to look at A.I. as a way of pursuing automation, and increasing headcounts across the board, ours is a creative industry where A.I. is currently poorly-equipped to take over human jobs. Today, a far better application is to use all the tools under the A.I. umbrella to automate just those mundane tasks that are sapping time from your business, and to retain all or most of your current creative team, giving them a new opportunity to push their creativity further without compromise.

At the time we wrote this publication, these repetitive tasks are in market, retail, and inventory allocation, but it is unlikely that these will remain the only stages of the lifecycle where A.I. will make itself useful.

"I want to make a strong statement here," continue Alexander Grey of Infosys. "I believe it's just a matter of time until machine learning, A.I., and automation transform at least half of what every business does. They have applications in sales, marketing, merchandising, product recommendations, loyalty programs, fraud detection, human resources – the list goes on. You need only look at the finance industry, where A.I. is making the future look extremely uncertain for financial advisors, and consider how comprehensively Amazon has transformed the retail industry using technology. Companies that are not using machine learning in any way will find themselves left in the dust shockingly soon. I firmly believe that's true."

And let us not forget that while the RFA industry is forging its own path for A.I., the wider world is likely to be even more receptive to the technology and its applications. And some – again, myself included – see A.I. as an engine for change and social re-engineering the likes of which our lifetimes have never seen.

"As far as I'm concerned, A.I. could trigger the next renaissance in human evolution," concludes Courtney Connell of Cosabella. "It's all too easy to just keep ourselves in that repetitive loop, where we're just doing the same things we've always done, and there's so much work that it's hard to srop and think about new approaches. As we use A.I. more and more, though, I see us valuing the human mind much more - valuing our own creativity, and valuing the time a human spends making something. I think that could be a really interesting shift in society because we don't know how far our minds can go. And I think that as long as we keep holding onto menial work because it's the only work we know, we'll never find out."

In the here and now, however, A.I. remains a tool. A tool with tremendous untapped potential, but, from a commercial perspective, a tool nonetheless. Its near-term applications will be supporting humans to not just keep their heads above water in the intelligence era, but also to make information decisions about the direction they want to swim in, and then to take more confident strokes towards their objectives.

"Our aim with A.I. isn't to automate jobs or dictate creativity – it's simply to give retail professionals the information they need to do their jobs to the best of their ability," adds Julia Fowler of EDITED. "We're not using A.I. to paint masterpieces, getting rid of painters in the process; we're giving painters better paints and brushes to help them create their own masterpieces."

This concludes our special editorial focus on intelligence. For more on new technologies, turn to the Future of PLM article at the end of this publication. Alternatively, to return to the role of core PLM in enabling business transformation, turn the page to discover an exclusive PLM story.

1. http://www.seagate.com/files/www-content/our-story/trends/files/Seagate-WP-DataAge2025-March-2017.pdf
2. https://www.technologyreview.com/s/604087/the-dark-secret-at-the-heart-of-ai/?set=607864
3. http://www.oxfordmartin.ox.ac.uk/publications/view/1314
4. https://hbr.org/2017/04/how-companies-are-already-using-ai

PLM STORIES:

PAM BUCKINGHAM

SHOES FOR CREWS

Pam Buckingham and Stuart Jenkins, Shoes For Crews' CEO and Chief Innovation Officer

The second in a series that began in our 6th Edition, this feature examines another apparel business's relationship with technology. Pam Buckingham, Director of PLM and Product Development at Shoes For Crews, tells the story of her life in PLM, and highlights a successful implementation where a high-speed hunt for the right solution was critical to supporting large-scale business transformation.

Pam Buckingham knows PLM. With at least four full implementations over the past fifteen years under her belt, she has seen first-hand the way the RFA industry has been transformed by technology. But her immersion in the inner workings of fashion began before she had even consciously chosen a career.

"I grew up in and around the apparel industry; my dad was a patternmaker and marker maker," she told me as we convened to talk about her latest PLM project at practical footwear company Shoes For Crews. "As a kid I would roller-skate up and down the floors of his cutting room, or help him with drill holes and notches when he did freelance grading out of our basement. My first job out of high school started with tracking samples, and once I graduated they asked if I wanted to learn to make and grade patterns myself, so of course I said yes."

As it turns out, this all happened at a critical juncture for RFA technology. The first computer aided design systems were seeing mass adoption in the late 1980s and early 1990s, and Pam recalls her work on the Gerber AM5 system as being the catalyst for a long-abiding love of technology. "As someone who'd seen all the papercuts from heavy paper, and the callouses on the graders' hands, I knew that I didn't necessarily love the physical part of patternmaking, but I definitely loved the digitizer board. I loved using the computer to straighten lines and create grade rules, so it was more the digital side of the industry that captured me."

Call it a function of being in the right place at the right time, or a result of her experience in both physical and digital patternmaking, but Pam soon became more than just an end user: she was soon instrumental in implementing new technologies for one of America's biggest outdoor brands.

"I then moved to California to work in patternmaking and grading on an incredibly complex product line, and eventually, with some great mentorship, I found myself managing that company's CAD/CAM systems. This was around the dawn of the Internet, and I remember approaching my boss at the time and suggesting that, instead of faxing spec sheets, we could build a website that allowed our suppliers to log on and download whatever they needed. I had always been encouraged to figure out how to put my ideas into action, so the company sent me to school over the summer, and when I came back we built a pre-PLM way of communicating with our contractors through the web."

In a natural progression, the brand Pam then worked for soon replaced its home-grown vendor portal with one of the first generations of fully-fledged PLM. And as an internal champion of collaborative technologies, Pam was tapped to explore the potential of new technologies to not just optimise but upend and totally redefine ways of working. "Being so involved in managing the ways that CAD/CAM had changed product development, it was only logical that I ended up working with data management and PLM when they came into play. Between the two different applications, I found that I had a real passion for process re-engineering – that idea of deconstructing everything, looking at how people interact with each other, and really mapping out how technology can be used to fuel change."

This is a passion that Pam has carried with her ever since, and one that the PLM market has only begun to embrace quite recently. Although things have changed in the past few years, the perception remains in some areas that PLM is simply a piece of software, rather than a tool to unlock more comprehensive business transformation. And while most brands, retailers, and manufacturers now think of the technology itself as essential, WhichPLM's customer surveys show that PLM selection and rigorous process re-evaluation still do not always go hand-in-hand.

> "Like a lot of experienced people in this industry, I believe that you cannot bring a product effectively today without technology."

"Like a lot of experienced people in this industry, I believe that you cannot bring a product

to market effectively today without technology," Pam says. "But at the same time, if you're implementing technology without also changing your processes, you are not doing the best possible job. You have to be willing to challenge and rebuild things - to ask hard questions about hand-offs and process ownership."

One company that appears to understand this attitude completely is Shoes For Crews, which brought Pam on board when it began looking for PLM in 2016, and asked her to lead its implementation project in earnest earlier this year. Shoes For Crews (hereafter also referred to as "SFC") bills itself as "the force behind the workforce," and produces durable, slip-resistant footwear for workers everywhere from catering to construction – keeping at least 100,000 workplaces safe worldwide. But while the company has always prided itself on the stability and safety of its products, its own internal processes needed to be not just optimised but overhauled, as Pam explains.

"One of the biggest challenges we faced – and it's a great one to have – is growth. We acquired another company in late 2016, expanding our portfolio. We also have licensing partnerships with other brands, where we take their silhouettes and add our patented non-slip outsoles, so over time the company has developed a much bigger product line, and has had to learn to manage more new products and new brands each year. And this is on top of a really significant new launch that we were preparing for in April 2017."

The "new launch" that Pam refers to might better be described as a whole new Shoes For Crews. Already unique, in that its patented outsoles come from a wholly-owned factory, SFC, under new leadership, had also begun to bring its product design and development processes in-house. "In 2016 our CEO and Chief Innovation Officer, Stuart Jenkins, decided that we needed to bring critical design and product creation processes in-house to ensure the best quality for our customers," Pam says. "So he set out to build a world-class product development team who could rebuild a lot of the company's product line from the ground up – designing from new lasts, with new materials and new outsoles, and working on women's shoes as their own product category, rather than grading down men's styles. He knew that he needed current technology to support these complex business processes."

> Like almost a third of PLM customers in 2016/17, finding a cloud-based solution was also one of Pam and her team's primary selection criteria.

Calling this a comprehensive change would be underselling it, so it should not be surprising that Pam saw simultaneous opportunities to implement new technology, to essentially redesign SFC's existing processes, and to introduce an inexperienced team to PLM. "At the time, we had a small number of people who had never worked in a system like PLM. Most of them had never had a material library or a last library before, and if they were going to execute and sustain this large-scale transformation, they needed that kind of technological support. So that's how we approached the market: we started from ground zero, shortlisted six vendors, and then narrowed our selection down to two that we felt could offer what we needed."

Pam is keen to remind readers that this was not a typical shortlisting and selection project, however. While it was important that she not bring any preconceptions to the table, she was nevertheless able to rely on knowledge gleaned from previous implementations to cut to the quick of what she and her team needed to see from vendors. "We didn't want to see Powerpoint presentations; we asked very specific questions, and we wanted to see how things worked in the system for real," she says.

Like Pam, WhichPLM has long advocated this style of "day in the life" demonstrations, where real-world data and use cases are evaluated, rather than pre-prepared presentations based on dummy data. In part this is because necessary functionality can be immediately observed – or its absence noted – but it also has the secondary effect of showcasing the solution's unvarnished user experience (or UX), for better or for worse. WhichPLM has previously referred to UX as the next major battleground for PLM vendors, and this particular implementation serves as a case in point.

> "It's important to get the core functionality you need first, and leave the added-value items for the future".

"The best way to gauge the usability of a PLM solution is to compare it to the services that your end users – particularly millennials - interact with every day in their personal and professional lives," Pam says. "When you first sat down to use Facebook or LinkedIn, did anyone have to teach you how they worked? No. And I understand that PLM holds more complex processes than either of those systems, but it isn't rocket science. One of the major reasons we selected the solution we did was its ease of use. Our product team were able to get in, navigate, and do a lot of the essential things without any guidance whatsoever, while a different system might have needed three or four days' training for each user."

Like almost a third of PLM customers in 2016/17, finding a cloud-based solution was also one of Pam and her team's primary selection criteria, and she is optimistic that the industry as a whole is gravitating towards off-premise solutions. "I think in the long run it's all going to be cloud. The burden on the business implementing it is so much smaller. Everything is so much lighter, faster, cost-effective and time efficient. At Shoes For Crews we went live in 42 business days, and I've been involved in enough implementations to know that that's ridiculous in comparison to traditional deployments. And it's not as though we had a small scope; our expectations were high, and the solution we chose has delivered even more than we planned."

And at both the individual user and the broader business level, PLM has proven essential to delivering the vision of a new Shoes For Crews, as Pam explains. "We make important products with a purpose. Our footwear has to be stylish and comfortable, but unlike a typical fashion brand or retailer, safety is our number one priority. With PLM we have the tools to track materials testing and certification with the click of a button, for example. And it's not just the obvious things: it used to be the work of a week to put together a presentation for a sales meeting, whereas now it's done in a few clicks. That's the power of having everything connected, and bringing together people working in different offices so they can share information in real-time and collaborate more closely."

But despite these clear and compelling results, Pam encourages prospective customers not to underestimate the work involved in truly making the most of the potential of modern PLM. "Working from experience I was able to do things more quickly, but for people who've never managed a PLM project, the sheer scope of what it touches can be so overwhelming," she says. "The vendor selection process alone can take six months if you're starting from scratch, and you should be thinking about a year-long project as a bare minimum."

The survey section of this publication contains advice from a range of different businesses (brand, retailer, and manufacturer) who have undergone their own PLM projects, so we asked Pam to add her own weight of experience and to set down some guidelines for how new customers should begin to approach the market.

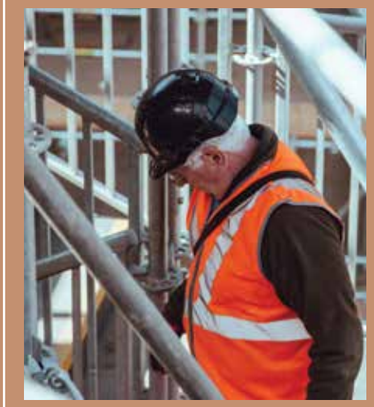
"It's important to research and network, first of all. Find other people who've done it and talk to them. Look up trending PLM topics on LinkedIn. Look at WhichPLM and other industry publications and blogs. Second, talk to your business partners and find out what the most painful part of their day is – what takes them the most unnecessary time? Write this all down. Look at how many times you've had one piece of information in different systems, because consolidating data, integrating systems, and gaining greater visibility into your vendor base is where you're going to save tons of money. Those kinds of cost savings are actually a lot easier to pull together than you might think."

And when it comes to actually shortlisting and selecting a solution and vendor partner, Pam believes that preparation will pay dividends.

"If you don't do your research and networking first, it's like going to the grocery store without a list. You'll come home with chips [crisps, for our UK and European readers] and cookies instead of the things you need to actually sustain yourself. The same goes for evaluating the features of PLM; sales teams will show you a bunch of cool stuff, but you have to remember your pain points, remember why your supply chain got disrupted or why you missed your intro dates. It's important to get the core functionality you need first, and leave the added-value items for the future. It will take time, patience, and a lot of work to get to where you want to be in the long term, but I know from experience that when it comes to PLM the payback is ample."

Keep watch on the WhichPLM website and our future publications for further instalments in the PLM Stories series.

Find out more about Shoes For Crews at **www.shoesforcrews.com**



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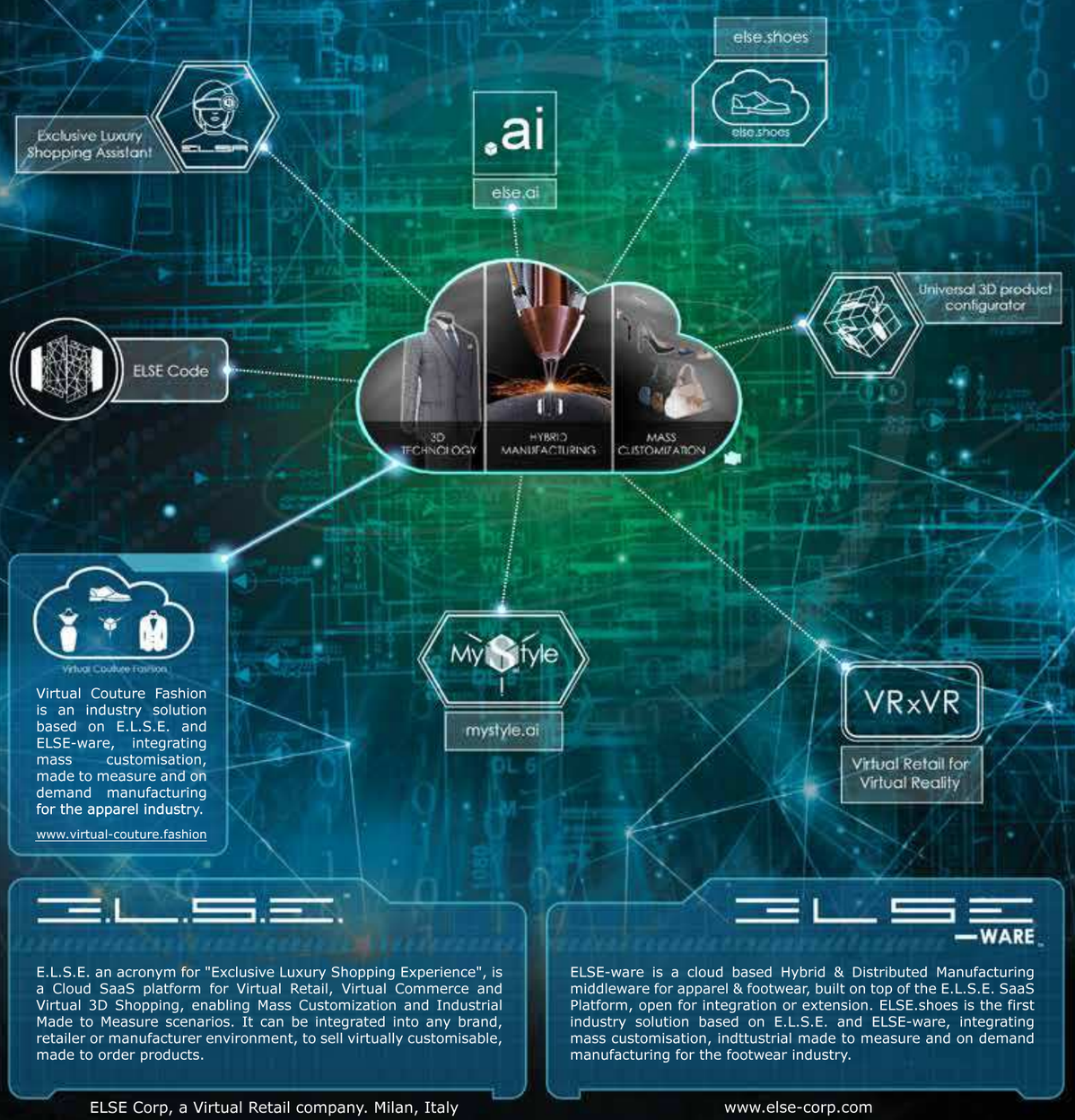

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E.L.S.E. an acronym for "Exclusive Luxury Shopping Experience", is a Cloud SaaS platform for Virtual Retail, Virtual Commerce and Virtual 3D Shopping, enabling Mass Customization and Industrial Made to Measure scenarios. It can be integrated into any brand, retailer or manufacturer environment, to sell virtually customisable, made to order products.

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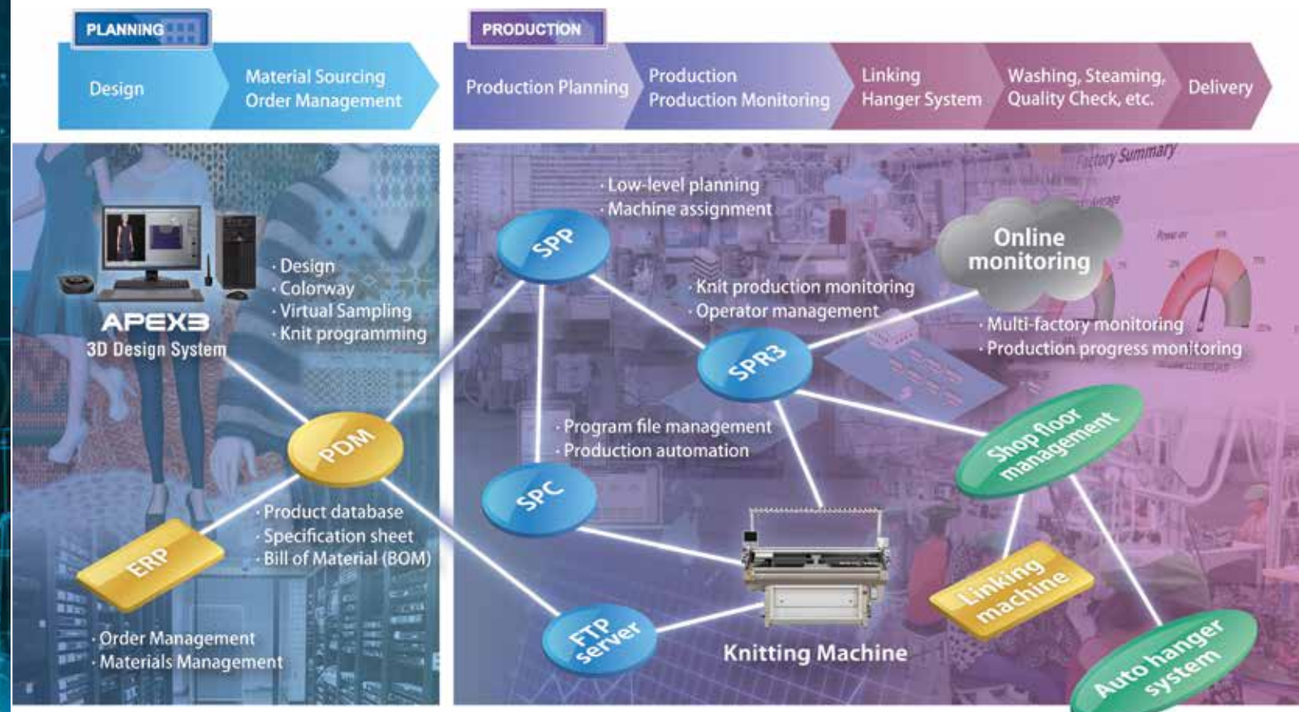

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THIS IS PLM BY SHIMA SEIKI. THIS IS THE SHAPE OF THINGS TO COME.

2017

PLM Customer Survey

This year marks our seventh survey of the global fashion PLM customer base. Beginning with our standalone Customer Survey publication in 2010, and evolving into the streamlined format we perfected in our 6th Edition, our data collection process has become both farther-reaching and more focused every year.

As always, we invited brands, retailers, and manufacturers on every continent to take part in our 2016/17 survey, from a cross-section of different business tiers – the boutique brand right up to the massive multinational. These companies provided detailed answers to more than 30 different questions, providing us with exclusive insights into how they prepared for their PLM projects, selected the right solution for their needs, planned for and managed their implementations, measured success (or otherwise), and laid the groundwork for future growth.

Their collected responses are analysed over the coming pages, with thoughts, context, and interpretation from our experienced analysts accompanying the raw numerical data. And, following extremely positive feedback from our 6th Edition, we again encouraged our survey participants to distil their PLM experience into short, sharp recommendations addressed to the next generation of prospective customers. You can find those on the adjacent page.

As the extent of the analysis contained in the following pages suggests, survey respondents have again provided a wealth of information and, again, volunteered no small amount of their time in service of creating a better-informed market for PLM. The entire WhichPLM team remains humbled by the commitment to knowledge-sharing shown by brands, retailers, and manufacturers in an industry often known for cut-throat competition. Without the help of these companies, we would not be able to continue producing what we believe remains – seven years on - the most accurate, unvarnished view of real PLM success and satisfaction in the retail, footwear, and apparel industry.

For readers short on time, a brief executive summary follows, highlighting the most noteworthy data points from our 2016/17 survey. As always, though, we encourage everyone – particularly those readers who are considering their own PLM project – to delve into the deeper analysis. Similarly, our Market Analysis section – which follows our PLM vendor and consultant listings – is essential reading for anyone who wishes to understand how these individual PLM stories fit into the broader context of an evolving market.

Executive summary

Our 6th Edition Customer Survey was a milestone for the industry: the first year that participants reported total satisfaction with their choice of PLM solution and provider. It is encouraging to see that result repeated this year, accompanied by 100% of respondents praising the ease of use of their chosen solution. On balance - since our survey participants represent a cross-section of the market in terms of geographical distribution and company size - these results suggest that PLM software has reached and is largely maintaining a high level of maturity.

But things are not so concrete across the board, and our 2016/17 results (particularly when read alongside the Market Analysis contained later in this publication) indicate that the RFA PLM industry is undergoing significant changes in other areas.

Today, almost a third of all PLM projects are off-premise in nature. We use "the cloud" as a catch-all term for SaaS, managed services, and other models that do not require a customer to set up and maintain their own hardware environment - and there can now be little question that this deployment method is rapidly becoming the future of the industry. When WhichPLM initially surveyed the PLM market, in 2010, there were no cloud implementations. And while that figure rose to 13% as early as 2014, an increase of a further 20% in just three years remains remarkable and is the highest figure we have seen to date.

Perhaps as a result of the ease of acquiring proven PLM software from the cloud, more customers than ever are choosing to forego traditional return on investment analysis, and our results show that fewer than ever are conducting a detailed shortlisting and selection process based on their own RFI or RFP documentation.

Although off-premise PLM does not necessarily mean low-cost PLM, most cloud solutions are now sold through monthly subscriptions, and targeted at small-to-medium businesses. The impact this transition is having on the wider industry is considered in our Market Analysis, but it is apparent from these results that the shift in emphasis towards the volume end of the market is already constraining vendors' abilities to manage their own implementations. In 2016/17, less than 10% of PLM projects are being handled by the vendors alone. The bulk of this work (a full 91%) is now being contracted out either in part or, in a third of cases, completely, to implementation partners.

Generally speaking, prospective customers of PLM in 2017 and beyond have access to more affordable, more mature software, and more agile implementation methodologies, resulting in a greater likelihood of project success. Nevertheless, as the volume of new name sales increases, further stretching vendors' internal teams, customers should take care to ensure that training, configuration and support – whether remote or on-site – are provided by an experienced, qualified third party.

PLM Project Advice from Real Customers

For the second year running, in addition to providing answers to the specific questions that follow, we asked our survey participants to also provide short snippets of guidance to readers who are considering embarking on their own PLM project. While the following pages include more detailed insight into how these real customers' projects performed, we encourage anyone charting their own PLM path to take in these words of advice from the retailers, brands, and manufacturers who have already begun their journey and who have the benefit of hindsight.

"Shifts in your business strategy may impact your implementation. Stay firm but flexible."

"Implementing PLM is not a simple process. It can be very successful if done methodically, and with the understanding that deadlines may need to be extended."

"You need to be aware of the options: out of the box (OOTB) versus a customised PLM solution. The more flexible options are expensive and can be a barrier to future PLM platform progress. Ask about agile implementation."

"Be wary of over-customising. This can create problems in the future with upgrades and integrations to other platforms."

"Out of the box (OOTB) is a myth. Before you start your PLM journey, look at your processes – are they standardised and documented and well-understood? What common practices need to be standardised into processes? Do this leg work first."

"Do your homework on industry best practices, and balance customisation with an openness to changing parts of your own processes and workflow."

"PLM will – and I believe should – change the way you do business. Are you ready for that?"

"Scope creep, scope creep, scope creep!"

"Assess the merits for both your technical (IT) teams as well as your internal business organisation to make sure you have 'checks and balances' between having a plan and delivering actual results."

"[Working with partners who have] appropriate understanding of the sector is important, but we also need to acknowledge that [fashion] is really late to the party. What can we learn from the way PLM has progressed in more mature sectors?"

"The ability to integrate PLM with your legacy systems will be important."

"We took on a new development team, and the new PLM system enabled that team to get up and running faster than having to learn a legacy system from an older team that no longer existed. Our supply chain stayed the same, though, and suppliers expected us to keep working the same way we had before. This meant some compromises in the implementation to allow legacy suppliers to continue to work."

"We used to invest a lot in interns whose time was often spent unproductively, doing administration or producing overviews. While the interns were 'cost effective' in some senses, the management time around them was not. [Implementing PLM] has delivered a big cost saving in this area, allowing us to reduce the size of our development team without a compromise in service or capacity."

"Spend time learning the software yourself, in order to improve the implementation. And make sure that the key external implementation team are identified and named in the contract – otherwise you are at the mercy of the supplier."

"Do your homework. Talk to people who have been through the PLM journey. Network, and learn from the experience of others. They will share if you ask!"

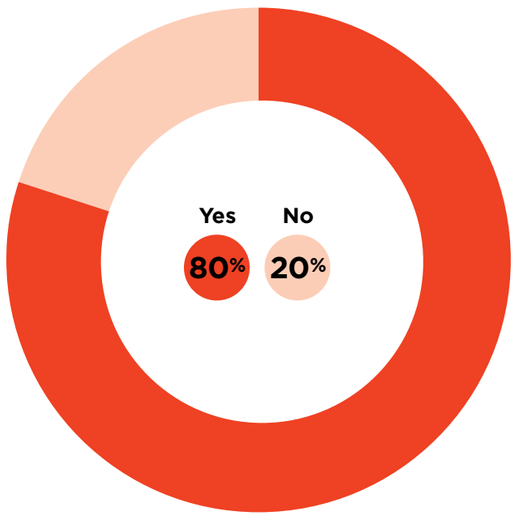
Section 1

PROJECT RESEARCH, PREPARATION, AND PRE-IMPLEMENTATION

1a.

Experience shows that often PLM project teams are hastily put together, without consideration given to their role. In recognition of the complexity of modern PLM projects, do you feel your team was equipped with the necessary knowledge of the true nature and scope of a PLM project prior to beginning shortlisting and selection?

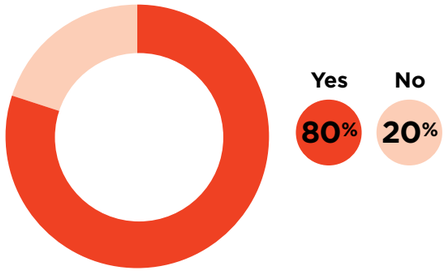
Analysis: Although PLM vendors are doing an increasingly good job of making their solutions configurable, cloud-deployable, and usable by non-technical professionals, selecting, implementing, and getting the most out of PLM remains a large-scale and long-term transformation project. Even where small businesses – which this year's results indicate are the largest PLM market segment by a significant margin – are subscribing to PLM for small, immediate use cases, this likely represents the first step in a multi-year journey. In our 6th Edition, only 65% of PLM customers surveyed believed that, with hindsight, their project team adequately understood the size and scope of the work they were undertaking. This meant that more than a third of PLM projects undertaken that year were not properly prepared for. We are glad to see a much more positive result this year, with more widespread recognition of how PLM will impact not just day-to-day operations but ongoing digital transformation.



> Do not underestimate the significance and impact of Organizational Change Management.

1b.

Did you conduct an in-depth analysis of your current business processes and associated challenges prior to implementing a PLM solution?



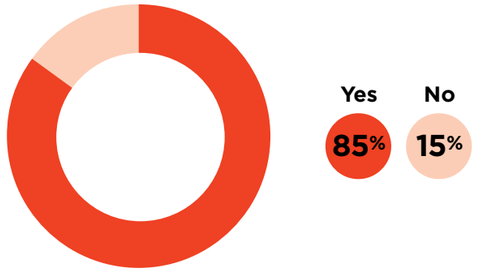
Analysis: As critical as mapping out the true potential of PLM itself, every implementation project should be prefaced by a detailed period of introspection, process re-engineering, and planning if it is to be truly successful. While this year's results show a minor decrease in the percentage of respondents who conducted this vital preparatory phase, broadly speaking the responses we have received to this question have been consistently positive over the past few years. It remains encouraging to see the vast majority of brands and retailers taking a considered approach – making sure they understand their own challenges and opportunities before approaching the market.

> Know your business processes inside and out. If possible, partner with a consultant to help you through the implementation.

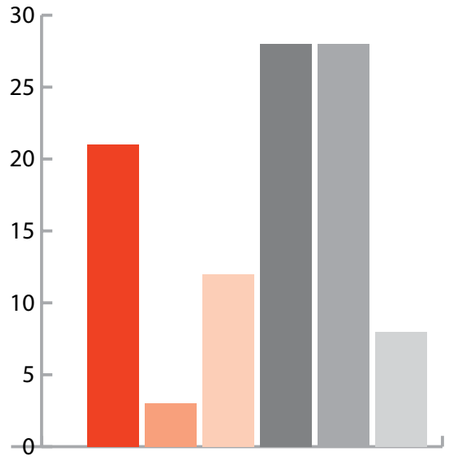
> I think it is important to do an evaluation of your company and how it plans to achieve its strategy, instead of just following the crowd or marketing spin. This is a long journey, so make sure you know where you are going and why first!

1c.

Did your business tailor its Request For Information (RFI/RFP) questionnaires according to the unique challenges and processes your project team had identified?



Analysis: Another critical early component of the PLM selection and implementation process has traditionally been the Refer For Information (RFI) or Request For Proposal (RFP). Until very recently, WhichPLM advised customers to tailor these questionnaire documents to ensure that the solution demonstrations they received were directly relevant to the challenges and opportunities they had identified during their introspection process. Today, with more mature, adaptable solutions, functional parity between major solutions, and more agile implementation approaches, smaller businesses likely no longer require such detailed RFI/RFP documentation. Larger businesses, however, do not have the luxury of taking a "one size fits all" approach, and should still commit to developing their own bespoke questionnaires.



1d.

WhichPLM believes that it is important for prospective PLM customers to conduct reference site visits before making a final PLM purchasing decision. Did you conduct any of the following before you made your decision?

Analysis: Customer reference interactions have long presented the best opportunity for new customers to ascertain how the functionality and user experience they have seen in pre-sales demonstrations transfer to a comparable production environment to their own, and to gauge the realised value of ongoing service relationships in real-world scenarios. We wrote in our 5th Edition, however, that "we believe that cloud deployments and improved configuration are beginning to change the nature of these references," and while the results we see this year are proportionally similar to those we saw in 2015/16, we still expect references as a whole to very soon take something of a back seat for small businesses buying fairly standardised PLM via a subscription model.

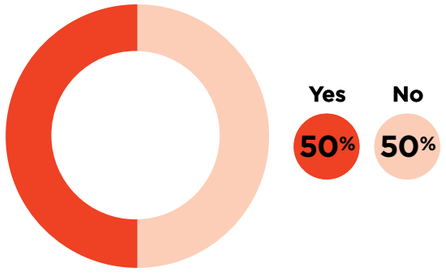
> We did a tremendous amount of research into the PLM marketplace before embarking on a PLM solution selection project.

> We also did a POC [proof of concept] with our own company data to better see a potential solution running 'live'.

PLM customer site visit organised by a vendor	21%
Site visit accompanied by a vendor	3%
Directly organised PLM customer site visit, unaccompanied	12%
Telephone reference calls	28%
Commissioning a consulting service to provide qualitative, unbiased insights into the vendor's customers	28%
None of the above	8%

1e.

Did you complete a thorough, scientific Return On Investment (ROI) analysis in advance of your implementation?

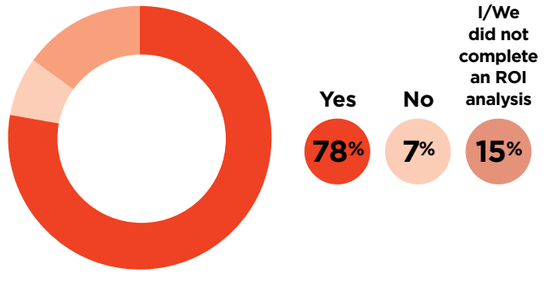


Analysis: Like any other large-scale capex expense, PLM projects have historically been subject to rigorous return on investment analysis prior to commencement – or at least should have been, when judged objectively and with the benefit of experiences. Counter to expectations, the responses we received in our 2014 Annual Review and 5th Edition, however, indicated that only around 40% of customers were actually conducting detailed ROI analysis before embarking on their PLM projects, with the expected knock-on effects to later evaluation and expansion work. That figure improved in our 6th Edition, only to fall back to an even balance this year – something we put down to the rise of configurable solutions built on top of proven best practices, that all but guarantee a return when properly implemented. For customers buying these solutions – particularly via low cost subscriptions that draw from opex rather than capex budgets - detailed ROI analysis is perhaps becoming unnecessary.

> Make sure to factor in the time and cost of doing nothing, as well as other factors that contribute to the real cost and/or real savings.

1f.

Did you use that ROI analysis to define your implementation strategy?



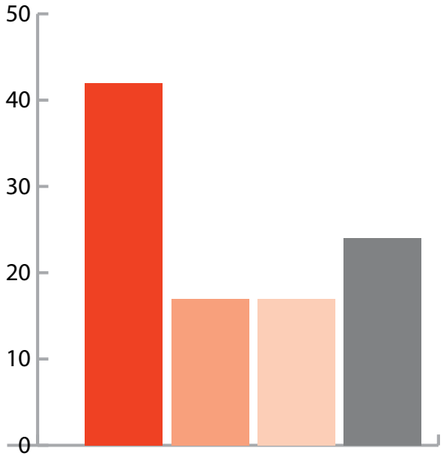
Analysis: In our 6th Edition, we wrote that "clean, clear data structures, an openness to less measurable kinds of value, and the rise of agile approaches to implementation are allowing a less rigid, more adaptable kind of PLM project to flourish". As this year's statistics demonstrate, that analysis remains accurate: improvements to the baseline functionality of PLM and a significant rise in the adoption of remotely configurable, cloud-based solutions are de-emphasising the importance of cast-iron implementation strategies, and helping the industry to shed prescriptive attitudes to ROI. This being said, the growth in popularity of the annual or monthly subscription model will ensure that emphasis remains on the delivery of early value, since short-term licenses will be far easier than their perpetual counterparts for customers to abandon should results fail to materialise on time.

> While ROI is an important metric, we wanted to make sure our implementation strategy was based on solid configurations, training and industry best practic.e rather than trying to beat the clock or reduce cost to meet some 'arbitrary' ROI goals.

> We are informed by our ROI analysis, but the implementation strategy is determined by the scale of the change management - in other words business impact rather than the cost of delivering.

1g. Did you conduct this analysis in-house, did you use a third-party ROI tool (such as an ROI calculator), or did you employ the services of a consultant or advisor?

Analysis: Where respondents did complete a thorough ROI analysis, fewer this year than ever before contracted a third party consultant or advisor to help with this effort. We believe that similar forces to those that have reshaped the industry's relationship with introspection, planning, and implementation structure have also had an effect here. Where previously retailers and brands might have thought of PLM as complex – leading a third of all customers surveyed in our 5th Edition to work with third party advisors to properly understand its value – today proven, configurable solutions and time-tested best practices are reducing the need for smaller businesses in particular to employ a third party to help maximise the value they obtain from PLM. Larger businesses, however, are more likely to rely on independent experts to help ensure the right return – in the right timeframe – on their initial investment.



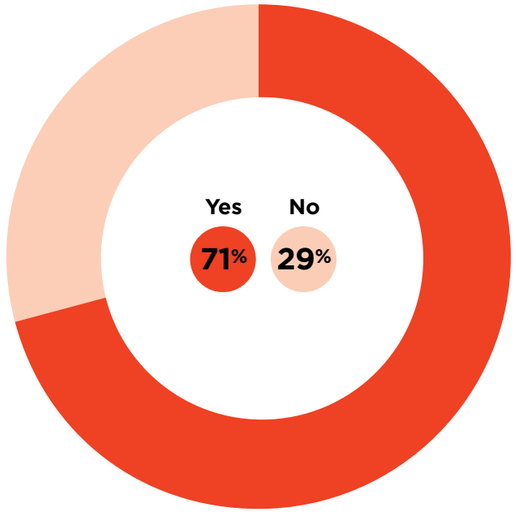
Internally	42%
Third party tool	17%
Consultant/Advisor	17%
I/We did not complete an ROI analysis	24%

> "Working with a third party helped us prepare for our implementation. They were able to provide assessments, recommendations and initial plans based on our unique business needs."

> "ROI is hard to quantify sometimes, especially in a Technical Design environment. Consultants can help a lot with this."

1h. Did you use any third-party consultants or advisors to help you plan your implementation beyond the ROI level?

Analysis: While more retailers and brands than ever are willing to work alone to define their return on investment criteria, a growing number (an additional 14% year on year since 2015/16) are choosing to commission consultants to help structure their PLM project at a higher level. Although small-business-focused, subscription-based solutions are becoming increasingly popular due to ease of deployment, the same challenges of integration and business transformation apply to any implementation – on-premise or online. In this sense, it is encouraging to see that, while the market is embracing more affordable, agile solutions, companies on the whole appear to recognise the important role that independent experts can play in planning a multi-year technology journey, and finding the right place for PLM in their digital workflow and I.T. ecosystem.

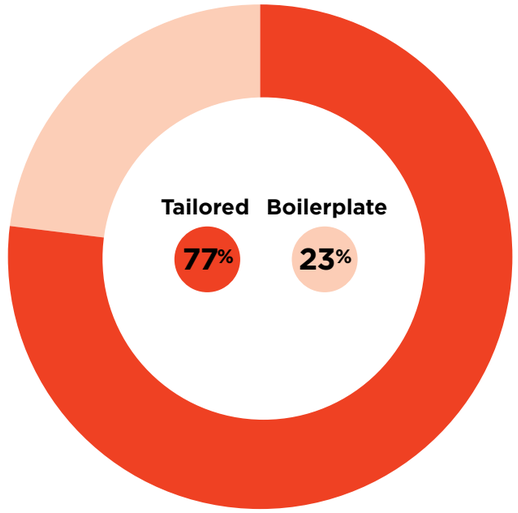


> "It was very useful to have a third party engaged before the implementation team within the business was formed."

> "Outside consultants are critical - they can be free from internal politics and influence."

Section 2

IMPLEMENTATION – WORKSHOPS, CUSTOMISATION & QUALITY



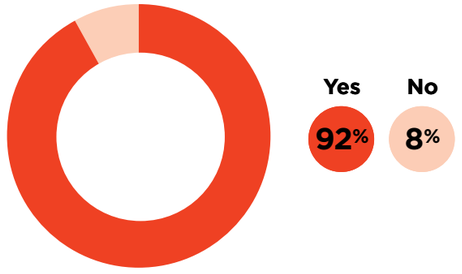
2a. Was your implementation drawn from a boilerplate template, or did your supplier tailor its method and milestones to address and prioritise those processes that offered the greatest ROI potential in your particular case?

Analysis: These results show a notable swing from those we saw in 2015/16, when only 9% of customers had used their vendor's boilerplate implementation plan rather than defining their own. This change is, we believe, emblematic of the same broader forces we have outlined in our analysis of previous questions. In a market where companies of all shapes and sizes share common challenges, and where the latest generation of PLM products incorporate proven best practices, the need for tailored implementation strategies is diminishing. We should note, however, that this principle applies only to PLM itself; more comprehensive integrations, digital transformations, and enterprise I.T. strategies should still be specific to each and every business.

> "We used our supplier's OOTB [implementation] template, but [the solution was] highly configurable to meet the specific needs of our business."

> "We had dedicated resources to configure the application, and whilst there was an overall standard project plan, we tailored it extensively to meet our unique requirements."

2b. Today, the majority of PLM vendors advertise out-of-the-box, ready-to-deploy solutions, with the need for little or no customisation. Whether you chose an out-of-the-box product or not, did you require any customisation to the solution you chose?



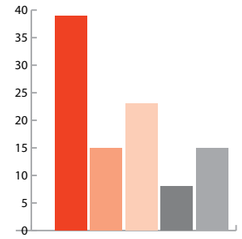
Analysis: Historically, PLM solutions were sold as "sandboxes," offering open-ended functionality that was then adapted to the needs of each customer through bespoke coding and development work. As a result, implementations were complex, time-consuming, and often resulted in over-customised solutions that became prohibitively expensive to upgrade. Today, the vast majority of PLM solutions emphasise non-destructive configuration – the bulk of which can be done remotely, and some of which is even accessible to non-technical team members. Although this year's results suggest that the vast majority of recent implementations required customisation, we suspect that the market as a whole does not always appreciate the distinction between that and configuration. And while some small elements of customisation will remain in most on-site implementations, cloud-based solutions may soon approach the point of total configurability.

> "[Implementing PLM within a] Vertical Retailer and Specialty Store with 1-3 brands is much different than a Department store with 15-20 private brands playing in apparel, home, footwear, etc."

> "Our system was configured to meet our business needs. Our goal was to avoid customisations in order to preserve the ability to easily upgrade the software without retrofitting each time."

> "We had minor additional attributes added for styles, some new calculations put in for landed cost and margin calculations, and some minor changes made to the calendar. In addition there was the interface to the ERP system, which had to be created, although this was done by ourselves in the end."

2c. Was any customisation you required conducted on time and to budget?



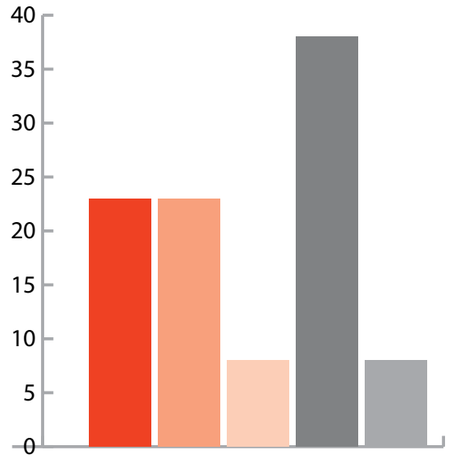
On time and to budget	39%
On time but not to budget	15%
Not on time but to budget	23%
Neither on time nor to budget	8%
I don't know	15%

Analysis: These statistics are a reminder that, even in a market where remote configuration is becoming commonplace, configuration and customisation work do not always go according to plan. While our 6th Edition survey showed that 70% of customisation work was completed on time and to budget, this year's result are a return to the proportions seen in our 5th Edition, when time and / or budget overruns affected 60% of projects. Readers should bear in mind, however, that this year's respondents appeared uncertain where the dividing line between configuration and customisation lies, so these figures may not be representative of the industry as a whole. In either case, it is important to remember that even remote configuration work can often come at a cost, and budget space must be allocated for this work as well as for any in-depth customisation or bespoke integration that is required.

> "Technically, there aren't any customisations in [the solution we chose], however, some of the 'configuration' needed either experts, or changes to config files behind the scenes, so I would still consider it customisation."

2d.

The rapid growth of the RFA PLM market is placing a great deal of strain on a very limited pool of highly skilled apparel PLM experts. In your opinion, were the implementation team (whether internal or third party) deployed to serve your project fully qualified and experienced in both fashion and the technical and functional aspects of PLM?



The team was experienced in the RFA industry	23%
The team had experience of technical implementations	23%
The team had experience of RFA-specific implementations	8%
All of the above	38%
The team lacked experience	8%

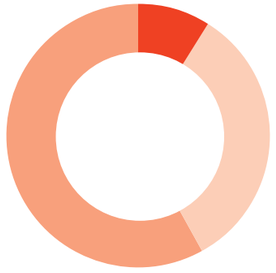
Analysis: Judged on the basis of new name sales and financial performance, the RFA PLM market continues to grow each financial year. Keeping pace with that growth has previously meant scaling a small pool of highly-skilled apparel industry experts to meet the demands of the middle market, but this is likely to change in the very near future. As our 2016/17 Market Analysis reveals, cloud-based solutions targeted at small businesses now account for more than 70% of all PLM sales. For vendors whose business models are structured around large, single sales to big businesses, forging entry into this volume market segment will demand automated implementations, online training, and other methods of managing a larger number of less lucrative customers. And while only 8% of this year's respondents felt that their implementation team lacked experience, the onus is now on vendors and their partners to maintain that standard in a changing market.

> "The team had experience of an apparel PLM implementation - but not [the solution we chose]. However, our Project Sponsor insisted on a Germany-based resource, and they were the only ones available."

> "It is critical to have an experienced RFA configuration expert on board - someone who has a great deal of knowledge of industry best practices."

2e.

Previous surveys have demonstrated a growing tendency for PLM vendors to contract their implementations out to third-party partners. In your case, was the implementation handled in-house by a supplier team, or given to a third party implementer? If the latter is true and was the entire implementation handled by them, or as a joint initiative?



Supplier	Third party	Joint
9%	33%	58%

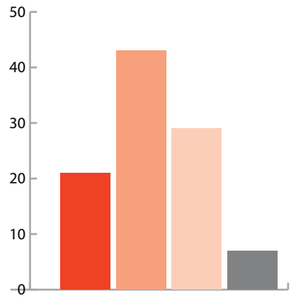
Analysis: Underscoring our analysis of Question 2D, these statistics demonstrate that a shortfall in in-house expertise has already led PLM vendors to contract out – in whole or in part – 91% of their implementation work. This is a significant increase on the 72% we saw in 2015/16, and is almost certainly driven by continued market growth and the explosion of the SMB segment. Customers should be aware, though, that the international third party implementer pool is also being squeezed, and while vendors would prefer to work with experienced, expert partners in every region, often the right partner is simply the one that has capacity to spare. As always, we caution customers to perform due diligence on any third party trusted to deliver all or part of their PLM project.

> "In hindsight - it would have been better to have implemented it ourselves after some more technical training. As the implementation partner was not that experienced, there were times where it felt like they were learning on the job - and the implementation probably cost more than it really should have."

> "I was hired as a consultant to implement PLM. I have since signed on as a Full Time Employee. So it's a combination here."

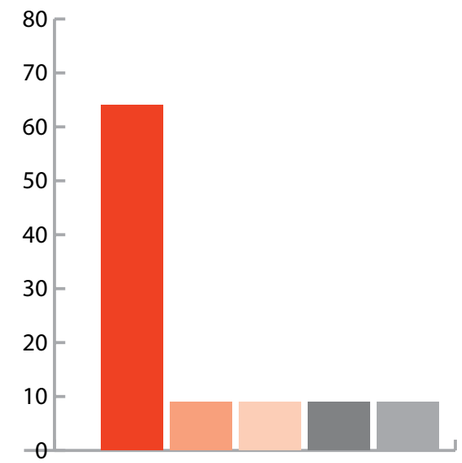
2f.

If your supplier did contract your implementation out to a third party, do you believe they were suitably qualified for this task – well versed not only in the technology itself, but in the particulars of fashion-specific processes?



The third party had fashion experience and qualifications	21%
The third party had technical experience and qualifications	43%
The third party had direct RFA PLM experience	29%
The third party lacked experience	7%

Analysis: These figures provide further evidence to support the cautionary statement in the analysis accompanying the previous question. Compared with our 2015/16 results, while an additional 15% of third party implementers this year demonstrated technical experience – i.e. had previously implemented PLM or other enterprise software of a similar scale in other industries, or in manufacturing –10% fewer could show direct RFA PLM experience, and an additional 7% lacked both technical and industry experience entirely. As the volume of new name PLM sales increases, WhichPLM believes it will be vital for vendors to establish or accelerate formal accreditation programmes to ensure that each of their partners is capable of delivering an effective implementation within a brand or retail setting.



On time and to budget	64%
On time but not to budget	9%
Not on time but to budget	9%
Neither on time nor to budget	9%
I don't know	9%

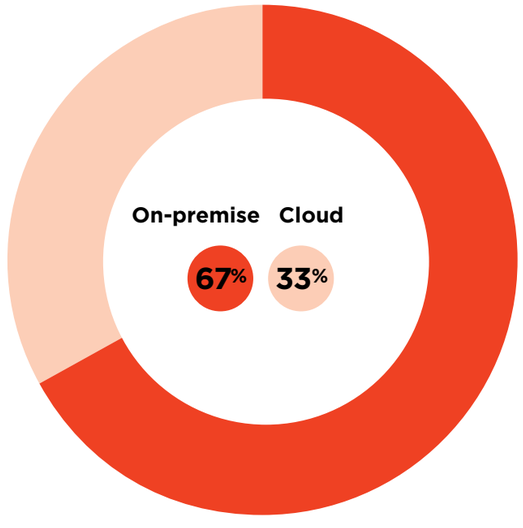
2g.

Did your supplier and/or their third party implementation partner complete your overall implementation project on time and to budget?

Analysis: On the surface these statistics seem discouraging, with 9% fewer implementations completed on time and to budget in 2016/17 compared to last year. Analysing the data in more detail, though, we see that this shortfall is accounted for by projects that were delivered by their deadlines, with budget overrun as a consequence. Judged as a whole, the same small percentage of PLM implementations missed both their time and cost targets as they did in 2015/16. And when we consider that, in 2014/15, a full 45% of projects either lagged behind schedule, cost too much, or were both overdue and over-expensive, it appears as though implementation success is proceeding in the right direction. It will be interesting to see, however, how this changes as rapid, remote implementations become more common, and the industry revisits the question of when a PLM project – often a multi-year transformation journey – can be said to be complete.

> "Some compromises had to be made in order to fit into the budget and hit the deadline. So whilst we were successful from a cost and time perspective - we compromised on scope to achieve this. With more experience from the third party implementation team, I don't think we would have needed to have made those scope compromises."

> "Manage stakeholders closely, scope creep will be your enemy if not managed."



2h.

How was your PLM solution deployed? On-premise (using your own servers) or via the cloud?

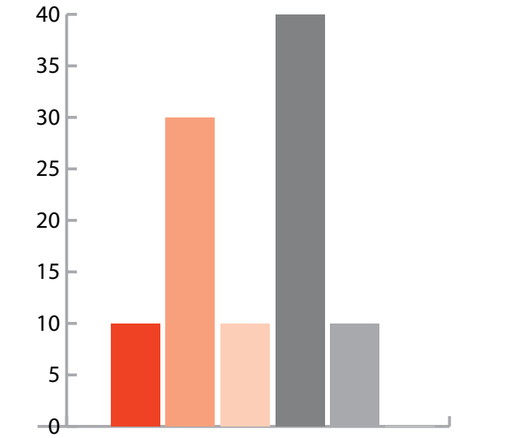
Analysis: The RFA PLM industry has flirted with cloud deployments for several years, with between 13% and 24% of our survey respondents reporting that their solution was hosted off-site between 2013/14 and 2015/16. This year's statistics show the most significant swing to date in the direction of the cloud, with close to a third of all customers we surveyed having bought PLM through one of the off-site models we collect under that umbrella. While this is noteworthy enough compared to the previous high watermark (demonstrating growth in cloud uptwake of 9%), it is important to remember that as recently as 2011/12, 100% of the PLM customers we surveyed were on-premise implementations, with a traditional license and maintenance pricing structure. And while not all cloud PLM sales are via subscription, we believe the bulk of the small business market will very soon acquire PLM the same way they do Microsoft Office or Adobe's Creative Suite.

Section 3

AFTER IMPLEMENTATION - SATISFACTION

3a.

In WhichPLM's experience, typical project costs are becoming far more evenly balanced between licensing and services. What was the ratio of software licencing to service costs for your project?



1:8	10%
1:6	30%
1:4	10%
1:2	40%
1:1	10%

Analysis: When PLM first entered the RFA industry, the vast majority of a typical project cost came from what we refer to as services (the vendor providing training, implementation services, customisation, configuration, and ongoing support) rather than from the expense of purchasing the software licenses themselves. This discrepancy is referred to as the software to services ratio – something that a decade ago would have been expected around 1:10 in favour of services, with ten units of service cost for every unit of software cost. This gap has been steadily closing, however, and our 6th Edition showed a ratio of 1:2 as the most popular costing model across a cross-section of PLM projects. Interestingly, though, while 1:2 remains the most popular ratio this year, we also see year-on-year spikes in the 1:6 and 1:8 ratios (a combined 40% versus last year's combined 10%,) suggesting that larger enterprise implementations are still being attached to extensive, expensive service contracts.

3b.

Following on from your initial introspection, ROI analysis and implementation, have you been able to quantify on a process-by-process basis the value that PLM has delivered to your business?

Yes	27%
Too early to draw conclusions	64%
No	9%

Analysis: This has always been a difficult question to interpret. Over the past two years, 50% or more of the customers we surveyed reported that it was too early in their PLM project to say with any certainty whether it had delivered the expected return on investment from process improvements. While this year's figures are similar in that more than half of respondents could not provide a concrete answer, it is encouraging to see that almost 10% fewer customers (9% this year versus 18% in our 2015/16 survey) knew that the expected process-by-process improvements had definitely not been realised. We should note that this does not mean that more than half of all implementations remain unfinished; the nature of PLM as a transformative, enterprise-wide initiative means that years' worth of data are often required for a full return on investment analysis at the process level to become feasible.

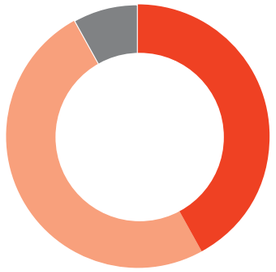
> "Many aspects of our PLM implementation were a 'Proof of Concept'. Some turned out valuable, others we decided not to go forward with in a big way. This impacts future ROI."

> "All processes are now far faster, data is now accurate and readily available across the company."

> "Make sure you can quantify time savings. Use manufacturing techniques of task time - how long a task takes."

3c.

Has your PLM solution enabled you to achieve increased sales and revenue by allowing you to position your product launches more effectively and cut product lifecycle times?



Yes	42%
Too early to draw conclusions	50%
No	0%
I don't know	8%

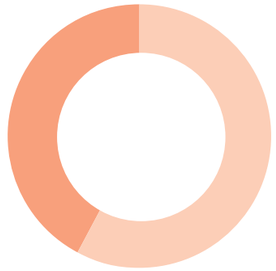
Analysis: In a market increasingly defined by fast fashion and the emergence of a "see now, buy now" attitude to catwalk styles, it is little wonder that shortened lead times, better-positioned product launches, and on-trend delivery are among the most often-cited reasons for customers of all shapes and sizes adopting PLM. And unlike total process overhauls – the measurable outcomes of which may not visible for years – the results of brands and retailers being able to get better products to market faster are often evident within the space of just a few seasons. This is evidenced by our 2016/17 statistics, which show an additional 23% (compared to the same question last year) being able to draw concrete conclusions about the success of PLM in this area, and 33% more reporting that they had obtained definite time-to-market value from their PLM project.

> "Giving vendors and suppliers access to PLM to do their sharing within the tool has streamlined communication."

> "[We have achieved] better margins and improved supplier management."

3d.

Please rate the PLM solution you chose on its ease of use, and quality of the user experience averaged across all modules. Are your users satisfied with their day-to-day working environment?



Not at all	Quite	Very
0%	58%	42%

Analysis: In previous publications (and our freely-available online Supplier Evaluations) we have referred to the user experience (UX) as one of the next "battlegrounds" for PLM. This prediction was based on the influx of a new generation of apparel industry professionals who will expect enterprise software as considered, intuitive, and attractive as the operating systems and applications they are accustomed to using in their personal lives. But while this year's figures – and the customer quotes that accompany them – suggest that PLM vendors are now developing user interfaces (UIs) that meet some of the expectations of digital natives, a better UI does not automatically solve the problem of onboarding longer-serving team members who are unaccustomed to working in a formal system. Customers should be aware that, however user friendly a solution appears, transitioning to working with PLM can be a significant cultural change – particularly for creative teams.

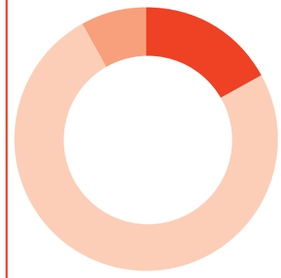
> "Despite a lot of initial suspicion, most users are very satisfied with the system, with very few users unhappy with it. There are always improvements that can be made to the software, but we are not having to make constant upgrades to the system - we will probably take them every 18 months to minimise regular disruptions."

> "Very user friendly. Easy to navigate without a lot of instruction."

> "They moved from an Excel existence into a governed, structured, systemized process - there has been some resistance!"

3e.

Please rate the PLM solution you chose on the basis of its speed, which might include refresh rates and the number of clicks required to navigate to commonly-used functionality.



Slow	Acceptable	Fast
17%	75%	8%

Analysis: Distinct from user interface (and only one component of UX,) the speed of PLM can be extremely variable between different modules, different solutions, and, most importantly, different deployment methods. It is perhaps telling that, in a year where almost a third of all implementations were cloud-based, we have seen a fairly dramatic reduction (37%) in the number of respondents who characterise their chosen solution as "fast". While the move to off-premise hosting is being driven at least in part by affordability, with no in-house servers for customers to maintain, it may come at a cost in other areas; externally hosted applications are reliant on robust internet connectivity, server performance, and other variables. The benefits of the cloud model are numerous, but customers must bear in mind that, for some time-sensitive tasks, performance may be noticeably slower than a self-hosted alternative.

> "Since we decided to host the system on [a leading distributed computing platform], and it is a web based system, it is not as lightening fast as if we had hosted it in our server room - but we are happy with the compromise. Users dont really suffer any performance issues unless we are printing seasonal collection books - while there is a technical 'fix' for this problem, we decided we didnt want to spend a large amount of money on a problem that only occurs for a handful of days per year."

> "I think all companies should benchmark a prospective solution's ability to process information or generate a tech pack to compare one solution to another. I realize this may be difficult to do for a true comparison but I think it's an important measuring stick."

3f.

Please prioritise the following functional areas (1 being the most important; 5 the least) according to where you would like your vendor to focus their development efforts in the near-term future.

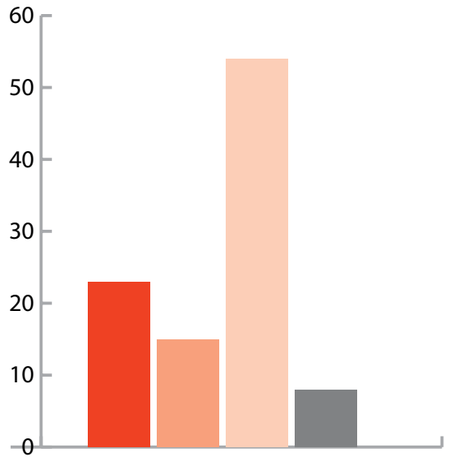
1	Creative Design (Trend Analysis, Storyboard, 2D Design, 3D Avatar & Engineering Design, 3D Printing, CAD, Knits, Weaves etc.) Management Functionality (Calendar Management, Critical Path, Change Approvals/ Disapprovals, Automation & Workflow, Business Intelligence, Dashboards, Reporting)
2	Technical Development (Technical Specification, Sizing & Measurements, 2D Pattern & Design, 3D Virtual Design & Sampling, Sample Management) Merchandise Planning (Financial, Placeholder, Assortment, Line List, Materials, Colours & Attributes, Store, Markets, Visual)
3	Materials Development (Material, Component, Trim, Packaging, Labelling)
4	Marketing and Customer Engagement (e-Commerce Content & Maintenance, Magazine Creation, Photography & Editing, Social Media, Partner Collaboration, Translation Services, Competitive Analysis)
5	Consumer Experience (Voice of the Customer, Product Testing, Surveys, Specialty User Testing) Sourcing & RFQ (Costing Bill of Labour, Quotation Management, Supply Chain Tracking, Visibility & Control, Supplier & Relationship Management)

Analysis: Despite significant innovations in 3D design, development, and marketing, the Internet of Things, A.I., and other new technologies, our respondents' appetite for new and bleeding-edge functionality has always taken a backseat to improvements to the essential components of PLM. The figures we see this year do not alter that trend, with better technical development and core management capabilities remaining high on customers' wishlists. As smaller businesses, whose focus is predominantly on product creation, have assumed a larger share of the market by volume, creative design capabilities have risen slightly in importance, while sourcing and RFQ management – priorities for larger businesses – have fallen to the bottom of the pile.

3g.

The unfortunate reality is that, for a variety of reasons, not all PLM projects reach completion according to their original vision. Was the initial vision for your project realised, or was that goal tempered in some way?

Analysis: Although these figures are more encouraging than those we saw in 2015/16 (or indeed in any previous survey,) statistically speaking, implementations are still far from guaranteed to run exactly according to plan. While slightly more of the customers we surveyed this year reported that their project had achieved its objectives completely, and slightly fewer were scaled back, it is not uncommon for some degree of compromise on the original vision to be required. As the quotes accompanying this analysis show, however, this need not necessarily be a bad thing; business priorities or the trading climate may change between planning and implementation, or the chosen supplier may announce a new module on their roadmap that the customer decides should be incorporated into a later phase of implementation. Today's more agile approaches to implementation are also better able to accommodate these kinds of alterations to the original shape and scope of a project.



Reached completion	23%
Scaled back	15%
Still in implementation	54%
On hold	8%
Cancelled	0%

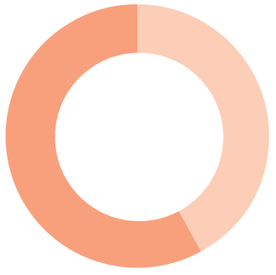
> "You should be open to changing course if the first attempt fails, or if the business climate or business needs change."

> "The impact of the change on the business was far greater than we first anticipated, in recognition of that, we scaled back into multiple phases."

> "We are waiting for the new version before we progress further. This has been our choice."

3h.

Overall, how satisfied are you with the PLM solution and vendor you chose?

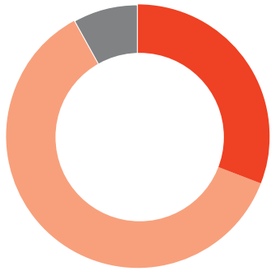


Not at all	Quite	Very
0%	42%	58%

Analysis: As the most succinct indicator of the viability of the RFA PLM market, we were encouraged to see a long-running series of incremental improvements to overall customer satisfaction (from 70% upwards) culminate in a 100% figure in 2015/16. At the time we referred to this as "one of the industry's proudest achievements," so we are thrilled to see that the same standard has been maintained in 2016/17. The challenge will now be for vendors to carry this level of customer satisfaction through to customers in the volume sector of the market, where boutique brands and retailers with as few as five users will expect similar levels of service, software excellence and support to their larger counterparts.

3i.

Are you considering replacing or upgrading your present solution – even if it's with a new version from the same vendor, which incorporates new functionality?



I am happy with the solution I have	31%
I am considering upgrading / expanding	61%
I am considering replacing my current solution	0%
I am not sure how I feel	8%

Analysis: As is to be expected given the total satisfaction revealed in the previous question, none of this year's respondents have considered replacing their current PLM solution – another achievement that is carried over from our 2015/16 survey. The composition of this year's results, however, are quite different, and indicate a subtle change in customers' attitudes to their solutions and vendor partners. At first glance we see that only 30% of respondents were happy with the solution they had – a dramatic difference from 70% last year – but a second look reveals that an additional 31% are considering either upgrading their current solution to a new version from the same vendor, or expanding its functionality. This, we believe, is a reflection of two major trends. First, the pace of software development and innovation is delivering more significant upgrades and additions to core functionality on a more regular basis. Second, the deployment of more configurable solutions in place of legacy toolboxes has seen more implementations remain on a viable upgrade path.

> "New versions of [our solution] come out around twice per year, however, we feel it is only worth upgrading every 12-18 months. It isn't worth the minor disruption to do it every time a new version comes out."

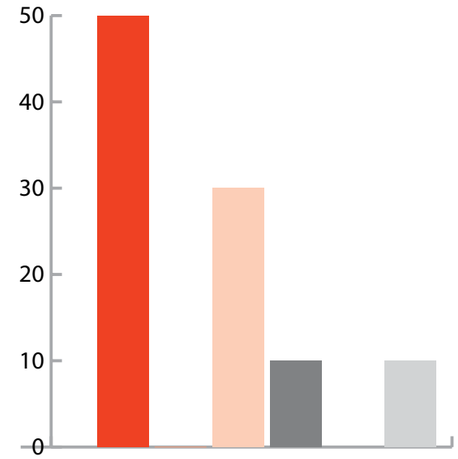
Section 4

CUSTOMER RELATIONS & PARTNERSHIPS

4a.

Does your supplier offer a support service that covers all time zones within your supply chain, on a 24/7 basis?

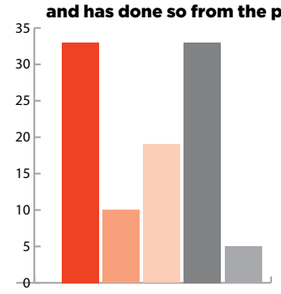
Analysis: Every PLM customer we surveyed this year was, broadly speaking, satisfied with the availability of the support services provided by their chosen vendor. An 80% majority have access to essential frontline support every day of the working week, and in almost a third of cases, into the weekends as well. While this mirrors the results we saw in 2015/16 in most areas, we can see a 10% increase in the number of respondents whose vendor-provided support did not cover all the time zones spanned by their satellite offices and multinational supply chains. As RFA PLM become more concentrated in the small business segment, with subscription models allowing new customers to spin up an instance of their chosen solution at any time, virtually anywhere in the world, 24/7 international support coverage will become essential. We expect to soon see vendors tackle this challenge with online training, videos addressing common challenges, and even A.I.-driven chatbots capable of fielding routine queries.



Covers all time zones 7 days a week	50%
Covers all time zones 6 days a week	0%
Covers all time zones 5 days a week	30%
Does not cover all time zones	10%
Provides support only to my head office location	0%
I don't know	10%

4b.

How would you class your supplier's support service? Does your supplier offer a support service that fully understands your configured or customised implementation, and has done so from the point of go-live?



Support fully understands the RFA industry	33%
Support fully understands my configured solution environment	10%
Support fully understands my customised solution environment	19%
Support has been in place since the point of go-live	33%
Support has been lacking	5%

Analysis: As evidenced by the responses we received to Question 2E, almost all PLM project work is contracted out by vendors some degree – either for initial implementation, or a host of different ongoing training, onboarding, support, and technical services. But while vendors' core teams – with few exceptions – tend to be made up of experienced professionals who know the RFA vertical intimately, the same cannot necessarily be said for the third parties who are tasked with delivering some or all of 91% of PLM projects. Fortunately the data we received from respondents in 2016/17 suggests that only a small portion of the support services they receive is provided by inexperienced third parties. Customers should set clear expectations prior to beginning their projects, however, since it is not uncommon for third parties to otherwise be reallocated to new contracts, leaving end users without a clear structure for ongoing assistance.

4c.

If your implementation was handled via a third party, who now manages your ongoing support?

50%	Supplier
8%	Third party who implemented
42%	A mixture of both

Analysis: As a coda to the adjacent analysis, these figures reveal that, in practice, very few third party implementers retain long-term responsibility for support. In the majority of cases, the support contract returns to the solution vendor – whose post-sales teams may be as strained as their roster of implementation consultants – or to a combination of vendor and third party partner. In the latter case, as the quotes accompanying this analysis show, customers may find themselves acting as intermediaries between two parties, neither of whom is wholly invested in seeing effective solutions realised quickly. Where customers have been told (or have reason to suspect) that their support will be shared between the vendor and a third party, it is vital to establish clear divisions of responsibility, so that issues can be addressed without delay.

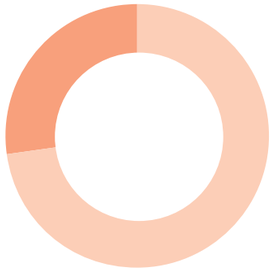
> "There are many types of 'support'. You should outline who your first line of support is for both technical and process related questions ."

> "We do rely on a third party implementer at times for support, and for their configurations and reports. When there is an issue without a known cause you are at risk [of one party, vendor or partner] blaming the other, which doesn't help resolve anything."

> "[It is essential] to keep strong ties to your vendor, do not rely solely on the integrator or supplier for support."

4d.

How satisfied have you been with the technical support provided by your PLM supplier and/or third party implementer over the last twelve months?



0%	Not at all
73%	Quite
27%	Very

Analysis: In the short term, every PLM customer we surveyed this year reported being satisfied with the support provided by either their vendor or third part implementer. Interestingly, though, the proportion of customers who were, by their own admission, "quite" satisfied or "very" satisfied is reversed when we compare our 2016/17 data to those collected last year. Without a detailed analysis of each implementation, it is difficult to pinpoint the root cause of this change, but our suspicion is that ongoing market growth (particularly at the small business end of the spectrum) is already beginning to affect the ability of vendors and their partners to provide outstanding support to every customer. It is also important to remember that many of the implementations covered by this survey are yet to be extended into the global supply chain, and these results may change depending on the level of support offered to customers' sourcing and manufacturing bases.

> "Asking vendors what type of global presence and exactly what Service Level Agreements they plan to have is important for [extending PLM to] your total supply chain."

4e.

Does your PLM supplier have a clear documented process and policy in place to enable you and other fellow customers to suggest NPI (New Process Introductions) and enhancements to the solution?

67%	Yes
8%	No
25%	I don't know

Analysis: In recognition of the long-term partnership that underpins a modern PLM project, customers typically remain in close contact with their supplier beyond the support level. After working with the solution for some time, they might privately request specific enhancements or changes to the solution itself. The supplier will then need to factor these requests and those received from other customers into their ongoing development - a process that often sees requests from more lucrative or prestigious customers taking priority. As with other elements of the relationship between customer and vendor, though, this paradigm is changing, with forward-thinking vendors targeting a more democratic approach and encouraging customers to put their ideas forward in public forums. It is encouraging to see that an additional 17% of customers in 2016/17 believe that their vendor has a clear, documented process for collecting these suggestions and requests.

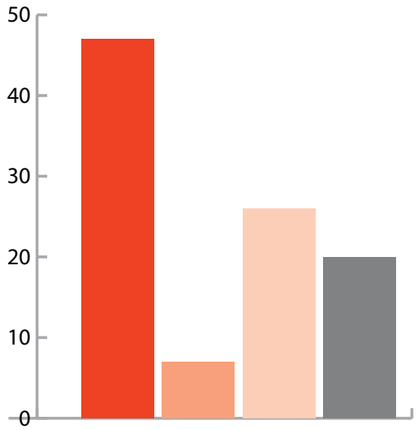
> "Ask your supplier to apply your requested features or enhancements to their roadmap."

> "Make sure you know the PLM provider's map or business plan. Even if you have your own priorities, if it doesn't fit into their total project plan for the year - you will have to wait. Especially if the vendor is 'waterfall' in nature vs Agile."

4f.

What mechanism(s) does your supplier have in place for taking on board your recommendations?

Analysis: To manage these change requests and recommendations, the majority of suppliers still appear to operate a "new requirements document" process, whereby a designated supplier contact submits a formal request that may or may not then be factored into development. Outside of this process, a democratic voting system is still only being offered in a handful of cases, and the remainder of new feature requests appear to be handled through bespoke development work, with the customer bearing all or part of the associated cost. As we have outlined earlier in this analysis, extensive customisation was once a necessary evil for larger businesses buying sandbox solutions, but WhichPLM does not believe it represents a viable option for the more democratic future of software development. Crucially, as more customers adopt PLM on the cloud, with patches delivered seamlessly to every user at once, the option of extensive customisation for an individual company may eventually disappear completely.



New requirements document, submitted by the customer to a designated person/team within your supplier	47%
Customer NPI voting system	7%
Offer from the supplier to customise the solution at full cost to the customers	26%
Offer from the supplier to customise the solution at a heavily discounted rate, with new or improved processes that will in time make their way into the core application	20%

> "Leverage Customer Advisory Boards when you can to help drive your 'customization' needs across other retailers."

> "Annual CAB (by invitation only) where we literally decide the direction the software will take through choice. This is democratic and effective."

Section 5

THE SHORT-TERM FUTURE OF PLM

5a.

Does your current PLM solution offer any of the following Corporate Social Responsibility capabilities? (Responses are weighted, with 1 being the most commonly-reported and 3 the least.)

Analysis: Only a small percentage of the brands, retailers and manufacturers we surveyed this year had implemented PLM solutions that incorporated some level of Corporate Social Responsibility (CSR) functionality – which was also the case in 2015/16. In WhichPLM's experience, this still mirrors the state of the industry at large: sustainability and compliance modules have only recently been identified by vendors as priorities for development, and as a result very few live implementations include these capabilities despite the appetite for them existing among customers. Among those respondents whose solutions did offer CSR tools (usually as part of their supplier management and sourcing functionality), quality assurance and quality control emerged as by far the most important to their businesses, while they placed equal weight on green design, technical, ethical, and environmental compliance.

> "These features were not available out of the box but were configurable in our system."

> "Surely these are coming."

1.
Quality Assurance & Control

2.
Sustainable Manufacturing

Technical Compliance (KPIs linked to the technical capabilities and competence of a supplier)

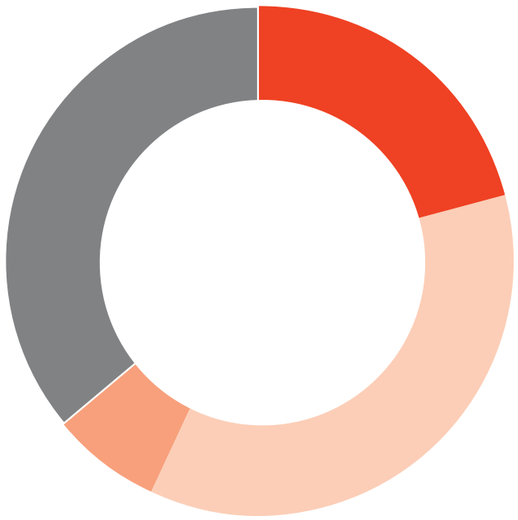
Ethical Compliance (freely available auditing information on your supplier and their ethical practices)

Green Design

3.
Environmental Compliance (freely available auditing information on your supplier and their affect on the environment e.g. pollution)

5b.

Is there a marketing module within your supplier's current PLM solution offering, and if so which of the following functionality does it incorporate?

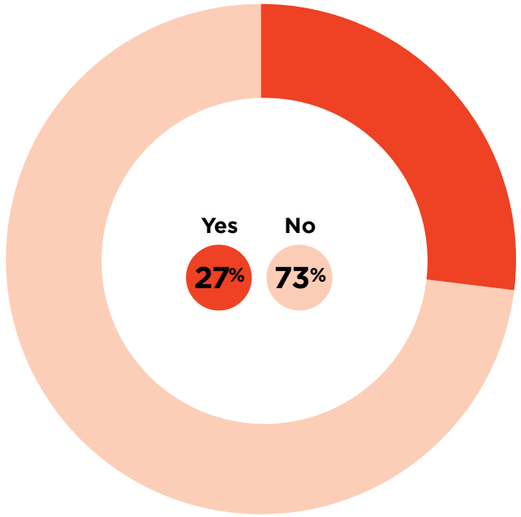


Analysis: Similar to Corporate Social Responsibility, marketing is a discipline that has historically been untouched by PLM. At WhichPLM we have long advocated for the extension of PLM functionality to sales and marketing teams, since the same essential product data that powers collaboration across design, production, sourcing, and manufacture can prove similarly useful when it comes to positioning products in front of retailers, consumers, or wholesale partners. Indeed, this year statistics show a 19% increase in the number of customers whose solution – either out of the box, or with some degree of configuration or customisation – supports integration to other elements of Adobe's Creative Suite beyond the common links to Illustrator, and more customers than ever are making use of PLM-held images and other assets to populate digital catalogues and collection books.

> "To be fair, we haven't tapped out the possibilities in PLM for supporting our marketing department. We plan to do this in the future."

> "[Our solution] has a limited ability to create online card style line plans."

Digital Asset Management (multiple file formats made available for different channels: print, e-commerce, reports, extended-PLM solutions etc.)	21%
Defined marketing data capture (a formal process for capturing marketing data e.g. short and long descriptions, how a product is to be used etc.)	7%
Automatic output of images and text to create online catalogues and collection books	36%
Ability to work within InDesign and/or Photoshop (InDesign for marketing publications; Photoshop for image editing and the creation of new marketing materials)	36%



5c. Does your current PLM platform feature a fully-integrated bi-directional apparel 3D module?

Analysis: Three-dimensional working is not a new concept in fashion. As our 5th Edition explains in considerable detail, the idea of visualising garments, accessories, footwear, and the retail spaces they occupy in 3D has been circulating for decades. It is only extremely recently, though, that the underlying technology has caught up to the vision, and that compelling use cases have emerged, delivering real returns on investment for brands and retailers around the world. As a result, this year's figures show a slight uptick in the number of respondents whose PLM solutions featured an integrated 3D module – either provided by a third party partner, or developed in-house. More notable are the quotes accompanying this analysis, which reveal that customers of varying shapes and sizes are looking to 3D for both longer-term objectives like large-scale customisation, and more immediate goals like improved supplier collaboration.

> "[We have] bet 100% on 3D mass customization."

> "Working with so many varied garment, home, and footwear vendors, having PLM host any type of 3D asset is important."

> "Not at this time, however I understand integrations to 3D modelling software is underway."

5d. WhichPLM believes that the IoT is one of the most disruptive technologies to enter our industry in recent years, and while it's unlikely that many brands and retailers have yet developed a firm IoT strategy, we nevertheless would like to know how you rate the following in terms of their potential value to your business (1 being of the highest potential, and 5 the lowest).

Analysis: The focus of our 6th Edition publication, the Internet of Things (IoT) is a far-ranging technological revolution, and one that is intimately linked to the dawn of the data and intelligence era, as examined in great deal throughout this Report. Like any large-scale transformation, however, a gap still remains between the promise of the IoT and its visible results – and a year on very few use cases have been made public. It is interesting to see, though, that customers' attitudes towards the medium-term value of the IoT have reversed this year; the majority now see more promise in visible applications like augmented reality than they do in heightened integrations between enterprise software and hardware. We do not believe that this change is because the "backend" applications of the IoT lack value, but rather that that value is less immediate, and more difficult to visualise.

1	The ability for your ERP system (capturing sales data) to share data with your merchandise planning system in real-time.
2	Information to trigger from PLM to the marketing teams in an automatic way (i.e. once a native image is approved, upon saving, the system converts the image into multiple formats which can be used for e-commerce, marketing collateral, supply chain partners etc.)
3	The ability to utilise data from PLM or 3D during a fit session so the data can be overlaid (augmented) on the fit model, to present 'how to measure guides' or provide more details on material & trims etc.
4	Technical specification data and images to flow into the front-end retailer/brand to support augmented reality, by overlaying data on products and/or a virtual mirrors within the fitting room.

5e. Whether you are a retailer, brand, or supply chain partner, how would you rate the following in terms of importance (1 being of high importance and 5 being of low):

Analysis: More than at any other time in WhichPLM's history, the future of PLM is open-ended. As the editorial features towards the beginning of this publication explain, the RFA industry's transformation to a digital business opens the door for a huge range of different applications for PLM functionality and the data that modern PLM solutions - the backbones of integrated enterprises - hold. We presented customers with a small selection of these possibilities, and the results suggest that (unlike previous years where capacity planning and concept-to-consumer tracking were considered top priorities) customers are becoming more interested in production automation, and the actionable intelligence that can be gleaned from extracting information from the traditionally-disconnected manufacturing process. For more on the role of information and intelligence throughout the product lifecycle – including the point of manufacture – please return to the editorial features at the start of this publication.

1	The ability for the PLM system to support automatic (push & pull) triggered notifications and commands coming from creative design systems - including 2D, knitting, weaving, packages - that supply data on approved products directly back into PLM with their current lifecycle status. As above the ability for 2D CAD pattern systems that on completion of an approved 2D pattern, would automatically update PLM on its current lifecycle status and would then use a push command to drive the next process (e.g. automatically instructing the marker maker, to proceed with marker making / lay planning).
2	Automatic notification of material types, cut plans, cutting parameters and production data feeds to be shared with the cutting machine when the material spread is ready for cutting. Cutting machines (on completion of style and quantity) to also share (actual cut data) details back to PLM to monitor tracking/ visibility of a given product's stage/status in the production process.
3	The ability for material information (width, length, utilisation etc.) to be fed to a spreading machine upon approval/ completion of the marker/layplan.
4	A material inspection machine that could automatically record quality defects in the roll and share these with the spreaders, cutting teams and quality control teams. The ability of PLM to track products from concept to consumer.
5	The ability of PLM to support human resource and capacity planning in both retail stores and across the extended supply-chain e.g. manufacturing.

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simple

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actionable

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Based on 20+ years of experience working in fashion houses with designers, production, merchants, marketing, PR, sales and shared services (i.e. HR, IT), we have developed intuitive cloud-based applications — Knowledge Vaults: PLM, Samples & Marketing.

Our technical enablers, tell the beginning to end story of a STYLE by offering dynamic reporting through normalized data and visual asset. These tools provide repositories, tracking systems, calendars, and strategic planning and measurement applications that can stand-alone or be customized to interact with other systems and platforms.

PLM Vault:
A comprehensive story on your Product Development. Your products are built with many details and have a story. Our Vaults organize metadata and images, so all the chapters of the story are captured in a normalized environment for reporting:

Line Sheets	Tech Packs	BOM
Raw Materials	Costing	Projections
Margins	Grading	WIPs
POs	and the list goes on...	

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Advisory Services from WhichPLM

Experts in PLM and emerging technologies.

The retail, footwear, and apparel industry is in the midst of a digital transformation. To keep pace with consumer demand, outdated processes and legacy solutions need to be replaced by best practice and cutting-edge technologies.

Brands, retailers, and manufacturers all recognise the need to make careful choices when it comes to creating a foundation for future growth, but finding and implementing the right solutions isn't always as straightforward as it seems. Business cases have to be made, extensive data cleansing and process re-engineering must take place, followed by shortlisting, selecting, implementation, and ongoing training and support.

Working with major brands in Europe, the United States, and Asia, and across every stage of technology adoption, the WhichPLM advisory team has helped brands and retailers of all shapes and sizes to seize the opportunities presented by PLM, E-PLM, and other emerging technologies.

Why work with WhichPLM?

- We have been proponents of fashion technology since the late 1970s.
- Our leadership group was instrumental in launching the world's first fashion-specific PDM and PLM systems.
- We have real-life, hands on, needlepoint experience of every process in the global supply chain.
- Our team has designed and developed integrations and APIs between a range of different solutions over the course of several decades.
- We have been part of hundreds of fashion-specific PLM and E-PLM projects.
- Beyond PLM, we cast our net even wider, with internationally-recognised experts in material innovation, fashion design, global manufacturing, digital printing, and other supply chain in-house processes.
- We offer the only fashion-specific, accredited PLM training programme in the world.
- We are the only consultancy that is continually evaluating the leading PLM and 3D vendors, making our findings freely available to all.
- We are long-standing futurists, passionate about new technologies like the IoT, blockchain, AI, and 3D printing – with detailed publications covering three of these topics.

whichPLM

www.whichplm.com

With more than 40 years' experience in fashion technology, WhichPLM are recognised as apparel PLM and E-PLM experts, and our advisors are ready to help your business make the most of new technologies and succeed in your digital transformation.

Full references are available upon request.

Contact advisory@whichplm.com to arrange an introductory conversation.

PLM Vendor Profiles.

FINANCIAL YEAR 2016/17

> **“All prospective customers of PLM should be seeking a viable and sustainable long-term partner - conducting their shortlisting and selection on the basis of financial stability, expertise, industry experience, and demonstrable investment in the vendor’s PLM product.”**

Beginning with the very first Customer Survey in 2010, our publications have been considered essential reading for any brand, retailer or manufacturer preparing for a PLM project.

Informed by feedback from those readers, each year we have taken progressive steps to make sure that the information we publish serves their needs. We know from speaking to brands and retailers on every continent that a large part of the value they realised from each “PLM bible” stemmed from our vendor listings – annual snapshots of the PLM landscape designed to allow readers to make informed decisions.

In 2014, at the market’s request, we added to these listings with counterparts for PLM consultants – those professional services organisations, large and small, who are proving instrumental to growing numbers of implementations. Those profiles appear later in this publication.

The following PLM vendor profiles, though, collect statistics, insights, and opinions exclusive to WhichPLM readers, and are designed to collectively serve as an introductory step for any fashion organisation looking to shortlist and select the right PLM partner for their unique requirements.

To make this shortlisting exercise simpler, in our 5th Edition (covering the financial period 2014/15) we applied even more stringent inclusion criteria to ensure that the vendors who appear in these listings played a demonstrable regional or global role in the RFA PLM market. The same criteria were carried through to our 6th Edition, and remain in force for this publication.

On the surface it may appear as though this kind of first-stage filtering of the global pool of vendors serves to artificially reduce choice, but it’s important to remember that of the forty or more software vendors that claim to sell PLM for fashion, only a fraction actually offer what WhichPLM and other analysts consider to be a modern PLM product, and only these merit inclusion in a WhichPLM publication. (Our definition of what constitutes modern RFA PLM is set out in full in the glossary at the back of this publication.)

Some vendors, for example, continue to sell outdated PDM software with a PLM sales pitch, while others who advertise PLM functionality actually better qualify as providers of extended PLM – particularly those in the area of supply chain management and planning.

Other vendors whose software does meet the criteria we set out instead fell short of our minimum RFA sector turnover requirements, voluntarily excused themselves from listing, or were revealed during WhichPLM advisory engagements to lack the apparel industry expertise or experience to merit inclusion on prospective customers’ selection lists.

Although any PLM vendor is welcome to submit its product and services to a WhichPLM Supplier Evaluation – with more information, and a growing number of published Evaluations available on our website – this section is restricted only to those vendors who we know to be making continued research, development and investment efforts, and who are invested in the apparel industry either entirely, or as a strong element of a broader industry portfolio.

This year, one additional vendor met the criteria for inclusion – something we believe reflects both that vendor’s commitments to the RFA sector, and the reconfiguration of the industry to focus on the low-cost, high-volume end of the market.

For vendors that cater to two or more different industries (i.e. another vertical alongside their presence in fashion and retail), the figures that appear in the following pages are confined to the sale, development and support of core PLM for the retail, footwear and apparel industry only. Similarly, where a vendor markets a range of products to the apparel industry - as is the case with vendors of CAD/CAM, pattern making software, three-dimensional design, and other components of the extended product development environment - we have disregarded income, resourcing and investment that falls outside the scope of this section’s PLM focus.

In recognition of this year’s focus topic, each vendor was also given the opportunity to set out their thoughts on the industry’s transition to the intelligence era. As was the case in our 6th Edition, readers will also find a double-page spread after almost every vendor’s profile, where a key figure from the organisation gives their take on what we see as the inevitable transformation of fashion into a digital industry.

Readers of previous Annual Reviews will notice that this year’s publication continues the more detailed format pioneered in our 2014 Annual Review and carried through unaltered since. We present overall customer figures, resource allocation by region, and the ratio of internal to external users as supplemental to the core customer data that has always been the backbone of our vendor listings.

Where “N/A” appears, it denotes that the vendor in question was unable or unwilling to provide the relevant information. In the majority of cases, the division between public and private companies’ disclosure policies was the cause, but in some instances information was withheld for other reasons. For this reason, “N/A” should be read as “not publically disclosed”, since this information – whether financial or otherwise - may be divulged to private parties.

Elsewhere, our vendor profiles continue the tradition of asking each listed supplier to provide their own insight into what they feel has differentiated them from their core PLM competitors this year, and to explain what they see as the prominent emerging trends for the near future. These insights are always exclusive to WhichPLM readers, and provide a unique perspective on the roadmaps, ethos and future direction of the market’s biggest players.

Where actual sales to new customers are concerned – our primary metric for the Market Analysis section of this publication - we remind readers that despite our best efforts towards verification and completeness, these lists are not exhaustive. Many of the suppliers listed here have made sales that have not been disclosed to the public, either through reasons of brand secrecy, or because those implementations have not yet reached agreed milestones at which they can be discussed in public forums. We have afforded suppliers the opportunity to number but not name these customers, provided their identities have been disclosed to the WhichPLM team under the terms of a non-disclosure agreement. This allows us to adhere to our goal of providing the most complete market intelligence without compromising customers’ rights to secrecy.

The final accuracy of these customer lists, too, remains the responsibility of each individual vendor. Just as we have in previous years, the WhichPLM team rebuffed attempts by suppliers to pass off non-PLM customers, non-apparel customers, and customers whose contracts were signed far outside the 2016/17 period as valid inclusions for these pages. We are happy to report, though, that this practice occurs less and less frequently with each passing year, and the vast majority of vendors accept our justifications for excluding particular customer names.

Where vendors chose instead to stand by their initial submissions, WhichPLM holds written confirmation from each of these suppliers that the customer lists displayed in their vendor profile are accurate, despite our own misgivings.

Although we do thank the overwhelming majority of vendors for their honesty, nothing in the vendor profiles or advertisements that follow should be considered as an endorsement of any particular PLM vendor. As always, we would caution all prospective customers to pay particular attention to the suitability of any vendor who, for example, refused to divulge the size of their R&D team or the composition of their global apparel resource pool.

All prospective customers of PLM should be seeking a viable and sustainable long-term partner, conducting their shortlisting and selection on the basis of financial stability, expertise, experience, and demonstrable investment in their PLM product. A vendor who is able to share these details and be candid about their performance and roadmap – rather than focusing on today’s deals and remaining guarded about the future – is clear about their willingness to engage in the kind of frank, open partnership that a truly successful PLM project demands.

Readers are invited, after finishing this section, to turn to our consultancy listings to continue building their picture of the apparel technology landscape, or to visit the WhichPLM website to see whether their newly shortlisted supplier(s) has submitted their solution for an impartial WhichPLM Supplier Evaluation – something several vendors have now chosen to do more than once.

NB: Adjacent to the vendor profiles that make up the remaining pages of this section are full-page advertisements provided by the vendors. Following these are double-page advertorials also provided by the vendors. WhichPLM does not control and is not responsible for the content of these advertisements or advertorials. Where they adopt an interview format, the interviewer is not a representative of WhichPLM.

CentricSoftware

Financial Year 2016/17

www.centricsoftware.com

46.

NEW CUSTOMERS OF RFA PLM, INCLUDING:
Able Jeans, Acne Studios, Barco Uniforms, Bestseller Denmark, Bettina, Barbour, Cabbeen, Desigual, Derek Lam, Gant, GOCCO, iMax, J Lindeberg, Judger (Pinkitec), Kering Eyewear, KiKo, Kroger, La Maison Simons, La Perla, Li&Fung (Gymboree) Lilly Pulitzer, Lotto Sports, Louis Vuitton,Manzi, Marine Layer, MGT, Modern Fashion Design, Mud Pie, Ninian & Lester, ON AG, Outward Hound, Pespow, POC Sports, Pousheng, Redbubble, Royal Robbins, Seven Brand, Shoes for Crews, Targus, Winds, YOOX/Net a Porter, YourMoon

187.

OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

73.

NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

49,381.

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

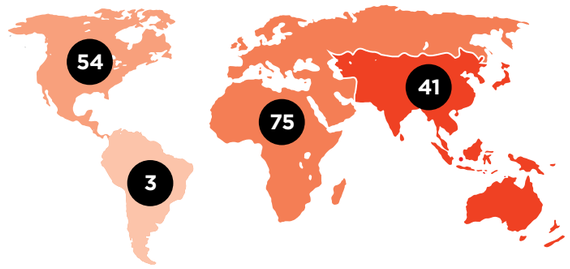
N/A.

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

Licensing revenue: **N/A**	All maintenance revenue: **N/A**
Implementation & services revenue: **N/A**	R&D investment: **$11-20 million**

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market.

Centric continues to partner with customers to develop innovations that drive retail transformation initiatives for fashion, retail and consumer goods companies. Our solutions go way beyond traditional PLM expectations.

Centric Software launched version 6.0 of its market-driven product lifecycle management solution in early 2017.

Version 6.0 includes major, broad-sweeping innovations across the entire Centric PLM suite. In the past 6 months, over 100 new features have been introduced. This release focuses on three areas; scalability and performance of up to 10,000 users, decision making analytics and personalization of a visually stunning interface.

Centric Software also unveiled its Field Testing mobile app which works seamlessly with Centric's PLM platform or can be used as a stand-alone solution. This app is unique on the market. It is designed to help apparel, footwear and outdoor companies both track the usage and performance of prototypes and samples of clothing, footwear and hard goods.

And finally, we released another major innovation, Centric VIP; a new collection of visual, touch based digital boards for ideation, collaboration, what-iffing, decision making and the mass automation of decision execution.

Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

The fashion industry is increasingly shaped by the flexible, adaptable structures of fast fashion businesses. Companies need more than just tech wizardry to rapidly respond to customer needs. We recognize that PLM systems must support changing business methods.

Companies want to be able to create on the fly and not necessarily plan everything upfront using a rigid architecture; see a trend, react to it and push a change across existing designs, or recycle elements from old designs to create new ones. PLM systems must allow this quick, responsive, ad hoc approach to creativity.

Improving the efficiency of collection allocation and structure is also crucial. Companies that have a dedicated team to decide themes, shapes or product structures are well-placed to quickly push changes across departments. If this group has already validated the use of a fabric or color, for instance, design teams can reuse it quickly.

Lastly, supply chains are getting pushed to respond faster and may need to allocate materials for thousands of styles in just 1-2 days. Suppliers need the ability to conduct mass operations across hundreds of styles at once to keep up with fast fashion demands.

The future is fast and PLM must keep up.

An Advertorial By

CentricSoftware

PLM, Paper, Scissors:

Digital Design & Merchandising Boards Bring Data-Driven Transformation to the Heart of Fashion

Technology innovations continue to push traditional ways of working, from sketching designs to selling products, into the digital world – where generating better intelligence and creating new user experiences are the essence of success.

Digital transformation in the fashion industry now encompasses almost every aspect of design, production and retail. However, there is one key aspect of fashion design and development that has remained stubbornly in the analog, paper-based era.

In school, students learn how to develop creative ideas and transform inspiration into fashion and apparel collections using the same basic tools that have been around for the past 100 years or so; foam core (or poster) boards, sketches, magazine tear-outs or photos and bits of fabric. Virtually every fashion and apparel company around the world works this way because, until now, no digital technology has corresponded to the fundamentals of the process: simple to manipulate, easily seen and shared by all and very visual with variety information necessary for making key strategic and operational decisions. Even execs use these boards.

Of course, there are downsides to this paper-based way of working. It's cumbersome and time consuming, requiring an army of assistant designers and a lot of non-value-added work (printing, cutting, pasting, placing post-its and stickers and Velcro, and replacing things when they fall off or get misplaced). If someone can't attend a meeting, a huge amount of 'scribing' is needed to keep track of what was decided and brief them on the decisions made – there are just too many details. The process is prone to misinterpretation and error and output is impossible to execute quickly and accurately. Most importantly, the information is static and thus continuously out of date.

One user explains, "Working with boards is a very manual process. All information is on a foam core board and the flow of information – from communicating and then noting decisions on post-its on the board as placeholders or reminders to communicate – creates a huge bottleneck and a game of telephone. It is hard to recap meetings and is time consuming. We lose notes that are supposed to be on the boards so not all people who need to be in the loop are alerted. Understanding the decisions made usually requires speaking to several people in several departments and then trying to get the system updated. People have different interpretations of what the notes mean. So, there are lots of mistakes."

Making decisions in a fast fashion world

For many fashion businesses, retail transformation initiatives are linked to strategic and operational decisions made based on these boards. Even for businesses who have otherwise embraced digital, most product lifecycles still begin in this analog way. All the paper and glue that we think of as being essential to product creation are serving as a roadblock to speeding time to market, shortening distance to trend, streamlining operations, reducing costs and improving team collaboration. Taking these boards into the digital age will transform the very heart of fashion.

A digital challenge

In 2016, Centric Software was approached by one of the world's largest retailers looking for ways to digitize line development strategy, design and merchandising across their business. They challenged Centric to "help us get rid of these boards" in order to better collaborate on decision-making, improve time to market and reduce work.

As Humberto Roa, VP of Innovation at Centric Software says, "Challenge accepted. First, one of our product managers spent months observing, learning and documenting. He charted the purpose of each board, contributors, stakeholders, needed information, the origin of information, decisions made and also the new information created during meetings. Above all, he also looked at how executives contribute to this process and how executive decisions are carried out."

"Second, he considered how technology could be applied to meet this challenge: could people use a tablet? A smartphone? A big touch-screen TV? All in all, the team concluded that many, interconnected boards are needed. Boards are used to set the creative direction and executive level strategy for the collection, develop a first level line plan, ideate, nuance the financial plan, allocate to manufacturers, incorporate feedback and commitments from sales, marketing and retail distribution among other key decisions. This is the heart of fashion and the decisions made are critical to the success of the brand and the company."

The result of this research is Centric Software's new digital board solution, Centric Visual Innovation Platform (Centric VIP). This visual, touch screen-based, multi-device solution incorporates mood boards, allocation and assortment boards, merchandising and sales boards – all pulling from the same source of digital information.

"Picture this," says Roa. "You gather for a meeting and instead of saying, 'Everyone put away your phones and pay attention' you would say, 'Ok, take out your devices.' This solution is touch-based and offers macro and micro level views. You can create boards, create new information, access PLM data, and drill down and roll up with an iPad app that syncs and shares with everyone else, using a touch screen TV and an iPhone version. The data is real and live. Everyone can contribute, decisions are allocated to those in charge, a change log is recorded and once given the go-ahead, you can automatically mass execute."

"This saves thousands of hours per year," says one user, "Replacing our physical boards with Centric VIP has boosted the productivity of one PLM user by a factor of 10."

Real time decision making

Digital boards are an example of data-driven transformation at its purest. Replacing users' analog tools provides more than just a smoother way of working: it allows them to create and collaborate in a comfortable environment that enhances rather than just replicates analog ways of working.

The visual, easy, touch-based nature of Centric VIP encourages creative ideation, collaboration, decision making and what-iffing, and also automates the mass execution of decisions. Digital boards are a natural way of working; they expand creative freedom and brainstorming within the guidelines of the business context.

It's possible to explore what-ifs and make decisions in real time, using real data. Since product data is real and live and comes directly from PLM, multiple users can play with what-if scenarios in a group context ('what if we move the wool crepe to that mill and only produce it in five colors instead of six?').

When it comes to mass executions of decisions, approvals and tasks can be allocated to the proper people. If sign-off is needed by someone who is not in a meeting, the corresponding person will receive an alert that a decision needs their approval. Real time change tracking allows decision-makers to go back in time to see what was decided or rewind decisions. This eliminates the hassle and confusion of having to keep minutes and get sign-off manually before executing decisions in the system, which boosts accuracy and speed.

Decisions can be made en masse: drop a color, and need to swap out the old one for a new one? Do it all at once to avoid have to go style by style. Or choose to go style by style if needed. Mass creation and updating; mass cascading of changes; the mass application of what-ifs; these all work toward automating changes that are the cause of massive time loss and risk of error throughout the development process.

And the benefits of bridging this digital divide will be felt throughout the product lifecycle. "Centric VIP has eliminated the manual process following merchandising meetings. A lot of time is spent trying to understand meetings that people were not a part of. It is hard to communicate all of the hundreds or thousands of details involved in merchandising the line," says one user.

Collapsing time to market

Anastasia Charbin, CMO at Centric Software, believes that the adoption of digital boards like Centric VIP will be a game changer for fashion companies, "The strategic decisions made around boards have a direct correlation to company performance; this where key financial, design and product decisions are made, all of which impact both time to market and cost of goods."

"Replacing the old cut and paste foam boards with a digital solution will collapse time to market, not just speed it up," says Charbin. "As information is live and accurate, the cost of product, time to delivery and sales feedback can be factored in when making key design and add/drop decisions."

As one user explains, "Working digitally allow us to take all of the data in PLM and pivot it in a way that designers, merchandisers and others can understand. People in fashion didn't go to school to work in excel. Creative people need to be able to see what they are doing. Innovations such as digital boards allow non-technical people, from designers to executives, to access and use data in a way that positively transforms the work they do every day."

As Roa concludes, "Everyone today – brands, retailers, manufacturers – is worried about time to market, not just because of speed but because of agility. Digital boards like Centric VIP will help companies get ahead by allowing greater flexibility, room for creativity and more executive input, ultimately enhancing business performance. This game changing innovation, conceived in on site partnerships with the world's leading brands and retailers, is a crucial step in the digital evolution of the fashion industry."

DASSAULT SYSTEMES

Financial Year 2016/17

www.3ds.com

27.

NEW CUSTOMERS OF RFA PLM, INCLUDING:
GUESS, MADURA (Aditya Birla Fashion & Retail), New Balance

74.

OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

N/A.

NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

37,000.

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

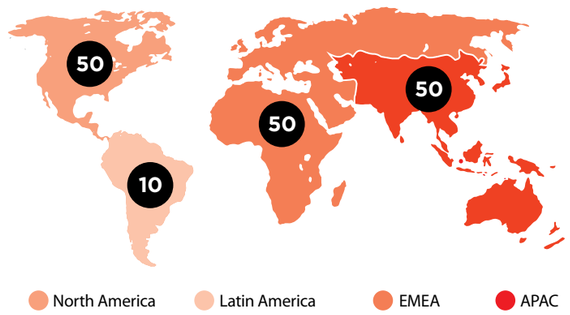
11,000.

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

Licensing revenue: **$8-10 million**	All maintenance revenue: **$8-10 million**
Implementation & services revenue: **$5-7 million**	R&D investment: **N/A**

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market.

Dassault Systèmes continues to invest and enhance our world-class consumer goods PLM solution, My Collection. Built on the 3DExperience Platform and ENOVIA, it's the leading, most scalable PLM solution. Built-in flexibility adapts to different business processes instead of forcing our customers to learn new ways of working.

Within My Collection, Visual Assortment Planning enables users to create and refine product assortments in highly visual and intuitive ways using lightweight 3D models, generated even from Adobe sketches. Teams can manage multiple options for increasingly diverse portfolios, based on user-defined classifications (Channels, Regions, Store Cluster, Brand) to address the omnichannel, consumer-driven marketplace. Buyers, planners, merchants can collaborate, review and finalize collections earlier in the product development lifecycle. Assortments can be optimized based on visuals plus business metrics – margin , color/material distribution or other KPIs – for informed business decisions.

Embedded within the 3DExperience Platform, Social Ideation is another intuitive way of improving innovation processes. DS brings logic to unstructured as well as structured data revealing market insights and accelerating decision making. Working within design communities, users can collect, share, and discuss ideas, which can be managed through the ideation funnel to curate design concepts and ultimately promote them to design projects inside PLM.

Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

With e-commerce expanding, and the "Amazon effect" changing the dynamics of physical retail, an omni-channel mindset is critical to a cohesive consumer experience. Online, retailers are challenged to increase customer interaction in a 'natural' way. In-store they are challenged to offer the full breadth of assortment 'anywhere/any time'. How to blend the experience in a way that's meaningful for consumers? How to market to individual consumer preferences across channels? How to recognise different behaviours to adopt messages/incentives and increase conversion? How to accurately predict demand and optimize logistics? How to use market insights to develop winning products?

Technological advances in cognitive computing are delivering analytics that help businesses align supply and demand, scale personal service and design better products. By analysing large amounts of data — like the browsing and shopping history of a fashion brand's online customers, as well as those of its competitors — data patterns can guide a retailer towards products more likely to be purchased, delivery drops based on more accurate projections of demand, and product adjacencies at retail and online to maximize sales.

With the 3DExperience Platform DASSAULT SYSTEMES provides digital continuity from concept to consumer and evolving analytics to shorten market cycles and increase success rates.

An Advertorial By

DASSAULT SYSTEMES

Game-Changer: One Company's Journey through Digital Transformation

The Fashion industry is at a crossroads in the new digital era. While many brands have embraced the world of digital commerce and online retail, few have explored the benefits of the other half of digital transformation; digital creation, and the value of data and intelligence in modern ideation. From concept to consumer; technologies such as 3D design, collaboration-based PLM, 3D visual merchandising, and seamless data-driven analytics are increasingly critical for fashion brands, and increasingly more intuitive. Leading companies are adopting a broader view of digital transformation – from digital creation to all-channel consumer experiences. These fashion leaders can leverage real and relevant consumer insights earlier in the process creating an ecosystem that goes from consumer to concept to consumer again; establishing a critical feedback loop between the brand and their potential consumers to provide the most relevant, consumer-focused products possible.

There are few technology and solution providers who have the process, tools, and expertise to create comprehensive digital solutions for today's fast moving fashion brands. Dassault Systèmes has created the **3D**EXPERIENCE platform to make it easier for forward-thinking companies to take advantage of the entire range of possibilities and ensure success. But what does this look like? Let's follow the story of Nicolai and Olivia, who work at the fashion company Milarose, as they launch their campaign to create a new, organic capsule collection:

Nicolai and Olivia have a problem. They've spent the day exploring Tokyo hoping to gather inspiration for their spring collection. The day hasn't gone well, and while the sushi at dinner was delightful, they're worried. Last year's collection was a disappointment and ended up suffering poor sales and high markdowns. Consumers didn't respond well to the colors and silhouettes in the collection; while the retail team reported a general lack of attraction in-store. Nicolai, the designer for the line, confides that he feels as if there is barrier between him and his target consumer. Olivia, the merchandiser for the collection, admits she has a hard time connecting Nicolai's vision for the line with the reality of the retail space. She also feels that there wasn't a line of sight between the marketing story at point of sale and the social media campaign.

Furthermore, both Nicolai and Olivia are tired of the old way of doing things. Nicolai struggles to accurately predict what his consumers want and to communicate his ideas to both the factory and the merchandising team. Olivia has tried numerous ways to visualize the retail assortment options and link them to financial data. The old methods of using paper sketch cutouts or physical product simply don't provide enough flexibility, connectivity to the analytics, or the ability to create a compelling consumer experience. They are both frustrated, and are no closer to creating a unique and compelling capsule collection they can be proud of.

Arriving back at home office, they discover that Milarose has decided to invest in the **3D**EXPERIENCE platform for collaborative innovation from Dassault Systèmes that some of the teams evaluated recently. The CEO explains that Milarose is embarking on a digital transformation to connect concept to consumer. The first step is providing a virtual space where teams can create a community to exchange stories, pictures, concepts, articles, and inspiration using both structured and unstructured data. The new solution can also capture 'voice of the customer' from multiple sources and automatically generate intelligent and actionable dashboards. The teams will be able to curate their ideas and develop different product and collection options. And ultimately they can establish a clear and shared vision for the line that involves everyone; design, merchandising, product development, sourcing, sales, and marketing and even consumer insights.

Nicolai and Olivia also discover that their team will be the first to pilot this new technology for the company. They're excited, but also a bit apprehensive. Nicolai, especially, isn't used to working with technology, but they both agree they're eager to take a look at a new way of doing things if it means better product.

The next day, they are introduced to the new workflow; they'll be creating a collaboration space within a social media app for business teams that will have two connected sections; one for the collection, led by Nicolai, and another focused on the merchandising and store layout, led by Olivia. The two sections will work together to produce a consistent brand message, from concept to consumer. They eagerly gather their teams, taking the inspiration they collected in Tokyo, generating ideas, and posting content. The experience seems familiar; much like other social media apps everyone uses in their daily lives. They can also consolidate vast amounts of undifferentiated data from multiple news feeds, favorite websites, and consumer blogs into logical and intelligent views to see what's trending. The two teams work collaboratively and separately; sharing street video, photos of sample product, sections of blog posts, and concept sketches. They can "like" good ideas and comment with their opinions.

Once the teams identify their best innovations, they send it to their social insights team who uses consumer groups, Instagram, and a preview on the Milarose mobile site to gather actual consumer feedback using social media as the 'new runway'. Using the **3D**EXPERIENCE platform and related solutions, they monitor the internet for keywords from the Milarose preview site and similar products in the marketplace across all relevant sites. Intelligent information is easily visible to the design and merchandising teams through an analytics dashboard that uses algorithms to track the keywords and even automates custom actions and alerts based on different triggers to support and shape decision-making.

Rather than trying to predict what his customers will respond to, the insights they gather are incredibly helpful to Nikolai and fall into the following areas:

- Milarose has a long, authentic fashion heritage and consumers like the fact that the company can blend edgy design with traditional, signature pieces across apparel, footwear, and accessories.

- The brand's followers like how Milarose leads fashion while the analytics show negative comments when they release product that look too much like the competition.
- Consumers responded very well to some of the items that were inspired by Nicolai and Olivia's trip to Japan; especially Nicolai's jewelry concepts. Since the data showed a negative reaction to the new handbag shapes, Nikolai thinks they may be too advanced and sets them aside to be considered for another season

The best product ideas are moved forward into the collection and details enriched for commercialization. Meanwhile all the associated data, including the history and actions taken, is maintained either with the active products or even those archived for later.

Rather than waiting for physical samples, Olivia begins building a 3D virtual mock-up of her retail space. As Nicolai and his team finish a design (early product photo, 3D model for the jewelry or even 2D sketches for apparel), it can immediately be updated within the virtual environment which provides rich information in context. Here the team can model options and make decisions about placement, color options, pricing, and quantities; all from an intuitive visual interface. Information pulled from product attributes can be viewed adjacent to the visual options as interactive dashboards to refine price points, tune color and material penetration, or manage supply chain risk by country and vendor. By retaining all essential design and development activities in a single digital space, Milarose is able to quickly and easily use its digital assets for a range of different purposes that would normally be held behind a bottleneck until physical prototypes arrived.

Olivia and Nikolai need to present their proposed assortment for the new, organic capsule collection at final line review. Not all the physical samples have arrived on time so the team uses the virtual mock-up of their full proposal. Olivia can also super-impose sales and margins projections for the collection based on consumer preference data. The value of working digitally means the team can make decisions which are both visually satisfying and data-driven.

The product director is thrilled. The collection is tight; with a clear visual message, broad emotional appeal, and carefully considered financial data they've never been able to consolidate this way before.

Olivia and Nicolai are celebrating. Their collection launched to immense critical acclaim and, even better, immense sales. Nicolai's Twitter feed has been blowing up with comments from admiring fans who are already giving him feedback for his next products. With the analytics currently being captured from both social media and sales, they're confident that next season's collection will be even better.

By creating a seamless flow of digital information starting with the consumer and continuously being enriched through design, product development, and out to the consumer at retail, has made both their products and the entire company–Milarose–more effective in the marketplace.

At the same time as launching their successful organic capsule collection, they've also successfully proven the benefits of digital transformation and the value of intelligent information in modern collaboration to support planning, simulation, insight and optimization.

FastReact

Financial Year 2016/17

www.fastreact.com

5.
NEW CUSTOMERS OF RFA PLM, INCLUDING:
Elis, Grana, MWUK Limited, Radley

39.
OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

11.
NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

2,795.
TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

495.
TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

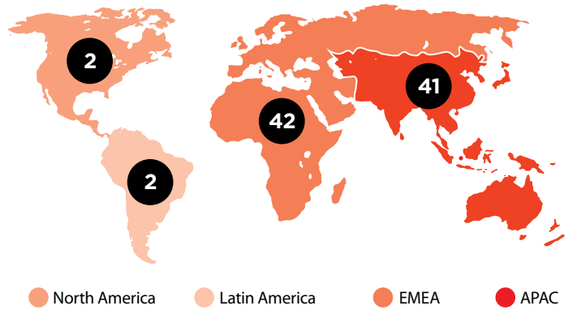
Licensing revenue: **$3-4 million**

All maintenance revenue: **$3-4 million**

Implementation & services revenue: **$1-2 million**

R&D investment: **$0-2 million**

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market.

Now part of Coats Global Services, we offer expertise and solutions which support agile, efficient and integrated supply chains, from product design, development and sourcing ('Vision^{ng} PLM'), to time-cost benchmarking ('GSD') and market leading planning solutions for garment manufacturers and fabric mills ('Evolve/Align'). Vision^{ng} PLM recent enhancements include:

Accessibility: New SaaS service using industry best practice configuration and deployment, supporting rapid implementation, flexibility and affordability for small, growing businesses.

UX and UI: Already intuitive, clean, and efficient, the UI now includes graphical KPIs, 'where used' search and a traffic light system for warning of urgent user-based issues. Further automation of critical path, through smart workflow enhances efficiency and data integrity.

Integration: Confirmation of our bi-directional Ai extension as a publicly available Adobe Add-on, now including BOM and critical path integration.

Supplier Collaboration: Drag and drop, 'what if' planning of high level demand and supplier capacity, now includes forecasts, the ability to share scenarios and comments with suppliers, integrated tracking and automatic updates of PO status through to delivery.

Critical Path: 'Inheritance' and 'roll up' of key milestones provides visibility by business, season, phase, department, product, option etc., with 'drill down' capabilities, further enhancing our 'best in class' critical path management.

Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

Consumer expectations for instant, omni-channel availability of newness and personalisation, are the biggest drivers shaping our industry. Addressing these challenges means that brands/retailers must 'play closer to the market' to maximise first-price sales, whilst minimising inventory and write-downs. This requires a step change in speed and agility that can only be delivered by a truly collaborative and efficient supply chain which harnesses the power of data. Real value lies in systems which provide accurate and up to date information, taking huge volumes of data and presenting this in a digestible format, to support faster and better decisions, throughout the supply chain.

Increasingly, businesses are embracing technology to streamline and control their processes, from design, product development and sourcing ('Vision^{ng} PLM'), to garment and fabric production ('Evolve/Align'). Significant focus on data alignment and common standards will allow greater information sharing, in real time, between supply chain partners as the integration of cloud-based applications and data (IoT) gains pace to support this. Our PLM roadmap focuses on those areas which support transparency and a collaborative supply chain, including integration of the Internationally recognised standard for pre-costing ('GSD'), enhancements to open costings and score carding, plus the introduction to budgeting and a supplier management portal.

GERBER TECHNOLOGY

Financial Year 2016/17

www.gerbertechnology.com

24.

NEW CUSTOMERS OF RFA PLM, INCLUDING:
CC Filson, Celebrity Pink Jeans, Danit Peleg, Hotel Particulier, Implement Now, Lindstrom, Slam, Sun City

203.

OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

55.

NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

25,605.

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

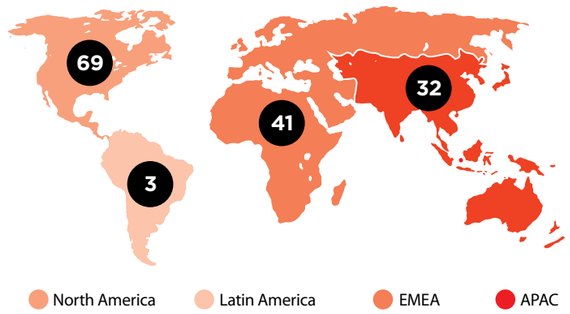
14,452.

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

Licensing revenue: **N/A**	All maintenance revenue: **N/A**
Implementation & services revenue: **N/A**	R&D investment: **$6-10 million**

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market.

The advancement in Cloud PLM is the largest change that has taken place within YuniquePLM. Over the last year Gerber has switched to a SaaS PLM model, making it easier for any business of any size to quickly try out and get up and running with YuniquePLM. The journey begins with a Test Drive, this allows clients to try the latest version of YuniquePLM completely free without any software installations or sales support. What used to take days or weeks is now accomplished in minutes with YuniquePLM Cloud SaaS installations.

The new YunqiuePLM Cloud allows Gerber to respond to industry evolving needs by rolling out updates as soon as new features become available. It also supports scaling up or down, as business needs change. YuniquePLM also has the ability to easily integrate with other applications through extensive APIs.

Everything from client on premise applications, Adobe Illustrator CC17, partner applications as well as our Gerber AccuMark and AccuMark 3D easily integrates. This allows our clients to get the data they need when they need it directly from YuniquePLM.

Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

Technology is driving shifts in the way trends evolve, how people shop and how brands respond. Speed to market is critical to meet changing consumer demands ensuring the right products are in the right place and at the right price. Practices must be also be done in a socially responsible manner. Those embrace the digitization of workflows will increase efficiency, improve quality and decrease cycle times. Leveraging PLM, 3D for virtual sampling and other digital technologies promise to improve compliance, sustainability and more socially conscious business practices.

The fashion industry's adoption of technology is speeding up and technologies gaining momentum are Saas and Cloud services. Companies no longer have resources to execute large on-premise systems that require complex implementations. They are leaning toward flexibility to address seasonal ebbs and flows. YuniquePLM, is focused on the needs of our customers and has established an industry leading position in Saas and Cloud technology. Helping our customers with configurability and integrating Adobe products so the designers are plugged into the PLM system at early stages. We are the only provider who offers a free trial and believe the key to the future is making software easy to try, buy and use.

An Advertorial By

GERBER TECHNOLOGY

The Digital Design And Production Revolution Is Here:

Six Key Digital Trends In Apparel Design, Management, and Production

Several major new digital technologies are now combining to revolutionize the process of apparel design, management and production. These innovations have moved beyond the early-adopter stage and are now within reach of apparel companies and brands both large and small, and the impact of these technologies will deliver on the promise of lean manufacturing in the apparel field. From a business standpoint, these technologies will enable apparel makers to get their products to market faster, to capitalize on fashion trends and maximize revenues season after season.

1: Cloud computing for apparel companies

Cloud computing is a major technology trend offering tremendous savings and efficiency benefits for apparel companies. Cloud computing moves a company's major server hardware and software systems "into the cloud," to operate on fast, powerful server networks at professionally managed data centers. Cloud computing allows companies to shed their expensive, on-site server and networking hardware overhead costs, and to significantly reduce software and related implementation, support, and maintenance costs, to move to cloud-based systems costing only a fraction of a company's in-house IT expense.

In addition to significant cost reductions, cloud computing provides apparel companies tremendous flexibility to meet their IT needs, by allowing companies to flexibly add as many users as needed to expand or reduce computing requirements as their business needs change, without incurring the additional overhead costs of servers, networking hardware, or additional software license fees.

2: Product Lifecycle Management (PLM) Systems

While cloud computing offers great potential for revolutionizing the IT requirements of apparel makers, it must be combined with powerful cloud-optimized software to deliver its full potential. One of the most important cloud-based applications for apparel businesses are Product Lifecycle Management (PLM) systems specially designed for use by fashion and apparel companies. Cloud-based PLM moves line planning, calendar development and project management tasks away from using multiple, haphazardly organized Excel spreadsheets and hard-to-access databases to a readily accessible, easy-to-use system that can be securely accessed by a company's design, production, sales and financial teams.

By providing immediate access to the latest and most up-to-date product line information and changes, such as color, size, style or production costs, cloud PLM systems enable a much higher degree of collaboration between everyone inside the company, and with key suppliers, retailers and supply chain partners.

For example, any changes made to any product or line are immediately viewable on the system, to provide everyone with "the single version of the truth" for making accurate line planning, cost estimation, sales forecast, and project management decisions.

Every critical step in the apparel manufacturing process, from design, to cost and production estimates, and transmission of sample tech packs and design and production files, occurs more quickly and seamlessly in this integrated, cloud-based PLM system. Compared to traditional, desktop-bound PLM systems, cloud PLM systems make it easy and affordable for apparel manufacturers of all sizes to gain the production, cost, and project management efficiencies that were, until recently, available only to the world's largest apparel brands.

3: Mobile Devices: Making Fashion Easy To Buy

Another important new technology trend in the apparel industry is the consumers' shift to smartphones and mobile devices for online shopping and purchasing. In 2014, the number of mobile-connected devices exceeded the world's population, according to Cisco Systems. Industry sources report that over 60% of Internet traffic is due to consumers browsing on smartphones and other mobile devices; of this amount, consumers spend about 88% of their time within mobile apps.

The consumers' shift to mobile devices is especially important for apparel companies and retailers who sell directly to their customers online. While only 15% of all e-commerce transactions today are done using mobile devices, Goldman Sachs estimates this share to increase to over 46% by 2018. This rapid growth makes it imperative for retailers, direct-sales apparel makers, and fashion brands alike to make their products easy to buy and their brands readily accessible over mobile devices. According to Karsten Newbury, VP/General Manager of Software at Gerber Technology, mobile developers such as Stripe, a creator of mobile solutions that enable easy online purchases and payments within any mobile app or browser, will make it easier for consumers to find, buy, and pay for apparel products of interest on their smartphones and mobile devices, and will make implementation of new mobile purchasing options far easier for online retailers.

The consumers' shift to mobile devices is also important even for apparel manufacturers who sell only through retailers and not direct to consumers, because manufacturers must still make it easy for mobile users to access, view, and learn more about their brands. Here, making a company's Website and e-mail communications to consumers "responsive"—that is, easily viewable on the smaller screens of mobile devices—will be a critical minimal requirement for making sure that customers can readily find and easily see the company's fashions on these devices.

4: 3D Design and Visualization

3D design and visualization features, integrated into every aspect of the apparel process, from design, pattern making, production, and manufacturing, is now an important part of the revolution in digital design and production technology for apparel manufacturers.

3D design capabilities enable designers to visualize their ideas on realistically human body shapes ("avatars"), to make instant changes to the garment's construction, sizing, color, design, or fit, and to scale, zoom, and rotate the on-screen avatar to view these changes from any angle. Once the design is finalized, changes made to the 3D sample are also applied to the 2D patterns to generate pattern files using programs such as Gerber's AccuMark pattern design software system.

Another key benefit of 3D design and modeling is the ability to use on-screen visualization to reduce the number of physical samples required to bring a design to market. According to digital apparel industry magazine WhichPLM, the apparel industry spends $6-8 billion per year on apparel samples alone; it is estimated that 75% of these samples could be developed in digital-only format and sent to production suppliers virtually using digital sample management.

Apparel designers are already gaining major benefits using 3D modeling for sample creation, and in their design process. A senior technical designer of a leading Australian women's apparel brand, says: "We are saving 1-2 sample production iterations each week, and we are able to be more creative and try new ideas more often."

While apparel companies derive major benefits using 3D modeling, improvements to 3D visualization, such as enhanced fabric draping and movement visualization, will enhance the development process for designers, further shortening design times and improving the productivity savings to be gained from this technology.

In the near future, 3D visualization will also extend to the consumer side of apparel purchases, with customers being able to visualize the fit of any garment on an avatar (or on themselves in an on-screen representation), and purchase this garment online once they are satisfied with the fit and appearance of their selection.

5 And 6: The "Internet Of Things" (Iot) and the Smart Factory

The history of manufacturing technology has moved through three major technological shifts, from the steam engine to the current age of computer-numerically controlled (CNC) manufacturing, and is now rapidly moving into a new era of smart automation, generally known as the "Internet of Things" (IoT).

Under IoT, every device in a manufacturing plant is equipped with multiple smart sensors, which monitor the key performance aspects of that device. Each of these sensors can communicate information in real-time to every other connected device, such as production rates, operating status, and condition of key sub-systems

These "intelligent" devices can now provide a much higher level of information and interaction to optimize manufacturing efficiencies. For example, in apparel manufacturing, newly "smart" devices, such as spreaders, cutters, and digital fabric printers, can share in-process production data and status updates to increase production line flow and efficiency. Currently, sensors built into apparel manufacturing machines, such as Gerber Technology's fabric cutters, can monitor the condition of these devices in real-time, to provide this information to service personnel and notify customers when pre-emptive repairs are needed, to avoid production downtime. In the future, these monitoring capabilities will also be made accessible to customers, so they can optimize their own service management, machine operation, and production efficiencies in their lines.

However, in the apparel field, IoT will not be limited just to the factory floor: Embedded sensor technology is also becoming a part of wearable garments, particularly in sports apparel. XelfleX, a wearable fabric technology created by the Altran Group, contains embedded fiber optic threads that turn the garment itself into a powerful sensor array. A XelfleX garment is connected to a smartphone app to record and monitor the wearer's body movement, and to evaluate key body movements, such as the wearer's tennis or golf swing.

According to an IoT innovation project report from DHL and Cisco, smart factories utilizing the "Internet of Things" are projected to generate $8 trillion in value over the next decade, by driving higher production efficiency in the global supply chain.

New digital technologies: proven, affordable, easy to implement - and creating new efficiencies and opportunities for apparel manufacturers.

The proven performance, cost-effectiveness, and growth potential of these six major technologies make it imperative for companies both large and small, in every apparel segment, to begin the process of implementing these new technologies in their companies, to prepare to meet the challenges and opportunities in the lean, highly connected, technology-driven apparel industries of the future.

Gerber Technology delivers industry-leading automation solutions helping their customers improve manufacturing and design, more effectively manage and connect the supply chain, from product development, production, retail and consumer. Gerber serves 78,000 customers in 130 countries, and manufactures its products from various locations in the United States, Canada and China.

Financial Year 2016/17

www.infor.com

5.

NEW CUSTOMERS OF RFA PLM, INCLUDING:
LTP Group A/S

62.

OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

N/A.

NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

1,850.

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

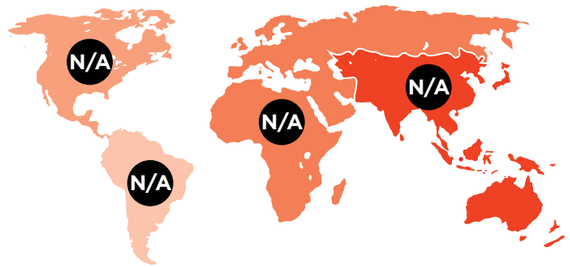
415.

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

Licensing revenue: N/A	All maintenance revenue: N/A
Implementation & services revenue: N/A	R&D investment: N/A

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market.

Infor Fashion PLM's bi-directional Adobe Illustrator plugin now includes support for Artboards and style templates that synchronize within the solution's hierarchies to help designers innovate faster and more efficiently. Plus, Infor PLM users also have access to larger and more advanced image displays for ease of use and granular attention to detail in every design.

Styles with dimensions beyond color and size—width, cup, or length, for example—can be easily managed with Infor PLM's new 3D grading format. And, brands who design their own patterns can upload and view those designs in any style.

To ensure sourcing compliance from sheep to shelf, users can better protect their brands through tools that confirm their suppliers meet regulatory and policy requirements. Plus, users can upload templates using .csv files to keep an organized, accurate compliance audit trail.

Infor PLM is available within Infor CloudSuite™ Fashion, which provides fashion, apparel, footwear, accessories, luxury goods, and textile companies with a full suite of tools to manage the entire fashion process from design, development, and sourcing, to production, distribution, customer service, and finance. And it's all plugged in to the Infor Commerce Network, powered by GT Nexus for seamless collaboration across the value chain.

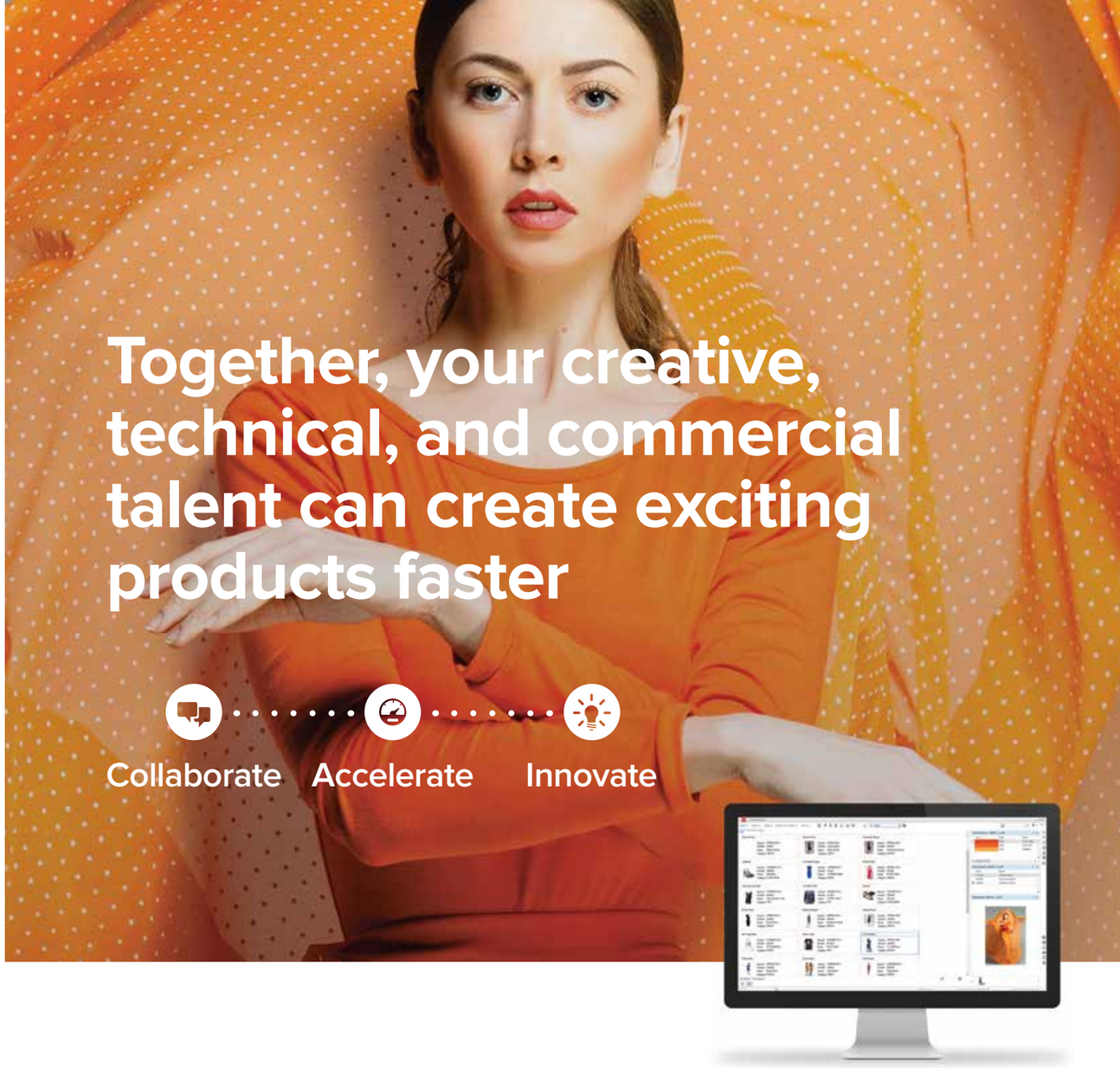
Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

Digital transformation is reshaping industries—and the dynamic retail, footwear, and apparel industries are no exception. Companies are seeking ways to differentiate through new business models, new processes, the leveraging of core competencies and, by harnessing the latest technology. In that light, there are a few core technologies that many will look to take advantage of.

PLM as a Cloud Service: We expect an increasing move toward deploying PLM in the cloud to improve agility, simplify global rollout, and enable anywhere-access from a variety of devices. PLM software in the cloud also alleviates the headache of day-to-day system maintenance while reducing total cost of ownership.

3D Integration with PLM: As companies recognize the benefits of style and fit simulations and virtual sampling to reduce cost and time to market, 3D technologies will continue to gain interest and momentum. Over time we'll see greater use of 3D avatars for merchandising across channels, from brick-and-mortar stores to e-commerce.

Social Collaboration: Effective merchandise planning, product design, and development require a high degree of internal and external collaboration. Software that supports this kind of collaboration has the power to increase innovation, speed up product development, and improve product quality.



Infor Fashion PLM

Infor's next generation PLM software covers the entire product lifecycle, from sales budgeting and merchandise planning to design, development and costing, to sample and critical path management. Plus, sourcing compliance and vendor collaboration capabilities protect your brand integrity, ensuring ethical conformity and product quality.

infor.com/fashion-plm

An Advertorial By infor

There's Strength in Numbers

Big data is a retailer's most powerful and profitable asset

In this market, there's the quick and the out of business. Fast fashion is no longer a novelty, it's the status quo. And it's not just millennials who expect to see runway looks in their favorite stores a few weeks after debut. Shoppers are so plugged in across every channel that when they see something they want, they'll find a way to get it as quickly as possible. If fashion and retail brands aren't presenting shoppers with the path of least resistance, they can pretty much count on losing the sale.

Thanks to the power of big data, always-on shopping channels, endless online product reviews, and the mobility to shop anytime, anywhere, customers have more control, more product information, and more paths to purchase than ever before. With so much information at their fingertips, shoppers also have the power to curate their own personalized supply chains—choosing products based on their unique desires: lowest price, fastest shipping time, available sizes, frequency of assortment updates, most sustainable supplier, or even the prettiest packaging.

To compete with endless aisles and carve out a customer base, brands have to be different enough to stand out in a sea of online retailers, while being able to provide the same level of personalization and speed to market that today's big box and fast fashion retailers have already mastered. To stay relevant in a marketplace that's now controlled by the customer, modern Product Lifecycle Management is a great place to start.

Retail metamorphosis starts with PLM

Whether you're a growing company, a well-known brand that's aiming to transition to a direct-to-consumer model, or an established retailer who wants to break into private labeling, true transformation takes a village—and its challenges are vast and varied.

Are you still running your factory in a spreadsheet? Paying commission to have an agent sort through your product lifecycle? Missing out on innovative styles that could have brought in major profits? Wasting materials because you can't collaborate with every supplier across your supply chain?

Always behind the curve because you don't know what your customers will want six weeks, or even six months from now? Putting your company at risk for bad press around ethical sourcing, non-compliance, or unsustainable business practices?

The good news is, you own your brand, and the power to transform is in your hands. Whether you're looking to pivot commerce models or simply modernize operations to future-proof the enterprise, today's smart, connected PLM solutions can provide the first step on the path to retail transformation.

Power up your retail ecosystem with PLM that's "plugged in" to big data

With consumer expectations so high, meeting the demand for instant gratification while maintaining the kind of profitability that will carry your retail enterprise into the future of the industry can be overwhelming—especially amongst a sea of technology solutions, a constantly changing market, and endless unknowns.

You already know that faster time to market and efficiency across the enterprise is essential to keep up … but without insights and collaboration across the global supply chain (and the power to instantly respond to fluctuations) how can you possibly hope to achieve "concept-to-consumer" retailing in the timeframe of just a few weeks?

Traditionally, retailers have used PLM as a standalone solution to better predict the future and accelerate speed to market. But imagine the possibilities when PLM is plugged in to some of today's most innovative (and lucrative) technologies like machine learning and predictive analytics.

The latest advances in data science are empowering retailers with the insight and agility to make strategic changes in assortment, shipping, and distribution at a moment's notice.

Storm approaching off the coast? Reroute an ocean-liner shipment in a flash. Unseasonably warm weather in December? Shift product distribution to meet local demand. Taylor Swift flaunting a new lip color? Mix up your cosmetics assortment on demand.

With a fully connected solution like Infor PLM, retailers can spot trends and get them to market before their competitors do, quickly restock high-performing items, pull products that aren't performing, and even reuse the material from those that aren't. So while you're increasing efficiency across the board, modern PLM also empowers you to run a sustainable, ethically sourced, and compliant enterprise—which in turn engenders brand loyalty from your customers.

By integrating PLM software with the power of big data (and the priceless insights that come with it) retailers can sense supply and demand before the competition does, take POS operations to the next level, seamlessly connect every aspect of your supply chain, get real-time insight into every supplier, warehouse, distributor, and sales channel across the globe.

Start with the end (user) in mind

It's easy to spend a fortune trying to transform your enterprise on a modern PLM solution—but if no one can figure out how to use it (much less enjoy the experience), your technology investment could be for naught.

These days, "design thinking" is more than just a buzzword, it's a necessity. In order for modern PLM solutions (or any software solution for that matter) to be easily adopted by retailers and their employees, applications must be designed around the people who will be using them most.

All of Infor's industry-specific solutions, including smart PLM, are built with the end user in mind—because we believe the apps you use on Monday should be as smart, beautiful, and intuitive as the apps you use on Sunday. That's why we've created our very own UX lab, Hook & Loop, to change the way our customers think about enterprise software with user-centered design that increases user adoption, reduces error rates, cuts training time in half, and delights our users from the board room to the showroom floor. And when your staff is efficient, informed, and happy, so are your customers.

koppermann®
A Passion for Innovation

Financial Year 2016/17

www.koppermann.com

5.

NEW CUSTOMERS OF RFA PLM, INCLUDING:
Amoena, Kümmel, Lerros, Olymp, TB-International

107.

OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

24.

NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

5,758.

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

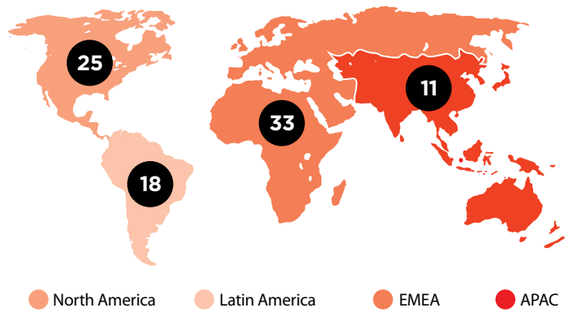
2,516.

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

Licensing revenue: **$1-2 million**	All maintenance revenue: **$1-2 million**
Implementation & services revenue: **$3-4 million**	R&D investment: **$0-2 million**

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market.

The progressive digitization of the RFA market enables the smart transition of existing process structures to the three-dimensional space of modern product development. A perfect user interface makes standardized Best Practice solutions from Koppermann even more intuitive and user-friendly as they create the virtual basis of a powerful and multifaceted data application. Koppermann utilizes state of the art web technology to enable the creation of a global value-adding network for perfect process control and transparent data transfer.

POS-oriented collection planning, to date the only one of its kind on the market, is at the centre of our development and enables the user to incorporate the three-dimensional product world in digital collection planning. Worldwide access to all locations via the cloud and web portal and a descriptive shop floor consolidation via Google Maps Integration give the user access to a new, multi-dimensional place of digital interaction within Koppermann Product Lifecycle Management. Koppermann rounds off the direct view of the existing or yet to be created floor space within the framework of the innovative Virtual Reality Floor project, enabling creative product designers to immerse themselves in virtual rooms to explore today the sales area and product presentation of tomorrow.

Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

Today, digitization is impacting the RFA segment more than ever before. Constant data availability and accurate insights into every aspect of the global value-adding process will gain further relevance over the coming years. Furthermore, an increasing end customer focus that is leading to a greater use of mobile IT and applications within the framework of the Customer Experience (CX) is discernible. The customer is no longer the end of the textile development process, but rather a decisive actor who is gaining influence through his preferences and interaction. However, the increasing collection and utilization of data also poses potential risks in the field of IT security and risk management. Solutions that protect from both external attack and internal manipulation will therefore be essential in the near future.

That said, the seamless and comprehensive integration of all actors and data involved in the product development process will prove to be a pivotal trend.

As a consequence, inadequate data flows and insular solutions will progressively disappear from the industry in favour of fully integrated solutions. That is why Koppermann has for years banked on seamless Product Lifecycle Management systems implemented as the central lifeline of the creative value-adding process in the company.

Financial Year 2016/17

www.lectra.com

7.

NEW CUSTOMERS OF RFA PLM, INCLUDING:
OVS, The Thai Silk Company, Yesim

186.

OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

165.

NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

7,441.

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

N/A.

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

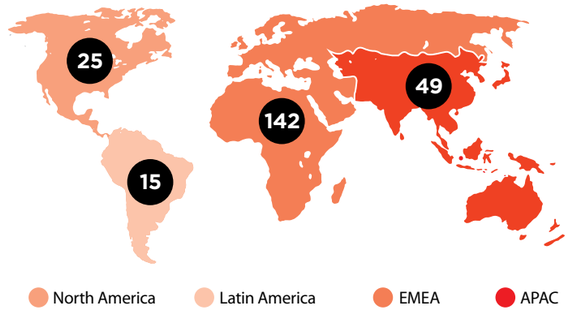
Licensing revenue:
$1-2 million

All maintenance revenue:
$3-4 million

Implementation & services revenue:
$3-4 million

R&D investment:
$11-20 million

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market.

Lectra Fashion PLM 4.0 is the first-ever solution designed to help fashion companies navigate Industry 4.0. By helping fashion companies respond quickly to today's market trends, the solution puts consumers right at the heart of their business.

It comes in the form of new standard offers that will firstly allow them to focus on their main challenges and then build as they go with additional modules, hence giving them the agility to adapt quickly to different business models and jump on trends.

It will also equip them with fashion business intelligence. The software was developed based on best practices derived from 40 years' experience in fashion. Built-in use cases, templates, and standard reports and tech packs help customers produce faster by eliminating redundant tasks.

The solution acts as an intelligent nerve center that connects all processes, systems (such as ERP), technologies (such as CAD, Adobe Creative Cloud) and supply chain actors together. Every user is constantly informed by accurate data that flows throughout the entire design-to-production process, which enables good decision-making within short time-frames.

To meet the everyday needs of users, this easy-to-use, configurable solution comes with new learning tools that guarantee fast onboarding and facilitate user adoption.

Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

We have identified four game-changing trends:

Millennials are now leading the production line. Fashion companies have to satisfy their quick-changing tastes by delivering personalized and sustainable products on time. They are looking for the ultimate customer experience, both online and off.

Consequently, fashion companies need to respond to trends quickly. Digitalizing the supply chain will give them the agility to do so. With new technologies that facilitate data aggregation and sharing across the supply chain, the big question now is how to leverage data by organizing and using it to forecast trends.

Digitalization has ushered in the era of Industry 4.0. Companies are embracing smart manufacturing to automate their processes and have more visibility on them. By connecting all supply chain actors and processes together, smart factories make information accessible for all and improve workplace transparency and production efficiency.

Transitioning towards "Made in China 2025", Chinese manufacturers are moving away from low-cost production to provide value-added services and higher-quality goods. Additionally, with the rising middle class and their dependence on social media, the market is becoming increasingly consumer-driven. This transition presents new opportunities for the market - more fashion companies will be investing in new technology to help them transition.

An Advertorial By Lectra

Data Intelligence:

The Next "It" Item in Fashion

When famous American retailer J.Crew revealed major plans to restructure its business in early June this year, CEO Millard Drexler famously took the blame for not helping the company jump on the technology bandwagon earlier. "I've never seen the speed of change as it is today," he said. "If I could go back 10 years, I might have done some things earlier." When someone such as "retail king" Drexler, who is often credited with the early '90s renaissance of GAP and Ann Taylor makes such a statement, the whole world better sit up and listen. Digitalization in fashion is no longer just a trend, but is now a necessity for surviving in this cutthroat business environment.

Fashion's Brave New World

Drexler was right. The "speed of change" is exactly why fashion companies should fully digitize their supply chains. With the demands of tech-savvy consumers nowadays, trends are changing at lightning speed. Companies need find a way to not only gain full visibility into their design-to-production process, but also the consumer psyche – what worked in the last collection and what didn't? Failure to deliver the products of the perfect fit and quality at their doorstep can be detrimental to fashion companies as consumers will not stepping into their stores again, both online and off.

This change in consumer behavior is exactly why data has become fashion's major currency and language. These demanding new consumers of the digital age want products that are on-trend, of the right fit and material. According to them, fashion companies are supposed to give them exactly what they want. After all, they did willingly leave a trail of digital breadcrumbs while shopping online, didn't they? It is the company's job to use trace them and give them the desired product.

Companies thus need aggregated data to give them perspective. It serves as a magnifying glass for them to examine their supply chain processes in detail and adjust it accordingly to fast-changing trends within short time frames. On the consumption side of the supply chain, point-of-sale data from stores allows companies to study their consumers, and create successful retail strategies that deliver the ultimate product and customer experience. This need for enterprise-wide visibility will subsequently serve as a catalyst for fashion companies' widespread acceptance of Industry 4.0, where all supply chain actors seek to automate industry processes by connecting them together through data that runs from consumer to factory.

Why Digital Is The Way To Go

For a lot fashion companies, a full digitization process has not taken place yet. For some of them, manual workarounds, and extracting and re-keying data by hand are still common practices. As for the others who already own systems such as ERP and SCM, big volumes of data are being amassed, but in the form of different data sets strewn across different parts of the supply chain that serve different purposes , without any cohesiveness or any real value being extracted. The bigger question then becomes – how can they get their data to tell them a story about their consumers and themselves?

To get the full picture, companies must start aggregating data that comes from all solutions, processes and actors involved in the entire lifecycle that spans from the first creative spark to production. For that, a PLM platform is much needed – it provides a centralized location in which data can be saved, and from which it can be easily extracted. Each of these solutions serves a certain purpose but when plugged into the same, cohesive system as the others, its true worth emerges. For example, material information that has been keyed into the system via a solution during a pre-production process can be used during the other later stages such as sourcing, sampling, fitting, quality assurance and marketing as well.

It is hence important to realize that with the emergence of the digital supply chain, products are undertaking virtual identities. The digital life of a product extends well beyond its shelf life with bigger volumes of new ones joining them each season. Thanks to its newly forged numerical existence, the products become malleable as its characteristics can be easily altered from one season to another through tech packs, based on point-of-sale information. With PLM solutions, fashion companies can manage these digital lives to make sure that they will effectively transform into their physical selves in the later stages.

Right Data, Right Products, Right Timing

Data integration is an art. In order to attain data that is clean, actionable and useful, the first step to take is to make sure to choose the right data from the right sources by deciding on which solutions are the most important ones to integrate into the platform. To meet the demands of today's market, fashion companies need an extensive and integration-friendly suite of solutions to cover key supply chain processes. This includes:

- PLM platforms to oversee and manage product lifecycles;
- Trend forecasting platforms and planning and calendar management tools to keep team members on schedule with their tasks;
- CAD and other creative design solutions to communicate information in 3D format, allowing all external and internal supply chain actors to collaborate;
- Computer-aided design solutions to transform their digital patterns to reality;
- 3D virtual sampling to offer a wider range of possible design options, and improve fit and form;
- Logistics and warehouse management systems to distribute products around the world;
- Marketing and product information management systems to advertise across multiple channels;
- E-commerce and point-of-sale solutions to make the right products for the right consumers;
- Retail performance analysis software to keep track of performance in order to make better-informed decisions when developing collections for the following season.

By integrating these solutions, companies are also building an integrated work environment for both internal and external supply chain actors, ensuring a seamless and continuous flow of accurate data among all team members. With a two-way interface between key data sets, brands and retailers are able to develop workflows that go beyond any system, language and geographical barriers, and facilitate fast and smart executive-level decision-making.

Data Integrity 101

Apart from choosing the right data sources, IT teams must also work with their solution vendors to establish certain norms when it comes to organizing their data. Data can only serve a higher purpose when it is made intelligible for all supply chain actors involved. This means that it has to be standardized, cleansed and stored well for users to identify recurring patterns and carry out their tasks accordingly. For example, without standardized color codes, designers might refer to black as "#00000" while product developers in the same production line might refer to the same color as"BLK".

This might cause confusion, and in the worst-case scenario, errors that trigger a domino effect across the supply chain, resulting in product defects. When companies fail to manage data correctly, they will lose their competitive edge as lower quality master data will not be able to provide them with the full and accurate picture of what their consumers want. As an overall consequence, they will not be able to produce on-trend collections on time.

Companies can facilitate data cleansing and standardization processes by putting new measures or policies into place. One such example is developing a data glossary so that all team members can keep track of new information, such as material codes.

Data Intelligence: Trust The Virtuous Loop

What then, makes big data intelligent? The key lies in its analysis. Fashion companies need to learn how to derive the best value from their data by being able to interpret it according to their specific business context. The PLM platforms they use cannot just function as mere data collection centers, as that would just defeat its purpose. They need to help companies convert data into actionable information by providing them with sound fashion business intelligence.

To do so, these solutions need to be developed based on the industry standards. By being able to provide customers with best practices, this technology will enable them to perform tasks with speed and accuracy and avoid wasting time on repetitive tasks. It is important that the software is programmed to perpetually update itself with the latest industry standards and equipped with a self-learning mechanism to help users stay relevant to the ever-evolving marketplace.

For example, while having material information is extremely useful in the sourcing, sampling and fitting stages, it can also be used to predict fabric consumption for the next collection-in-progress in the form of an application. PLM software can also be developed to use data from previous collections to simulate cost scenarios for users, so they can help companies estimate overall production costs for their future collections. To take this one step further, if these platforms were equipped with a self-learning ability, they would be able to perform these functions with increasingly more accuracy from one collection to the next.

As time goes by, users will seek to make increasingly intelligent use of data. Fashion companies will not only use PLM platforms to cleanse and store data, but to also forecast upcoming market trends based on information from their past collections. To help fashion companies make better use of data, a virtuous cycle of business intelligence must be established between them and technology providers, where solution vendors continuously upgrade their solutions according to the evolving business needs of their customers through an active feedback loop. This way, their technology will be more intelligent and up-to-the-minute.

Ultimately, real intelligence comes from the classic synergy of human and artificial intelligence. Converting large-volume data into actionable intelligence is something we cannot do without the aid of certain PLM technologies .Only some solutions can act as digital nerve centers as they are blessed with a wide functional scope that can cover the entire design-to-production process and integrate other software (such as CAD), systems (such as ERP) and industry processes. Platforms of this nature can ensure that there will be a steady flow of actionable data that will run throughout the supply chain. By bringing the consumer closer to the factory through big data, these PLM solutions will enable fashion companies to progress swiftly towards Industry 4.0. The faster fashion companies embrace digitalization and the virtuous loop, the less time they waste. After all, the devil is in the detail.

Sources:

Business of Fashion: "J. Crew's Mickey Drexler to Step Down as CEO". Retrieved 31 July, 2017.

Informatica: "Potential at Work: Converting Raw Data into Business Intelligence". Retrieved 31 July, 2017.

Financial Year 2016/17

www.ngcsoftware.com

6.

NEW CUSTOMERS OF RFA PLM, INCLUDING:
Aden + Anais, Byer of California, Royce Too, The Gem Group

140.

OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

155.

NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

32,500.

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

57,250.

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

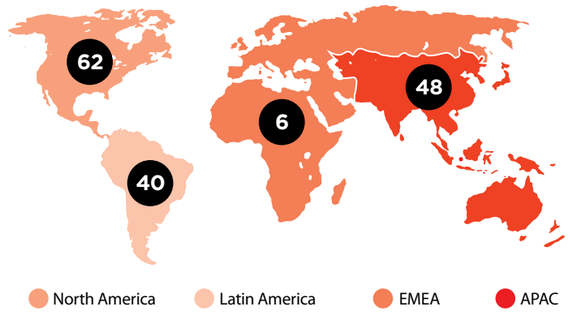
Licensing revenue:
$11-20 million

All maintenance revenue:
$8-10 million

Implementation & services revenue:
$11-20 million

R&D investment:
$6-10 million

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market.

In early 2017, NGC introduced the Andromeda Cloud Platform for the Connected Enterprise. The retail industry has embraced the platform enthusiastically, with many upgrades and new implementations underway. Andromeda brings together all departments – Merchandising, Product Development, Sourcing, Compliance, Purchasing, Production, Quality, Logistics, Marketing and Sales – into a single cloud-based solution that connects all users with their global vendors, suppliers and other providers. Andromeda provides a single platform, with core PLM and supply chain functionality that can centralize and share information created in any other legacy PLM, ERP, SCM, Planning and Point-of-Sale solutions.

Andromeda's notifications use real-time consumer sales data to proactively alert all supply chain teams regarding fast-turning product and more sales opportunities. Andromeda supports Just-In-Time manufacturing, postponement, reserved capacity, direct-to-store shipments and material commitments with drawdowns. Critical path management, exception alerts and user collaboration streamline the flow of information and allows all global users to share information and quickly react to rapidly changing market trends. As a result, retailers and brand owners can optimize lead times, reduce expenses, improve quality and maximize company revenue and profit.

Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

Getting product to the consumer that wants to buy it is the most important trend shaping our industry. Every company can improve speed to market. In order to meet consumer demand quickly and accurately, companies must respond faster than ever to the latest data and trends – and this can only be done by connecting data throughout the enterprise, so that everyone in the global enterprise can react to consumer buying trends.

Another key trend is improving vendor compliance. In today's socially-connected world, it's more important than ever for retailers and brands to protect their reputation by carefully monitoring vendor relationships to ensure Corporate Social Responsibility. NGC is seeing tremendous interest from some of the industry's largest brands and retailers in adopting new technology solutions for streamlining and managing vendor relationships.

The ongoing retail shakeout affects our industry in numerous ways. Fast fashion and off-price apparel continues to dominate, many stores are closing or downsizing to become showrooms with leased space, more inventory is being positioned in local DCs, and micro seasons (three weeks) have become the new normal.

An Advertorial By

NGC

Transforming the Fashion Industry into a Connected Enterprise

Q&A with Mark Burstein, President of Sales and Development, NGC Software

The fashion and retail industries are going through an era of tremendous change. What's behind this?

Retail is in an unprecedented period of intense disruption. Credit Suisse expects more than 8,600 stores to close before the end of the year, according to a recent story in Business Insider.

However, some notable outliers are significantly outperforming their peers. Companies that have embraced fast fashion, such as Inditex (the parent company of Zara), H&M, Primark, Uniqlo and others, are seeing great success. Inditex grew its sales more than 15% to 20.9 billion in 2016 and posted a net profit of 2.88 billion. New York-based Xcel Brands has transformed its business through a data-driven, fast-fashion model that gets products to retailers in a fraction of the time that was previously required.

These successful brands share several things in common – they've embraced the concepts of lead time optimization, the demand-driven supply chain and enterprise technology to react faster than ever to the latest data and trends.

Fashion companies have been discussing lead-time optimization for years. Why is it still such a huge challenge for the industry?

Today's fashion industry is moving faster than ever. As Liz Rodbell, the president of Hudson's Bay department-store group, told The Wall Street Journal, "With the world moving so fast, we need to get fashion here faster."

To do this, data must flow in parallel communication between all departments. However, the supply chain data flow that characterizes much of the industry today resembles the assembly line of the automotive industry. Data and processes are very linear; data moves from Design to Production, then on to Distribution and Sales. This is slow and cumbersome. Moreover, companies are hampered by organizational silos that make it difficult for departments to share information, and ripple effects are felt throughout the organization.

To meet consumer demand quickly and accurately, companies must respond instantly to the latest sales data – and this can only be done by sharing real-time sales data throughout the enterprise, so that everyone in the global enterprise can react to the current consumer buying trends.

In order to succeed, brands and retailers must take advantage of real-time sales information to adjust plans in-season and immediately react. If products are selling rapidly, companies must accelerate production; if products aren't selling, companies must stop or redirect production and cut their losses immediately.

What role can data play in transforming the industry?

As Intel's CEO said recently, "data is the new oil." Data is the new lifeblood of the fashion industry, and data-driven retailers and brands are changing the industry.

This means that fashion companies must become data-driven, digital enterprises. Rivet recently emphasized this when it noted that "Inditex…is more than a retailer—it's a digital company… Their points of sale at retail around the world are all connected, meaning they have access to data in real time that allows them to see what's selling well and what isn't, and to make quick decisions about what to make more of and what to ditch. That also means Zara can sell much more of its goods at full-price, not sharing in the markdown misery so many retailers are reeling from in this overly promotional market."

When fashion companies see that a product has exceptionally strong sell-through, they must take advantage of data and move quickly to get product to the consumer faster. To do this, they can take several steps: accelerate more of the product design in-season, quickly reallocate or reorder raw materials, accelerate production schedules, or expedite logistics to get products to the consumers faster.

How can PLM help companies become more data-driven?

PLM must be part of a "connected enterprise" that brings together all global departments, users and data into a single enterprise system, which is exactly what NGC's Andromeda cloud platform does.

In the connected enterprise, PLM is part of a single platform, with core PLM and supply chain functionality, that can centralize and share information created in any other legacy PLM, ERP, SCM, Planning and Point-of-Sale solutions. This brings together all departments – Merchandising, Product Development, Sourcing, Compliance, Purchasing, Production, Quality, Logistics, Marketing and Sales – in a single cloud-based solution that connects all users with their global vendors, suppliers and other providers.

A connected enterprise can bring together retailers and brand owners to achieve the levels of performance and responsiveness that are necessary to thrive in today's highly competitive retail environment. All global users share information and can quickly react to rapidly changing market trends. As a result, retailers and brand owners can optimize lead times, reduce expenses, improve quality and maximize company revenue and profit.

Can you provide an example of the connected enterprise in action?

Xcel Brands is an example of a company that has embraced the connected enterprise. Xcel Brands is an NGC customer, and our solutions are helping Xcel Brands achieve exceptionally fast turnaround times in design, production and replenishment.

Xcel Brands made headlines last year in The Wall Street Journal when the company worked with Lord & Taylor to quickly replenish a best-selling blouse that had sold out in days. When the hot off-the-shoulder Isaac Mizrahi blouse sold out quickly, feedback was immediately sent down the supply chain, and blouses were back in stock in six weeks – something that would previously have taken nine months.

Through a connected enterprise, Xcel Brands can gain quick insight into sales data – allowing them to react quickly to the latest sales trends and optimize their supply chain. With NGC's solutions, Xcel is not only planning more effectively on the front end but making the most of every selling opportunity. As The Wall Street Journal summed up, Xcel Brands is pairing "proprietary brands with more nimble sourcing, to help retailers sell more goods at full price by delivering merchandise in real time based on customer demand."

What can companies do to become more data-driven and responsive to consumer demand?

First and foremost, they must embrace the connected enterprise. They must also break down the silos in their organizations. Siloed systems and departments are one of the biggest barriers to lead time optimization and process improvement, and companies must eliminate silos in order to share information in real time across their internal departments, as well as with their global vendors and suppliers.

Companies must adopt the concept of postponement, too. The industry has talked about postponement or "just-in-time manufacturing" for more than 15 years, but they're just now starting to get it right. The companies that that have implemented just-in-time manufacturing practices are reaping huge benefits. With postponement, apparel companies can wait until the last possible minute to decide what to make to ensure they're making decisions based on the latest consumer trends and sales data. If they don't do this, their merchandise may be headed for instant markdown as soon as they arrive at the stores.

Vendor compliance is another area where companies can digitize their operations to become more data-driven. In today's socially-connected world, it's more important than ever for retailers and brands to protect their brand reputation. By carefully monitoring vendor relationships to ensure Corporate Social Responsibility (CSR), retailers and brand owners can ensure Corporate Social Responsibility (CSR) compliance by streamlining vendor management.

New solutions such as Andromeda Vendor Compliance can help manage important government-mandated compliance regulations; vendor compliance is very data-intensive, and companies need new solutions to help streamline this increasingly complex role.

What will be the near-term impact of technologies such as AI and machine learning on the digital supply chain?

AI and machine learning are transformational technologies. When companies encounter unexpected obstacles within the supply chain, the ability for technology to automatically recommend the optimal resolution is a high priority at NGC. Most companies are still in the very early stages of understanding how these technologies will fit into their current processes. As with other industry-changing technology such as EDI and RFID, the full benefits will be realized once all supply chain partners embrace it.

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6.

NEW CUSTOMERS OF RFA PLM, INCLUDING:
Ashley HomeStore, Eral China, Honeywell, Kipling, Specialized, Sportmaster

100.

OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

85.

NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

94,903.

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

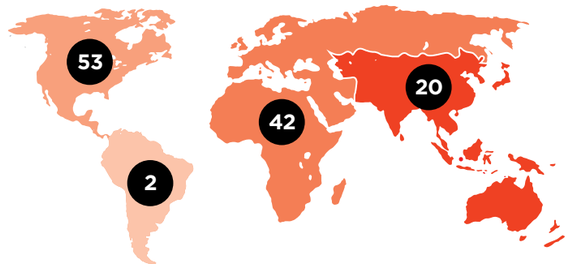
28,470.

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

Licensing revenue: **$11-20 million**	All maintenance revenue: **$11-20 million**
Implementation & services revenue: **$11-20 million**	R&D investment: **$6-10 million**

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market.

PTC's next-generation FlexPLM solution now comes equipped to harness data from the Internet of Things (IoT). Our customers have demanded a connected PLM experience, and with our latest platform, we enable them to leverage rich data from their entire ecosystem. FlexPLM is pre-packaged with an IoT platform to easily connect devices, such as RFID readers, beacons and mobile phones. Users also can readily link FlexPLM to their ERP, POS and other software. They also can integrate external data, such as social media feeds. With IoT dashboards, individual users can build customized reports to access actionable information most important to their specific roles. Other recent advancements help designers and developers tap into the voice of the consumer and channel new ideas. For example, with new digital design tools, they can capture inspiration and create concept boards in a completely digital environment. When apparel, footwear and consumer goods retailers and brands shift away from physical mood/trend/concept boards to a digital process, they eliminate many inefficiencies and open the door to much stronger collaboration and faster development cycles. The iterative process goes much more quickly when teams can aggregate ideas and share them digitally with both internal users and external suppliers.

Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

Consumer expectations are driving the industry toward more season-less fashion and personalized products and services. Shoppers demand 24/7 access to detailed data about products, including real-time inventory availability. When they see something they like on social media, TV or in a fashion magazine, consumers expect to be able to find that look, compare pricing and arrange for purchase and fulfilment on their terms — anytime, anywhere. These trends make it imperative for retailers to shave weeks off their ideation-to-delivery cycle so that they can get the right product to the right place at the right time. To do this in 2017 and beyond, they have an opportunity to leverage the power of IoT-enabled PLM for better decision making during product planning, development and sourcing. Only with stronger supply chain connectivity and visibility can fashion and consumer products retailers be more responsive and agile in how they bring the right styles to market. Predictive analytics are essential to identify what trends are resonating with consumers and what combination of circumstances increase a risk of a product order being delayed. Retailers who can capture and synthesize real-time data from the market and their value chains will be able to excel at consumer engagement.

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ptc

Retail's Digital Revolution Calls for a Connected PLM Strategy

The digital transformation of the retail industry is reshaping how executives measure success, how global teams do their jobs and how consumers engage with their favorite brands.

During Q1 2017, for the first time in history, retail digital commerce surpassed US$100 billion in sales in a single non-holiday fiscal quarter, according to comScore. Mobile commerce chalked up an impressive US$22.3 billion of those sales. Apparel was the top-selling product category during the period. In 2015, apparel made another historic digital leap, surpassing computer hardware to become the No. 1 top-selling product category on the Internet. As the balance of retail sales continues to shift between the physical and digital, omnichannel commerce is clearly the retail model to master.

Fashion and consumer products retailers and brands have responded by focusing heightened attention on shortening cycle times, achieving greater supply chain visibility, improving inventory accuracy and reinventing fulfillment methods. At the same time, fashion labels are gravitating away from traditional seasonal merchandise calendars and blazing trails with new season-less collections and frequent product infusions.

At PTC's LiveWorx user conference this spring, a live poll of retail, fashion and apparel industry participants highlighted the importance of speed to market and readily accessible, actionable information. Attendees called out these pressing concerns:

Top Areas for Improvement Based on 2017 Business Priorities

#1: Lengthy development cycle times

#2: Poor visibility and lack of easy access to critical data

#3: Excessive time spent on managing data vs. goals

The Solution: IoT-enabled, Connected PLM

Connected product lifecycle management (PLM), equipped to harness the Internet of Things (IoT), can help retailers methodically transform core processes and become strong competitors in today's retail economy, with its omnichannel complexities. Connected PLM is both a methodology and technology platform drawing from disparate systems and data sources to unlock valuable insights to keep companies on trend, on time and on budget.

Next-generation PLM technology is pre-packaged with an IoT platform to easily connect devices, such as RFID readers, beacons and mobile phones. Users also can readily link these PLM solutions to their ERP, POS and other software. They also can integrate external data, such as social media feeds. With IoT dashboards, individual users can build customized reports to access information most important to their specific roles. This data does not require hours to pour over and analyse. Instead, it can be presented in easily digestible dashboards on the end user's mobile device.

For companies embarking on a digital transformation journey, acronyms such as "IoT" and terms such as "machine learning" and "artificial intelligence (AI)" may seem futuristic and hard to grasp. In layman's terms, the IoT refers to systems, sensors and devices all communicating with one another automatically via the web, gathering and synthesizing information machine-to-machine, with minimal to no human intervention. A powerful analytics engine is essential for making sense of enormous IoT data feeds. Only then can retailers turn the data into actionable intelligence to improve decision making during product planning, design, sourcing and selling activities.

Researchers are bullish on IoT's retail prospects:

- $410 billion to $1.2 trillion = IoT retail economic impact by 2025 due to revenue increases, better customer experience, supply chain optimization, cost savings (McKinsey)
- $2.5 billion = retail IoT hardware and infrastructure spending by 2020 (Accenture)

In LiveWorx 2017 polls, attendees shared where they see the greatest opportunities to leverage IoT technology.

Top Potential Advantages of Using IoT Technology

#1: Easier access to data/better reporting and analytics

#2: Better supply chain connectivity/visibility

#3: Deeper customer insights in planning and product creation stage

Applying Technology Across the Value Chain

With such clear business drivers and momentum behind these new technologies, how can they be realistically used within the enterprise? IoT-enabled, connected PLM touches myriad aspects of the concept-to-consumer cycle. IoT transformation projects beckon to be tackled across the retail value chain. Executives are actively engaged in seeking out opportunities to use PLM and IoT to make sense of Big Data, get visibility to key insights, improve global connectivity between teams and trading partners, speed processes and squeeze out inefficiencies.

Plan and Create: One goal is to achieve more connected product design and development. Connected PLM empowers retailers to accelerate assortment planning, design and product development. Teams are becoming more digitally connected, with the PLM platform serving as a central repository and collaborative hub for concepts, raw materials, story boards, social media trends, tech packs and even retail POS highlights. Thus armed, designers, planners, merchandisers and product developers are better positioned to offer fresher, season-less fashion targeted to different customer personas.

IoT-enabled PLM advancements are helping designers and developers tap into the voice of the consumer and channel new ideas — rapidly and digitally. For example, with new digital design tools, they can capture inspiration and create concept boards in a completely digital environment. The iterative process goes much more quickly when teams can aggregate ideas and share them digitally with both internal users and external suppliers.

In addition, development teams are dramatically accelerating time to market through the use of 3D virtual prototyping solutions. 3D virtual sampling empowers brands to rapidly make adjustments to specifications without waiting for physical samples or scheduling live fit model sessions. Realistic virtual product renderings can shave weeks, even months, off cycle times. 3D also is playing a growing role beyond design and development. "The importance of 3D cannot be overstated," says Chad Markle, partner, Kalypso's Digital Innovation Practice. "Leading companies leverage 3D technologies across the value chain, through line planning, design, development, merchandising and production, all the way to marketing and sales."

LiveWorx poll participants ranked the following factors as the prime motivators to use virtual prototyping.

Top Motivators to Use Virtual Prototyping

#1: Reduce concept-to-consumer cycle time

#2: Enable collaborative and interactive new product development processes

#3: Reduce materials costs

Source and Produce: IoT-enabled PLM also is integral to building more responsive, agile value chains. Connected PLM is designed to open up new levels of supply chain transparency. For example, more companies are installing smart sensors on products, within factories and at stops all along the supply chain. These feed a steady stream of information to different systems, which ultimately connect to the PLM platform. As a result, decision makers gain real-time visibility into work-in-process (how many garments have been sewn?), fabric availability (when did the rolls leave the mill?) and many other variables.

Such seamless access to value chain data differentiates leaders from laggards, according to a 2016 study by Aberdeen Group. The firm's research found that:

68% of best-in-class companies have visibility into supplier quality and manufacturing processes

36% of best-in-class companies measure suppliers' ability to collaborate on product design

Firms on the leading edge of leveraging IoT technology use algorithms to parse through data about the weather, fashion trends and their supply chains to help them decide what to make and where and when to make it.

Ultimately, with a connected PLM approach, product information doesn't get stuck in silos or lost in translation after the last sample is approved. When all trading partners can connect to a common cloud-based PLM platform, there is no need for data to be rekeyed, attached to emails or called in. Seamless, speedier collaboration means that styles can progress much faster from inception to purchase order to retail rack. "Simply put, connected PLM allows for multiple parties around the globe to work simultaneously and collaborate on products, enabling speed and agility, both of which are required to respond quickly to trends," says Sonia Parekh, senior manager, retail, Kalypso.

Sell and Engage Consumers: Leading retailers and brands also are using real-time IoT insights from connected stores. What do the sensors say about what displays are attracting the most traffic? Which styles are being tried on most frequently? Which are being tried on and purchased vs. put back on the rack? Through IoT-enabled, connected PLM, answers to these questions and many more feed instantaneously to upstream teams of designers, technical designers, merchandisers and planners, informing the next wave of styles, fit specifications and assortments.

They also are engaging the consumer with augmented reality (AR), such as using smart mirrors to test styles and concepts with consumers before physical garments are made. With AR, designs from the PLM solution can be "fitted" to the individual consumer's body in the mirror. Shoppers can experiment with many different looks, selecting different colors and mixing and matching various pieces. Retailers get a wealth of feedback on consumer preferences, and shoppers enjoy sneak peeks (and special deals) on potential new styles. "Before, you would have to wait an extended period of time to see this consumer behavior. Now, it's all integrated into the PLM ecosystem," says Victoria Brown, senior research analyst, retail supply chain, IDC Retail Insights.

In this digitally transformed world, such a connected ecosystem is required to parse through data, predict trends and issues, share key insights with partners and act fast, together, to fulfill consumer expectations.

To learn more about the technologies and solutions impacting the retail industry, visit ptc.com/retail, follow PTC on Twitter @PTC_Retail or email us: retail@ptc.com

Financial Year 2016/17

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5.

NEW CUSTOMERS OF RFA PLM, INCLUDING:
Acerbis, Atlas for Men, Auchan China, GiFi, Orsay

147.

OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

N/A.

NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

5,800.

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

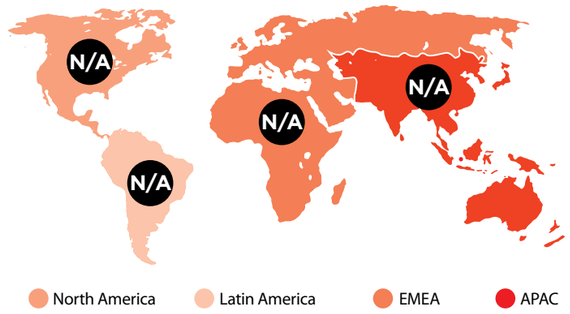
3,400.

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

Licensing revenue: N/A	All maintenance revenue: N/A
Implementation & services revenue: N/A	R&D investment: N/A

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market

TXTRetail 8 is uniquely positioned in the marketplace as a truly End-to-End Merchandise Lifecycle Management solution.

It combines core PLM capabilities such as Creative Design, Collection Development, Sourcing and Costing with Financial Planning, Assortment and Line Planning, as well as Forecasting, Replenishment and the Supply Chain.

Latest advancements include:

'Real-time' with Merchandise and Assortment Planning: with release 8.0 and the inclusion of in-memory computing, the wide scope of data and business decisions managed in Assortment Planning are immediately reflected in all areas of Planning, Supply Chain Collaboration and PLM, providing new levels of reactivity throughout collection lifecycles.

Productivity through Integration and Collaboration: From product specs and line plans to automated purchase order generation, initial allocation and replenishment.

Capture buyers' data: whether 'design or buy', buyers can easily capture and visualize products from suppliers' catalogues, negotiate details and quantities, analyze proposed buys and select products for assortments

Blending Art, Science: Enhanced 3d visualization working in conjunction with numeric recommendations to create picture perfect, customer focused assortments

CSR / Sustainability: quickly identify exceptions when managing CSR. Incorporate data and tools for early indications and assessments of Collections' sustainability.

Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

The discipline of fast (and ultra) fashion and pressure on creating more products, localized assortments, deliver better value at lower cost, are strongly impacting the way companies design, plan and execute their assortments.

Line and Assortment Planning and PLM integrated: the creative and business perspectives are reconciled from the earliest phases, collections are more balanced, the use of customer insights helps establish the best portfolio management decisions and create products that resonate.

Collaboration: Dealing with increasing product counts at faster speeds requires all parties (planning, design, production, transportation, buying, replenishing) to work more closely together

Omnichannel and Digitalization of the enterprise: not only fashion companies continue to invest in omnichannel but bring digitalization 'behind the scenes' to speed up innovation and decision making (e.g. digital product creation and trend research, digital moodboards, order proposals & tracking, buying)

Managing 'Big data': the need is to flexibly manage the abundancy of data coming from different sources, turn it in useful information and bring this 'intelligence' back upstream to all aspects of planning and innovation.

Integration for Cloud continues to grow: Web services integration is now essential to provide real-time integration over the internet.

An Advertorial By

TXT

The Fast (And Ultrafast) Fashion Value Chain:

Digital, Intelligent, Collaborative

The fashion sector is moving ever quicker. The rhythm of innovation is incessant and, if the 'fast fashion' paradigm with up to 15-20 collections per year, capsules and limited editions seemed extremely challenging, new approaches such as 'see now buy now' adopted by many brands, are changing once again the rules of the game. These business models require incredible agility and all require a strong understanding of the customer and real demand that needs to be transferred back upstream to all levels of the supply chain, marketing, merchandising and design. Quickly.

In this context, where the concept of 'seasons' is blurring and time to market is a top concern, the fashion value chain becomes ever more digital, 'intelligent', collaborative.

"Digital" is the oxygen of the fashion ecosystem: digital is the 'omnichannel' customer who searches, discovers, buys, expresses his 'sentiments' and connects to the brand in complete new ways. Digital is the lingua franca of a closer relationship with suppliers with the increased use of systems to support purchasing, online order management, tracking, visibility. Digital is underpinning the whole fashion enterprise. Fashion organizations continue to realize digital transformation strategies to reach key decisions faster and at lower cost, such as digital product creation and visualization, digital mood boards, trend research, catalogues, and buying. The whole design cycle has been inundated by the advent of digital, with creative teams finding it is much easier to collect and share ideas, including inspirations coming from fashion shows, social media, influencers.

The integration within PLM of design and image management tools is clearly an enabler making the management of creative assets faster and more accurate. Also extremely important, is the role played by mobility that has allowed connectivity throughout the value chain 'anytime', 'anywhere': digital pics are exchanged during the trend research process effortlessly with smartphones; buyers place orders through their mobile apps; the customers (and particularly millennials) search, buy, review, share, largely via mobile.

Central to the 'digital' revolution is 'intelligence': how to leverage all this data, visuals, comments, messages which flow – digitally indeed - up and down the fashion value chain? Leveraging this rich new flow of data regarding customers, internal as well as supplier processes, poses new questions on how to thrive in a data rich environment, not get bogged down by all the information available and how best to take more informed decisions, faster.

Customer side the theme of big data is obviously a hot one. 'Sentiment analysis' or 'opinions mining' techniques (which analyze texts commenting a certain product or brand), Visual Sentiment analysis (which identifies positive or negative reactions from visuals posted on social communities), Intelligent video analysis (which analyze, for example, videos recorded at stores to study people buying behaviors): are just some of the trends fashion companies are placing bets on in order to know their customers better, understand their opinions, and find ideas that work best in the market. Human reactions, behaviors and language are obviously complex and this 'science' is far from perfect, but great opportunities lie in these approaches. This is particularly true when, big data is backed up by advanced planning techniques and combined with the facts of past and current sales data, with rich attributes, channel and customer profitability analysis. The first step is monitoring reactions to our product and brand, the second is being able to efficiently transfer that information back upstream to the whole value chain: to marketing (who can refine messaging, positioning and the digital customer experience itself), to assortment and portfolio management decisions which can be reviewed in course of action; up to design, which doesn't lose its originality but can benefit from this new intelligence coming from the market and leverage it in the next innovation cycles. Market and customer intelligence can of course come from different areas such as: fidelity cards, websites clickstream, social communities, and by deeply analyzing past and current sales by any dimension (customers, product attributes, channels).

Supply side, studies reveal how digital innovation is going 'behind the scenes', transforming data on suppliers, their products and the quality of their services as useful information for decision making is another target many fashion brands are hitting. The buying office, when supported by the right solutions can utilize a large numbers of qualitative and quantitative information on their suppliers (KPIs, ratings) which help them take the best buying decisions with timely reactions when problems arise. This ability becomes strategic in today's marketplace where time to market, as well as reducing inventory along the value chain is a top priority. Some would claim that digital supply chains have existed for a long time (when we abandoned paper in managing our suppliers), what is different today is that systems to support supply chain management and collaboration are not just merely tracking and data exchange applications; they support decision making and visibility. The use of analytics, dashboards and real-time reporting in supply chain management is helping fashion brands and retailers turn the whole value chain from reactive to predictive, with the ability to preview where bottlenecks might occur and where risks ultimately sit, as well as to identify opportunities and alternative options.

True collaboration is key: Managing fast and ultra-fashion business models is of course not just a matter of information (digital and intelligent), but of processes. There's much debate on how digital is transforming the way we work: faster, "in mobility", and closer to our network of colleagues, customers and suppliers. What becomes evident is that the abundancy of information (digital and other) that is nowadays flowing up and down the fast-fashion value chain at incredible pace requires an all-new level of orchestration, disciplined workflows, defined tasks roles, and visibility throughout. Applications cannot work in silos and be just 'systems of records', they need to support the End-to-End merchandise process with true collaboration, allow users to detect and anticipate the cause and effects of their decisions on different processes.

TXT Retail supports Fashion companies with the challenges of ever faster innovation cycles through an End-to-End Merchandise Lifecycle Management solution TXTRetail 8. Uniquely, TXTRetail 8 integrates core PLM capabilities such as Creative Design, Collection Development, Sourcing and Costing, not only with the Supply Chain but with Line, and Assortment Planning, Allocation and Replenishment. All phases of Creativity and Development are empowered by cloud, mobile and digital technologies enabling true collaboration and accelerating the trend research, design and development phases. Design and Planning integrated blends creative market insights with the hard data that planning can bring regarding best product direction. Turning this data into useful information for the creative teams means development can become demand driven while customer insights are leveraged to establish the best portfolio and assortment management decisions to create the optimal number of new products that ultimately will sell. Planners can associate visual evaluation to the numeric analysis, performing powerful simulations in a more intuitive manner, via web or tablet. A full range of analytics and advanced reporting capabilities are available to retailers which unlike the past now require real-time visibility as to how new collections are performing in the market allowing data-driven, fact-based decisions. Supply side, TXTRetail 8 provides the capabilities to digitally manage all relationships with suppliers (negotiation, orders and quality tracking) and supply chain (logistics and TSP's, down to stores and end-customers). The whole process is coordinated through the use of advanced workflow management capabilities, fed with the right information at each step, monitored, collaborative, and faster.

VISUALNEXT
End2End Software Solutions

Financial Year 2016/17

www.visualnext.com

6.

NEW CUSTOMERS OF RFA PLM, INCLUDING:
Focus, Premium Uniforms

72.

OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2016/17

20.

NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

8,000.

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

2,500.

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

REVENUE & INVESTMENT INFORMATION

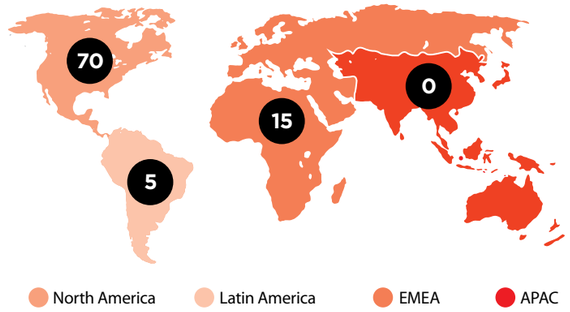
Licensing revenue:
$1-2 million

All maintenance revenue:
$3-4 million

Implementation & services revenue:
$1-2 million

R&D investment:
$0-2 million

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:
(Excluding those cited as R&D-specific resources above.)



Tell us what you feel has changed and / or advanced in your product offering this year to differentiate your company from others in the RFA PLM market.

Visual Next continues to innovate with fully integrated PLM features enabling speed-to-market for fashion professionals taking on complex collaborative environments. PLM, as-a-platform, is the single most important technology and this year's advancements are focused on empowering users with a fully mobile set of tools as well as business intelligence to make smarter and faster decisions.

Throughout the last year, the Visual PLM team added a variety of mobile friendly tabs and features in order for users to work efficiently anytime and from anywhere. Users can also collaborate on a new level using online annotation tools.

The new user interface provides professionals with intuitive tabs, grids and features to simplify cumbersome daily tasks and automate business operations. New data and media integrations give users the ability to collaborate and share assets effectively while protecting their work with new security features.

Using VIS (Visual Integration Services), Visual PLM is seamlessly integrated with a powerful BI platform, point-of-sale system, pre-production and supply chain information empowering production teams with real-time data to increase efficiency across all channels.

Importantly, Visual PLM's eCommerce integration has improved, and can act as a CMS to share and upload product information and images to webstores, including Shopify and Magento sites.

Tell us what you believe are the most important trends shaping the near-term future of the industry – either in terms of technology or broader market forces.

Coinciding with the increased adoption of IoT services and the rapid growth of unstructured data, Visual Next is focusing on helping their clients make sense of Big Data.

As the number of connected devices and business applications grows and mobile and web usage increases, correspondingly, so does the number of data sources at the disposal of a given company; both the challenges and opportunities are monumental. In a time where only 22% of RFA businesses have adopted Business Intelligence, fashion companies stand to increase their operating margin by 54%.

However, these benefits cannot be fully realized without first being able to efficiently and meaningfully process and decipher the data that these connected applications and channels generate.

Embracing Big Data for modern fashion companies starts and ends with a PLM software connected to all your business platforms, including POS, eCommerce and third-party marketplaces.

Importantly, Visual Next is also integrating with The Higg Index to enable customers to assess and measure their environmental, social and labour impacts in order to become more sustainable and responsible businesses.

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Big Data:

Changing the PLM Ecosystem

By
Charles Benoualid
CEO, VP of R&D, Visual Next

PLM Today and Tomorrow

The vast majority of companies employing PLM at the moment have a powerful resource that they are not using to its fullest extent. The PLM of today is used primarily as a tech pack during the design process. At present, the way most companies use it plays to some of its advantages: handling illustrations, measurements, target specs, sample materials/ fabrics, costing and critical path tracking.

But that isn't everything that a PLM can or should be. Using the engine of Big Data, the PLM of tomorrow will become increasingly indispensable for both the creation process and for fostering innovation within fashion companies by using Big Data and real-time feedback from customers.

Technically speaking, we don't need to wait until tomorrow, since this technology is available to us in the present day. In many cases, they're already in use, because the nature of fashion as an industry is that it demands speed and rapid change, both of which are the bedrock drivers for information-technology development. There are not many industries that move as quickly as fashion, and therefore not many that absorb and respond to as much data either.

KPIs are only part of the data set available that you can use to revolutionize the way you do business. The upsurge of interest in big data comes from the ability to access, correlate, and draw conclusions based on information from a far greater set of sources than have ever been available to us before, and in every industry and sector, the most successful businesses—like Zara and Tesla—have already thought very carefully about how to gain a competitive Big Data advantage.

From design, to sales, to marketing, to dealing with suppliers, Big Data-grounded PLM can streamline and unify aspects of your business to an extent never before thought possible. This future will also make space for critical information from the consumer in the development process, by tracking actionable real-time data on the fit, quality, choices of materials and designs and feeding it back to brands. This is beyond the future: it's happening right now, and every business can be profiting from it.

The Data Challenge

The fashion industry, in particular, is awash in data. We live in a river of it, yet we're not effectively damming it to use it to its full advantage.

At the moment, only 22% of RFA businesses have adopted Business Intelligence (BI) products, which is lower than other industries, many of which encounter rates of change far slower than we do, and use far less information than we face. The fashion companies using BI have 54% higher operating margins, on average, according to WhichERP.com.

Buyers are already consumed by analytics: no one buys by personal intuition about styles anymore. Instead, they find out from the data what's going to sell and they buy to their budget by filling categories created by that information. A market once shaped by individual tastes and feelings is now codified by hard data based on real-world sources.

But adopting BI is a challenge. The first is making sure the data you have is reliable, and that's not a given: self-service BI projects are notorious for their high projected failure rate due to data inconsistencies that turn numbers on a page into real-world balance-sheet losses.

Meanwhile, the first era of BI was marked by siloing. We've come to see it as a problem to have BI access-points specific to each one's individual context, and have information segregated as a result. In this market, it is critical to be able to access a significant variety of information easily and move quickly from one store of data to the next. For that reason, second-generation BI has come out of the silo to consolidate data for everyone's benefit: the techniques of the Big Data era are making BI more critical than ever.

But even among those who have adopted BI, there exists the problem of managing and analyzing the data they have on hand. Once you have huge streams of new data coming in, what do you do with it? How do you categorize it, keep track of it, draw inferences and conclusions from it, and—above all—profit from it? How do we make certain that each team is receiving the data most valuable to their members?

Big Data Comes to PLM

Our challenge is to engineer the technology so that data is no longer a single siloed BI access point opening onto a single source of data. The move toward democratization of data means that you should be able to seamlessly integrate the information flowing from your ERP system, PLM software, eCommerce platform, Supply Chain Management system, and more.

Integrated PLM systems aggregate data from many disparate sources and share it among all departments, allowing all teams and departments to easily access and make sense of the information at hand. Meanwhile, the number of sources is rising precipitously: The Internet of Things is revolutionizing the amount of information we can derive from customer feedback, and it's paired with increasingly rich streams of information from product reviews, surveys, feedback, social media, partner websites, data from returned items, and eCom with scraping technologies and predictive analytic tools. Each of these streams is full of actionable business intelligence. This fine-tuning of the flow of information places the design team in direct collaboration with consumers.

Adding other sources of Big Data to PLM only increases the array of opportunities. Take for example the rising value of geolocation in establishing colour and size scales. It's easier than ever to find out that pink is selling in Texas but not in Arizona, while there's a demand for small sizes on the West Coast far more than on the East Coast, and move beyond basic distribution planning into PLM-based forecasting. With a foundation in Big Data, we can foresee planning colour assortments in a future where we know in advance which colours will sell in only a small fraction of stores, so we can choose not to design with those colours in the first place.

An omnichannel PLM (bringing together data from a wide variety of streams) makes it possible for you to absorb and work from customer feedback from POS systems, your retail stores (N2Cs), and your ERP-integrated dot-coms. These three channels, providing data about fits, fabrics, and many other factors, are a far more reliable and fact-based data set to feed into your PLM than retail buyers' feedback about what sold and what didn't.

Without POS data from retailers, the wholesale channel is blind. But relying on your own B2C channels improves your products and their desirability, and consequently provides an opportunity to boost retail sales while making retailers rely more on you. You now have the data they need to make their enterprises more competitive, and feedback they have not yet analyzed.

The most successful world-leading companies have been doing this for a long time. Nike, for example, beta-tests new products with consumers long before they formalize their designs for major retailers. This allows them to pre-empt unsold stock by simply not introducing stock unlikely to sell in the first place.

Retailers and top brands know what the rest of us need to: the biggest reason provided by customers for returns is fit. But fit data is not widely analyzed. We allow two to three fits (and sometimes four to six) per pre-production sample and production sample, yet often we ignore the opportunity to analyze fits per particular style, to take note of how many styles were based on a similar block, and to consider averages over the season, brand, and supplier.

And that takes only fit into consideration. Other factors—such as forecasting, stock and POS data, colour, materials, cost—each offer multiple possibilities to gain increased understanding of present conditions through data, and a greater sense of how to improve efficiency in the future.

Our Big-Data-Fueled Vision for PLM

The key to using Big Data is having software that is intuitive, and user-friendly. With proper training and implementation, both novice and expert users can derive enormous value from data-driven PLM. Collecting data over the past years, Visual Next understood the most valuable form this information could take was in its PLM data warehouse and PLM cube—a true BI cube, built with OLAP Microsoft SQL analysis services.

As a result, we no longer need to write reports or guess at the potential implications of data: instead, we offer our End2End suite that provides all platforms already connected (from ERP and PLM, to POS, eCommerce and third-party marketplaces). This centralizes our customers' data set and allows us to feed appropriate KPIs and analytics to the right departments. This data is then consumed to expose microscopic close-ups of different parts of the business.

Big Data works when it helps manufacturers understand development outcomes and envision products from the consumer prospective. Our hope is that customers using our software will be able to visualize their businesses in a smarter and more complete manner. From that position, we want to make companies better suited to compete in this fast-paced fashion industry by manufacturing smartly and efficiently, produce less waste and reduce product returns, yet yield higher sales. That is our Vision.

PLM Consultant Profiles.

FINANCIAL YEAR 2016/17

> **While the financial year 2016/17 shows a dramatic move away from long-running, in-house implementations and towards cloud, SaaS, and other off-premise deployments, the work of preparing for and executing on a successful PLM project - finding the right path for your business - remains significant.**

The goal of this report (and the 5th and 6th Edition publications that preceded it) is to provide vendors and customers alike with the information they need to make informed investments in PLM and extended PLM technologies specifically designed for the retail, footwear and apparel industry.

Although selecting the right solution represents a significant part of this decision-making process, truly modern PLM and E-PLM projects extend far beyond the software level. And the extent of the whole business transformation that an effective PLM project entails means that the services of experienced, independent advisors are now as sought-after and scrutinised as PLM platforms themselves.

Every previous WhichPLM end user survey has indicated that growing numbers of PLM customers solicit the help of third party advisors or consultants each year. And while the financial year 2016/17 shows a rather dramatic move away from long-running in-house implementations towards cloud, SaaS, or other off-premise deployments, the work of preparing for and executing on a successful PLM project - finding the right path for your business - remains significant whether the solution itself is being installed on-site or off - particularly where larger businesses are concerned. As a result, advisors, trainers, and implementation partners remain key components of many brands' and retailers' PLM project strategies – whether it's conducting a thorough review of legacy technologies, planning implementations and integrations, or conducting a detailed, scientific ROI analysis.

So, for the fourth year running, we have invited a select few of the world's leading apparel PLM consultancy practices and advisors to provide readers with some insight into their methods, the work they have undertaken to date, and their up-to-the-minute perspective on the industry's ongoing digital transformation. This information is intended to help readers make an informed decision about which advisory practice (if any) to work with at the different stages of their PLM project.

Depending on their history, available resources, and industry experience, an advisor or consultancy practice may offer a host of different services. Some will help clients to select a solution from a thorough knowledge of the market; some will assist their clients in implementing that solution and ensuring buy-in from the executive to the user level. Some will conduct a complete evaluation of the client's apparel-specific processes and technical environment; some will work within a scientific framework to consolidate the client's product development master data ahead of implementation. Some will do all of these things and more, while others will attempt instead to bend cross-industry boilerplate methods to fit the difficult and idiosyncratic world of apparel.

It is vital for customers to remember, then, that not all consultants are equal. A new apparel practice from a business that has typically focused on entirely different verticals, for example, should not be compared to a proven advisor who has catered to the retail, footwear and apparel industry for a number of years. Those renowned international consultancy firms who have entered our sector in recent years may now be better established, but work still remains for them to build the kinds of methodologies, tools, and process frameworks that more experienced, apparel-specific consultants should boast as standard.

Conversely, larger consultancy practices can – and more than likely will – leverage international reach and a comparatively large pool of strategic resources to provide more comprehensive management services than their smaller,

more specialised counterparts. This may prove to be less vital in the cloud-first market of the near future, but today it remains important for customers to make the distinction between broad strategic services and the kind of detailed knowledge that only a long-serving apparel industry specialist will have of the extended product development landscape.

Whether they are seeking remote support to make the most of a subscription solution or beginning a lengthy period of introspection and on-site implementation, customers should exercise caution when it comes to locating a truly independent and impartial advisor. Many consultancy practices obtain the bulk of their work from a single vendor in a partnership arrangement. And although this does not necessarily imply that the business is tied exclusively to that vendor (indeed, many practices have established partnerships with more than one PLM vendor) it does increase the likelihood of that advisor preferring to work with a particular solution - particularly when unexpected growth has forced a vendor to effectively promote that partner to the status of preferred or primary implementer.

Customers, therefore, should continue to ensure that any third party they opt to work with is experienced with their chosen vendor and solution – to the same degree they are with any other vendor on their roster.

Although many of the fundamental principles remain the same – customers are seeking the same industry experience, financial stability and long-term partnership potential – between selecting a PLM vendor and choosing the right advisor, there are a number of ways in which the two are distinct. To that end, each of the consultancy practices that appears in this section was asked to provide a selection of key information: their status as vendor partners, multi-vendor services providers with a small pool of expertise, or truly vendor agnostic; and insight into their tactical and strategic strengths. We also asked each practice to enumerate the RFA PLM experts they employ on a global basis, and to name the marquee retailers and brands they have worked with to date – where that information is publicly available. Lastly, each consultant was invited to submit two pages on their thoughts around the key topic of this publication: the dawn of the intelligence era.

Prospective and existing customers of PLM are not, however, the only parties interested in the experience, expertise and international reach of consultancy practices and advisors. As results of yet another PLM customer survey reveals, vendors' internal resources – for pre-sales, sales, technical demonstration, implementation and change management – continue to be stretched by multiple concurrent implementations and the rise in the volume market for subscription-based PLM, leading most to establish partnerships with third parties.

Needless to say, these third parties have limitations of their own, and vendors should be as cautious as customers when it comes to satisfying themselves of the competence and availability of subject matter experts within any advisory practice - no matter how large or experienced they may seem on the surface.

Owing to the relatively small sample size and the difficulties inherent in comparing drastically different services on a like-by-like basis, WhichPLM's publications have not previously, and do not this year, contain any analysis or evaluation of the consultancy practices listed in this section. Instead, we encourage prospective clients to undertake their own due diligence when working with any third party – whether they were selected directly, or nominated (either openly or covertly) by a vendor partner.

NB: As with our PLM vendor profiles, the final responsibility for the accuracy of all information contained within this section remains the responsibility of the companies listed. Although WhichPLM has made every effort to quantify and verify the information provided to us, nothing in these pages should be construed as an endorsement or assessment of any consultancy practice or advisor, and WhichPLM has no responsibility or liability for the content of advertisements and advertorials that appear adjacent to these profiles.

KALYPSO

www.kalypso.com

Which PLM solutions / suppliers do you work with? If your services are vendor-agnostic, please say so.

Kalypso provides objective services designed to transform and optimize the end-to-end product development lifecycle for retail, footwear and apparel (RFA) clients. Our PLM services include assessments, strategy, process, organization alignment, requirements definition, selection, implementation planning and execution, and managed/outsourced services. These services can be delivered independently or with a strategic PLM solution partner. We work with any PLM vendor that best suits our clients' needs.

List your implementations of PLM within retail, footwear and apparel to date (including the year of implementation), accompanied by the name of the solution they chose where this is public information.

Kalypso does not publicly share client names. Our team has conducted over 100 PLM implementations across numerous industries. In RFA, we have helped many clients tackle core PLM challenges as well as integrate new digital technologies with PLM. Examples include:

Multi-year, multi-brand, global PLM transformation for a $70B+ home improvement goods retailer

Visualization platform integration across a core PLM application, 3D design tool and visualization platform for a multi-division, global apparel manufacturer

PLM transformation/implementation for hardlines and softlines for an international toy and children's apparel retailer

Digital strategy and prototyping for the integration of a PLM application, 3D design tool and voice of the customer analytics solution for a specialty apparel retailer

PLM assessment, requirements definition and selection for a $10B+ hardlines and softlines home goods retailer

Product and material development assessment, software selection, end-to-end process redesign and implementation strategy for a leading branded performance footwear, apparel and equipment wholesaler/ retailer

PLM transformation/implementation and managed services for a $3B+ apparel and hardlines catalog retailer

What do you consider your practice's strategic, tactical and implementation strengths to be in the region of retail, footwear and apparel lifecycle?

We work with RFA clients to transform innovation performance and drive differentiation through dramatically improved, scalable and sustainable capabilities across the broadly defined product development lifecycle. We do this by developing vision, strategy, business cases and roadmaps; by operationalizing these strategies into efficient processes and organizations; and by enabling them through industry-leading technologies.

Our exclusive focus on the end-to-end product development lifecycle, combined with extensive hands-on RFA industry experience, allows us to enable retailers to make the leap from PLM to digital to drive true business transformation. We help clients understand, evaluate and apply adjacent digital capabilities that leverage a strong PLM foundation, including 3D digital product creation, augmented reality and virtual reality, machine learning and advanced analytics, IoT and smart connected products/ wearables, and voice of the customer.

To accelerate ROI and time-to-benefit, we employ industry-specific methodologies, accelerators, leading practices and tools, including our proprietary Accel delivery model, EVOLVE framework, Rapid Results implementation methodology and Pulse managed services model.

Tell us (in a maximum of 150 of your own words) what you see as the two most important emerging trends for retailers and brands (particularly fashion, footwear and accessories) in the coming year?

Digital technologies have disrupted the RFA business, challenging companies to find new ways to transform their end-to-end product development lifecycle to deliver top and bottom-line results – and to stay competitive. Digital technologies are more than ideas; they are the way innovation happens today.

Our 2017 research on the "Adoption of Leading Product Development Practices in a Digital World" reveals two important, emerging areas where retailers recognize significant value in adoption:

1. 3D digital product creation – leveraging 3D design, fit analytics, and augmented and virtual reality to significantly shorten, streamline and/or disrupt the product development lifecycle process across innovation, design, development, sourcing and production.
2. Advanced analytics – leveraging machine learning, voice of the customer analytics, and IoT platforms and sensors to apply internal, external, structured and unstructured data to make better design and development decisions.

Tell us (in a maximum of 150 of your own words) what you see as the two most important emerging trends for supply chain manufacturing (particularly fashion, footwear and accessories) in the coming year?

The digital transformation of the RFA industry also includes the evolution of the smart connected supply chain that leverages IoT and PLM to enable better supply chain visibility, traceability and collaboration.

Two important, emerging trends as a result of the smart connected supply chain are:

1. IoT and advanced analytics to generate new insights and identify opportunities for significant speed and transparency improvements within the supply chain.
2. Product personalization via mass customization, and season-less design and development to deliver more customized product options and on-demand orders to smaller consumer segments.

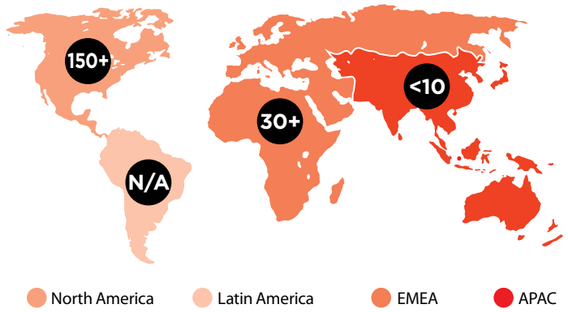
Please provide the number of qualified domain experts you have specifically focused on implementations in the RFA sector, separated by region as follows:

North America: 150+, including resources located in our Monterrey, Mexico near-shore technology center.

Latin America: We serve Latin America from our US/Mexico geographical centers.

EMEA (Europe, Middle East, Africa): 30+, including our near-shore technology center in Hamburg, Germany.

APAC (Asia Pacific): Less than 10. Our resources in APAC primarily interface with the Asia-based sourcing operations of our clients from North America and EMEA.



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KALYPSO

Data-Driven Design Leveraging Machine Learning

By Sarah Pierson and Steve Riordan - Kalypso

Big Data Dilemmas

Big data has been a dynamic area of innovation in recent years. Internal enterprise systems like PLM, ERP and POS, along with smart connected scanners, devices, and machines, all generate an avalanche of information. We have all become more efficient in collecting, organizing, and managing this data. In addition, equally rich external data, including customer sentiment and feedback regarding brands and products, resides on the web and in social media.

Now the challenge is to monetize the available information, internal and external, by extracting key learnings from all available data sources and close the feedback loop into product development.

Retailers face many unique questions:

- How can customer sentiment and feedback tie into sales and returns monitoring?
- How can social media content, competitor information, and environmental factors be layered into performance reporting?
- How do current trends influence future trends and inform new product development?
- How can I combine my system-siloed data to get a better view of what is and is not working?

Retailers and brands have the opportunity to leverage internal, external, structured and unstructured data to make better design and development decisions through the advanced analytics of digital technologies such as artificial intelligence (AI) and machine learning (ML).

What is Machine Learning for Retail?

ML is a subset of AI that is fueled by big data and provides computers the ability to learn without explicit programming. Algorithms are created to assess a myriad of data from multiple inputs and find correlations to sales. For example, winter weather patterns have a strong correlation to product sales of cold-weather apparel, footwear, and equipment, while hurricane and tornado weather patterns have a strong correlation to disaster-prevention and remediation home supplies. These correlations are systematically refined, based on more history and feedback, resulting in improved accuracy over time.

ML solutions recognize patterns by considering many more factors, and much more quickly, than humanly possible. ML employs natural language processing to translate consumer sentiment on products and brands gathered from sources such as on-line product reviews, call centers, in-store associates, and social media. That European designer's dress, worn by that A-list celebrity, trending on social media, and touted by that known fashion critic as the "next big thing," is a ML-provided recommendation that was on your desk last month. Think of ML as an immensely scalable and "always on" digital workforce.

Potential Use Cases for Retail, Footwear and Apparel Product Leaders

The potential for ML in retail is massive. Its sophisticated techniques and tools typically go beyond those of traditional business intelligence to discover deeper insights.

Some potential use cases for ML:

1. Mine returns data, product reviews, social media scrutiny and call center complaints for product feedback to identify potential defects or opportunities for design improvements. ML can aggregate and prioritize common phrases from various data inputs to show what your customers are saying about your brand and your products. Weightings can also be applied to add more weight to the feedback from customers who actually purchased the product versus those indicating a blind opinion. Negative sentiments can reveal a material issue, fit issue, or manufacturing issue. ML can assist in further assessing these findings by drilling down into the data to indicate a root cause.

For example, material and product sampling and testing history from PLM can be aggregated by ML to show the number of material test and product sample iterations needed before passing and the reasons for failure. Supplier and factory data in PLM and ERP can be assessed to identify vendor tier, actual versus expected lead times and on-time deliveries, and compliance ratings. Learnings from data could reveal consistent issues with certain suppliers or under certain conditions, and ML-based predictions could help in preventing issues before they happen.

2. Detect brand, product, and consumer trend patterns to identify emerging sales opportunities by monitoring and analyzing retail competitors, social media, trend-setting celebrities, and fashion authorities. Your product team, working with a data scientist, can identify data sets that have relative importance to your sales. ML can forecast the degree of correlation between current trends and what is selling in your stores at various time intervals.

For example, if a particular celebrity shows a high relative importance to your sales, this indicates that the styles they wear are highly correlated to what your customers want to buy. ML can suggest current images from the web of that celebrity wearing items that are likely to trend in your store in the future, providing inspiration for product design and development teams.

3. Optimize initial buy quantities and allocate to channels based on sales data combined with online traffic, mobile apps, and digital in-store interactions to identify customer buying trends at local levels. Based on the volume of a particular attribute correlated to a trend, and your own historical sales associated to that attribute, ML can predict how large the trend is like to be for your business. ML can also break that trend down to forecast how it will appeal to various demographic groups, such as gender, age, and region.

For example, regional trend forecasts can assist in defining more granular-level customer preferences, such as fabric fiber content, weight, and color, as well as product silhouettes, fits, and sizes. Additionally, by understanding the likelihood of a trend appealing to various regions above others, units can be allocated to stores and distribution centers appropriately to help ensure the product is in-stock where customers want it.

4. Optimize recommended initial retail price based on known demand curves of similar items combined with feedback from consumers, web/mobile sites, stores, and wholesale customers. ML can leverage your sales and markdown history as well as trends to predict price points that optimize sales and margin. Additionally, ML can indicate when competitors are running promotions that may erode sales.

5. Detect patterns in country sourcing dynamics by monitoring and analyzing country labor rates, political and military news, regulatory changes, and other variables. ML can monitor political and environmental developments to provide regional stability forecasts.

For example, dry weather patterns in cotton-producing areas can translate to higher cotton prices in 6 to 12 months. Armed with this knowledge, materials teams can make bulk buys at current prices, look to alternate region for supply, or consider alternate materials for product development.

Where to Start

ML has the power to unlock insights hidden in disparate data pools and present those insights to better understand what customers want. To transform your business by driving product differentiation – there are two options for getting started with ML.

Option 1: Align on a Program

Start here when there is a need to produce a compelling case for change and a roadmap to build support. Start by developing a proprietary vision of the future, perform an honest assessment to identify the gap between current state and future vision, build a game plan to address the gap, define the program and build a business case to gain buy-in and support, and develop a 2-3 year roadmap.

Option 2: "Get Started, Get Better"

Start here when leaders already have an idea of major opportunities and agree on initial areas of focus. Use success from the first initiative to build a broader case for change and a roadmap.

Now is the time for retailers to invest and gain the benefits of an exciting new tomorrow, ushered in by Machine Learning.

Which PLM solutions / suppliers do you work with? If your services are vendor-agnostic, please say so.

Vendor Agnostic. We work with Centric, Visual Next, Infor, PTC, Gerber, Lectra.

List your implementations of PLM within retail, footwear and apparel to date (including the year of implementation), accompanied by the name of the solution they chose where this is public information.

Ben Sherman – 2012/2013 – PTC
Kwintet – 2012 – Gerber
Marsylka – 2014/2015 – Visual 2000
Tally Weijl – 2014 – Centric
Build a Bear – 2013 – Centric
Voice/Gresvig Sports – 2012/2013 – Lawson
Local Boyz – 2016 – Visual 2000
Closet Clothing – 2016 – Visual 2000
Mountain Equipment Co-op – 2015/2016 – Visual 2000
Seasalt – 2015/2016 – Visual 2000
Pentex – 2015 – Visual 2000
Studio One – 2016 – Visual 2000
Trekmates – 2015/2016 – Visual 2000
Boden – 2016 – Centric
Tom Tailor – 2016/2017 - Centric
Paragon Clothing – 2016/2017 – Visual 2000
A&D Hope – 2016/2017 – Visual 2000
*Plus 4 other clients in 2016/2017 who do not wish to be identified.
Over the last 7 years we have implemented in excess of 30 systems from PTC, Lectra, Gerber, Lawson/Infor, Visual 2000, Freeborders and Centric.

What do you consider your practice's strategic, tactical and implementation strengths to be in the region of retail, footwear and apparel lifecycle?

Deep understanding of the methods and processes used within the RFA sector. The knowledge and experience of our consultants both in the RFA industry and in implementing software systems within it. Ability to handle all aspects of an implementation including selection, business process re-engineering and definition, system configuration, onsite training and documentation, report writing and development and support services. As a team PDP is there from the initial concept right through to Go Live and beyond a true partnership.

Tell us (in a maximum of 150 of your own words) what you see as the two most important emerging trends for retailers and brands (particularly fashion, footwear and accessories) in the coming year?

Collaboration between the Retailer/Brand and the Supplier(s). Most companies still do not bring their external suppliers into PLM but this is now starting to change and 2017/2018 should see this become the norm rather than the exception.

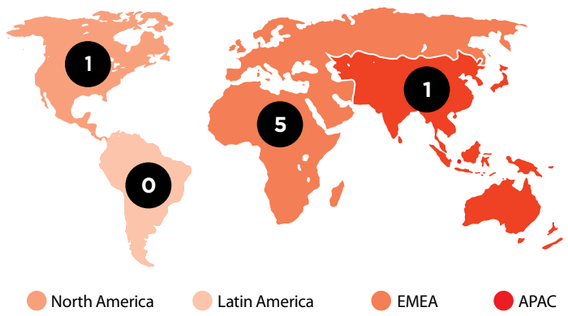
Internet of Things (IoT) – A lot is being done to enable the IoT and PLM is at the forefront of combining different technologies (Electronics, Computing, Communication etc) with the ever changing landscape of Clothing, Footwear and Accessories .

Tell us (in a maximum of 150 of your own words) what you see as the two most important emerging trends for supply chain manufacturing (particularly fashion, footwear and accessories) in the coming year?

Collaboration is still the most important function for the extended supply chain. The growing trend of End to End solutions combining PLM and ERP means that this is even more important in providing a seamless communication and tracking system that enables all partners to participate and visualise the complete supply chain.

Use of 3D Technologies to enable Virtual Sampling, true to life visualisation and integration to the Design, Merchandising and Garment Tech roles.

Please provide the number of qualified domain experts you have specifically focused on implementations in the RFA sector, separated by region as follows:



PRODUCT DEVELOPMENT PARTNERS

www.pdplimited.com
info@pdplimited.com
+44 (0)7515 741852

Led by Perry Bonney, Product Development Partners provides expert consultation services to companies in the retail, footwear and apparel industries who are looking to implement new software or enhance their existing product lifecycle management environments.

An Advertorial By

PRODUCT DEVELOPMENT PARTNERS

Driving Intelligence from PLM

By Perry Bonney - Product Development Partners

Enter the information era

Modern fashion runs on information. And the smartest and best—performing retailers, brands, and manufacturers tend to be those who have made the most of their ability to collect as much of that information as possible through informed investments in technology.

- In a digital world, the list of possible sources of raw information (and potential intelligence) are almost limitless. Some of the most common examples might be:
- Trend analysis services and platforms.
- Creative design solutions – both 2D and 3D.
- Material planning and forecasting solutions.
- Supply chain management and collaboration tools.
- Enterprise Resource Planning, EPOS, and financial systems.
- Consumer engagement tools such as social media and responsive marketing.

To complicate matters even further, the dawn of the Internet of Things has begun to usher in an even greater explosion in the amount of raw information generated at almost every stage of a product's lifecycle. From retail beacons and RFID tags to connected factories – known variously as Industry 4.0 in Europe, or Smart Manufacturing in North America – huge volumes of non-normalised information are now being created and captured in areas that were traditionally invisible, digitally-speaking.

From data to decision making

With this volume and variety of information available, the primary challenge facing brands, retailers, and manufacturers today is how to transform huge stores of historical data or streams of real-time information into actionable insights.

In practice, this typically means integrating data-creating and data-capturing systems where it makes business sense to do so, consolidating and centralising information, then applying an interpretive layer on top of the results.

As an example, raw information collected from consumer channels like social media, retail performance, and trend capture and demographic data is, in its natural state, just that: raw information. It is only when that information is mined and analysed that it becomes usable by the business to achieve measurable results. With intelligence – rather than just information – in hand, trends can be predicted sooner and more accurately, allowing a brand to better capture opportunities, plan assortments, calculate size ratios and more.

With speed to market becoming more important with each passing year – as fast fashion continues to dominate the mass market - the ability to obtain valuable, time-critical insights like these is becoming essential for companies who wish to remain competitive. As well as enabling them to seize new opportunities, data-driven insights will also make a material difference to the efficiency and speed of their design, development and production processes.

All about analytics, autonomy, and A.I.

While PLM has emerged as the best platform for centralising and consolidating information, and for reporting to different degrees of complexity, it does not, by itself, provide sophisticated analytics or tools for prediction. On top of PLM, today's most prominent technology leaders are investing in machine learning, Artificial Intelligence, and other components of data science to mine insights from the information they hold in PLM.

Already in use in other industries, A.I and machine learning are already making their presence felt in fashion – from trend prediction and merchandising to consumer engagement in the form of chat bots. But while these applications involve collecting and relaying information, a truly digital business – with a truly digital supply chain – will also employ some elements of automation, using the same insights, integration, and connectivity to drive action.

In practice this means taking insights into cut order planning, material forecasting, and product costing, and having these automatically influence manufacturing through connected cutting machines, knitting machines, pressing and packaging machines, and other supply chain hardware that can be brought into a digital workflow. And by connecting these physical machines, suppliers themselves are also brought into the information era; brands and retailers can gain visibility into the actions of Tier 1 (finished product suppliers), Tier 2 (materials, components and trims suppliers), and Tier 3 (laboratory, auditing, and testing companies) partners, who will in turn begin to generate their own streams of information.

An industrial revolution

The logical result of connecting factory hardware and suppliers is a connected global supply chain, with digital communication and collaboration between brand HQ and agents, factories, and mills driving a new level of agility and accountability from the manufacturing process. And the benefits of this collaboration flow both ways: while manufacturers gain the capability to better plan their capacity and to communicate exceptions with the brands that commission their orders, those brands and private label retailers become capable of factoring more accurate accounts of production time, cut and sew status, and other milestones into their own design and development processes.

This end-to-end sharing of information and intelligence is what we refer to as a 360-degree, data-driven loop. Manufacturers become smarter through stronger tools, greater connectivity, and better planning from their customers. Brands retailers become better able to understand how to design to cost, make full use of materials, and generally make better products more efficiently.

Together, these two threads of interconnectivity are, as we mentioned, being referred to as Industry 4.0. Following on from the initial industrial revolution and the rise of the cotton empire in the North of England, today the combination of ubquititous internet connectivity and advancements in robotics and automation are allowing us to replace manual human labour with smart machinery in even high-volume, high-variety tasks like making footwear and apparel. Today we can already see robotic manufacturing helping some of the world's biggest sportswear brands to produce shoes, t-shirts, and other product categories with lower turnaround times, lower costs, closer to home than traditional offshore manufacturing. We expect to see much more of this in the years ahead, as brands and retailers begin to extend their technology strategies both up and downstream, collecting, curating, and analysing more information than ever before along the way.

Indeed, the world's biggest retailers are already making large bets on both connected manufacturing hardware and predictive analytics (generated by deep learning networks) to better anticipate consumer demand and respond in record time. The likes of Amazon are investing in analysing consumer behaviour, making extremely accurate, data-driven product recommendations which are then manufactured quickly by large-scale fabric printers, allowing customers to receive their orders in record time.

And connectivity doesn't end there; the combination of IoT and blockchain technologies is already helping to ensure that transparency, authenticity and integrity are maintained throughout a single product's lifecycle – even when that product is in the consumer's hands. In the near future, items in your wardrobe will share data with the brands who created them, helping them to better understand product performance, and to create new products that meet your preferences as they change over time.

Experience counts

The explosion of data in our industry truly is creating a different world – where disruption is common, and early leaders are already using intelligence and integration to differentiate themselves in a competitive market, and to fine-tune their supply chain operations to respond quickly to the demands of a new generation of consumers.

For more than thirty years, PDP and its customers have focused on building precisely these kinds of integrations – anticipating a time when all-digital workflows will become commonplace. In a single instance, we have developed interfaces between more than 40 different software solutions within a single retail organisation's operations. Each member of our team is an expert when it comes to understanding the benefits and the challenges of connecting different solutions, including establishing data ownership, timing data transfers, and other common challenges.

We understand the digital world from firsthand experience, and, working with almost every major PLM supplier, we are ready to help today's businesses make the most of tomorrow's opportunities through technology and true, data-driven intelligence.

Which PLM solutions / suppliers do you work with? If your services are vendor-agnostic, please say so.

Infor Software

List your implementations of PLM within retail, footwear and apparel to date (including the year of implementation), accompanied by the name of the solution they chose where this is public information.

Ptex Solutions have been involved in several Infor Fashion PLM (earlier known as Freeborders PLM and Lawson Fashion PLM) implementations. This includes providing different services to our customer. The time period mentioned below is when we provided the services to the customer.

ITC Limited (India - 2006)
Reliance Retail (India - 2007)
Gini & Jony (India - 2007)
Aditya Birla Retail (Madura Fashion & Lifestyle Division) (India - 2008)
Colorplus Fashions (India - 2009)
Peacock (UK in 2009)
Weissman (USA in 2010)
Club 21 (Singapore in 2010)
TAL (Hong Kong in 2010)
Big Strike (USA in 2012)
Darice (USA in 2013)
CUK Clothing Limited (UK in 2013)
Badger Sportswear (USA – 2014)
HH Brown (USA - 2015)
Future Retail Limited (India – 2015)
Indus League (India – 2016)
Ziera Shoes (New Zealand – 2016)
The Apparel Group (USA – 2016)
Dynamic Designs (USA – 2016)
Outpac Designs (Hong Kong - 2017)
Horseware (Ireland - 2017)
LTP Limited (Lithuania - 2017)
* Plus 14 other customers that do not wish to be named.

What do you consider your practice's strategic, tactical and implementation strengths to be in the region of retail, footwear and apparel lifecycle?

With a decade long service in PDM and PLM for RFA, Ptex Solutions have been involved in 32 PLM projects that are Retailers, Brands, Sourcing, Manufacturing, Apparel and Footwear companies. Ptex is a software services company that focuses only in Retail, Footwear and Apparel space.

Founder, Prasham Kamdar's association with the fashion and textile industry goes back several decades, due to his family business of garment manufacturing. He therefore understands the importance of having a team with domain experts. At Ptex, Business Consultants have education qualification from Fashion Institutes and or have the background of prior work experience in RFA. This has allowed Ptex to develop PLM implementation methodology that incorporates industry best practices and addresses customers' requirements.

Tell us (in a maximum of 150 of your own words) what you see as the two most important emerging trends for retailers and brands (particularly fashion, footwear and accessories) in the coming year?

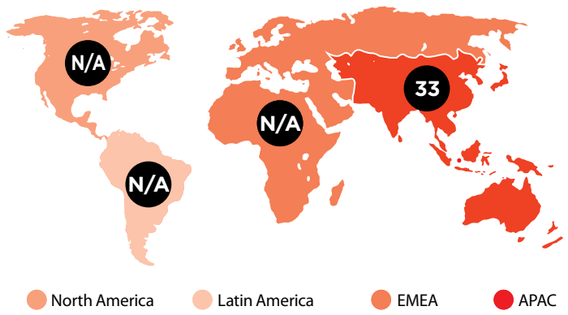
The scope of PLM functionality is rapidly evolving and moving beyond the traditional boundaries of PLM. Emerging trends such as 3D modeling and simulation, 3rd party collaboration, increased regulatory intelligence, and open source collaboration are just a few to look out for. At the same time, mobile and cloud solutions provide greater flexibility to customers. Mobility is an incredibly important factor in creating an appealing PLM user experience and in making users truly effective. Next- generation PLM technology has been built from the ground up for mobile devices. People should be able to access any information at anytime from any where. Full functionality of PLM should be able to use from your palm. The next chapter in apparel PLM technology will be true analytics. All data captured in PLM is immediately available for sharing, tracking, reporting and analyzing. These analytics will allow companies to keep a pulse on what's going on.

Tell us (in a maximum of 150 of your own words) what you see as the two most important emerging trends for supply chain manufacturing (particularly fashion, footwear and accessories) in the coming year?

There is a need for manufacturers and retailers to look at their processes and identify areas that can be digitized during the product development and manufacturing lifecycle to deliver better efficiency by making technological and operational changes. Digital Supply Chain can allow all the stake holders to be flexible and interactive, prepared to respond to challenges and disruptions. Consumers, Retailers and Suppliers can be connected so that right product can be offered in the right channel at optimum buying and selling cost. Which colors, fits, styles and design the consumer likes can be captured and can be immediately relayed to the suppliers. Based on the demand analysis, material purchases can be negotiated, production plan is optimized so that right product is available for consumers to purchase. PLM can provide mobile apps to global production suppliers so that they can download tech packs, view the changes at the same time provide hourly production statuses to the Buyers.

Please provide the number of qualified domain experts you have specifically focused on implementations in the RFA sector, separated by region as follows:

We have a team of 33 Business and Technical Consultants. All of them are based in India. However, they have travelled to many countries for Implementation. This includes US, UK, Europe, UAE, China, Singapore, Hong Kong and New Zealand.



Market Analysis 2016/17.

(1st April 2016 to 31st March 2017)

> **“The RFA PLM market is vastly outperforming the growth expectations of the wider enterprise I.T. industry.”**

For years the PLM market for retail, footwear and apparel has been misunderstood by customers and misrepresented by vendors and analysts alike. Now in its seventh year, WhichPLM’s exclusive market analysis continues to set the record straight, using data collected throughout the financial year to examine who is buying PLM, where they are buying it, and why.

WhichPLM Market Analysis Approach

This RFA PLM Market Analysis follows the framework first adopted by WhichPLM in our 2013 Annual Review, which in turn built on the customer satisfaction and PLM adoption analysis approach initially taken in 2010. Now in its seventh iteration, we have steadily refined our Market Analysis - everything from our data collection methods to our core metrics - all with the single goal of presenting what we believe to be the most accurate, unbiased, snapshot of the PLM market for retail, footwear and apparel.

Over the coming pages we have, again, reviewed the RFA PLM market at a global level, analysed the customers it comprises (segmented by Tiers, according to size and turnover), and examined the geographical spread of PLM adoption and its effect on the total international market size in the fiscal year 2016/17. We have also considered the drivers shaping the future direction of the market, updating these to reflect changes in market attitudes since our 6th Edition. Finally, we present the implications of twelve months’ worth of research in three executive summaries tailored for the different sections of WhichPLM’s audience: software vendors, consultants, and existing and prospective customers.

As always, WhichPLM is grateful to the vendors that contributed their time and effort to provide the information we requested, and those that share our desire to build a unique, transparent analysis of the global PLM market each fiscal year. Building on the reputation established by our previous publications, vendors, consultants and customers alike now clearly recognise how transparency and clear metrics of measurement can serve the international PLM market for retail, footwear and apparel as a whole.

As has been the case in all of our previous publications, this market analysis covers “pure” PLM for the RFA space only. For the avoidance of doubt this includes all of the following areas: retail, brands, manufacturers, sourcing agents, footwear, apparel, accessories, home furnishings, textiles, handbags, car seats & soft trims. As with last year’s focus on the Internet of Things, our special editorial attention to A.I. and machine learning featured elsewhere in the publication does not influence this analysis in any way. The scope of the research, intelligence and analysis seen over the following pages remains constrained to the market for core PLM solutions, rather than the wider set of extended PLM solutions that range from supply chain management and execution to 3D CAD and store visualisation.

As in previous years, the Glossary section at the rear of this publication includes a full definition of all terms used in this analysis, and clarifies the meaning that WhichPLM associates with each term. The definition of PLM itself, our criteria for new name sales, and our definition of a financial year are all important examples of why reference to the Glossary section can be helpful in understanding this analysis. Readers should not hesitate to look up any terms that are unfamiliar to them, or to refresh themselves on our interpretation of more common ones.

As always, WhichPLM has taken great care this year in obtaining, cataloguing, collating and analysing information from across the RFA PLM market – both from our long-running customer survey, and from direct conversations with the industry’s premier vendors. With an identical format to last year’s 6th Edition (and the 5th Edition before it), the process of collecting refreshed information from each of the vendors for this analysis was smooth, allowing us to compare and interpret our data in a clear context,

carried through from previous years. And although our analysis team continues to push back, validate and check for simple mistakes in the information given to us, we remain in a strong position when it comes to enforcing our criteria with vendors, and we are very seldom provided with inflated or falsified sales information.

Each of the supporting vendors (many of whom also appear in this publication’s PLM vendor listings, and have shared their opinions on machine learning and the broader role of intelligence and analytics) has shared publicly available PLM sales data from the fiscal year 2016/17, and, under non-disclosure agreements, they have also each shared the identity of private sales. To maintain the accuracy of our global market analysis and compare these results to those we obtained in previous years, we also asked each vendor to provide further insight into global sales trends.

In the same vein, we have maintained our longstanding focus on the number of new name PLM sales as the key measure of the market, rather than other metrics such as seat numbers and revenue achieved – both of which are harder to secure and contrast, and are often entirely private, even in the context of relationships as strong as those WhichPLM maintains with key PLM vendors. As was the case in our previous publications, we have also been careful to discern between real sales of modern PLM, and PDM and E-PLM sales that, despite being grouped with PLM sales by some vendors, do not meet the inclusion criteria set out in our Glossary.

Although WhichPLM is based in the United Kingdom, our online and print publications adopt a truly international perspective, and ours remains a growing, global readership, including vendors, customers and analysts who are distributed worldwide. For ease of comparison and in recognition of this international reach, we continue to use the US Dollar (USD) as a common currency.

International readership of WhichPLM

WhichPLM readership by region, averaged over the 2016/17 fiscal period, is as follows:

EMEA	**39%**
APAC	**17%**
Americas	**44%**

Although these figures are not necessarily representative of the makeup of the PLM market in same period – as the remainder of this analysis will demonstrate – they can serve as an indicator of PLM interest, which is to say a method of predicting potential trends in the industry.

During the period covered by our 6th Edition (April 2015 to April 2016) North and South America made up the largest portion of the WhichPLM audience by a fairly significant margin. While this reflected the state of the market in general, with the USA seizing the largest share of PLM sales by volume every year we have analysed, it was also, we felt, unfairly weighted by extensive coverage that WhichPLM had provided of North American events.

As a result, we predicted that the distribution of WhichPLM readership would become more balanced in the following twelve months, and the data now show that this was the case – at least between the EMEA region and the Americas. From 63% of our readership, North and South America now account for 44%, while the EMEA region (Europe, the Middle East, and Africa) has increased from 26% to 39%. Readers from the Asia Pacific countries now account for 17% of our traffic – an increase of 6% on the figures we saw in 2015/16.

Interestingly, almost all American traffic in the fiscal year 2016/17 came from the USA and Canada. Although analysts (WhichPLM included) have, for several years, predicted significant PLM sales growth in key South American economies, this has not materialised. This is also reflected in our readership figures, with Brazil being the only Latin American entry in our top 20 countries by visitor volume, representing only half a percentage point of our overall traffic.

Our qualifications

These Reports form only part of WhichPLM's constant industry analysis and comment, and our ongoing work has solidified our position in the RFA industry - a uniquely privileged one that enables us to speak from a perspective no other RFA PLM analyst or industry publication can:

- **WhichPLM has been an independent source of information and advice to prospective customers looking for RFA PLM solutions (not to mention existing users of PLM) since 2008, and our audience has grown in absolute terms each year since the company was established.**
- **WhichPLM's editorial and executive board has deep international industry knowledge and expertise, born out of hands-on experience of design, development, selection and implementation of apparel-specific PLM and ERP products.**
- **WhichPLM has benchmarked many of the market's leading solutions and vendors, and has a deep understanding of the functionalities, capabilities and business potential of modern RFA PLM solutions, as well as a clear and well-documented roadmap for its future.**
- **WhichPLM team members have worked alongside all the market's primary vendors, but these relationships do not colour our analysis; our publications and services remain entirely unbiased.**
- **WhichPLM has received considerable praise for its efforts to create a fair, informed, and growing market. Our Annual Reviews (which became our numbered "Editions" as of our 5th Edition, in 2015) are routinely cited as vital tools in large-scale digital transformation initiatives by PLM vendors, customers, and analysts.**

For all this, however, the intelligence contained in these pages would not have been possible to assemble without the aforementioned participation of the premier PLM vendors, as well as those brands, retailers and manufacturers who contributed to this year's customer survey - helping us to provide an up to date view of the sharp end of the market.

Thanks to this approach, now firmly established, we are able to present a more comprehensive and robust view of the RFA PLM market and its true scale than ever before – and certainly one that we believe remains wholly unique and useful.

The RFA PLM market in brief

Each year, our analysis team has produced detailed predictions for the following year, setting down our expectations for how (and where) the PLM market is likely to grow or contract in the next twelve months. For the second year running, it appears that our estimates were too conservative.

In our 5th Edition (covering the fiscal period 2014/15), we concluded that the worldwide RFA PLM market was likely to grow by around 17% the following year. In practice, a variety of forces conspired to produce actual growth of 25% in new name sales in 2015/16 – exceeding our expectations by 8%.

Nevertheless, we chose to err on the side of caution, and our 6th Edition Market Analysis again predicted 17% growth in new name

sales, averaged across all customer Tiers. It is now evident that we again underestimated the potential of key areas of the market (and overestimated others,) since actual year on year growth exhibited in 2016/17 sits at 24%, averaged across all Tiers. (Details of how we segment customers into Tiers are contained in the box titled Understanding Our Customer Tiers.)

It is important to note, however, that despite surface similarities, the compositions of the 2015/16 and 2016/17 markets are quite different. Working from the data our analysts had to hand in 2015/16, it was reasonable to assume that sales to new PLM customers in the mid-market – which we define as containing Tiers 2 and 3, with revenues of between $100 and $999 million – would continue to make up around a third of the total market size. Indeed, we predicted the most significant market segment potential to be in Tier 3, where we expected 2016/17 to reveal 40% year on year growth.

In reality, a confluence of trends (including WhichPLM's own quest for greater granularity in its data collection processes) has produced growth that has all but bypassed the middle market, and the most significant changes in the makeup of the international PLM market this year are concentrated at the highest and lowest ends of the spectrum.

These trends are analysed in greater detail further into this analysis – along with their likely catalysts, and the impact they may have on the medium and long-term future of the industry - so we now return to the overall size and span of the market.

Although the RFA PLM market has now grown by around a quarter each year for the past two years, it is important to place this growth in context. For 2015, I.T industry analyst firm Gartner predicted 7.5% annual growth in general Enterprise Application Software – an umbrella that covers ERP, CRM, SCM and other big budget technology transformation initiatives – with growth of around 8.5% per year inferred in the firm's prediction that the market would then grow from a value of approximately $150 billion to a value of $201 billion by 2019[1]. Taking a more inclusive look at external software spend among major corporations – encompassing a wider variety of solutions than the large-scale focus of Gartner's research – a survey of Chief Information Officers conducted by Morgan Stanley in early 2017 revealed predicted growth of 4.2% for the year, compared to just 3.5% growth in broader I.T. budgets[2].

By either yardstick, the RFA PLM market is vastly outperforming the growth expectations of the wider enterprise I.T. industry. It is important to remember, though, that while WhichPLM does assess the financial performance of the market year on year, our growth predictions (and subsequent analysis) are based solely on the quantity of new name sales. The Market Sizing section of this analysis explains the raw numbers behind these calculations, and this detailed explanation is not repeated here. It should be noted, however, that we have again been conservative in our estimations of the "hidden" PLM market – those sales that are not covered explicitly by this publication – when it is entirely conceivable that more than a hundred additional such sales may exist outside the purview of this analysis.

Rather than indulging in pure speculation, however, the WhichPLM team remains steadfast in its commitment to analysing only those vendors who meet our inclusion criteria, respond to our requests for information, and those about whom we can draw confident conclusions, rather than confusing the market.

Compared to the distribution of sales we saw in our 6th Edition, the top-level international composition of RFA PLM sales in the period 2016/17 can be broken down as follows, into EMEA (Europe, the Middle East and Africa), Asia-Pacific, and the Americas (the USA, Canada, and Latin America):

Region	2014/15	2015/16	2016/17
EMEA	36%	40%	35%
Asia	13.5%	23.5%	23%
Americas	50.5%	36.5%	42%

Comparing this year's figures to those from our 5th and 6th Editions, we see that, over a three-year period, the EMEA segment has achieved relative stability, while the Asian and American segments have seen more significant shifts.

The country-by-country geographical drivers for PLM adoptions are analysed in greater detail later in this section, but at a high level the likely influences behind this change of sales concentration are:

- The success of key PLM vendors in establishing or expanding operations in Asia – particularly India, Hong Kong, and mainland China. While this development was also reflected in the results we saw in 2015/16, it is encouraging to see that the 10% spike in the region's share of new sales was not short-lived.

- The ongoing evolution of manufacturers in Asian countries – particularly those in longer-established manufacturing hubs where domestic consumption markets have evolved – into private label brand owners. While these companies are purchasing PLM for their own-brand design and development work, pure manufacturers in both proven and emerging sourcing regions are increasingly being incentivised to use PLM through external user and vendor collaboration arrangements.

- A buoyant market for eCommerce businesses in Europe, where online sales are expected to be worth around 600 billion in 2017 according to the eCommerce Foundation[3]. While regional variances obviously exist between different European countries, the success of online-only brands and retailers like Boohoo and ASOS in WhichPLM's native UK has spurred further investment in technology among both direct competitors and high street retailers who are facing stiff competition from online alternatives.

- The rise of subscription-based solutions, which have made PLM affordable and accessible for the smallest businesses. Where previously we would have expected Tier 4 businesses to average around 20 in-house users, evidence suggests that user counts below 10 are not uncommon, with sales routinely occurring to businesses where the PLM projects begin with just one or two users who may even be based at a co-working space rather than a permanent office.

More than ever, we must draw readers' attentions to the difference in size and scope between sales to large Tier 1 companies and sales to those boutique businesses who may be paying for 10 or fewer licenses on an ongoing subscription basis. The box titled "End of Life for the License Model?" considers the wider implications of this change in the way PLM is being sold, but broadly speaking it is important to remember that, from a vendor's perspective, revenue achieved from even a single sale at the higher end of the market cannot be replicated at the lower end without a significant increase in sales volume.

End of Life for the License Model?

Core license cost is defined as the price an average customer of PLM pays to obtain a single, named read / write user license to use core PLM software modules. It is one of the simplest metrics by which total cost of ownership (TCO) can be judged, and reductions in this cost – coupled with the ongoing move towards equal software to services spend ratios - are often cited by vendors and analysts as helping to lower the 'barriers to entry' of PLM.

Two important caveats apply to this ongoing downward trend. First, while the cost of a core PLM license may have decreased, prospective PLM customers should remember that module cost – the price of additional software modules that a customer may be required to purchase in order to have a complete solution – has demonstrably risen over the same period of time. Secondly, the license model may shortly be upended by the rise of subscription-based PLM platforms, so it is critical that customers compare like-for-like solutions, including all required modules, and comparable deployment methods and pricing structures when analysing their TCO.

For several years, we have tracked reductions in core license cost, which is the price an average customer of PLM pays to obtain a single, named read / write user license to use core software modules. Over the course of the past three years, however, that cost has hit a plateau. And while we have previously cited this affordability (coupled with the industry's ongoing move towards equal software to services spend ratios) as being key to lowering the barriers of entry to PLM, its importance in this respect is now secondary to the rise of the low-cost subscription model.

As the survey results set out earlier in this publication demonstrate, close to a third of the customers we approached in 2016/17 had implemented PLM on the cloud. While not all of these will also have purchased their solution on a subscription basis, the trend towards this model is clear: a full 72% of all PLM sales in the period covered by this analysis were to businesses with annual revenues of less than $99 million. For brands and retailers in this bracket, the option of paying for proven functionality and best practices in affordable monthly instalments is an attractive one – and one that we believe is already opening up the potential of PLM to essentially every business with reliable cashflow and an Internet connection.

How the industry will accommodate this pricing model is still uncertain. As mentioned elsewhere in this analysis, vendors accustomed to closing large single deals for significant upfront sums (followed by residual payments for maintenance under a multi-year support contract) will not be able to achieve similar financial performance from selling subscriptions to small businesses without massively increasing their sales volume. To overcome this discrepancy in the immediate value of these different sales, vendors will likely need to develop automated sales, implementation, and support processes to reduce the manpower expense required to deploy PLM to smaller businesses.

At the time this analysis was assembled, it appears as though PLM sales will continue down both avenues; traditional upfront software licenses and ongoing support will remain in place for Tier 0 and Tier 1 customers, while Tiers 3 and 4 (and more than likely Tier 2, once the scalability of subscription-based PLM on the cloud is proven) will pursue the subscription model. This two-pronged approach is currently manifested in the presence of tailored "SME" or "fast deployment" solutions that contain only those modules that their vendors feel small businesses need, and can be remotely set up, reliably configured, then charged for on a rolling monthly basis.

Understanding our Customer Tiers

Throughout this section and elsewhere in this year's publication, we refer to customers as falling into five distinct "Tiers". In a market where PLM sales to the middle and lower portions of the spectrum are growing at an increasing rate, it is important to differentiate – especially for the purposes of market estimations – between a sale to a large, multinational, multi-billion-dollar organisation and one to a single-territory boutique brand. For the purposes of revenue and license quantity analysis alone, the former sale will likely be worth substantially more than the latter, and it is only possible to build fair and reasonable market estimations when these disparities in value and size are taken into account.

For clarity's sake, our customer Tiers for retailers and brands are delineated as follows:

Tier 0 Also known as the "super tier", customers who fall into this category demonstrate annual revenues in excess of $10 billion, and are typically multinational organisations.

Tier 1 With revenues of between $1 billion and $9.9 billion, Tier 1 customers may share equal domestic renown to their larger counterparts, but lack the sheer sales volume and international impact that would elevate them to the super tier.

Tier 2 Encompasses a wide variety of retailers and brands in what is commonly referred to as the "mid-market". These companies demonstrate revenue of between $500 million to $999 million.

Tier 3 Takes in those smaller organisations that fall below the revenue threshold of Tier 2 – typically single-territory or boutique retailers and brands with revenue from $100 million up to $499 million.

Tier 4 Newly added for the 6th Edition, this Tier encompasses businesses – typically emerging designers, extremely small brands, or retail startups – that fall below the Tier 3 bracket, turning over $99 million or less per year.

Customer Tier	Percentage of new name sales
Tier 0	3%
Tier 1	7%
Tier 2	8%
Tier 3	10%
Tier 4	72%

In the pursuit of greater granularity in our analysis, the 6th Edition expanded our customer Tiers with the addition of Tier 4 – designed to capture the smallest businesses, with annual turnovers of $99 million or less. This action was taken in the hope that it would allow us to provide more detailed insights into a segment of the market that, in our 5th Edition (when the lowest revenue bracket encompassed anything below $499 in revenue) accounted for 77% of all PLM sales worldwide.

Effectively, we split the previous Tier 3 in two, and the results were telling: in the financial year 2015/16, the largest market segment by volume of new names was the newly-created Tier 4, with a 55% share.

Rather than complicate matters unnecessarily, we chose to maintain the five Tier structure into 2016/17, expecting that we would see a similar breakdown of sales. As evidence by the figures above, however, this has not been the case; the largest share of the market has shifted downwards again, and Tier 4 sales (i.e. those with revenues under the new $99 million bracket) again account for more than 70% of all PLM sales at a global level.

As explained in the introduction to this analysis, this change confounded our expectations. In our 6th Edition we predicted that the most significant untapped potential remained in Tier 3 (turnovers between $100 million and $499 million,) and we expected to see 40% growth, year on year, in that segment. Instead, the Tier 3 market segment has contracted by 27%, while the most explosive growth has been seen at the two extreme ends of the spectrums: Tier 0 and Tier 4.

Judged in percentage terms, Tier 0 exhibited the largest growth of these two segments (80%), but a more prudent analysis sheds some light on why this figure is misleading. Examining the raw data, we see that the absolute increase in Tier 0 was from 5 sales in 2015/16 to 9 sales in 2016/17. While there is no question that four additional sales at this level account for a great deal of monetary value, percentage values can be skewed when small quantities are involved, and it is important to remember that, despite impressive year-on-year growth on the surface, Tier 0 still accounts for just 3% of the total RFA PLM market. With a single sale able to sway figures so dramatically, this market segment is inherently unpredictable, and, as always, we do not encourage customers in any other Tier to base their strategic goals or value assumptions on the actions and results of the world's largest businesses.

Far more interesting in both quantity and percentage increase terms, however, is Tier 4, which exhibited 60% year on year growth (far exceeding our prediction of 26% growth) and accounted for 190 individual sales – an increase of 40 on the figures we saw in 2015/16. The primary force driving this growth is, of course, the affordability of the subscription model, and the viability of small-scale, remotely-configured cloud deployments. The pace with which this growth has accelerated, however, is remarkable.

At the time we undertook the research that informed this analysis, the WhichPLM team fully expected to see the market concentrated in Tiers 3 and 4, and we saw no reason to add any further granularity to our data collection processes. Now we are in possession of the full data set for the fiscal year 2016/17, however, we recognise the importance of adding a further Tier – Tier 5 – to our next market analysis, covering the year 2017/18.

The demarcation between Tiers 4 and 5 is yet to be defined, but in spirit we believe that splitting Tier 4 in two (as we did with Tier 3 in 2015/16) will allow us to better understand the forces shaping what remains the largest segment of the RFA PLM market by a massive margin.

Geographic trends in RFA PLM

This section will analyse the international adoption of PLM in what we believe to be the most noteworthy regions highlighted in the "Regional Adoption of RFA PLM" section that appears later in this Analysis.

Broadly speaking, key PLM vendors who have established substantial operations outside their domestic markets have typically done so only after considerable success at home. This being the case, international expansion by one or more of the market leaders is typically taken as a strong indicator of growth potential in the locations they select. Put more bluntly, successful PLM vendors do not tend to invest unwisely in new markets, and as a result we believe that new name sales resulting from these expansions remain a stable metric for judging the potential of different markets.

It is unsurprising, given the United States' continued dominance of the RFA PLM market (beating even its closest competitor by almost 30%) that most vendors who have pursued international expansion following domestic success are headquartered there. Companies like Centric Software, Gerber Technology, Infor, NGC, and PTC remain forces to be reckoned with at home and abroad in 2015/16, along with their Canadian neighbour Visual Next (formerly Visual 2000). That being said, American and Canadian vendors are not the only ones to enjoy success outside their home countries: Dassault Systèmes and Lectra (both French companies) have also achieved impressive results on a global level.

The following regional analysis examines the different markets in which these and other vendors competed in 2016/17, and considers how intrinsic and extrinsic forces have shaped the market share of the year's most interesting regions.

United Kingdom

WhichPLM's home country has long been a prominent market for PLM. Lacking the size and diversity of the US market, however, it is prone to fluctuations in demand; from a high of 13% market share in 2012/13, the country dipped to 6% share for the following two years, before recovering some of that ground in 2015/16 and 2016/17.

Today, although its 8% share falls short of the high watermark, the UK is the world's second largest RFA PLM market by volume of new name sales, although mainland China and Hong Kong hold an equal share if combined.

For a variety of complex reasons – the lack of significant cultural and language barriers is likely to be a prominent and obvious one – North American PLM vendors continue to be the dominant forces in the UK market. The country does have several domestic PLM providers, as well as a healthy startup scene for extended-PLM providers, but their success is currently confined to the small-to-medium end of the market.

Where the UK market distinguishes itself from its US counterpart, however, is eCommerce. More people in the UK shop online than almost anywhere else in the world, which is a function of both domestic success stories like Boohoo, ASOS, and Missguided, and the resonance of the Amazon rapid fulfilment model in a country with a small geographical footprint.

In our 6th Edition we wrote that the so-called Brexit (the UK's voluntary removal from the European Union) might have a measurable effect on sales in 2016/17. However, since no meaningful steps have yet been taken to withdraw the country from the common market, we believe the true outcome of Brexit may not be evident until one or more fiscal years hence.

Brazil, Colombia, and Mexico

Forecasters have, for several years, suggested that we might see an explosion of RFA PLM interest in Latin America. At the time, this appeared a relatively safe prediction; big name brands in South American countries were implementing PLM solutions, and massive Brazilian delegations were in attendance at all major retail trade shows.

If that explosion is to happen, however, it appears it will have a longer fuse than initially thought. Brazil is the only country in South America to register in any significant way in WhichPLM's readership this year, even though the country's PLM market fell from a 1% share in 2014/15 to a zero figure in 2016/17. Interest has also dwindled in other South American markets: Colombia held 2.5% of all RFA PLM sales in 2014/15 but accounts for none today; Mexico held 4% in the same year, and similarly has reported no sales in 2016/17.

We might speculate that political scandals in Brazil have perhaps undermined regional business's confidence in the future of the economy, which could have, in turn, influenced overall outlooks for the region as a whole. This is evident in the World Bank Group's assessment of the country as having the lowest economic growth potential of any other Latin American country besides Venezuela in the three years from 2017[4]. WhichPLM is not, however, a regional expert, and we encourage any business investing in the region (whether a vendor or retailer / brand) to carefully weight the various factors that may have led to stagnation of sales since 2014/15.

China and Hong Kong

Although China has ceded some market share since 2015/16, when combined with Hong Kong the two markets still tie for second place with the United Kingdom.

As a long-serving manufacturing hub with its own burgeoning consumption market for both Western and domestic luxury and mass market fashions, China serves as the spearhead for a farther-ranging expansion of PLM into Asia. Since our first formal Market Analysis – covering the period 2012/13 – sales to customers in Hong Kong and on the mainland have risen considerably. Most major vendors now have a presence in China, and the country played host to a well-attended, PLM-focused event in 2017.

Given the country's history as a sourcing and production stronghold (a reputation it maintains, although ground is being lost to other Asian countries, as explained in the following paragraphs) the vendors achieving the most success in China are those who have hooks into its manufacturing base. At a time when manufacturers are increasingly looking to launch their own private labels, this footprint has enabled them to articulate the benefits of designing and developing in PLM to a captive audience.

Bangladesh and Thailand

Both new entrants to our Market Analysis, Bangladesh and Thailand are two of the most direct beneficiaries of China's reduced share of the international apparel manufacturing workload. As Western brands have shifted their sourcing operations, Bangladesh in particular has become the world's second-largest exporter of apparel, while Vietnam has established a reputation as the go-to destination for footwear.

Although sales to both countries combined only account for 4.5% of total global volume, this is a figure we expect to see increase over the coming years as manufacturers experiment with their own private labels and become Tier 4 brand owners in their own rights.

Nordic Countries

In 2015/16, we remarked that the Nordic Countries (a collective fashion powerhouse that includes Sweden, Denmark, Finland, and Norway) had quietly become a major international market for RFA PLM. And while sales to the region have fallen by 0.5% this year, a similar decrease in China's total share (when not combined with Hong Kong) of sales means that the Nordic bloc now sits in third place behind the USA and UK.

While several PLM vendors have offices in Sweden, it remains incredible to consider that a market few have expressly focused on now accounts for more sales than widely-advertised markets like India and Italy, and exceeds the sales volume of France and Germany combined.

France

A significant shortfall in sales to French customers in 2016/17 is something we did not expect. The country has held a steady share of PLM sales at between 6% and 8% for several years, so it seems likely that a slump to 3% is a temporary setback rather than an indication of a longer-term trend. As the country analysis below explains, the luxury and haute couture industries (both part of the rich tapestry of France's history of fashion) are, if anything, demonstrating a considerable appetite for PLM, so we fully expect the French market to recover ground in 2017/18.

Italy

The aforementioned resurgence of luxury interest in PLM is likely to be a contributing factor to the partial recovery of the Italian market this year. From a high point of 12% in 2013/14, the region's share of sales dwindled as low as 4% in 2015/16, before reclaiming another percentage point this year.

WhichPLM has attended (and our CEO has spoken at) several PLM and fashion technology conferences in the country in 2016/17, and is scheduled to attend another before the close of the 2017 calendar year. Attendance at these shows has been strong, and our analysis reveals that at least one renowned luxury house is due to begin its second PLM implementation very soon. On the basis of these and other indicators, we expect the Italian market to return to (and perhaps even exceed) its previous record within three years.

Poland

A quiet success story in many different service, creative, and digital industries, Poland first appeared in our Market Analysis in 2015/16, with a 0.5% share of the total global sales volume. This year that share has increased to 1%, which may seem unremarkable, but given the strength of the Polish economy and its status as a talent pool for other industries, it is an increase that should not be ignored.

It is also important to remember that Poland has a history of apparel manufacturing (albeit one that was overtaken by the so-called "Factory Asia") and a legacy of traditional tailoring and craftsmanship that may serve to bolster its potential as a home for new and exciting brands in the near future.

USA

The United States remains the RFA PLM industry's most mature market – from the perspective of both vendors and their customers. The country is home to most of the world's leading PLM software providers, and many of its most prominent brands and retailers have now been exposed to several generations of solution: traditional PDM, bespoke "toolbox" PLM, the modern strain of more configurable solutions, and now the emerging small-business-focused subscription model.

While the US market has seen some fluctuations (from a high of 40% share in 2013/14 down to 30% in 2015/16) it remains, by a considerable margin, the largest single market for RFA PLM in the world. As a consequence of this, coupled with the country's strong internet infrastructure and startup culture, the USA is also extremely likely to be the vanguard for even greater adoption of cloud and subscription-based PLM among small and boutique businesses in the coming years.

Market Sizing

Drawing on our primary metric of new name RFA PLM sales and applying our own exhaustive cost calculations, the WhichPLM team has reached a number of conclusions regarding the overall market size for the financial period 2016/17, including some adjustments to take account of the following factors:

- Minor changes in the list of premier vendors that qualified for inclusion in this report, or who opted not to be included. This also covers a single vendor who, for clear and understandable reasons, was unable to participate at the last minute and does not appear in our vendor listings; its customer numbers are, however, reliable and have been factored into our calculations.
- The unwillingness of a small number of vendors to provide the requisite level of insight into their sales within the defined annual period.

These adjustments were made prior to this analysis, and have therefore been included in this accumulated market size and all geographical analysis, and their effect will therefore be felt in any analysis of the underlying trends. The effects of these adjustments are not significant, and remain consistent with the evidence visible in international and Tier-based adoptions.

The following table demonstrates the method by which our analysis team calculates the total cost for a sale in each customer Tier, including each of the individual elements that are taken into account. These elements are based upon the variation in estimated typical costs and effort required to implement solutions across the different Tiers. Multiplied out, this table then shows the total value of the Tiered segments of the market, and it is followed by another table and accompanying interpretation that provide a monetary size for the market as a whole.

Missing regions?

Although WhichPLM works internationally, we cannot monitor every region. If you feel your country is missing from our analysis, please contact us at info@whichplm.com.

Legend for below table

- Per user license costs are based on an equivalent, traditional licensing model, and do not take account of subscription /cloud deployments.
- Service days includes only supplier days which the customer pays for – total costs and time could potentially be much greater when internal costs and hardware upgrades are factored in. Last year's research suggested a ratio of two to one in man days of internal resource compared to external.

	Tier 0 (9 sales)	Tier 1 (19 sales)	Tier 2 (22 sales)	Tier 3 (26 sales)	Tier 4 (190 sales)
Average seats per customer:	2,000 (comprised of 750 internal and 1,250 external)	600 (comprised of 200 internal and 400 external)	300 (comprised of 100 internal and 200 external)	75 (comprised of 50 internal and 25 external)	30 (comprised of 20 internal and 10 external)
Total seats this year:	18,000 (comprised 6,750 internal and 11,250 external)	11,400 (comprised 3,800 internal and 7,600 external)	6,600 (comprised 2,200 internal and 4,400 external)	1,950 (comprised 1,300 internal and 650 external)	5,700 (comprised 3,800 internal and 1,900 external)
Typical per user license cost:	$1,000 internal, $500 external	$2,500 internal, $500 external	$2,250 internal, $500external	$2,000 internal, $500 external	$1,500 internal, $750 external
Total license cost this year:	$12.4 million ($6.8 million internal, $5.6 million external)	$13.3 million ($9.5 million internal, $3.8 million)	$7.2 million ($5.0 million internal, $2.2 million)	$2.9 million ($2.6 million internal, $0.3 million external)	$7.1 million ($5.7 million internal, $1.4 million)
First year maintenance:	18% (of the above to get the below)	20%	17%	15%	0%
Total maintenance this year:	$2.2 million	$2.7 million	$1.2 million	$435,000	$0
Typical number of service days to conduct implementation:	2,000 man days	600 man days	300 man days	100 man days	25 days
Total service days this year:	18,000	11,400	6,600	2,600	4,750
Typical service costs per day:	$1,750 per day	$1,500 per day	$1,250 per day	$1,000 per day	$1,000 per day
Total service costs this year:	$31.5 million	$17.1 million	$8.3 million	$2.6 million	$4.8 million

For Tiers 0-3, this calculation table takes account of the typical numbers of users, internal to external user ratios, percentage maintenance costs, and the service implementation days required for an average PLM project in each Tier.

The same approach is taken with Tier 4, although maintenance is assigned a nil figure for these sales, because this cost is factored into the monthly subscription fees that the vast majority of these small brands and retailers pay in lieu of traditional licenses. These are not all cloud sales in the truest sense, but almost all are priced according to a "rental" structure, with traditionally-upfront fees segmented into monthly billing periods whether the underlying deployment method is pure cloud, hybrid cloud, managed services, Software as a Service, or some combination of these.

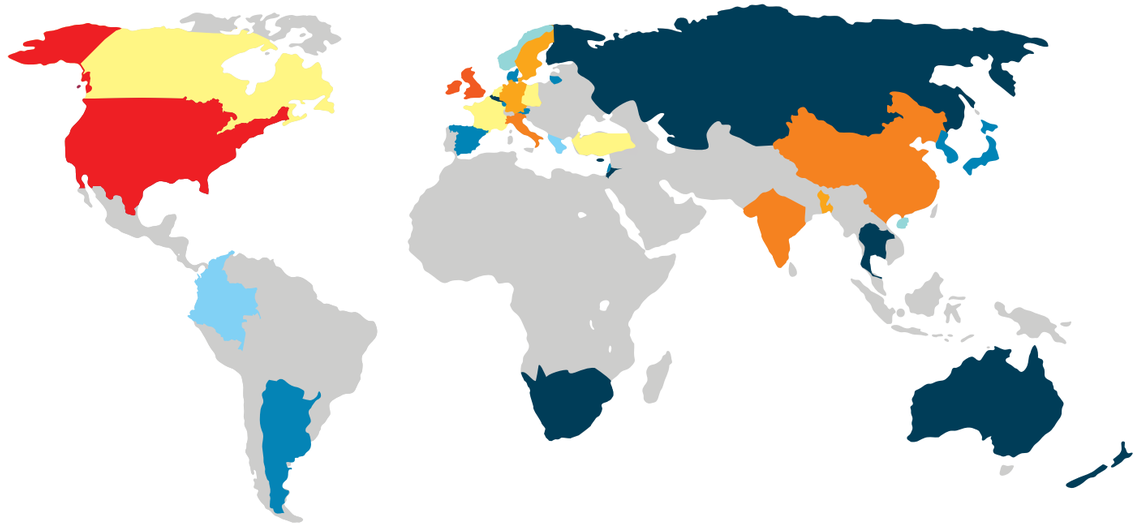
Taking these differences in costing models into account, the composite total of licensing, maintenance, and servicing reveals a total size for new name sales in the RFA PLM market in 2016/17 of $113.7 million. This represents a minor improvement on the figure ($112.2 million) we saw in 2015/16, but while the surface remains untroubled, the way that value has been created differs considerably between the two years.

For a more detailed analysis of these differences and their implications, turn to the "Long Term Market Forces" section of this Analysis, since we now move on to a more detailed look at the geographical composition of this overall market size.

Total RFA Market Size for 2016/2017

	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4	Total
License Costs	$12.4 million	$13.3 million	$7.2 million	$2.9 million	$7.1million	$42.9 million
Maintenance Costs	$2.2 million	$2.7 million	$1.2 million	$435,000	Zero	$6.5 million
Service & Setup Costs	$31.5 million	$17.1 million	$8.3 million	$2.6 million	$4.8 million	$64.3 million
Composite Total	$46.1 million	$33.1 million	$16.7 million	$5.9 million	$11.9 million	$113.7 million

Regional Adoption of RFA PLM



United States	37.5%	France	3.0%	Poland	1.0%	Jordan	0.5%
United Kingdom	8.0%	Germany	3.0%	Spain	1.0%	Russia	0.5%
China	6.0%	Netherlands	3.0%	Switzerland	1.0%	South Africa	0.5%
India	6.0%	Turkey	3.0%	Australia	0.5%	Thailand	0.5%
Italy	6.0%	Hong Kong	2.0%	Belgium	0.5%		
Bangladesh	4.0%	Norway	2.0%	Finland	0.5%		
Sweden	4.0%	Denmark	1.0%	Greece	0.5%		
Canada	3.0%	Japan	1.0%	Israel	0.5%		

The illustrations accompanying this analysis present the geographical distribution of new name RFA PLM sales in 2016/17 in two ways: as a heatmap, with different concentration levels coloured according to the legend beneath the map; and as a table (on the next page), displaying this year's data alongside the same figures from the periods 2014/15 and 2015/16. While WhichPLM holds the same sets of historical data for the fiscal years dating back to 2012/13, these have been excised from this publication as their ongoing relevance is limited.

As has been the case in all previous years, the RFA PLM market remains one where the bulk of sales are concentrated in a small number of countries. Although 2016/17 reveals some significant changes in the distribution of sales (as examined in the earlier Geographic Trends in PLM section of this analysis,) those sales are primarily confined to seven key locations: the USA, UK, China, India, Italy, Bangladesh, and Sweden. Each of these individual countries holds a 4% or greater share of the overall volume of new name sales.

While we outlined, in our 6th Edition, the possibility that China's market share could overtake that of the USA within four years if the growth exhibited that year continued, the country's share of new name sales has instead slowed. On this basis, while China remains the largest potential threat to the American PLM hegemony, is not the only other country with significant share of the overall market – nor is it the only country with the potential for further growth.

These primary sales regions are then joined by a further seven countries who each hold a 3% or 2% share of the total global sales volume: Canada, France, Germany, Netherlands, Turkey, Hong Kong, and Norway.

Share Of Total RFA PLM Sales By Country (%)

Country	2014/15 percentages	2015/16 percentages	2016/17 percentages
Argentina	1.0%	0.0%	0.0%
Australia	0.5%	0.0%	0.5%
Bangladesh	0.0%	0.0%	4.0%
Belgium	1.0%	0.5%	0.5%
Brazil	0.0%	0.5%	0.0%
Canada	5.0%	5.0%	3.0%
China	4.0%	10.0%	6.0%
Colombia	2.5%	0.0%	0.0%
Denmark	0.0%	1.0%	1.0%
Finland	0.5%	0.5%	0.5%
France	6.0%	8.0%	3.0%
Guatemala	0.0%	0.5%	0.0%
Germany	6.0%	4.0%	3.0%
Greece	0.0%	0.0%	0.5%
Hong Kong	1.0%	2.0%	2.0%
India	6.0%	6.0%	6.0%
Israel	0.5%	1.0%	0.5%
Italy	5.0%	4.0%	6.0%
Japan	1.0%	1.0%	1.0%
Jordan	0.0%	0.0%	0.5%
Lithuania	0.0%	0.5%	0.0%
Luxembourg	0.5%	0.0%	0.0%
Mexico	4.0%	0.5%	0.0%
Netherlands	1.0%	1.5%	3.0%
New Zealand	0.0%	0.5%	0.0%
Norway	0.5%	3.5%	2.0%
Poland	0.0%	0.5%	1.0%
Russia	0.5%	0.0%	0.5%
South Africa	2.0%	0.5%	0.5%
South Korea	1.0%	1.0%	0.0%
Spain	2.0%	1.0%	1.0%
Sweden	0.0%	3.0%	4.0%
Switzerland	0.0%	1.0%	1.0%
Thailand	0.0%	0.0%	0.5%
Tunisia	0.0%	0.5%	0.0%
Turkey	4.5%	3.0%	3.0%
UK	6.0%	9.0%	8.0%
USA	38.0%	30.0%	37.5%

From there, the remainder of the market is comprised of a list of smaller countries that each account for a single percentage point share or less, and that together taper into a long tail. In 2016/17 there were 14 such countries, and the preceding heat map sets out their distribution visually.

The adjacent table titled Share of Total RFA PLM Sales by Country also includes 10 further countries where sales have been registered within the last three years, but where no attributable sales that met our assessment criteria took place in 2016/17.

Finally, four countries that have previously shown PLM sales outside that three-year period but where none have been attributable since 2012/13 do not appear in this analysis. These are Austria, Lebanon, Romania, and Taiwan. None of these countries held a significant share of the total market volume even at their peak, and all have now been inactive for some time.

Long Term Market Forces

In our 6th Edition, we wrote that "the RFA PLM market has stabilised just in time to be disrupted," referring to our expectation that cloud-based PLM deployments and a gigantic untapped market of boutique businesses might soon up-end the pricing, selling, and implementation practices that have underpinned our industry for many years.

In what appears to be a common theme in a rapidly-changing industry, our analysts understood the directions the market was likely to take, but underestimated the pace at which it was going to evolve. As the data collected for both this Analysis and our Customer Survey reveal, 2016/17 has seen the largest uptake to date of affordable, cloud-based PLM (an increase of 15% in just twelve months) and at the same time sales to the lowest end of the market have surged 16%.

Rather than attempt to separate them, a prudent analysis recognises that these two forces are intertwined – and indeed that each is serving to accelerate the other. PLM on the cloud, with affordable monthly pricing, is being promoted by vendors because the mid-market is contracting, leaving them with little alternative but to create a product that appeals to the largest market segment by volume. Smaller and smaller businesses, who make up that volume, are then buying into PLM precisely because it is affordable and accessible, and the cycle continues.

Both of these market forces are, of course, built on decades of PLM implementation and innovation. Cloud-based PLM that is remotely configurable and rapidly deployable relies on extremely secure technological foundations, modules that have been road-tested in hundreds of live implementations, and best practices distilled from the experience of end users at every stage of the product lifecycle. Similarly, the willingness of extremely small businesses to embrace PLM hinges on the aforementioned "crossing the chasm" mentality, where these boutique businesses have waited, observed the actions of larger organisations, and are confident in their ability to emulate or approximate their results now that equivalent functionality is available in their price bracket.

Technologically speaking, the growth of PLM on the cloud is no surprise. Distributed computing has revolutionised most other software markets, and many other consumer-grade and enterprise solutions have already shifted from perpetual licensing to a subscription pricing structure. Microsoft's Office productivity platform is primarily sold on a subscription basis – although offline versions remain available – and the Adobe Creative Cloud, which sees heavy use in the RFA industry, is now the only way of acquiring new versions of Photoshop, InDesign, and Illustrator.

Indeed, the value proposition for fashion brands and retailers is, if anything, more potent than either of these examples. Essential word processing, spreadsheet manipulation, and design functionality changes very infrequently, making buying these kinds of tools outright a more cost-effective option for businesses that do not need to live on the bleeding edge. In retail, footwear, and apparel, however, even core functionality must evolve rapidly to keep pace with market forces, and new modules are added frequently as technology matures – all of which conspires against the concept of lengthy on-site implementations and delayed milestone releases for all but the biggest businesses.

For PLM vendors, while targeting the volume market appears on the surface to be the logical approach, it is not without its drawbacks – and these are exemplified in the composition and size of the RFA PLM market as they stand in 2016/17. Unlike our 6th Edition, where a significant amount of dollar value had been added to the total market size in the fiscal year 2015/16, this year has only the seen market grow – in financial terms – by 1.3%. This is despite an increase in raw sales numbers from 214 to 266, representing 24% growth according to the primary metric used for this Analysis. In this sense, the fiscal year 2016/17 has seen more of a reconfiguration of the market – again, in financial terms – than it has actual year-on-year growth.

To examine this reconfiguration in more detail: as our Seat & License table and Total Market Size table demonstrate, not all PLM sales are equal. Vendors who wish to reorient their business around high-volume, low-cost cloud deployments will face a significant challenge: namely that pursuing greater sales numbers in the Tier 4 market segment will not automatically lead to increased revenues without potentially fundamental changes to business models.

In an unusual twist, the two extreme ends of the market in 2016/17 are essentially negative reflections of one another. Tiers 0 and 1, which account for just 10.5% of total new name sales volume, made up close to 70% of the total global revenue this year. Conversely, Tier 4 alone made up 72% of all new name sales, but contributed only 10.5% to revenues.

At first glance, these figures seem to lead to an extremely simple conclusion: PLM vendors should target the extreme of the market where a single sale can be worth millions of dollars, rather than the one where a single sale may only be worth thousands, with that revenue coming in regular instalments.

This, however, is a reductive view that does not take future market performance, economies of scale, or the cost of customer acquisition into account. As readers will see in the following section of this analysis, we are predicting Tiers 0 and 1 to contract by 22% and 21% respectively in 2017/18, whereas Tier 4 is currently pegged for at least 15% growth. And while it would be easy to assume that, with its being comprised mainly of low-cost subscriptions, software sales to the Tier 4 segment were the smallest source of software revenue, this is not actually the case. Our 2016/17 data shows that, of the four customer Tiers we track, total revenue from software sales to Tier 4 was close to being tied for third place.

By a similar logic, it is tempting to assume that remote deployments and configurations have all but eliminated the need for implementation services in the Tier 4 segment. But while last year's figures showed that Tier 4 was indeed the smallest generator of service revenue, that award has now passed to Tier 3 in 2016/17. Today, Tier 4 service revenues sit at more than half of those of the Tier 2 segment, where individual implementation

projects tend to be far more time-consuming and expensive. This may not necessarily remain the case when PLM vendors are able to automate more of their deployment, onboarding, training, and support services, but, for the time being at least, a not-inconsiderable amount of manpower is still required to help even the smallest brands get the most out of PLM. Lastly, we must remember that the small business implementing PLM today – possibly using only PDM elements - has the potential to become the large business of tomorrow, and will likely need to add further functionality like workflow, line planning, and calendar management over time, and at cost.

In WhichPLM's opinion, there can be little doubt that cloud deployments and high-volume, low-user-count sales will be the most significant influencing factors on both the medium and longer-term future of the RFA PLM market. To that end, the executive summaries set out at the close of this analysis make concrete recommendations for how vendors and customers might best position themselves to weather the changes to come.

As mentioned earlier in this analysis, the next time WhichPLM assesses the market, a sixth customer Tier will be added to our list. It has become evident in 2016/17 that the average number of seats (20 internal and 10 external) that we use to inform our Tier 4 calculations is too high in many cases; user counts in the single figures are now commonplace among small but rapidly-growing online businesses in particular.

“In light of how rapidly the market appears to have re-oriented itself around low-cost solutions sold to small businesses, many vendors will now be questioning their approach.”

But even with some uncertainty over how Tiers 4 and 5 will be separated (a determination we will make in early 2018,) our outlook for the industry remains optimistic. Before moving on to make predictions for its future, we must underline just how impressive it is that a market of the size, scale, and worldwide spread of RFA PLM can reconfigure in this way and still exhibit growth in every absolute sense. It is a testament to the potential of the industry that monetary growth, an increase of close to a quarter in new name sales, and continued total customer satisfaction can all be achieved at a time when the composition of the entire market is in flux.

Market Predictions

A pattern has been established in our predictions for growth in new name RFA PLM sales over the last two years. For 2015/16 our analysts expected 17% growth, averaged across all Tiers, and were greeted with 25% growth. For 2016/17, we again predicted 17% growth – albeit it for different reasons – and 24% growth was actually realised.

As tempting as it may be to continue that pattern, we believe that both financial and new name sales growth are likely to slow in the next twelve months. As a consequence, WhichPLM predicts that new name sales in the fiscal year 2017/18 will grow by 7%.

This overall market growth prediction is built up from expectations that sales to Tier 0 size businesses will contract by 22%, Tier 1 will contract by 21%, Tier 2 will remain static, Tier 3 will contract by 23%, and Tier 4 (which for the time being encompasses the future Tier 5) will grow by 15%. These growths by Tier level are informed by the conclusions set out throughout this analysis.

As in all previous Market Analysis sections, this year’s market sizing is measured on the basis of new name sales and does not reflect the potentially significant roll-outs of new licenses, upgrades, additional modules or expansions to existing customers. While our analysis team is confident that new name sales remains the most efficient and informative method of analysing the RFA PLM market, its monetary value may be dramatically larger if a total contract value perspective were taken instead.

Prediction Accuracy Assessment

As internationally-renowned analysts and publishers, WhichPLM has a well-established history of making predictions for the future of the PLM industry for retail, footwear and apparel.

Although these have, generally speaking, proven accurate or overly conservative, the growth predictions indicated in this analysis are made at a particular point in time (this publication being released in the autumn of 2017) and are therefore based upon the best information available at that time. No prediction is guaranteed, although our conclusions are based upon clear content, context, and a strong basis for anticipated growth.

Market Analysis Implications

Given the depth of the market analysis covered in this report, and the desire of WhichPLM to directly address the concerns and interests of its key readers, we now set out what we believe to be the key findings from this analysis in three executive summaries, each tailored for the needs of a particular type of reader.

Executive Summary for PLM Vendors

In light of how rapidly the market appears to have reoriented itself around low-cost solutions sold to small businesses, many vendors will be questioning their approach to the market. Although this trend was evident in 2015/16, it is more acute today, and a go-to-market strategy for 2018 and beyond absolutely must include a cloud-based product, sold on a rolling monthly basis, lest vendors become locked out of 72% of the market.

This being said, pursuing a cloud and subscription strategy is not a cut-and-dried affair. Although target businesses in this demographic are small, they will not necessarily be easy to win over. And while vendors may be accustomed to spending considerable amounts of time and money acquiring lucrative Tier 1 and 0 customers, pursuing the same strategy at the other extreme of the market will very quickly become a loss-leading proposition.

Similarly, if a vendor’s business model currently hinges on residuals from ongoing maintenance contracts, targeting the Tier 4 market segment will be a rude awakening. In just twelve months, the lack of maintenance revenue from increased Tier 4 sales has wiped close to a million dollars off the total value of the RFA PLM market. While some element of these costs can be amortised in the ongoing subscription itself, competition in this area will be fierce, and monthly payments will quickly coalesce around an acceptable range.

In WhichPLM’s opinion, the only sensible way to target the volume required to be profitable in the Tier 4 market segment (although this applies less to new entrants to the market, who will likely have much lower overhead costs) is to push towards automation. By this we mean that a boutique brand customer should be able spin up an instance of the latest version of a PLM product from her or his office, choose the modules that matter to them, configure core settings without vendor intervention, set up recurring monthly payments for the use of the solution, and address any outstanding queries through online training, support videos, and even chatbots.

Making it easier (even hands-off) to acquire customers in the volume segment of the market will vastly increase a vendor’s chances of succeeding in the small business future. By the same logic, however, making it easier to bring customers into the fold also makes it easier to lose them, and vendors will need to take extra care to ensure that cloud customers feel valued.

This does not, however, mean that WhichPLM is advocating that all vendors go after the Tier 4 market segment. Rather, our advice is for PLM providers to retain the strategy they currently apply at the top extreme of the market (hands-on selling and support, delivered by industry experts, and traditional licensing and maintenance pricing) but complement it with the automated approach to Tier 4 mentioned above. In the longer term, making both approaches scalable will ensure that the vendor is able to capture the dwindling middle market, too.

Finally, vendors who have invested in the UK, China, India, and the Nordic countries will already be seeing dividends and should, we believe, remain committed to those international markets. Those who have established beachheads in Latin America, however, may consider withdrawing them, as the RFA PLM market in even the most promising of South American companies has now all but vanished.

Executive Summary for PLM Customers

While the composition of the market has changed, our advice to potential customers of PLM has not. What follows is a slightly-altered repeat of the summary set out in our 6th Edition.

In every sense, RFA PLM remains a buyer’s market. Customer satisfaction is being sustained at an all-time high; solution capability is strong and constantly improving; total cost of ownership of traditional deployment models has levelled out at its lowest ebb for decades, and non-traditional models – i.e. “the cloud” – are in the ascendance, with almost a third of all deployments being conducted off-premise, and more than 70% of the market being comprised of customers for whom cloud-based subscription PLM is the logical choice.

Unlike other industries, where the move to subscription pricing and cloud hosting felt forced, it should be considered a natural evolution for RFA PLM. The tools that brands and retailers need to compete domestically and internationally can be evaluated more easily, deployed much more quickly, seamlessly updated with new modules, and their cost can be spread over affordable monthly instalments.

But while WhichPLM has no reservations in recommending cloud-based PLM to customers, we encourage them to be careful that the solutions they evaluate contain all the functionality they expect. Often, subscription PLM is a cut-down “essentials” version of the vendor’s enterprise product, and while many smaller businesses will be satisfied with these core competencies, others may not.

Just as with size, customers in almost any geography are now able to consider an investment in PLM, with many of the industry’s leading vendors diversifying their customer bases to account for significant growth in Asia and Northern Europe. Wherever they are located, however, prospective customers should take steps to ensure that the vendor resources who will be conducting their implementation (or those responsible for managing the support portion of their subscription) have sufficient business process expertise, as well as the technical capabilities to deliver the project efficiently.

As we have in previous years, WhichPLM must also continue to caution customers who intend to approach a vendor who does not appear in this publication. While we do not assess the functionality of any solution or the roadmap or resource availability of any vendor outside of our dedicated Supplier Evaluations, the openness and relative transparency of most of the industry’s key PLM vendors serves only to accentuate the guardedness with which the others treat their product, fiscal stability and their approach to the retail, footwear and apparel industry.

While readers should not assume that the presence of a vendor in these pages represents an endorsement of that company or its PLM solution, any vendor who is unwilling to divulge information to an impartial industry body should be subject to heightened scrutiny at the time of shortlisting and selection.

Executive Summary for PLM Consultants

Advisory practices with operations in the UK, the Nordic countries, India and China remain in a privileged position, since vendors will now be looking to ally themselves with proven consultancy firms – particularly those who can demonstrate in-house experience and expertise specific to RFA PLM and E-PLM, and whose delivery capabilities can be scaled up to both meet unpredictable demand and to cater to a more diverse customer base.

Similarly, consultants should carefully consider their role in an increasingly SME-driven future market, with a greater volume but shorter duration of implementation projects. Service and implementation days will not disappear completely, however, and although online try-outs of PLM will eventually become more common than in-person demonstrations, the complexity and whole-business scope of a modern implementation will still require many businesses to employ an independent analyst to aid in final selection.

Eventually onboarding and some degree of change management will be handled through online videos, in-app training, chatbots and other automated avenues. While vendors may be capable (and willing) to develop these in-house, it is equally likely that they will look to partner with third parties who can develop and maintain these materials, as well as providing human second-line support where needed. In the near future, we advise consultants to dedicate their resources to both maintaining current implementation, support, and training services, and to establishing a clear roadmap for how they can continue to play a role in the automated, high-volume future.

As always, we encourage consultants to treat those vendors who are absent from this publication with caution. Partnerships must be approached from a perspective of mutual benefit, and any vendor unwilling to divulge sales information to WhichPLM should be treated as an unknown.

SOURCES
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2. https://www.morganstanley.com/ideas/software-sector-growth
3. http://www.ecommercefoundation.org/reports
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THE FUTURE

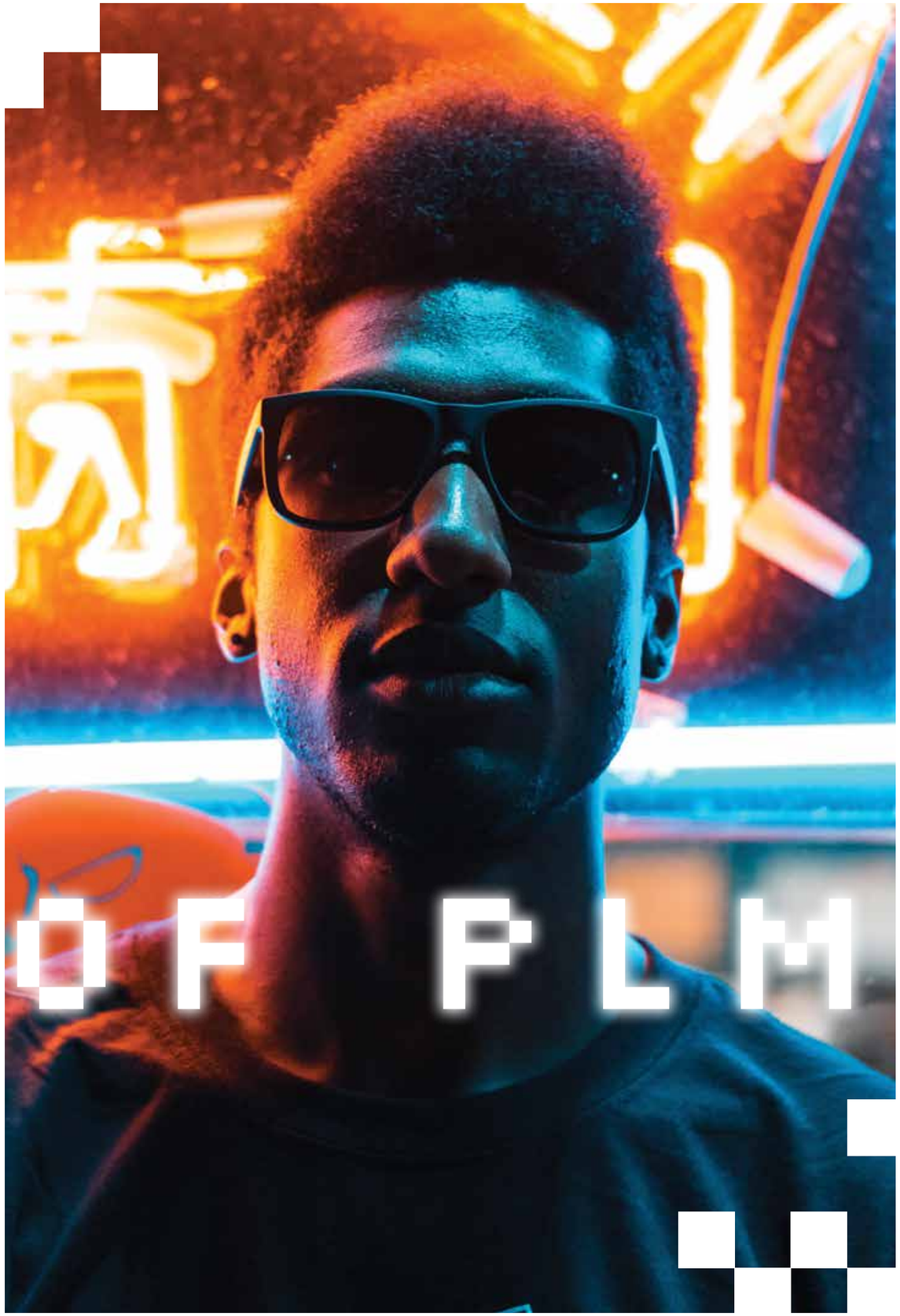
As the editorial features collected towards the beginning of this publication explain, fashion has well and truly entered the intelligence era. Second only to the products themselves, raw digital information (and the intelligence that can be gleaned from it) has become the major currency exchanged between retailers, brands, their supply chain partners, and consumers.

But while neural networks, bespoke analytical algorithms, and other methods of data analysis can sift through huge volumes of this information and serve up insights that can be trusted in the direct sense – i.e. their methods are clear and transparent - what they cannot do is tell us how trustworthy the sources of those data were to begin with.

This is not to downplay the importance of A.I. – which, as we've discussed earlier in this report, can transform everything from trend analysis to consumer engagement – but rather to draw attention to a missing piece of the intelligence puzzle: provenance.

Consider the current standard of supply chain information. Here in the UK, the Modern Slavery Act has recently come into effect, mandating that businesses with a turnover in excess of £36 million produce an annual audit statement, openly declaring that slavery – by the broad modern definition – is not present anywhere in their supply chains. That revenue threshold effectively covers all but the smallest companies, so today brands and retailers across the country are scrabbling to pull together supplier statements and establish concrete codes of practice to allow them to say, with some degree of confidence, that they are in compliance with the Act.

But while these business's intentions are good, is their confidence well-founded? They request code of practice statements from their suppliers, who promise not to use unpaid or low-pay labour. They take pains to obtain and archive testing certificates from raw material suppliers on the other side of the world. They track, as far as they can, prototype, sample, and product orders when they are loaded onto boats and arrive at distribution centres. But if we take a step back we can see that each of those pieces of evidence is only as trustworthy as the people signing their names to



YOU MAY ALREADY BE FAMILIAR WITH BLOCKCHAIN IN YOUR PERSONAL LIFE. IF NOT, THE ODDS ARE BETTER THAT YOU VE HEARD OF THE DIGITAL CURRENCY THAT LED TO ITS CREATION: BITCOIN.

it – people who may have motive to tamper with it, or to get creative with its contents in the first place. So, when we aggregate this evidence and collect it in a single, centralised system – preferably PLM – we are, in effect, creating a chain where each individual link runs on faith.

And while the Modern Slavery Act is UK-only, similar (or much more prescriptive, punitive alternatives) are already being implemented in other production and consumption markets around the world. And at a global level, fashion is making bold claims – about product safety, product provenance, fair labour and sourcing practices - on the basis of digital information we cannot guarantee we can trust. Are we, as an industry, satisfied to settle in this way? More importantly, in a market where consumers increasingly buy with a conscience, how long will the court of public opinion accept plausible deniability when the tools for far greater transparency already exist?

"When you're talking about sharing and communicating intelligence, you need to be able to rely on a single source of information for the trinity of actors: brands, products, and consumers," says Emanuele Bertoli, Chief Marketing Officer at 1trueid, an Italian company focused on discovering applications for emerging blockchain technology in the fashion industry. "In a data-driven world, we often get so preoccupied with using and analysing information that we overlook our need to actually verify it."

It's a new word in fashion, but you may already be familiar with 'blockchain' in your personal life. If not, the odds are better that you've heard of the digital currency that led to its creation: BitCoin. A near-constant fixture in finance and investment headlines, BitCoin was the first of the so-called "cryptocurrencies," digital tokens that can be spent, stored, speculated upon, imbued with value, and traded the same way as traditional paper-backed money - but without the oversight of a single, central authority.

The vision for BitCoin came first. A democratic digital currency, free from the control of governments, where every individual is responsible for their own wallet, and value and applications are dictated by the open, global market. The technology to actually deliver on this promise came about out of necessity; there is no single BitCoin bank, so the blockchain was created to serve as a replacement, delivering a decentralised, constantly-reconciled, publically-accessible ledger of transactions that is incorruptible and effectively un-hackable. The titular blocks represent the immutable entries on that ledger.

Since then, blockchain has taken on a life of its own. There are now hundreds of competing cryptocurrencies of varying utility, and the best-performing in this new asset class have seen their values increase by more than 1,000% in the last year. Blockchains themselves now underpin everything from smart contracts (agreements which execute at set milestones, without human intervention) and distributed applications, to transparency in the energy and infrastructure markets, with exacting insight into every unit of electricity generated, sold and used. Blockchain technology also promises to be the lynchpin of the "sharing economy," bringing to life far-future ideas like the safe subcontracting of self-driving cars when their owners don't personally need them, or the hiring of compute power from a global decentralised pool, paid for with dedicated digital tokens.

In light of its potential, Blockchain has been called the 'second age of the internet', and WhichPLM feels that this is not too bold a claim, given how likely it is to transform entire industries and create totally new service economies. More practically and immediately for our purposes, though, blockchain promises to transform the way that product-oriented industries think about and track their products throughout their lifecycles.

"Blockchain usually hits the headlines for financial reasons, but we can apply the same ideas to products rather than units of currency," says Darioush Nikpour, whose New York City consultancy StycheCo is working with 1trueid in the United States. "It gives us a discreet channel of connection between the brand and the consumer, with no middle men. Without the need for any proprietary systems, the ownership status of a product can be transferred in a way that's transparent and totally accessible to everyone."

Although Nikpour is talking mainly about the transfer of ownership from retailer to consumer (and then perhaps to the second-hand market), blockchain principles are also easily applied to other stages of the product lifecycle. Today, proprietary systems or informal records, updated after the fact, are generally used to track changes in the state or location of materials, components, or finished products: from farm to mill, dye house to factory, distribution centre to retail outlet. Using a blockchain and some simple IoT sensors, the same information can be recorded at the instant a change occurs, with no chance of misinterpretation, creating true and total transparency – without a single link that hinges only on human-to-human trust.

As is often the case with new technologies, the CPG industries (where tight regulations mean that concrete knowledge of product origins is absolutely critical) have pulled ahead when it comes to deploying blockchain technologies. A Chinese company named veChain, launched by former members of IBM and Louis Vuitton, is tracking a variety of food and beverage products using blockchains, including wine bottles that carry a record of their vineyard of origin, bottling year, grape varietal and so on.

Another service business, appropriately called Provenance, is also making waves with its blockchain-based backend solution and consumer-facing mobile application. Although Provenance works in multiple sectors – and across retailers, producers, and partners – the company advertises a potent example that helps to articulate one of the core values of blockchain in a retail and brand setting. In-store, a consumer picks up a can of tuna, scans its unique label, and is able to see exactly where in the world – and by whom – the fish inside was caught. In principle, this is no different to today's world, where an eco-conscious shopper might choose one can of tuna over another because it bears a seal saying that the fish inside was line-caught, rather than captured with a net that risked ensnaring dolphins. In practice, there is a world of difference: while a formal 'line caught' body is likely responsible for accrediting fishing businesses that do not trawl for tuna with nets, the consumer is not privy to the inner workings of its auditing processes. In effect, the consumer trusts the 'line caught' label the same way they might an equivalent that says 'fair wages,' or 'made in Mexico.' Which is to say they believe in them without proof.

While we are certainly not suggesting that the bodies behind ethical and environmental food standards are lax in their duties, the important

BLOCKCHAIN HAS BEEN CALLED THE SECOND AGE OF THE INTERNET, AND THIS IS NOT TOO BOLD A CLAIM, GIVEN HOW LIKELY IT IS TO TRANSFORM ENTIRE INDUSTRIES AND CREATE TOTALLY NEW SERVICE ECONOMIES.

thing to realise is that a blockchain – unalterable, unimpeachable, and accessible to anyone – is simply a step beyond what has previously been possible in the area of transparency. With no hint of subjectivity or arbitration, a product whose lifecycle lives on a blockchain either is or is not from where it says it's from; it either is or is not made or sourced the way it claims to be. And, sooner rather than later, the tools could be in customers' hands to allow them to say with certainty one way or the other.

> USING A BLOCKCHAIN AND SOME SIMPLE IOT SENSORS, INFORMATION CAN BE RECORDED THE INSTANT A CHANGE OCCURS, CREATING TRUE AND TOTAL TRANSPARENCY.

Of course, the idea of substantiating what is behind a label takes a different aspect in the footwear, apparel, and accessories industries. While a food producer might take a chance and stake a claim to an accreditation they have not quite earned, fashion has a much more pressing problem when it comes to consumers' trusting the labels they see.

"The vision for blockchain in fashion is that for any product passing through our channels, we can know, without doubt, who its owner is, and that the product itself is authentic," explains Bertoli. "To put that into context, the international trade in counterfeit goods is currently worth around $460 billion, which is $100 billion more than drug trafficking. So using blockchain to secure the authenticity of products, particularly luxury goods, solves two problems: we save the luxury industry huge amounts of money that's currently lost to fake products, and we realise a new and unique connection between brand and consumer that was not possible until now."

While the immediate value of better securing intellectual property with blockchain is clear, we can also consider what the same technology might mean in a market where personalisation and mass customisation are more common. Where today's RFA blockchain entries might be thousands of instances of the same t-shirt, tomorrow's might be comprised entirely of one-offs, with consumers able to buy a garment that is not just physically but also digitally distinct from any other.

But while the potential applications of blockchain technologies in fashion are exciting and far-ranging, how imminent actually are they? Are we approaching a point where a shopper can use BitCoin or Ethereum to buy clothes from an eCommerce retailer and know instantly where they were cut, sewn, and shipped from? In the next three years, no. But all of the technical cornerstones of this vision are present, correct, and already proven in different industries. How far the use of cryptocurrencies or supply chain transparency become common in fashion is, instead, a question of preparation, market penetration, mindshare, and motivation.

It is important, too, to remember the short timescales we are working with; BitCoin first saw widespread use in 2011, and just six years later the planet's biggest technology businesses, financial gateways, infrastructure providers and others are all moving beyond the proof of concept stage and beginning to deploy blockchains in their essential business operations. Today, a single designer can create his or her styles in an affordable, subscription-based PLM solution, have their fabrics digitally printed around the corner, and then sell the resulting products on platforms like Open Bazaar, which accept all major cryptocurrencies and have few – if any – real barriers to entry. Products conceived digitally, manufactured digitally, and sold for digital money – with integrity of information at every step.

For fashion to make any further leaps, however, new fundamentals must be in place. From decentralised data storage and open systems, to improved data governance and mass roll-outs to supply chain users, WhichPLM will be watching to see how this foundational work is tackled in the very near future.

For more on the role of blockchain in the RFA industry, stay tuned for future WhichPLM coverage in print and online.

Glossary.

WhichPLM has a history of introducing new ideas to the industry, and coining terms to better define and encapsulate existing ones. The concept of Extended PLM (E-PLM) originated with us several years ago, and throughout our editorial, analytical, and advisory work, we have helped to define (or re-define) many common industry acronyms and terms.

Throughout this publication, readers will find those industry acronyms and common terms used or alluded to by both our in-house team and this year's pool of advertorial and feature contributors. While we have made every attempt to define these where they first occur, the nature of the a WhichPLM Report means that not every reader will approach its content in a linear fashion, cover to cover.

In order to avoid confusion and provide absolute clarity for all common acronyms and phraseology, this glossary collects concrete definitions from PLM experts of what we consider to be the most useful, contested, and popular PLM industry terms, arranged in alphabetical order.

2016/17 = Each WhichPLM publication represents a retrospective look at the financial year that has gone before it, this Report included. Our 6th Edition, released in autumn (fall) 2016, examined trends, market analysis, topics, events, end user feedback and more – all originating from or pertaining to the fiscal year 2015/16, while the publication you hold in your hands contains the same content, but from the financial year 2016/17. As a British company, WhichPLM defines a fiscal year as beginning 1st April of the originating year, and ending 31st March of the following one - so when we refer to "2016/17" in these pages, we mean the period from 1st April 2016 to 31st March 2017 rather than both full calendar years.

Artificial Intelligence (AI or A.I.) = The primary subject of this publication, A.I. has no real fixed definition, but it – along with machine learning, deep learning, neural networks and other core concepts – is analysed in considerable detail in the editorials that appear towards the beginning of this report. Broadly speaking, A.I. is currently used in either an extremely specific, academic sense (to connote the replication of human intelligence in an artificial system) or an extremely vague commercial one, as shorthand for everything from basic analytics to advanced, automated interpreting and decision-making systems. While debate rages about its use in other industries – the automation of our road networks and factories is currently a hot topic – this publication focuses on the extent to which A.I. and machine learning are enabling fashion businesses to derive true intelligence from huge volumes of real-time information, or to better understand and interact with consumers.

CAD = An acronym for Computer Aided Design, which collectively refers to any software platform – including peripherals and hardware accessories – that enables a designer to work digitally rather than on paper, to agreed-upon and replicable standards of measurement.

Cloud = A catch-all term for any application, deployment, or strategy that involves distributed processing or storage. Historically, these were split into Software as a Service (SaaS), Managed Services, and a host of other labels, but while the differences between these approaches remain, WhichPLM considers the most important distinction today to be between whether a solution is hosted on-site (i.e. on hardware owned and maintained by the customer) or off-site, in data centres owned and maintained by the vendor. While this is not always the case, a cloud deployment is often tied to a subscription pricing model, rather than the traditional upfront license / ongoing maintenance model.

E-PLM = Shorthand for "extended PLM", E-PLM is a catch-all term referring to any of a massive variety of product development related applications or data repositories that should rightly be considered a part of the product development environment for the purposes of integration and data integrity. Today, digital transformation initiatives centre around the creation of a unified technological environment comprising E-PLM, PLM and other enterprise solutions.

ERP = Enterprise Resource Planning is often cited as being one of two large business systems that sit at the heart of a modern retail or brand environment – the other being PLM itself. ERP is more financially and logistically-oriented than PLM, and although this is not an exhaustive definition, the simplest method of delineating the two is to remember that PLM handles all product development tasks, passing its information on to ERP at the point that a product becomes a reality and enters the ordering, shipping, allocation, and selling process.

External user = We define an external user as an active, individual license situated outside the parent company – typically within the offices of one of its geographically distant supply chain partners. These users will likely have restricted access to the PLM solution, so the functionality of an external license should not be automatically considered equivalent to an internal license. Prospective customers should also note that vendors' approaches to these licenses differ dramatically: some provide free-of-charge external user licenses; some assign a license fee; some choose not to distinguish between these and internal users; and still others offer a stripped-down "vendor portal" instead, and do not recognise the term "external user" at all.

Internal user = We define an internal user as an active, individual license situated within the confines of the parent company – either its own offices, satellite locations, or international representatives.

Internet of Things (or IoT) = An old term, today repurposed as a way of labelling an interconnected, internet-enabled future of devices, products, machinery, white goods, garments, and essentially anything that might feasibly become connected in the near future. Crucially, "smart" should not be read as synonymous with "connected", since a considerable proportion of the value that fashion brands, retailers, and manufacturers are able to derive from the IoT will involve passive (or "dumb") nodes that are connected to the same networks as smartphones, driverless cars, and intelligent home automation systems.

License = A PLM solution is typically sold on a license basis, with each individual user that the customer predicts will need access to the solution (whatever their role) charged an individual license fee at an agreed rate. This applies to both internal users and external users. Pricing for both types of user can be subject to volume pricing. The word "license" may also be used to refer to the actual agreement between customer and vendor.

Maintenance = While vendors' own definitions of the term "maintenance" vary, WhichPLM defines it as the ongoing contract between customer and vendor that stipulates the provision of help desk support facilities, as well as access to bug fixes and enhancements to the licensed solution provided as GA (see above). This does not typically include the costs of the implementation itself or any hosting costs, since these are usually factored into what are referred to as "first year" costs, alongside licensing and more immediate services.

New, signed customer = Readers will find this phrase throughout our Vendor and Consultant Profiles, as well as our Market Analysis section. Where it is used, we are referring to a business that has, in the period we define as 2016/17, signed a deal with – the case of the PLM Vendor Profiles - an apparel PLM vendor to acquire that vendor's PLM solution ready for implementation across one or more brands, and with any number of licensed users. Customers who adopted a different solution from the same vendor without PLM – CAD, for instance – do not fall within this definition, and neither do customers of ERP, warehouse management and so on, unless they bought and adopted those solutions concurrently and in addition to PLM. For the reasons stipulated in its definition, PDM does not qualify as PLM for the purposes of the WhichPLM Report, and customers of PDM (and CPM) are not included in overall figures or statistics for 2016/17, falling well outside the scope of this publication.

OOTB = This acronym stands for "Out of the Box", and refers to a pattern whereby preconfigured PLM solutions have become simultaneously more feature-rich as standard, and more streamlined to deploy. As a result, vendors applied the OOTB label to their solutions, claiming that they offer a robust product development environment as-is, with little or no costly customisation, and reduced implementation services. These claims vary in their truthfulness, but in WhichPLM's opinion, no PLM solution can be considered truly "out of the box", and prospective customers must be mindful of the need for effective configuration and almost mandatory customisation when evaluating the marketplace.

PDM = An acronym that saw widespread use prior to the year 2000, when Product Data Management solutions were considered to be the best possible tools available to retailers, brands and manufacturers seeking to modernise their product development environments. As the name suggests, these systems were focused on the production, cataloguing and communication of product data – typically in the form of a PDF "tech pack". Although these solutions were later web-enabled, refined and enhanced as the industry progressed, eventually more fully-featured, web-based solutions that handled a greater variety of processes emerged, and PLM replaced PDM in virtually all of the territories WhichPLM covers. No major vendor focuses on selling PDM systems today, and the majority that previously did have established clear transitional programmes to move their legacy PDM customers to their modern PLM platform.

PLM = An acronym used in place of its longhand version, Product Lifecycle Management. Considered to have superseded CPM in approximately 2003, PLM is a suite of tools (often collectively called a "platform") that enables retailers, brands and manufacturers to optimise their product development processes, consolidate their data, and create a centralised, contemporaneous, collaborative backbone for the people, products and processes that together make up the lifeblood of their business. Although the acronym itself originated in the aerospace and automotive industries, today there are many vendors who provide proven PLM solutions to the retail, footwear and apparel industry, either as their sole focus, or as one vertical amongst many.

Resourcing = Where we refer to a given vendor's "resourcing", or where (such as in this publication's Vendor Profiles section) we have requested statistics to support a vendor's "resources by region", we are referring to individuals in the employ of the vendor who work in the area of PLM for retail, footwear and apparel. This does not typically include third party implementation or development partners, but these may fall under the umbrella of "resources" where an extremely close relationship has been established between the vendor and its partners over the course of many years. It is clearly desirable that these individuals have direct RFA industry experience in addition to deep product knowledge, but sadly this is not always the case, and in order to draw a distinction between pure numbers and what we consider to be "real" apparel industry staff, we use the phrase "expert resources".

RFA = A common industry acronym, RFA stands for retail, footwear and apparel, and is widely-used shorthand for the fashion, accessories, jewellery, footwear, toys, and automotive and home furnishings upholstery / textiles industries.

ROI = Return on Investment refers to the main metric by which implementations of any enterprise system is typically judged: financial performance relative to the required investment. Despite some reductions in the total cost of ownership of PLM, the expenditure involved in licensing, implementing, and maintaining a modern solution remains significant. As a result, PLM projects should only be undertaken when a clear ROI business case has been assembled – an objective analysis of how soon and in what form the chosen solution can be expected to deliver a financial return greater than the cost of obtaining it.

Seat = Essentially interchangeable with "license", seat refers to an active, maintained individual software license – i.e. a human being occupying a seat at a desk, performing a job role, and actively using the software in question.

UI / UX = These two acronyms are not – despite common misuse – interchangeable. UI refers to the user interface of a given piece of software – the actual design and interactivity components through which the user experiences raw functionality. UX, on the other hand, is a farther-reaching term, used to denote the broader experience of actually working with that software. UX will include UI, but will also factor in other aspects like speed, social collaboration, click rates, the flow of information and more.

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Interviewees (listed alphabetically by surname):

Emanuele Bertoli, CMO, 1trueid

Eric Brassard, CEO, Propulse

Pam Buckingham, Director of PLM and Product Development, Shoes For Crews

Courtney Connell, Marketing Manager, Cosabella

Raj De Datta, CEO, BloomReach

Matt Field, Founder and President, MakerSights

Julia Fowler, Co-Founder, EDITED

Alexander Gray, Co-Founder and CEO, Skytree

Steve Laughlin, General Manager, Global Consumer Industries, IBM

Julian McAuley, Assistant Professor, UC San Diego

Daryn Nakhuda, Co-Founder and CTO, Mighty AI

Andy Narayanan, VP of Intelligent Commerce, Sentient

Darioush Nikpour, Subject Matter Expert, StycheCo

Susan Schneider, Associate Professor, Department of Philosophy, University of Connecticut

ShiSh Shridhar, Director of Business Development, Data, Analytics and IoT, Microsoft

Edgar Simo-Serra, Researcher, Waseda University, Tokyo

Timo Steitz, CEO and Co-Founder, ShoeSize.me

Ganesh Subramanian, Founder and CEO, Stylumia

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